SOIL REMOVAL APPLICATION
&
PROJECT NARRATIVE

FOR

SITE PLAN
35 COPICUT ROAD
FREETOWN, MASSACHUSETTS

APPLICANT:

K.R. Rezendes, Inc.
3 Sammy's Lane
Assonet, MA 02702
508-644-5795

CIVIL ENGINEER:

Zenith Consulting Engineers, LLC
3 Main Street
Lakeville, MA
508-947-4208

PROJECT MANAGEMENT AND DESIGN ASSISTANCE:

Holmes Engineering
622 Berkley Street
Berkley, MA 02779
508-880-6535

ASSESSOR LOTS:

Map 232, Lot 32
Map 233, Lots 2, 3, and 4

September 10, 2020

Holmes Engineering
Byron R. Holmes, P.E.
Civil Engineering and Consulting

622 Berkley Street
Berkley, MA 02779

Phone: 508-880-6535
Email: Holmes@holmes.net

September 10, 2020

Soil Conservation Board
3 North Main Street
Freetown, MA 02702

RE: Application for Permit
A.P. 232, Lot 32 and A.P. 233, Lots 2, 3, and 4

To the Board:

Enclosed is an application for a soil permit submitted on behalf of Kenneth Rezendes for property on Copicut Road. This parcel is located on the north side of Copicut Road and abuts an active soil removal operation owned by the applicant. The proposed project is for the expansion of the existing soil removal operation onto A.P. Lot 232, Lot 32, with an access road and grading on A.P. 233, Lots 2, 3, and 4. The parcels have wetland resource areas that are described with this application.

A Notice of Intent for this project is being submitted to the Conservation Commission.

Included in the application are:

Application for Permit
Locus Map
Project Narrative with Wetlands Report
Drainage Report
Stormwater Management Form
Hydrology Calculations for 2, 10, and 100-year storms
Certified List of Abutters within 100 feet of subject property
Check in the amount of 575.00 payable to Town of Freetown:
$50.00 plus 35 acres at $15.00 per acre: $50.00 + (35 acres)($15.00)= $575.00

Thank you for your consideration.

Sincerely,

Byron R. Holmes

Byron R. Holmes, P.E.

Table of Contents

SECTION 1

Application

Application for Permit
Project Locus

Town of Freetown -- Soil Conservation Board

APPLICATION FOR PERMIT

Date Application Filed

Cross out those activities not desired, below.

The undersigned herewith applies for permission to REMOVE, REFINE, STORE - SOIL, SAND STONE GRAVEL,, LOAM

LOCATION OF OPERATION (Give directions from nearest road, or telephone pole # and Assessors MAP LOT)

Assessor Map 232, Lot 32 and Map 233, Lots 2, 3, and 4. Frontage located approximately 150 feet south of rail line crossing on Copicut Road. Current access gained through existing soil removal operation at 35 Copicut Road, owned by the same entity, Map 233, Lot 5. Entrance at utility pole 21/17.

DESCRIPTION OF OPERATION (Removal, Processing, Storage, Other-List)

Proposed work includes removal, processing, refinement, storage, rock blasting, and other associated operations. Included will be construction of a gravel right of way for access and construction of infiltration ponds.

TYPE OF LAND (Wooden, Open, Flat, Rolling, Upland, Swampy, Other-List)

Combination of former gravel operation, gas easement, woods, and wetlands.

APPROXIMATE AREA IN ACRES 93 DIMENSIONS PLANS ATTACHED (Yes or No) Yes

A simple sketch may be adequate for a small project. However, the Board may request engineer plans for any project it deems necessary. Attach two (2) copies of these plans to the permit application for presentation at the hearing.

ESTIMATE OF YARDS TO BE REMOVED 900,000 TIPPING FEE (25 cents per yard) $225,000.00

NAME and ADDRESSES of ABUTTING OWNERS. A signed list from the Freetown Assessors Office must accompany this application. The Applicant is responsible for notifying the abutters by certified mail, five (5) days prior to the Public Hearing, and must show proof of notification at the time of the hearing. (Attach list if necessary.)

Assessor Lists attached for each lot.

NOTE: Total area = 93 acres. Area of disurbance (roadway, stormwater controls, excavation) = 35 acres

Permission is granted by the owner of the property to the Freetown Soil Conservation Board to hold routine inspections and to photograph site(s) described above where soil operations are in progress.

THE GRANTING OF A PERMIT IS SUBJECT TO THE SOIL CONSERVATION BY-LAWS OF THE TOWN OF FREETOWN, MASSACHUSETTS AND IT'S GOVERNING REGULATIONS.

THE UNDERSIGNED AKNOWLEDGE RECEIPT OF THE FREETOWN SOIL CONSERVATION BOARD CONDITIONS AND HAVE READ AND UNDERSTAND THE CONDITIONS AND REGULATIONS.

SIGNATURE OF OWNER AND ADDRESS

3 Sammy's Lane

Assonet, MA 02702

SIGNATURE OF OPERATOR AND ADDRESS

3 Sammy's Lane

Assonet, MA 02702

Owner: R Five Co., Inc. and R Five Limited, Inc.

Operator: K.R. Rezendes, Inc.

Map 232, Lot 32 and Map 233, Lots 2,3,4

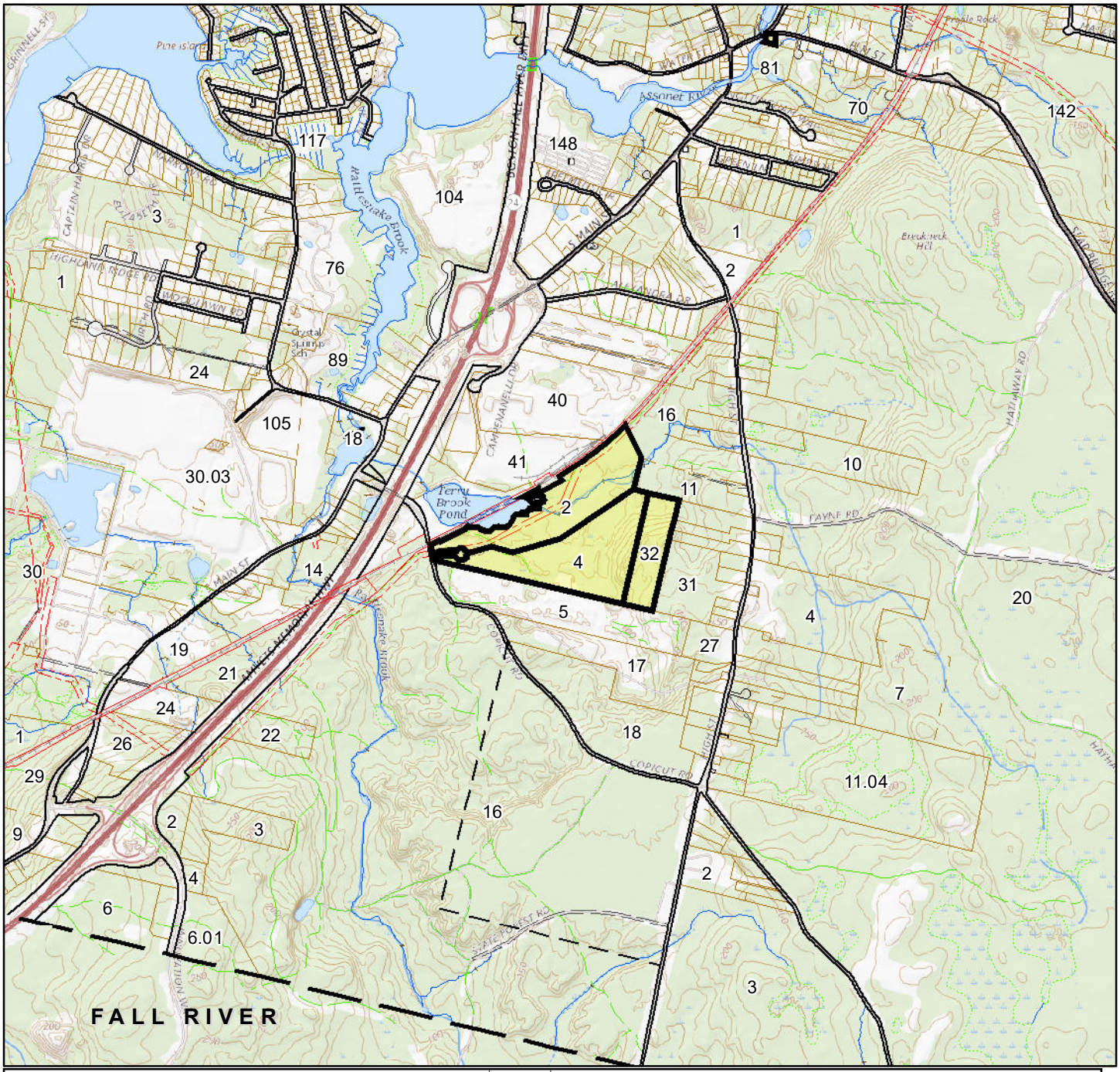
Freetown, MA

1 inch = 2000 Feet

0 2000 4000 6000

August 30, 2020

CAI Technologies
Precision Mapping. Geospatial Solutions.



Data shown on this map is provided for planning and informational purposes only. The municipality and CAI Technologies are not responsible for any use for other purposes or misuse or misrepresentation of this map.

SECTION 2

Narrative

Project Narrative and Wetland Review

Holmes Engineering
Byron R. Holmes, P.E.
Civil Engineering and Consulting

622 Berkley Street
Berkley, MA 02779

Phone: 508-880-6535
Email: Holmes@holmes.net

PROJECT NARRATIVE AND WETLAND REVIEW FOR LAND OFF COPICUT ROAD
FREETOWN, MASSACHUSETTS

LOCATION:
ASSESSOR MAP 232, LOT 32
ASSESSOR MAP 233, LOTS 2, 3 AND 4:

OWNER:
R FIVE COMPANY, INC. AND R FIVE LIMITED, INC.
3 SAMMY'S LANE
ASSONET, MA 02702

1. Existing Conditions:

This project is located on Copicut Road in the western portion of Freetown, Massachusetts, also known as Assonet. It is abutted by a rail line to the north, wooded portions of residential lots to the east, an existing soil removal operation to the south, and Copicut Road to the west. It is a combination of wetlands, woods, and former gravel removal. The gravel removal shows on USGS maps dating back to 1963.

The parcel designated as Map 232, Lot 32 is a 14.7-acre lot purchased in 1992 by R Five Limited, Inc. It is located at the eastern end of the overall project. The land is a partially cut wooded area with two untouched wetland locations. A wetland delineation was conducted in 2020.

The portion of the parcel designated as Map 233, Lots 2, 3, and 4 is a mixture of woods, wetlands and the formerly mentioned gravel pit. Lot 3 is currently shown on assessor maps as a private roadway (Rocky Road) with a two-lot subdivision. Lots 2 and 4 divide the remainder of the land. Rocky Road was never built. The parcel was purchased in 2020 and is intended to be combined back into its original form. The subdivision will be abandoned.
The intent of this review was to determine the areas subject to the Massachusetts Wetlands Act in preparation for an application to expand the existing gravel removal use on an abutting parcel, Map 233, Lot 5, located directly south of the subject parcels.

2. Proposed Conditions

It is the intent of the owner to expand the existing gravel operation currently being undertaken on Map 233, Lot 5. This lot is directly south of the subject parcels. There will be an entrance road built off Copicut Road in the same area as the current Rocky Road location. This will allow access to Map 232, Lot 32, which is currently not excavated. The applicant will remove gravel and ledge from this area and transport it along the new access road to off-site locations.

The entrance road will incorporate 2 infiltration basins to provide stormwater mitigation. There will also be three infiltration ponds constructed on the site to receive stormwater from the areas to be excavated. A separate drainage report is included within this application that will further detail these basins and the stormwater characteristics of the parcels.

3. Wetlands Review – Assessor Map 232, Lot 32:

There are two wetland areas on Map 232, Lot 32. One area is a wooded deciduous swamp located toward the middle of the east property line The second wetland area is located along the northern property line and consists of a wooded deciduous swamp with an intermittent stream emanating from off-site wooded swamps to the southeast of the parcel and leading to Terry Brook on Map 232, Lot 2.

At the request of the owner, a wetlands investigation was undertaken by David Duranleau, Wetlands Specialist and Byron Holmes, P.E. on February 29, 2020. This evaluation consisted of a field reconnaissance of the parcel, with the limits of the above two wetland areas being located.

The area was traversed for the purpose of determining locations that would be considered resource areas under the Massachusetts Wetlands Act. Plant species that were used to delineate the wetland edge included those listed in the Massachusetts Wetlands Act, those having a wetland indicator status of Obligate (OBL), and those having a status of Facultative Wet (FACW, FACW+, FACW-) or Facultative (FAC, FAC+).

Other indicators were also utilized, including water marks on vegetation, mound and pool microtopography, evidence of recent or periodic flooding, wetland drainage features, exposed or shallow root systems and water stained leaves.

Wetlands Delineation flags were placed along the edge of the resource areas found. The individual wetland flags were located by field survey conducted by Mount Hope Engineering, Inc. The wetland locations for Map 232, Lot 32 are as shown on an accompanying plan.

Predominant species indicate plants and trees that make up over 50% of the total vegetation. Areas with over 50% wetlands vegetation are within the delineated wetland locations. Areas with less than 50% wetlands vegetation are outside the delineated wetland locations. Indicators are from National List of Plant Species That Occur in Wetlands - Massachusetts provided by U.S. Fish and Wildlife Service, National Wetlands Inventory.

Category	Abbreviation	Descriptor	Frequency in Wetlands
Obligate	OBL	Almost always	>99%
Facultative Wetland	FACW	Usually	67% - 99%
Facultative	FAC	Equally likely to occur	34% - 66%
Facultative Upland	FACU	Seldom	1% - 33%
Upland	UPL	Rarely	<1%

Pertinent mapping was consulted for the following, with the results showing none of these being present on Map 232 Lot 32:

- 100-year flood elevation as established by the Federal Emergency Management Agency (FEMA)
- Natural Heritage and Endangered Species Program (NHESP) Estimated Habitat of Rare Wildlife
- NHESP Priority Habitat of Rare Species
- NHESP Certified Vernal Pools
- Areas of Critical Environmental Concern

Data sheets for the wetland areas are presented on the following pages.

WETLAND RESOURCE DATA SHEET

Wetland Resource Area: Flags WF-A1 through WF- A27

Location: Along east property line of Map 232, Lot 32

Fed by: Wooded area east of parcel

Predominant Wetland Species:

Common Name *Scientific Name*	**Indicator**
Red Maple *Acer Rubrum*	FAC
Sweet Pepperbush *Clethra alnifolia*	FAC+
Common Greenbrier *Smilax bona-nox*	FAC
Swamp Moss *Sphagnum*	OBL
Swamp Azalea *Rhododendron viscosum*	FACW
High Bush Blueberry *Vaccinium corymbosum*	FACW-
Tupelo *Nyssa sylvatica*	FACW+

Predominate Upland Species:

Common Name *Scientific Name*	**Indicator**
Scarlet Oak *Quercus coccinea*	UPL
Princess Pine *Lycopodium obscurum*	FACU
Eastern White Pine *Pinus Strobus*	FACU
Black Cherry *Prunus serotina*	FACU

WETLAND RESOURCE DATA SHEET

Wetland Resource Area: Flags WF-B7 through WF-B16

Location: Entire width of northern portion of Map 232, Lot 32

Fed by: Wooded area east of parcel, including intermittent stream running east to west between wetland edge and stone wall along north property line

Predominant Wetland Species:

Common Name *Scientific Name*	**Indicator**
Red Maple *Acer Rubrum*	FAC
Sweet Pepperbush *Clethra alnifolia*	FAC+
Common Greenbrier *Smilax bona-nox*	FAC
Swamp Moss *Sphagnum*	OBL
Green Ash *Fraxinus pennsylvanica*	FACW
Yellow Birch *Betula alleghaniensis*	FAC
Northern Spicebush *Lindera benzoin*	FACW-
American Hornbeam (Muscelwood) *Carpinus caroliniana*	FAC

Predominate Upland Species:

Common Name *Scientific Name*	**Indicator**
Scarlet Oak *Quercus coccinea*	UPL
Princess Pine *Lycopodium obscurum*	FACU
Eastern White Pine *Pinus Strobus*	FACU

4. Wetlands Review – Assessor Map 233, Lots 2, 3 and 4:

Wetland limits on these parcels were approved under an Abbreviated Notice of Resource Area Delineation (ANRAD) application in 2008. An Order of Resource Area Delineation (ORAD) was issued by the Freetown Conservation Commission on February 2, 2009. The File Number for the ANRAD and ORAD is SE 026-0477. The conditions of this approval are noted on page 8 of this narrative. The ORAD has been extended by the Conservation Commission since the approval in 2009. The current expiration date of the ORAD is February 27, 2021.

Wetlands consist of both bordering and isolated vegetated wetlands, open water, land under water, inland bank, a 100-year flood plain, and a perineal stream (Terry Brook). The wetlands are shown on a plan by Kelly Engineering Group, Inc., titled Plan to Accompany ANRAD Application, revised through February 19, 2009. This plan was prepared for Campanelli Companies of Braintree, Massachusetts.

The ORAD mentions several conditions of the approval which effect the wetlands. One of these conditions has to do with the so called Isolated Vegetated Wetlands, noted as flag series B, C, D, and E. At the time of the approval, no review as to whether these are jurisdictional under the Massachusetts Wetlands Act appears to have been performed. The ORAD conditions state the boundaries shown on the plan are accurate, but do not determine whether these areas are capable of holding the requisite volume and depth of water to be regulated as Isolated Land Subject to Flooding under the Act. Therefore, their applicability under the Act was not a part of the approval.

Under the Act, isolated wetlands are not considered as bordering vegetated wetlands and are therefore not subject to the restrictions of that delegation. However, such isolated areas may be jurisdictional as Isolated Land Subject to Flooding (ILSF) under certain conditions. Such areas are locations that experience ponding as a result of run-off or high ground water. To meet the criteria of an ILSF, an area must both of the following conditions:

- Be an isolated depression or closed basin without an inlet or outlet
- Be an area which at least once a year confines standing water to a volume of one quarter acre-foot and an average depth of six inches

If there is an outlet at an elevation such that water will not be confined within the basin above that elevation, the outlet elevation should generally represent the boundary of the area. The boundary of the ILSF is either the elevation at which retained waters would flow out of the ILSF, or the maximum volume calculated for a 100-year storm flowing into the depression.

In the case of the isolated areas on the plan, while the depressions do have depths of over 6 inches, there are varying results when the volume requirement is applied. Both volume and depth are required to be classified as an ILSF. Volume determinations were made based on the top elevation of the depressions, and the following results and conclusions are noted.

Isolated Area B:

This area is quite large and obviously exceeds the threshold. Therefore, Area B would be classified as an Isolated Land Subject to Flooding and would be subject to the associated requirements of the Wetlands Protection Act. No work is proposed within this recourse area.

Isolated Area C:

This depression has an area of 8,756 square feet. Using a top elevation of 58, it has a volume of 396 cubic yards, or 0.245 acre-feet. This is close to the level required to be considered an ILSF. No further determination was made, since there is no proposed impact to this area.

Isolated Area D:

This depression has an area of 3,235 square feet. Using an elevation of 76.5 as the top elevation, it has a volume of 230 cubic yards, or 0.143 acre-feet. It is less than the level required to be classified as an ILSF and is therefore not subject to the Act. The proposal is to eliminate this depression.

Isolated Area E:

This depression has an area of 4,332 square feet. Using an elevation of 66 as the top elevation, it has a volume of 39 cubic yards, or .024 acre-feet. If the top elevation to the south, elevation 68, were used, the volume would be 286 cubic yards, or 0.239 acre-feet. However, this higher elevation is not applicable to the holding capacity of the area, since the depression is actually located on a slope. As per the findings, it is not capable of actually storing the requisite volume of water and is therefore not subject to the Act. The proposal is to fill this depression.

Although replication is not required, the applicant is proposing to construct a vegetated wetland at another location on the site. This wetland will be hydraulically connected to a bordering vegetated wetland. This wetland replication location has an area of 10,809 square feet.

Based upon a review of the materials provided to the Commission by the Applicant and our Review Consultant, Nover-Armstrong Associates, Inc., the Freetown Conservation Commission makes the following findings:

1. the boundaries of Bordering Vegetated Wetlands under the Act and Bylaw (i.e., Flag Series A and F) as shown on the approved site plan are accurate and no other areas of Bordering Vegetated Wetlands occur on the site;
2. the boundaries of Land Under Water and Inland Bank under the Act and Bylaw on the site have not been specifically delineated in the field; however, Land Under Water and Inland Bank are confined entirely within the delineated Bordering Vegetated Wetlands;
3. the approved site plan shows the Zone A boundary scaled from the Flood Insurance Rate Map, Community Panel 250056 0015 B, dated June 18, 1980. This Zone A boundary is not based upon a specific 100-year flood elevation and may not be equivalent to the boundary of Bordering Land Subject to Flooding under the Act and Bylaw. As such, the presence and extent of Bordering Land Subject to Flooding under the Act and Bylaw are not determined by this Order of Resource Area Delineation;
4. the boundaries of four Isolated Vegetated Wetlands under the Bylaw (i.e., Flag Series B, C, D, and E) as shown on the approved site plan are accurate and no other Isolated Vegetated Wetlands under the Bylaw occur on the site;
5. Isolated Vegetated Wetlands B, C, and/or D may be capable of holding the requisite volume and depth of water to be regulated as Isolated Land Subject to Flooding under the Act. Engineering calculations have not been provided relative to the volume and depth of water that may be confined within these areas. As such, the presence of Isolated Land Subject to Flooding within Isolated Vegetated Wetlands B, C, and D has not been determined by this Order of Resource Area Delineation. Isolated Vegetated Wetland E is a slope wetland that is not capable of holding the requisite volume and depth of water to be regulated as Isolated Land Subject to Flooding under the Act. Except as noted above for Isolated Vegetated
   Wetlands B, C, and D, there are no other areas on the site that are capable of qualifying as Isolated Land Subject to Flooding under the Act;
6. there are ponding areas located within the delineated Bordering Vegetated Wetlands and Isolated Vegetated Wetlands that may qualify for certification as vernal pools. These areas have not been evaluated to determine if one or more of these areas would qualify for certification as a vernal pool and/or meet the vernal pool definition under the Bylaw. The boundaries of vernal pools under the Bylaw have not been specifically delineated in the field; however, all areas on the site that may qualify as a vernal pool under the Bylaw occur within the delineated Bordering Vegetated Wetlands and Isolated Vegetated Wetlands; and
7. adequate evidence has been provided to demonstrate that the portion of Terry Brook located on the site upgradient of Flags RI/SI as shown on the approved site plan is intermittent and does not have an associated 200-foot Riverfront Area under the Act or Bylaw. The segment of Terry Brook located between Flags RI/SI and the Reservoir is determined to be perennial. The mean annual high-water line (i.e., Flag Series R and S) of this segment of Terry Brook and the associated 200-foot Riverfront Area under the Act and Bylaw as shown on the approved site plan are accurate and no other Riverfront Area under the Act or Bylaw occurs on the site.

SECTION 3

Drainage Report

Stormwater Narrative
Drainage Summary
Soil Report
Illicit Discharge Statement
DEP Stormwater Checklist
Calculations (HydroCAD modeling) with Watershed Plans
Operations and Maintenance Plan
Stormwater BMP Plan

Stormwater Management Report

Earth Removal Operation

35 Copicut Road

Freetown, Massachusetts

Dated:

August 27, 2020

Prepared for:

KR Rezendes, Inc.

3 Sammy's Lane

Assonet, MA

Prepared by:

Zenith Consulting Engineers, LLC

3 Main Street

Lakeville, MA 02347

ZCE

Zenith Consulting Engineers, LLC

COMMONWEALTH OF MASSACHUSETTS

NYLES C. ZAGER CIVIL No. 48717

REGISTERED PROFESSIONAL ENGINEER

9-4-2020

TABLE OF CONTENTS

NARRATIVE

STORMWATER NARRATIVE
Earth Removal Operation 35 Copicut Road, Freetown, Massachusetts

The storm drainage system at the proposed earth removal operation located at 35 Copicut Road, Freetown, Massachusetts, has been designed to create a reduction in the rate and volume of storm water runoff when compared to the existing site. In addition, the project's design will not reduce the quality of the runoff discharging from the site. The collection and treatment systems will be in the form of grassed swales, vegetated filter strips and infiltration basins. Hydrologic computations were performed in order to model the rate of flow of stormwater from the site under both existing and proposed conditions for a broad range of design storms.

1.0 STORM WATER COLLECTION SYSTEM

Throughout the proposed project, storm water will be collected from the altered areas via an open drainage system with grass swales and vegetated filter berms. There will be no increase in impervious area on the site as the propose use is an earth removal operation. The grass swales and vegetated filter berms will be provided gravel filter berms where they terminate and discharge into the infiltration basins.

The grass swales and vegetated filter strips will provide pretreatment removal of Total Suspended Solids (TSS) and then into infiltration basins designed to infiltrate all runoff up to, and including, the 100 year storm event. All roof runoff, which is considered clean by the Stormwater Management Standards, will be directed into subsurface infiltration systems where it will recharge into the groundwater. The infiltration systems have been designed to meet the requirement for recharge and to handle more than the 100-year design storm event.

2.0 STORM WATER MANAGEMENT FACILITIES

Current Department of Environmental Protection Policies require that the peak runoff rate after development is not more than peak runoff rate prior to development for the 2 and 10 year 24-hour storm events. Additionally, it is required that the storm water management system be evaluated for the 100-year storm projections.

Hydrologic modeling has been conducted for the design of the infiltration areas to determine appropriate sizing and infiltration characteristics. HydroCAD Version 10.00 was utilized to perform this hydrologic and hydraulic modeling. The 2, 10, and 100-year design storms were evaluated. The hydrologic and hydraulic modeling established that the stormwater management systems will effectively attenuate the full range of design storms. That is, the peak rate of flow after development will be less than under existing conditions. The drainage summary provided with this document tabulates the projected decrease in runoff rate when the site is subjected to the design storm events. The complete hydrologic and hydraulic computational output is presented in this document.

2.1 LOW IMPACT DEVELOPMENT (LID) CONSIDERATIONS

The Massachusetts Stormwater Handbook encourages the use of Low Impact Development (LID) techniques by offering design credits for their implementation. No credits are sought or required for this project and, therefore, no LID techniques are required. Nevertheless, the project design incorporates LID techniques by proposing no impacts to wetlands and infiltrating of the runoff from the site in multiple areas rather than infiltrating all of the stormwater runoff in one centralized location. Other LID measures were incorporated including providing the minimum amount of pavement required to provide safe vehicular access to and around the site for all vehicle types.

3.0 WATER QUALITY CONSIDERATIONS

On November 18, 1996, The Massachusetts Department of Environmental Protection (MADEP) issued the Storm Water Management Policy. The goal of this policy is to improve water quality and address flooding problems, which are sometimes caused by development projects, by the implementation of performance standards for storm water management. These standards were issued as guidelines with the possibility that in several years, after review by design engineers, they might be implemented as regulations. The project was designed to meet and exceed all relevant standards established in the policy. The following sections describe how each of these standards will be achieved on this project by incorporating Best Management Practices into the design. In January, 2008, the revised policy was issued.

3.1 UNTREATED STORM WATER - Standard 1

Standard 1 recommends that no new storm water conveyance, such as storm drain outfalls, discharge untreated storm water directly to wetlands or waterways of the Commonwealth. Flows from woods, fields, and other undeveloped areas are to be considered uncontaminated, however, runoff from paved road surfaces should receive treatment prior to discharge.

In designing this project, provisions have been made so that the runoff from all altered surfaces will receive proper treatment prior to discharge. All the proposed improvements will be located and graded such that runoff from the roadways will be directed to a series of BMP structures. Runoff from these areas will be collected and conveyed to the water quality measures through several open grassed swales. This collected runoff will receive a treatment utilizing Best Management Practice (BMP) measures designed into the swales, vegetated filter strips, and infiltration basins as further described under the discussions for Standards 2 through 9. Through the collection and treatment of all runoff from altered areas, DEP Standard 1 is satisfied.

3.2 POST DEVELOPMENT PEAK DISCHARGE RATES - Standard 2

Standard 2 prescribes that storm water management systems be implemented in order to ensure that post-development peak rates of discharge do not exceed existing rates of runoff for standard 2-year and 10-year design storms. In addition, the pre and post peak rates for the 100-year storm must be evaluated to assure that there will not be increased off-site flooding. Hydrologic calculations have been conducted in designing the storm water control measures to ensure that this standard is satisfied.

HydroCAD version 10.00, a computer aided design program, was selected for modeling the hydrology and hydraulics of storm water runoff for the site and its contributing drainage area. This program utilizes the latest techniques to predict the consequences of any given storm event and to verify that the drainage system is adequate to meet the performance standards for the area under consideration. The HydroCAD computer model uses TR-20 and TR-55 methodologies to generate runoff hydrographs and perform hydraulic routings through the modeled project.

Runoff hydrographs were generated for each subcatchment area. For post-development, all altered areas were considered in determining composite runoff curve numbers for each subcatchment. For pre-development, all subcatchments were evaluated in their existing condition. The majority of the soils within the development area of this project are described as hydrologic soils groups A and B, according to the U.S.D.A., Soil Conservation Service mapping. There also are areas of soil is described as hydrologic soil groups C and D.

In evaluating the same areas under pre and post development conditions, a direct comparison can be made as to the net increase or decrease in runoff rates attributable to altered land uses. The Drainage Summary table included in this report presents a summary of the hydrologic modeling conducted for this project. As presented in this table, the drainage system successfully moderates the flow for the full range of design storms and this standard is met.

3.3 RECHARGE TO GROUNDWATER - STANDARD 3

The loss of annual recharge to groundwater will be minimized through the treatment and infiltration of runoff genrerated from all altered surfaces in the earth removal project site. The annual recharge from the post development site will approximate the annual recharge from the pre-development conditions based on an assessment of soil types. Standard 3 of the DEP Stormwater Policy prescribes that the storm water runoff volume to be recharged to groundwater should be determined using existing soil. According to the U.S.D.A. Soil Conservation Service mapping, the surficial soils are Hydrologic Soil Groups A, B, C, D and B/D. Since more recharge is required for A soils, all of the soils are assumed to be A for this calculation. A portion of the project site is classified as Pits - Udorthents complex, gravelly. This area is assumed to be HSG A soils due to the surrounding soils being of HSG A classification. The DEP Stormwater Policy requires that a certain volume of runoff be infiltrated to groundwater based on the type of soil present and the amount of impervious area being generated by the proposed development. For Type A soils, the recharge rate has been established to be 0.6 inches of runoff. For Type D soils, the recharge rate has been established to be 0.1 inches of runoff.

The proposed amount of impervious area on the site is 0 sf. So, the required volume of recharge is 0 cf.

For this project, all of the runoff from the proposed roofs, pavement and sidewalks is designed to be infiltrated on site. Based on the HydroCAD model, in the 2-year storm, 26,572 cf of runoff is recharged.

3.4 REMOVAL OF 80% OF TOTAL SUSPENDED SOLIDS - Standard 4

A series of stormwater BMP's have been designed in order to meet the objectives of removing 80% of the average annual load of total suspended solids. These proposed measures include:

- All runoff from the proposed earth removal operation areas will be routed through a 50' wide vegetated filter strip with a gravel filter berm adjacent to receiving BMPs (either grass swale or infiltration basin.
- Grassed swales with gravel filter checkdams will provide pretreatment to
- Runoff will be infiltrated into the ground via an infiltration basins.

The combination of the above features will result in the removal of over 80% of the total suspended solids as demonstrating through the following table:

For areas provided with a grassed channel and infiltration basin (entrance drive):

A BMP	B TSS Removal Rate*	C Starting TSS Load**	D Amount Removed (BxC)	E Remaining load (C-D)
Grassed Channel	50%	1.00**	.50	.50
Infiltration System	80%	.50	.40	.10
TOTAL TSS REMOVAL			**.90 x 100 = 90% Removal**	

** Equals remaining load from previous BMP (E)
* TSS Removal Rates As Published in the DEP Storm Water Policy Handbook (3/97)

For areas provided with a vegetated filter strip and infiltration basin (earth removal areas):

A BMP	B TSS Removal Rate*	C Starting TSS Load**	D Amount Removed (BxC)	E Remaining load (C-D)
Vegetated filter strip	50%	1.00**	.50	.50
Infiltration System	80%	.50	.40	.10
TOTAL TSS REMOVAL			**.90 x 100 = 90% Removal**	

** Equals remaining load from previous BMP (E)
* TSS Removal Rates As Published in the DEP Storm Water Policy Handbook (3/97)

3.5 USES WITH HIGHER POTENTIAL POLLUTANT LOADS - Standard 5

The DEP Storm Water Management Policy - Standard 5 requires that storm water discharges with higher potential pollutant loads, such as gas stations, be provided with specific BMP's. The

use of infiltration practices for these discharges prior to pretreatment is prohibited. This project is not considered a Land Use with Higher Potential Pollutant Load. As such, this standard is satisfied.

3.6 STORM WATER DISCHARGES TO CRITICAL AREAS - Standard 6

Standard 6 of the DEP Storm water Policy seeks to protect critical areas. Critical areas are specifically designated Outstanding Resource Waters (ORW's) such as shell fish beds, swimming beaches, cold water fisheries and recharge areas for public water supplies. Such areas require the use of specific BMP's. This project is not located within a critical area per the above definition. Therefore, this standard is satisfied.

3.7 REDEVELOPMENT OF PREVIOUSLY DEVELOPED SITES - Standard 7

Standard 7 applies to sites which have been previously developed and are being redeveloped. Diminished performance of BMP's is allowed in these areas. This project is not a re-development and therefore, the design of the storm water management system meets all of the design standards.

3.8 EROSION AND SEDIMENT CONTROL -Standard 8

Erosion and sediment control measures have been developed for this project and are included in the construction set of drawings. These plans show the proposed locations for erosion control devices. The following supplemental provisions are also a part of this plan.

Erosion and Sedimentation Control measures which are proposed to be implemented during construction include the installation of and silt fencing which has the bottom 6 inches buried in the ground. Any extra excavated soil which is not used to bury the base of the fence will be cast up-gradient of the silt fence.

- Erosion control devices such as silt fence, haybales and silt socks shall be inspected after every major rainfall runoff event (over 1½" depth of precipitation). All damaged or misaligned devices shall be immediately repaired. Silt shall be immediately removed from all areas of the silt fence when depth of accumulation exceeds 6 inches.

- Out falls , filter berms and checkdams shall be inspected after every major rainfall runoff event (over 1½" depth of precipitation). Silt shall be immediately removed from all areas where the depth of accumulation exceeds 9 inches.

- All exposed construction areas will be stabilized upon completion in order to minimize the time that these areas are unstabilized.

With the full impact of the measures presented on the Erosion and Sedimentation Control Plans,

along with the provisions stipulated above, Standard 8 will be satisfied.

3.9 OPERATIONS AND MAINTENANCE PLAN - Standard 9

Standard 9 of the DEP Storm Water Policy prescribes the adoption of a formal operation and maintenance plan to ensure that the storm water management systems function properly as designed. The proposed Operations and Maintenance Plan is attached in an appendix to this report. The plan includes Stormwater operations and Maintenance procedures, Construction Period Pollution Control measures and a Source Control and Pollution Prevention Plan.

DRAINAGE SUMMARY

Proposed
35 Copicut Road, Freetown, Massachusetts

Drainage Summary

2 YR STORM (3.4 in.)

Receptor	Pre Development		Post Development	
	Q Max (cfs)	V (AF)	Q Max (cfs)	V (AF)
Wetlands North	4.22	1.102	2.22	0.405
Wetlands Southwest	0.00	0.000	0.00	0.000
Wetlands East	3.08	0.325	3.02	0.252

10 YR STORM (4.8 in.)

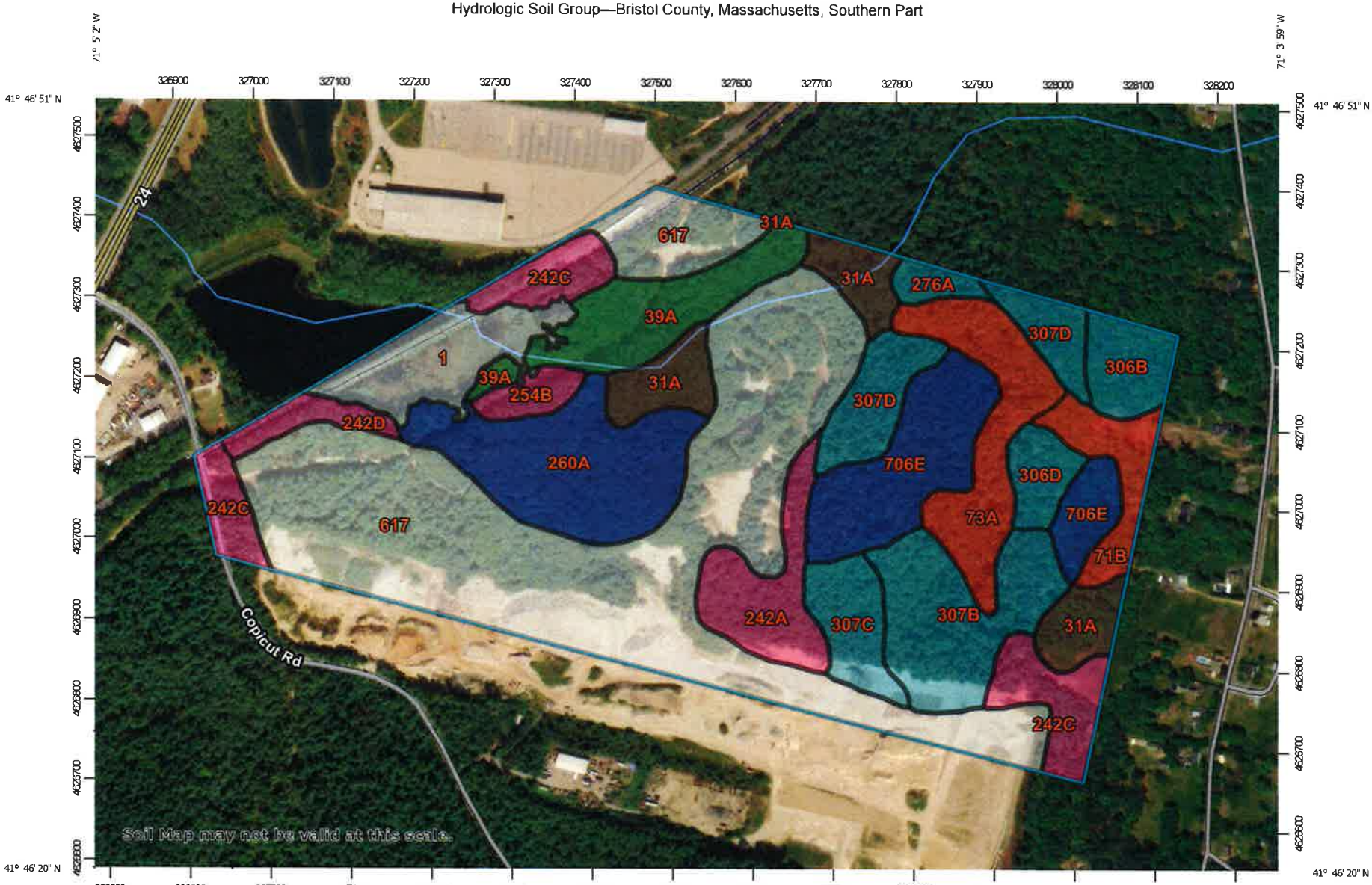
Receptor	Pre Development		Post Development	
	Q Max (cfs)	V (AF)	Q Max (cfs)	V (AF)
Wetlands North	18.13	3.110	15.98	2.046
Wetlands Southwest	0.14	0.091	0.10	0.065
Wetlands East	6.44	0.639	5.68	0.463

100 YR STORM (7.0 in.)

Receptor	Pre Development		Post Development	
	Q Max (cfs)	V (AF)	Q Max (cfs)	V (AF)
Wetlands North	51.42	7.487	45.96	5.964
Wetlands Southwest	2.58	0.623	2.51	0.497
Wetlands East	12.46	1.210	10.22	0.831

SOIL REPORT

Hydrologic Soil Group—Bristol County, Massachusetts, Southern Part



Map Scale: 1:6,730 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 300 600 1200 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

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

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

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

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

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

Soil Survey Area: Bristol County, Massachusetts, Southern Part
Survey Area Data: Version 14, Jun 9, 2020

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

Date(s) aerial images were photographed: May 6, 2015—Sep 12, 2017

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		5.8	4.2%
31A	Walpole sandy loam, 0 to 3 percent slopes	B/D	6.8	5.0%
39A	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	A/D	6.8	4.9%
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	D	3.5	2.5%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	D	7.4	5.3%
242A	Hinckley loamy sand, 0 to 3 percent slopes	A	5.1	3.7%
242C	Hinckley loamy sand, 8 to 15 percent slopes	A	7.9	5.7%
242D	Hinckley loamy sand, 15 to 25 percent slopes	A	1.8	1.3%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	1.5	1.0%
260A	Sudbury fine sandy loam, 0 to 3 percent slopes	B	11.0	8.0%
276A	Ninigret fine sandy loam, 0 to 3 percent slopes	C	1.1	0.8%
306B	Paxton fine sandy loam, 0 to 8 percent slopes, very stony	C	2.9	2.1%
306D	Paxton fine sandy loam, 15 to 25 percent slopes, very stony	C	2.2	1.6%
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	C	8.5	6.1%
307C	Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony	C	3.5	2.5%
307D	Paxton fine sandy loam, 15 to 25 percent slopes, extremely stony	C	5.6	4.0%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
617	Pits - Udorthents complex, gravelly		47.1	34.1%
706E	Charlton-Rock outcrop-Paxton complex, 15 to 35 percent slopes	B	9.8	7.1%
Totals for Area of Interest			**138.2**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

HYDROCAD OUTPUT

NORTH

ASSESS. MAP 215
PARCEL ID. 215_41_0
N/F 11 CAMP (MA) LLC
11 CAMPANELLI DR
DEED BK 8678
PAGE 104

ASSESS. MAP 214
PARCEL ID.
214_107_0
N/F 11 CAMP (MA)
LLC
0 CAMPANELLI DR
DEED BK 8678
PAGE 108

ASSESS. MAP 214
PARCEL ID.
214_14_0
N/F FALL RIVER
WATER DEPARTMENT
0 COPICUT RD
DEED BK 708
PAGE 150

ASSESS. MAP 233
PARCEL ID. 233_01_0
N/F CAMPANELLI FREETOWN LAND
LLC
0 COPICUT RD
DEED BK 8159
PAGE 102

ASSESS. MAP 232
PARCEL ID. 232_32_0
N/F R FIVE LIMITED INC
0 COPICUT RD
DEED BK 2478
PAGE 17

SOIL BOUNDARY (TYP)

1S

2S

3S

ASSESS. MAP 233
PARCEL ID.
233_1_0
N/F BORGES
PETER D & THOMAS
A
15 COPICUT RD
DEED BK 2329
PAGE 161

STONE BOUND FOUND

STONE BOUND FOUND

COPICUT ROAD

ASSESS. MAP 233
PARCEL ID. 233_5_0
N/F R FIVE LIMITED INC
0 COPICUT RD
DEED BK C25008
PAGE

GRAPHICS SCALE
1 inch = 100 feet
0 100 200 300

PROGRESS PRINT NOT ISSUED FOR CONSTRUCTION

P.E. STAMP

ZCE
ZENITH CONSULTING ENGINEERS, LLC
3 MAIN STREET LAKEVILLE, MA 02347
PHONE: (508) 947-4208

BY	APP.

NO.	REV.	DATE	DESCRIPTION	BY

SHEET NAME: PRE-DEVELOPMENT DRAINAGE AREAS

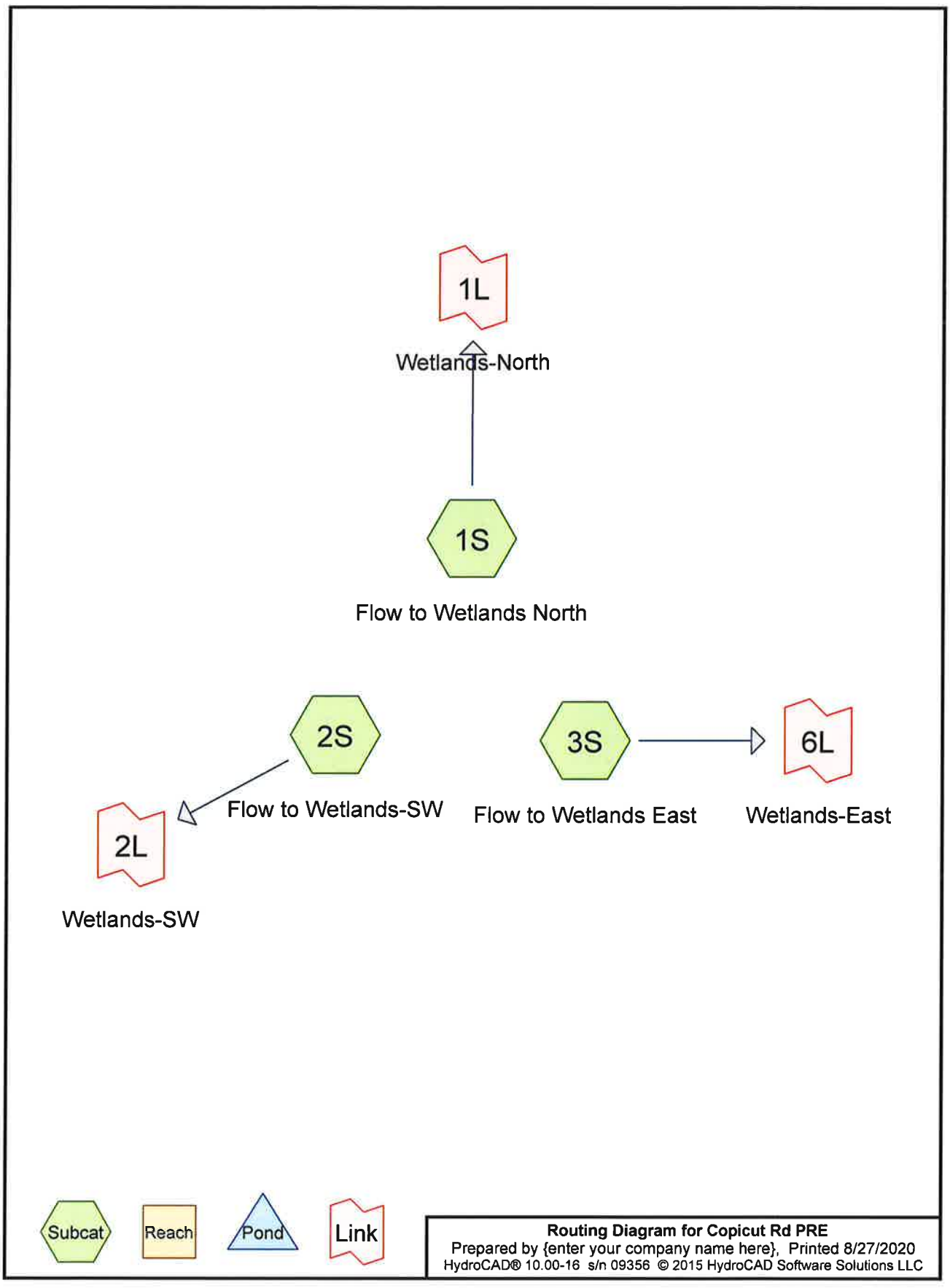
PROJECT SITE: 35 COPICUT ROAD
FREETOWN, MASSACHUSETTS

CLIENT INFO: KR REZENDES, INC.
3 SAMMY'S LANE
ASSONET, MASSACHUSETTS

DRAWN BY: RLG
DESIGNED BY: RLG
CHECKED BY: MZ
APPROVED BY: MZ

DATE: 8/27/2020
PROJECT NUMBER: 0617-01-01
DRAWING SCALE: 1"=100'
SHEET ID: PRE

S:\Civil Engineering Projects\Freetown\Copicut Road\0 Copicut Road\DWG\0 Copicut - Site Base Plan.dwg


1L
Wetlands-North
1S
Flow to Wetlands North
2S
Flow to Wetlands-SW
2L
Wetlands-SW
3S
Flow to Wetlands East
6L
Wetlands-East
Subcat
Reach
Pond
Link
Routing Diagram for Copicut Rd PRE
Prepared by {enter your company name here}, Printed 8/27/2020
HydroCAD® 10.00-16 s/n 09356 © 2015 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Flow to Wetlands North

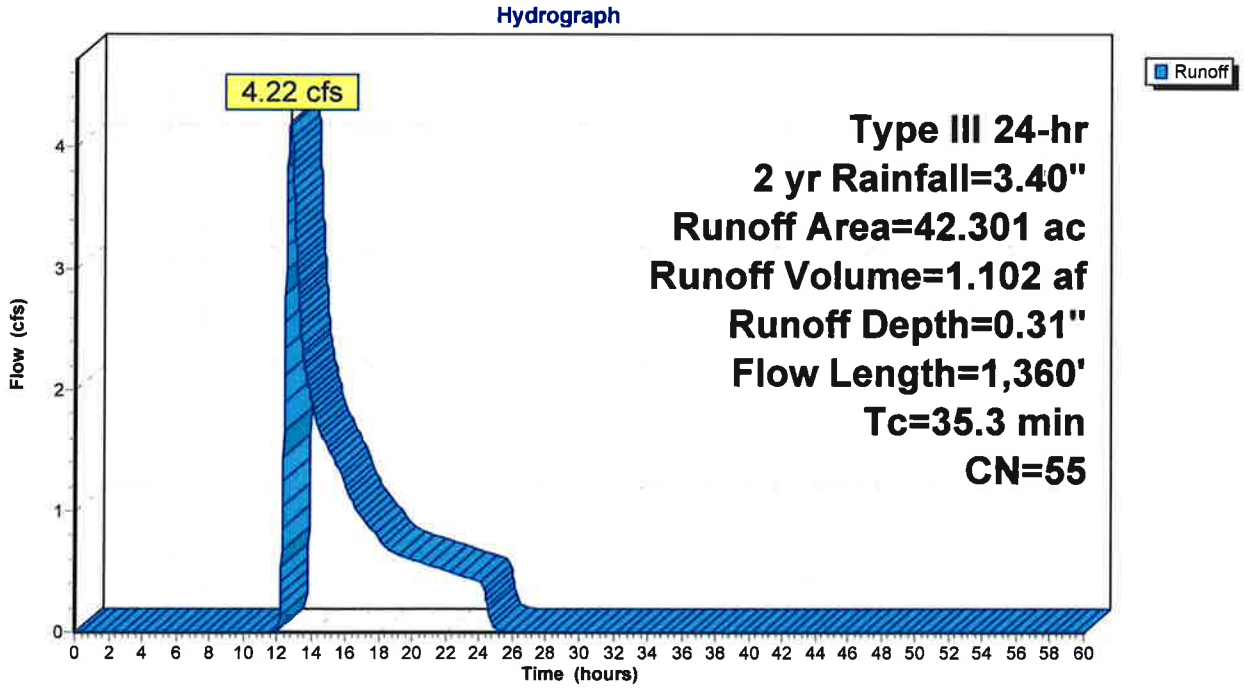
Runoff = 4.22 cfs @ 12.73 hrs, Volume= 1.102 af, Depth= 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 yr Rainfall=3.40"

Area (ac)	CN	Description
16.269	36	Woods, Fair, HSG A
14.792	60	Woods, Fair, HSG B
8.717	73	Woods, Fair, HSG C
2.523	79	Woods, Fair, HSG D
42.301	55	Weighted Average
42.301		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
19.5	1,310	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
35.3	1,360	Total			

Subcatchment 1S: Flow to Wetlands North



Summary for Subcatchment 2S: Flow to Wetlands-SW

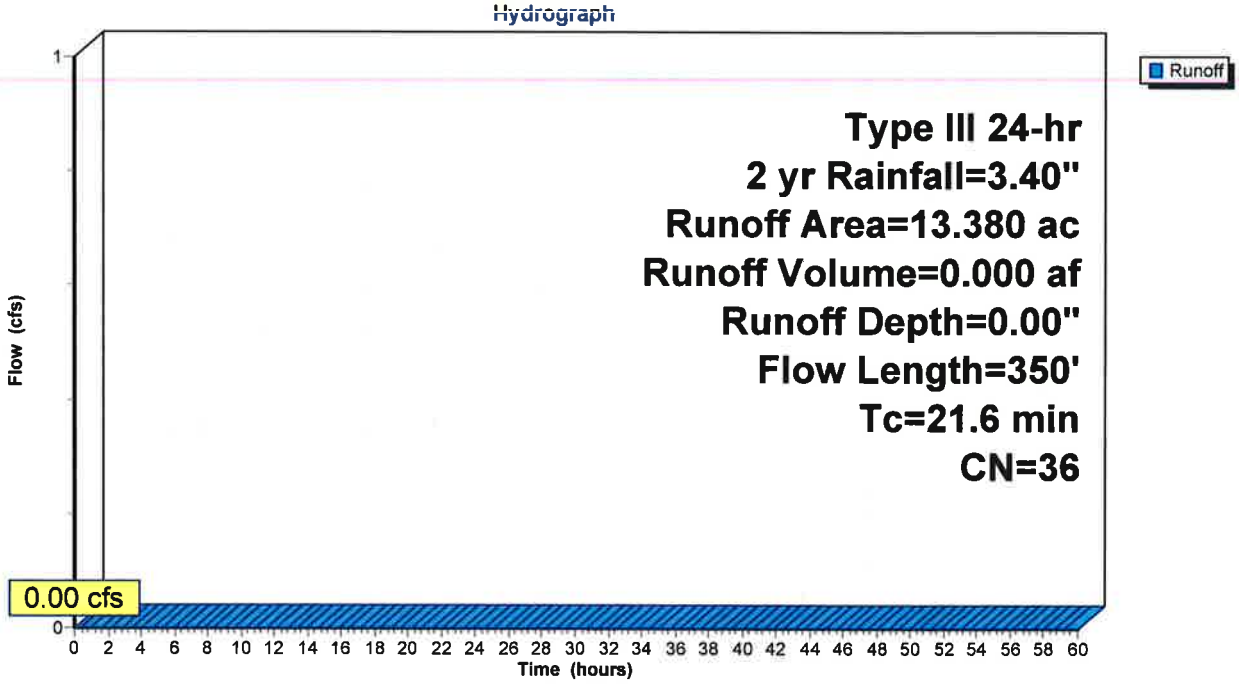
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 yr Rainfall=3.40"

Area (ac)	CN	Description
0.106	60	Woods, Fair, HSG B
13.274	36	Woods, Fair, HSG A
13.380	36	Weighted Average
13.380		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
5.8	300	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.6	350	Total			

Subcatchment 2S: Flow to Wetlands-SW



Summary for Subcatchment 3S: Flow to Wetlands East

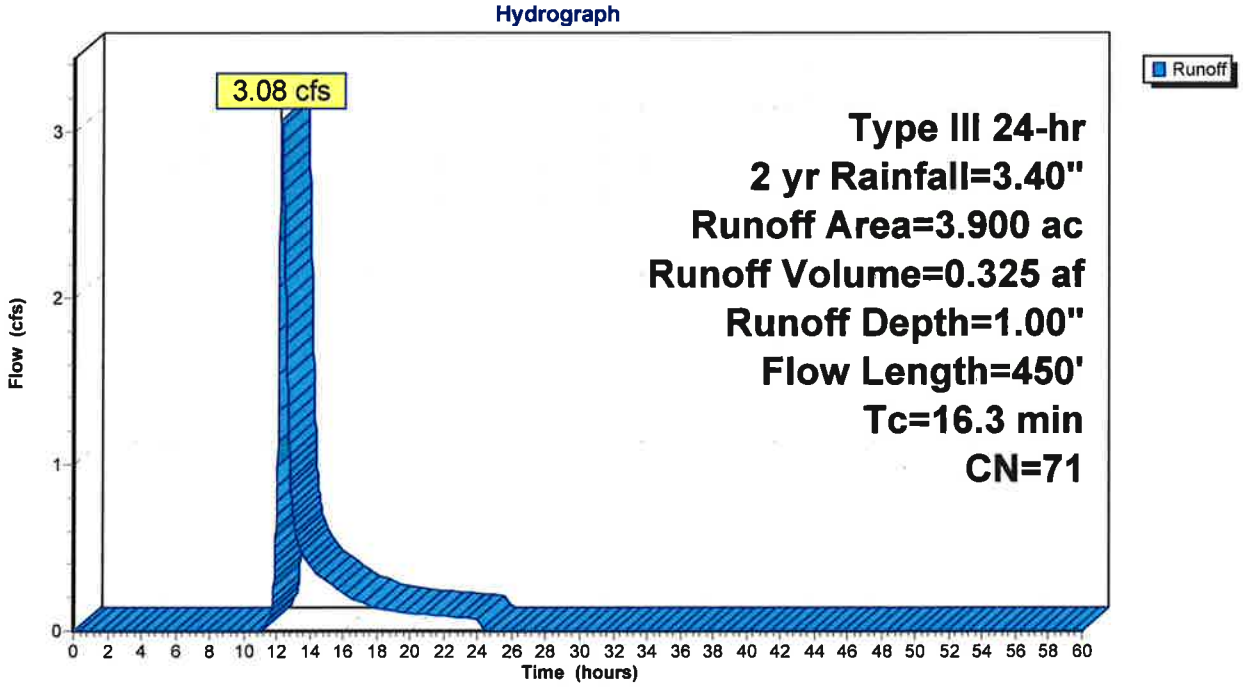
Runoff = 3.08 cfs @ 12.25 hrs, Volume= 0.325 af, Depth= 1.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 yr Rainfall=3.40"

Area (ac)	CN	Description
1.139	60	Woods, Fair, HSG B
1.586	73	Woods, Fair, HSG C
1.175	79	Woods, Fair, HSG D
3.900	71	Weighted Average
3.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
9.4	400	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.3	450	Total			

Subcatchment 3S: Flow to Wetlands East

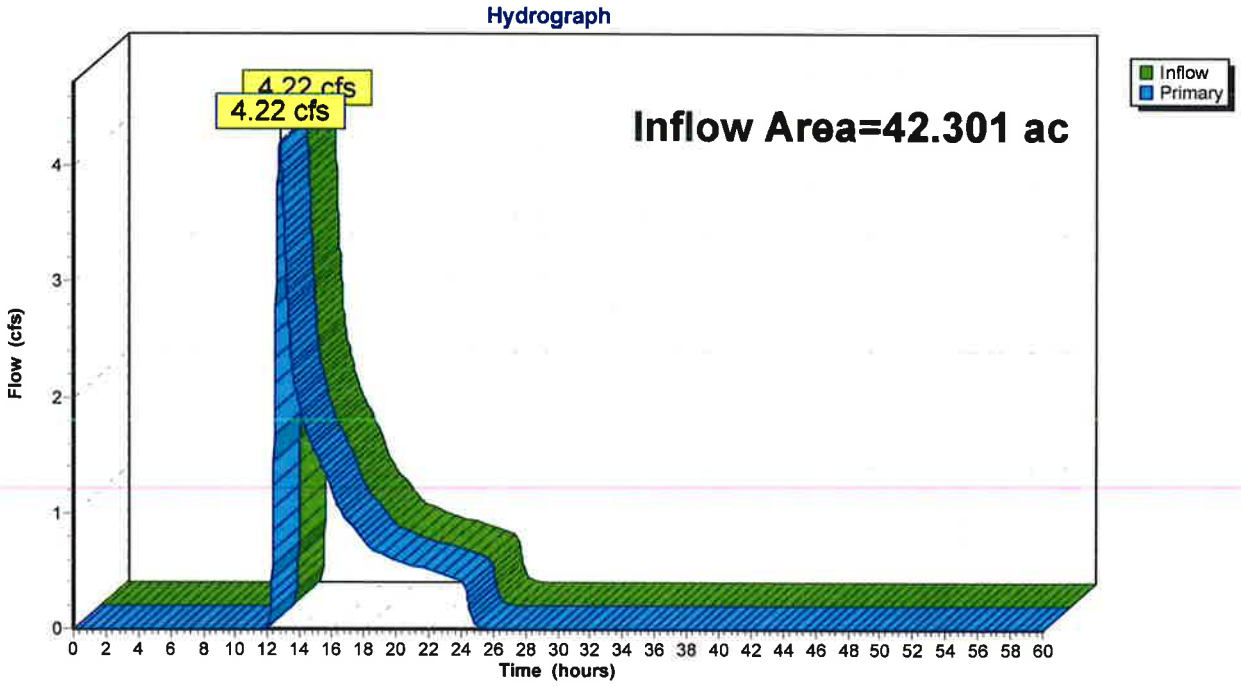


Summary for Link 1L: Wetlands-North

Inflow Area = 42.301 ac, 0.00% Impervious, Inflow Depth = 0.31" for 2 yr event
Inflow = 4.22 cfs @ 12.73 hrs, Volume= 1.102 af
Primary = 4.22 cfs @ 12.73 hrs, Volume= 1.102 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs

Link 1L: Wetlands-North

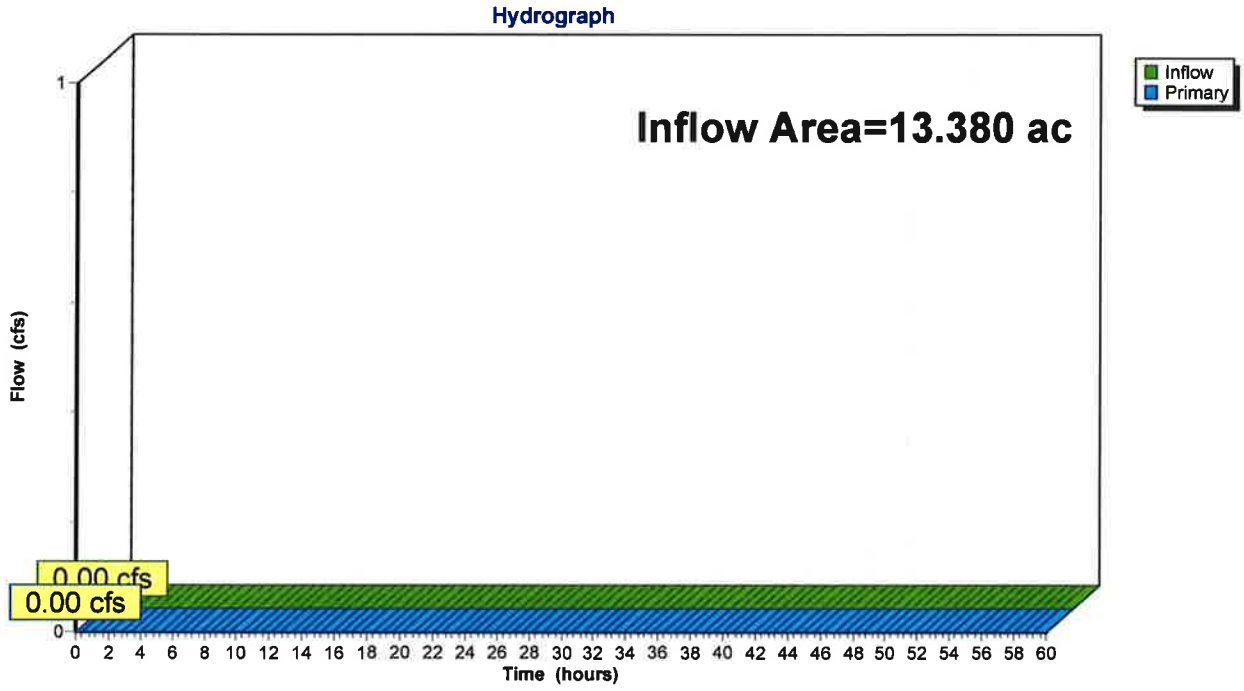


Summary for Link 2L: Wetlands-SW

Inflow Area = 13.380 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2 yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs

Link 2L: Wetlands-SW

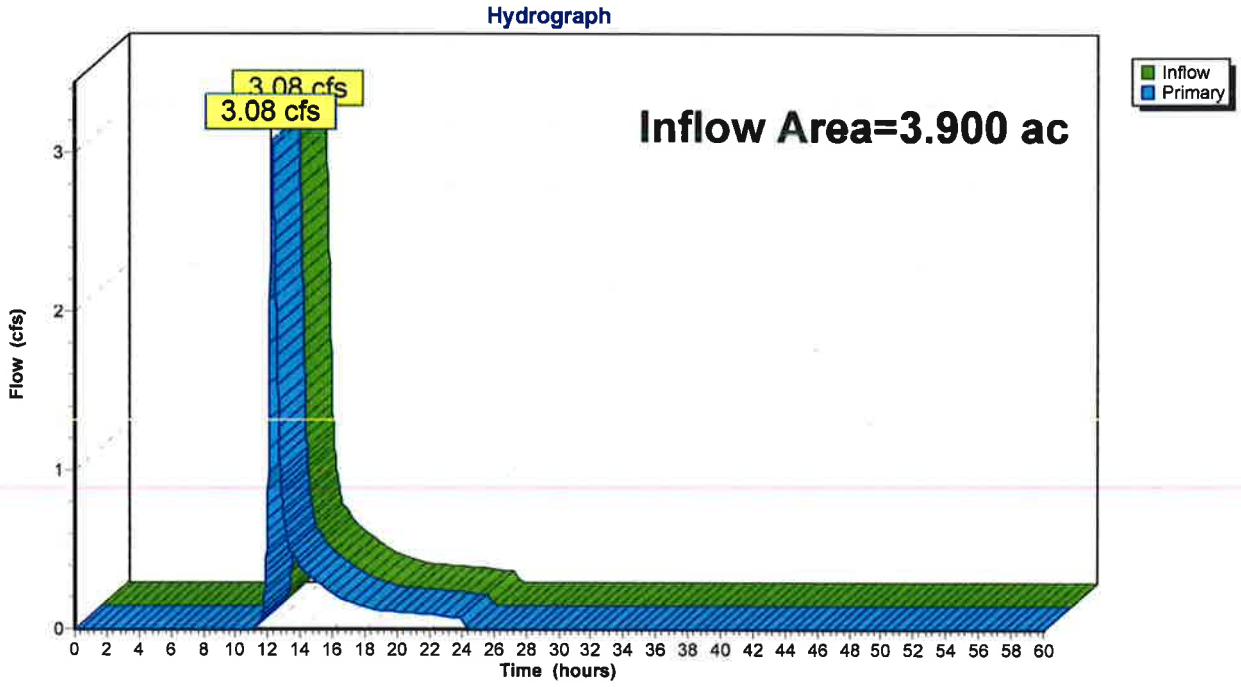


Summary for Link 6L: Wetlands-East

Inflow Area = 3.900 ac, 0.00% Impervious, Inflow Depth = 1.00" for 2 yr event
Inflow = 3.08 cfs @ 12.25 hrs, Volume= 0.325 af
Primary = 3.08 cfs @ 12.25 hrs, Volume= 0.325 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs

Link 6L: Wetlands-East



Summary for Subcatchment 1S: Flow to Wetlands North

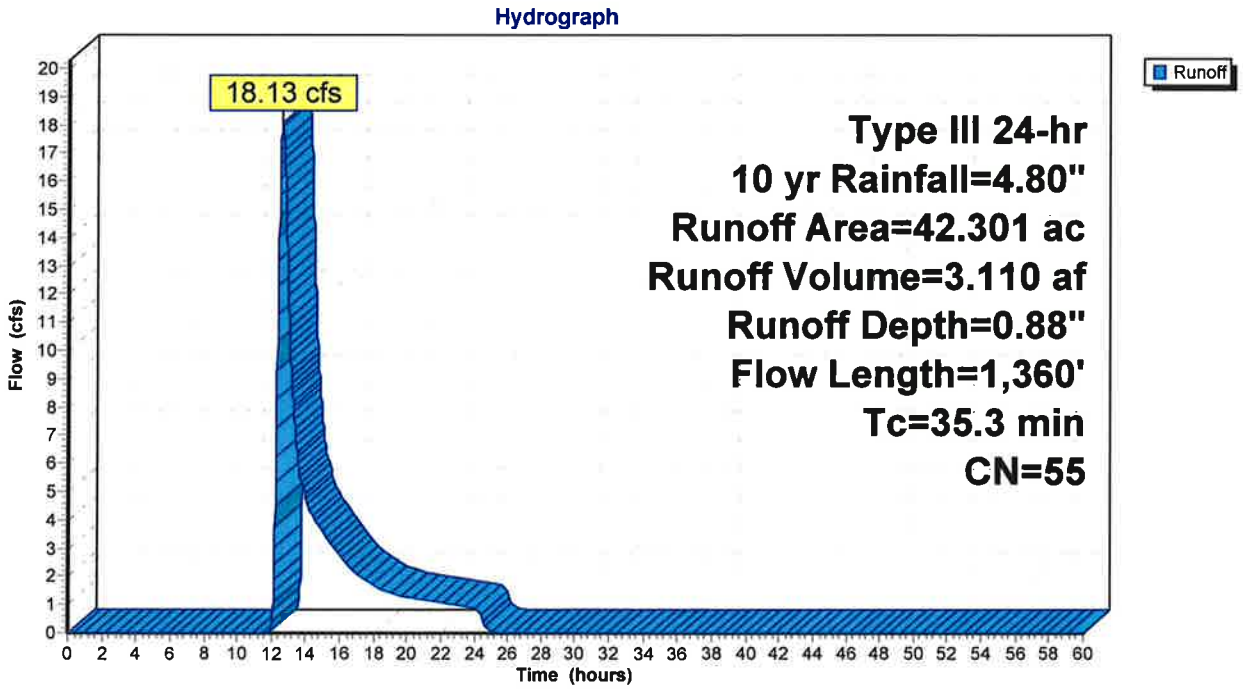
Runoff = 18.13 cfs @ 12.60 hrs, Volume= 3.110 af, Depth= 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 yr Rainfall=4.80"

Area (ac)	CN	Description
16.269	36	Woods, Fair, HSG A
14.792	60	Woods, Fair, HSG B
8.717	73	Woods, Fair, HSG C
2.523	79	Woods, Fair, HSG D
42.301	55	Weighted Average
42.301		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
19.5	1,310	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
35.3	1,360	Total			

Subcatchment 1S: Flow to Wetlands North



Summary for Subcatchment 2S: Flow to Wetlands-SW

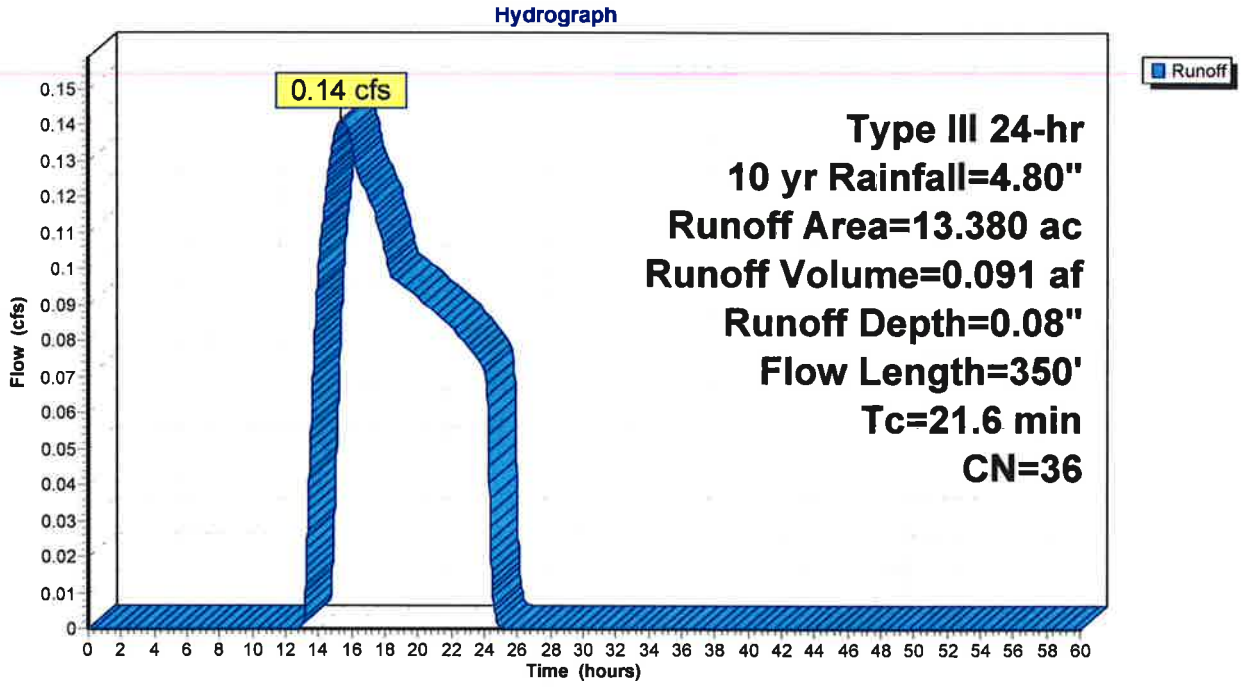
Runoff = 0.14 cfs @ 15.38 hrs, Volume= 0.091 af, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 yr Rainfall=4.80"

Area (ac)	CN	Description
0.106	60	Woods, Fair, HSG B
13.274	36	Woods, Fair, HSG A
13.380	36	Weighted Average
13.380		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
5.8	300	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.6	350	Total			

Subcatchment 2S: Flow to Wetlands-SW



Summary for Subcatchment 3S: Flow to Wetlands East

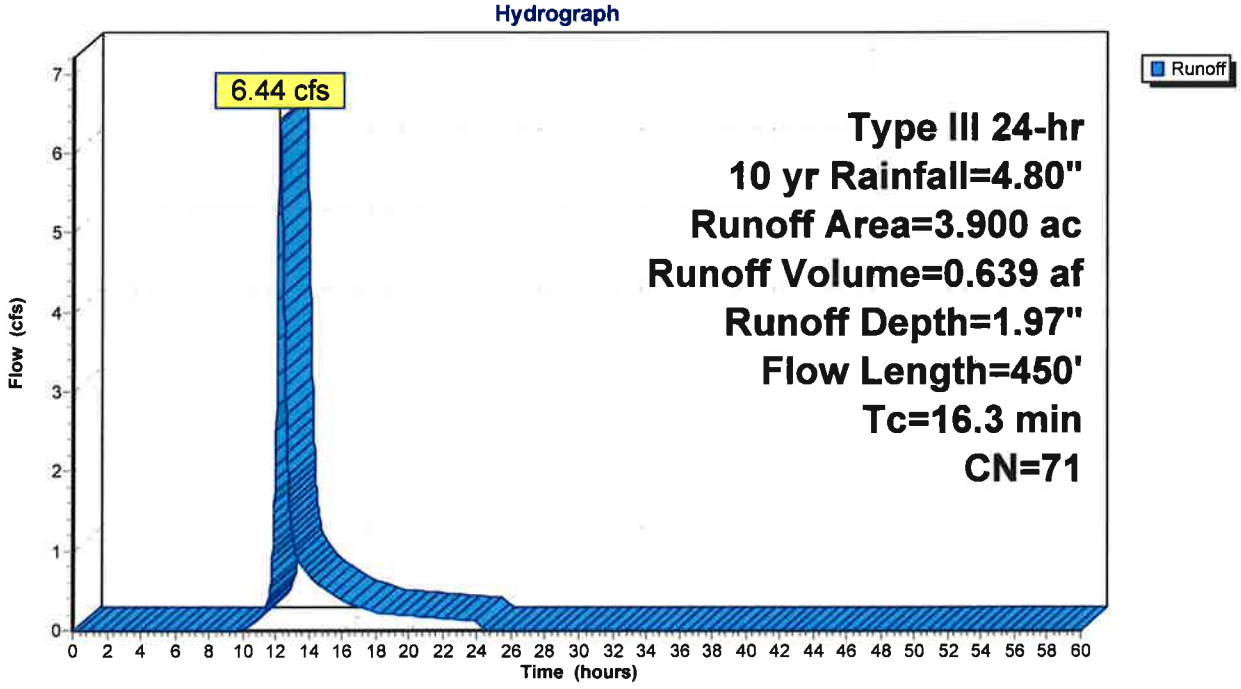
Runoff = 6.44 cfs @ 12.23 hrs, Volume= 0.639 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 yr Rainfall=4.80"

Area (ac)	CN	Description
1.139	60	Woods, Fair, HSG B
1.586	73	Woods, Fair, HSG C
1.175	79	Woods, Fair, HSG D
3.900	71	Weighted Average
3.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
9.4	400	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.3	450	Total			

Subcatchment 3S: Flow to Wetlands East

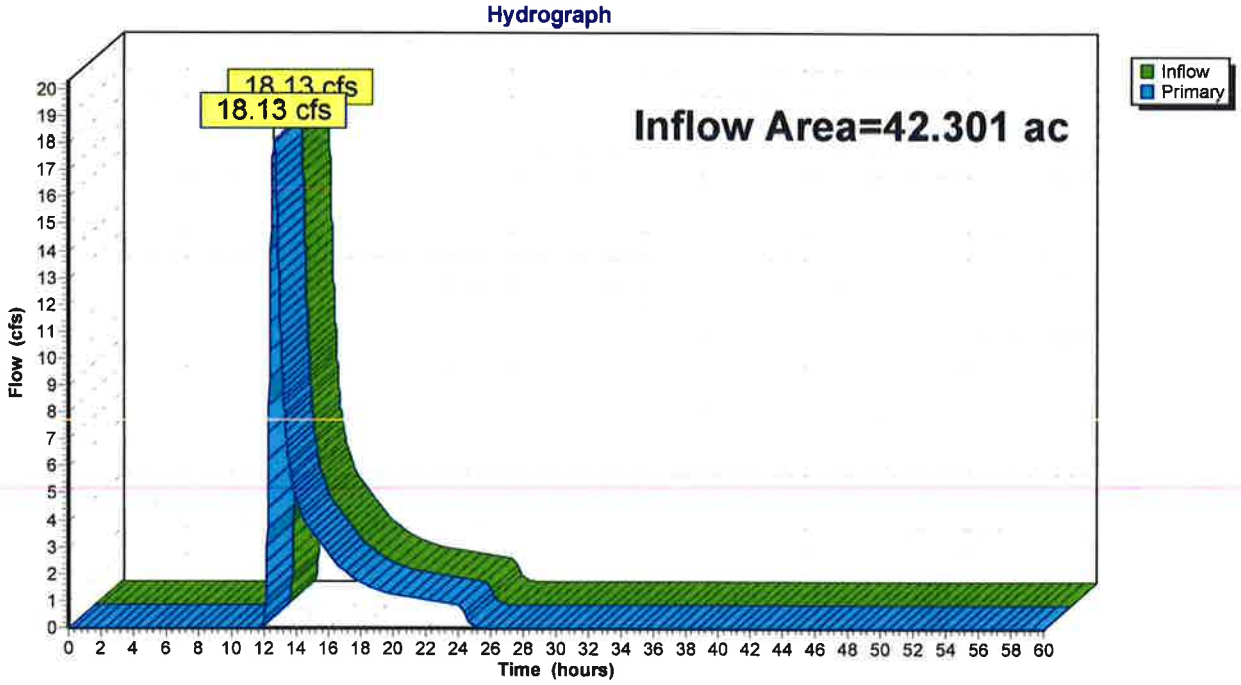


Summary for Link 1L: Wetlands-North

Inflow Area = 42.301 ac, 0.00% Impervious, Inflow Depth = 0.88" for 10 yr event
Inflow = 18.13 cfs @ 12.60 hrs, Volume= 3.110 af
Primary = 18.13 cfs @ 12.60 hrs, Volume= 3.110 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs

Link 1L: Wetlands-North

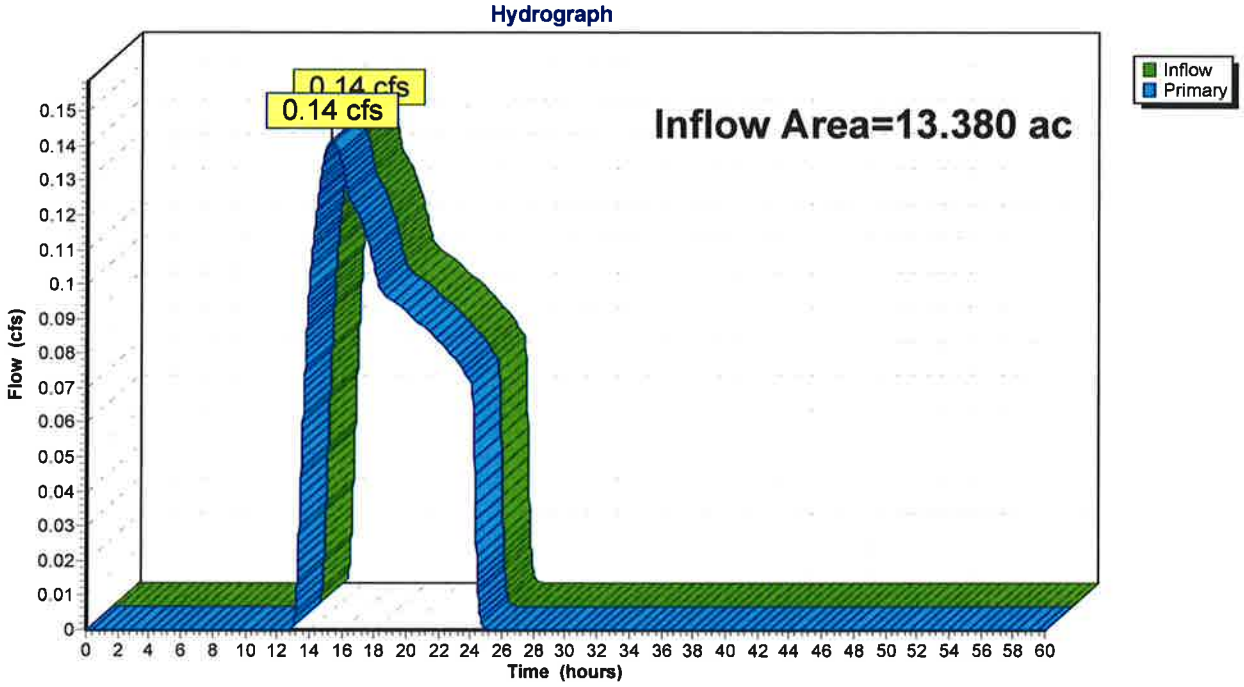


Summary for Link 2L: Wetlands-SW

Inflow Area = 13.380 ac, 0.00% Impervious, Inflow Depth = 0.08" for 10 yr event
Inflow = 0.14 cfs @ 15.38 hrs, Volume= 0.091 af
Primary = 0.14 cfs @ 15.38 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs

Link 2L: Wetlands-SW

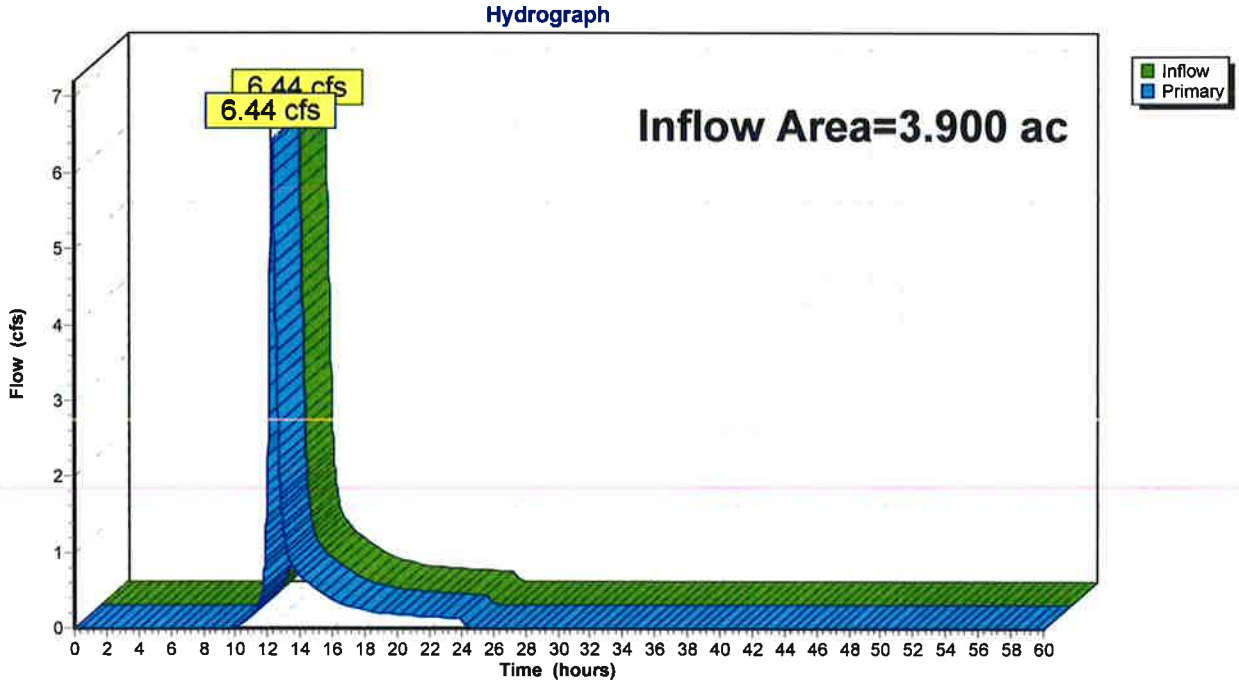


Summary for Link 6L: Wetlands-East

Inflow Area = 3.900 ac, 0.00% Impervious, Inflow Depth = 1.97" for 10 yr event
Inflow = 6.44 cfs @ 12.23 hrs, Volume= 0.639 af
Primary = 6.44 cfs @ 12.23 hrs, Volume= 0.639 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs

Link 6L: Wetlands-East



Summary for Subcatchment 1S: Flow to Wetlands North

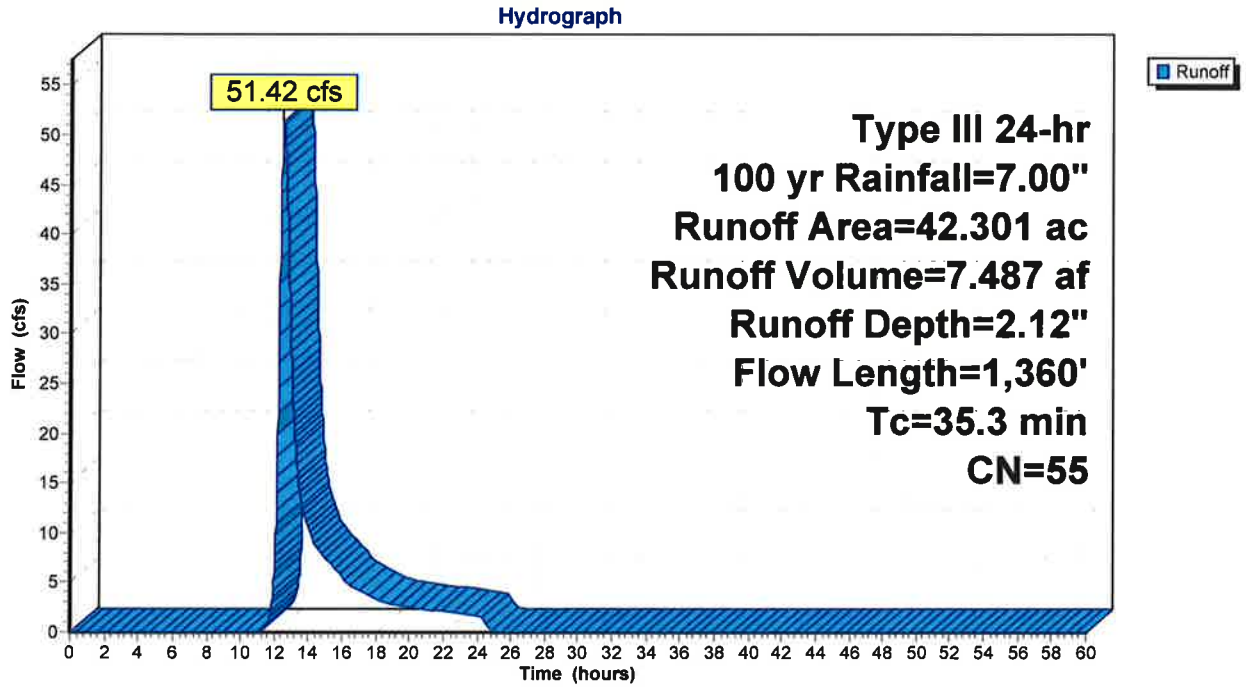
Runoff = 51.42 cfs @ 12.53 hrs, Volume= 7.487 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
16.269	36	Woods, Fair, HSG A
14.792	60	Woods, Fair, HSG B
8.717	73	Woods, Fair, HSG C
2.523	79	Woods, Fair, HSG D
42.301	55	Weighted Average
42.301		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
19.5	1,310	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
35.3	1,360	Total			

Subcatchment 1S: Flow to Wetlands North



Summary for Subcatchment 2S: Flow to Wetlands-SW

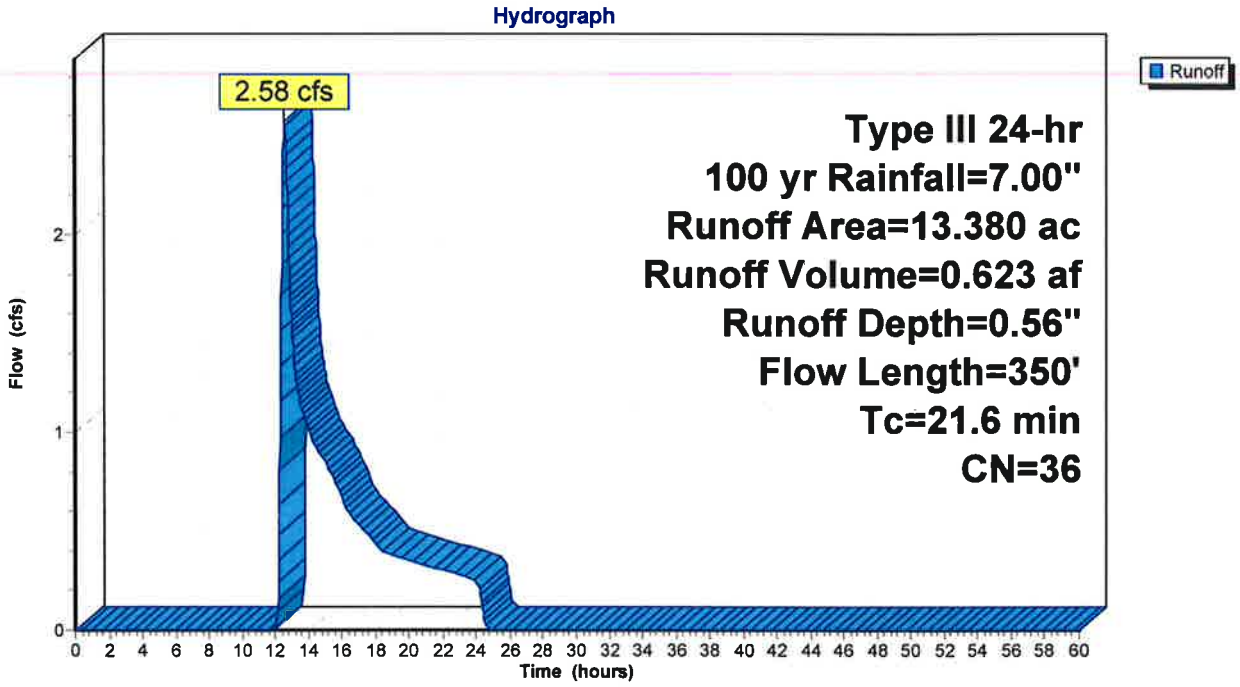
Runoff = 2.58 cfs @ 12.56 hrs, Volume= 0.623 af, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
0.106	60	Woods, Fair, HSG B
13.274	36	Woods, Fair, HSG A
13.380	36	Weighted Average
13.380		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
5.8	300	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.6	350	Total			

Subcatchment 2S: Flow to Wetlands-SW



Summary for Subcatchment 3S: Flow to Wetlands East

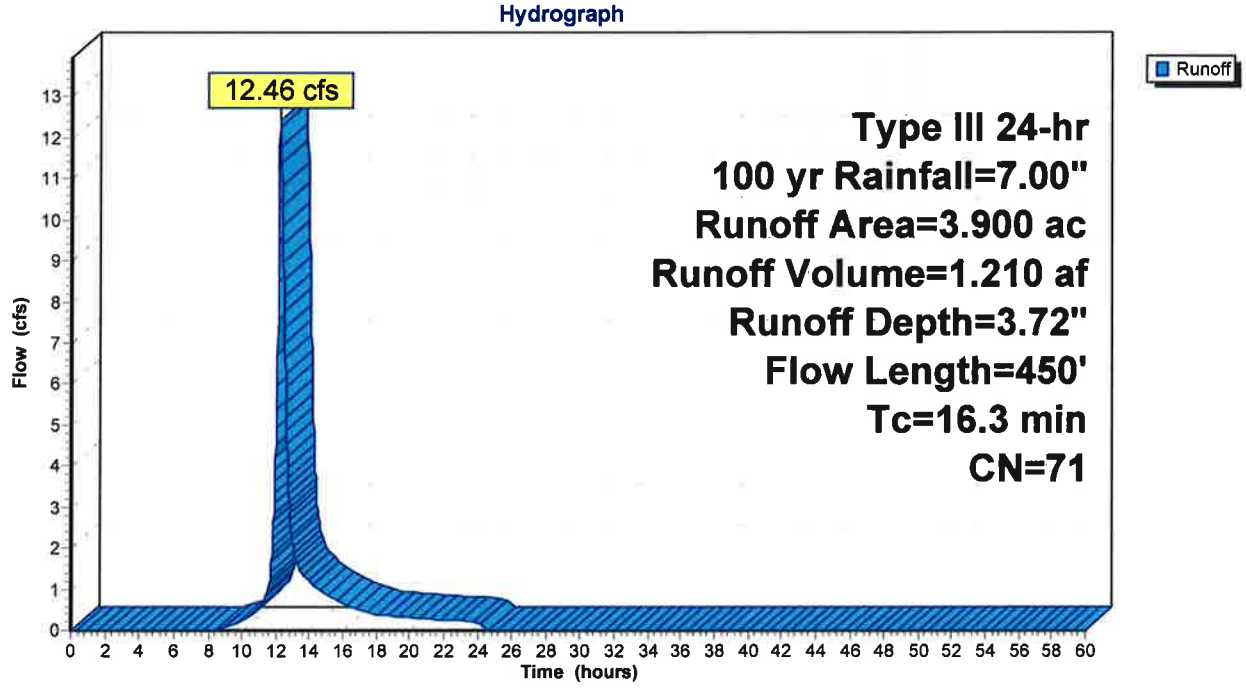
Runoff = 12.46 cfs @ 12.22 hrs, Volume= 1.210 af, Depth= 3.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
1.139	60	Woods, Fair, HSG B
1.586	73	Woods, Fair, HSG C
1.175	79	Woods, Fair, HSG D
3.900	71	Weighted Average
3.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
9.4	400	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.3	450	Total			

Subcatchment 3S: Flow to Wetlands East

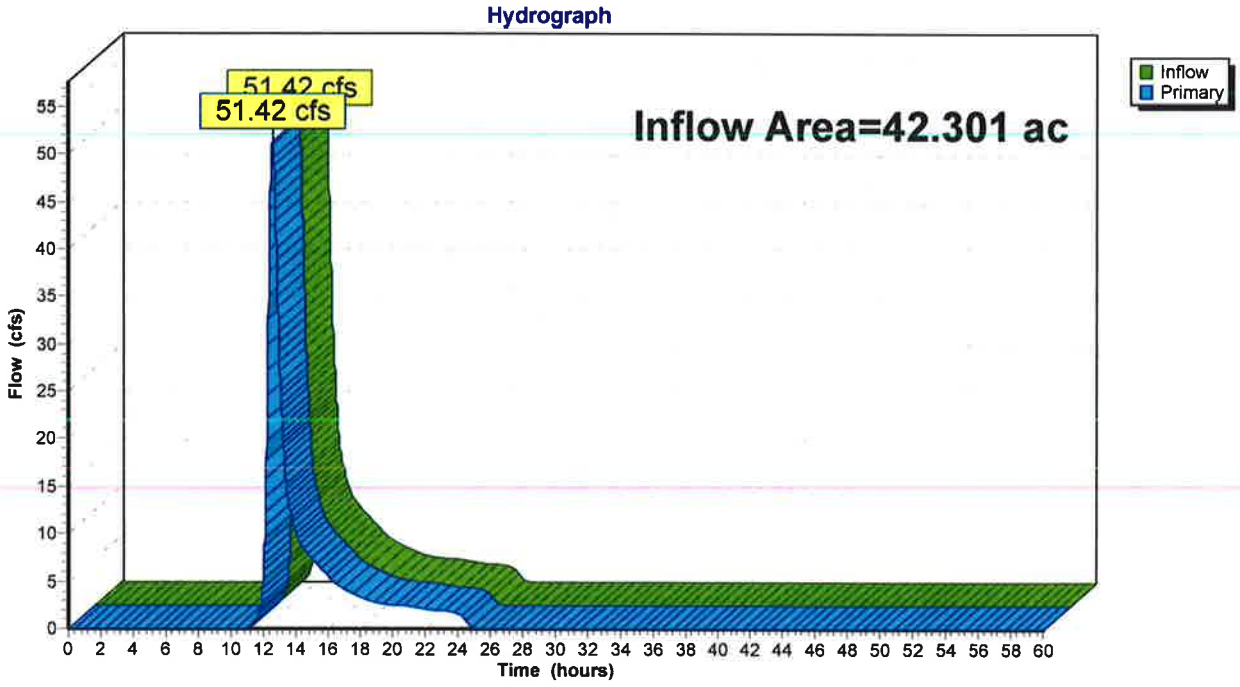


Summary for Link 1L: Wetlands-North

Inflow Area = 42.301 ac, 0.00% Impervious, Inflow Depth = 2.12" for 100 yr event
Inflow = 51.42 cfs @ 12.53 hrs, Volume= 7.487 af
Primary = 51.42 cfs @ 12.53 hrs, Volume= 7.487 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs

Link 1L: Wetlands-North

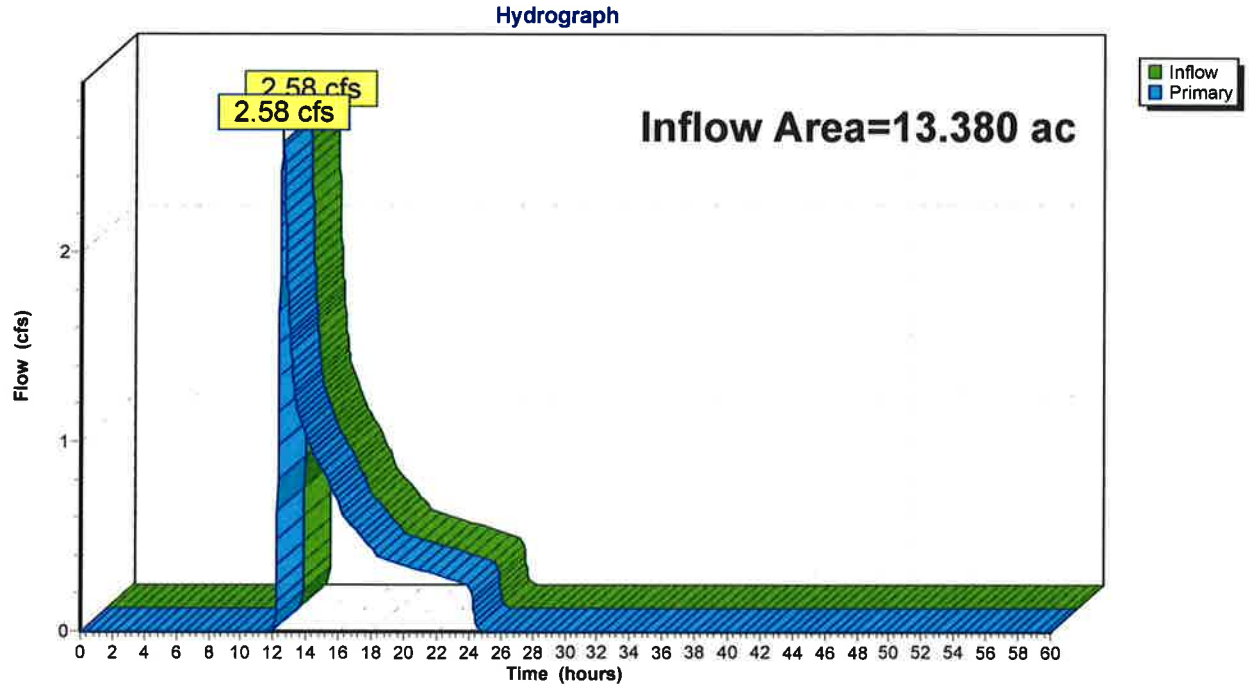


Summary for Link 2L: Wetlands-SW

Inflow Area = 13.380 ac, 0.00% Impervious, Inflow Depth = 0.56" for 100 yr event
Inflow = 2.58 cfs @ 12.56 hrs, Volume= 0.623 af
Primary = 2.58 cfs @ 12.56 hrs, Volume= 0.623 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs

Link 2L: Wetlands-SW

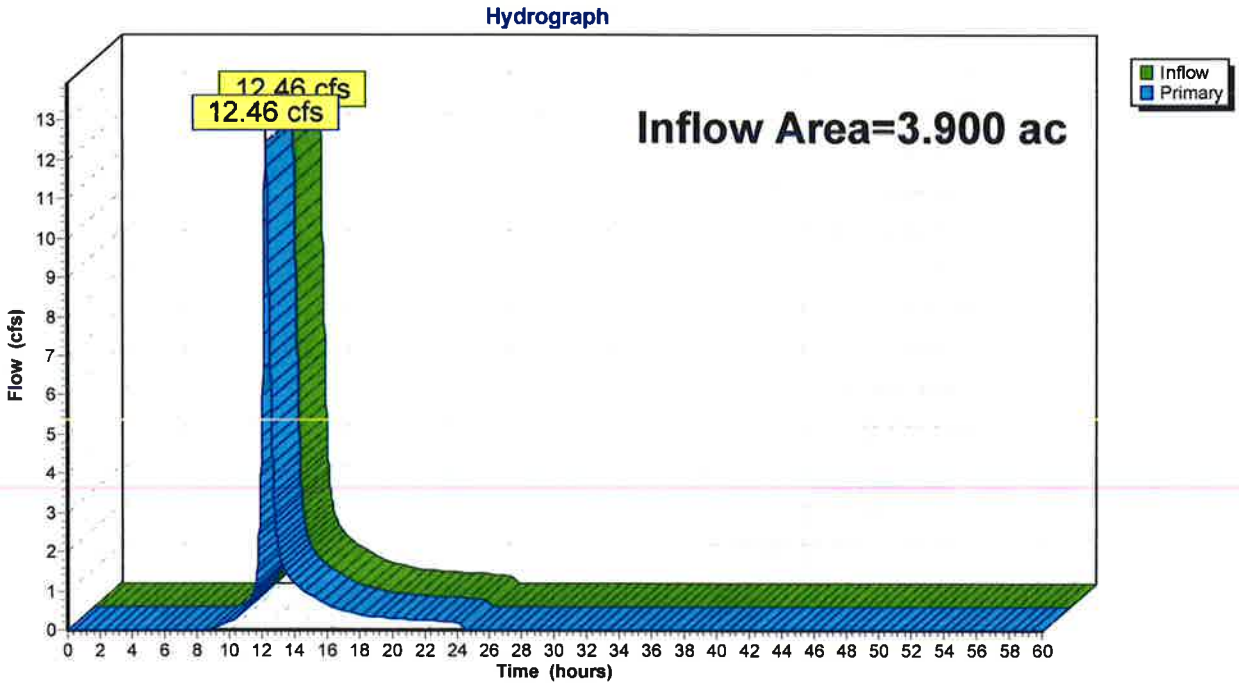


Summary for Link 6L: Wetlands-East

Inflow Area = 3.900 ac, 0.00% Impervious, Inflow Depth = 3.72" for 100 yr event
Inflow = 12.46 cfs @ 12.22 hrs, Volume= 1.210 af
Primary = 12.46 cfs @ 12.22 hrs, Volume= 1.210 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs

Link 6L: Wetlands-East



COPICUT ROAD

GRAPHICS SCALE
1 inch = 100 feet
0 100 200 300

GRAPHIC NORTH

S8
2S
7S
1S
S9
4S
5S

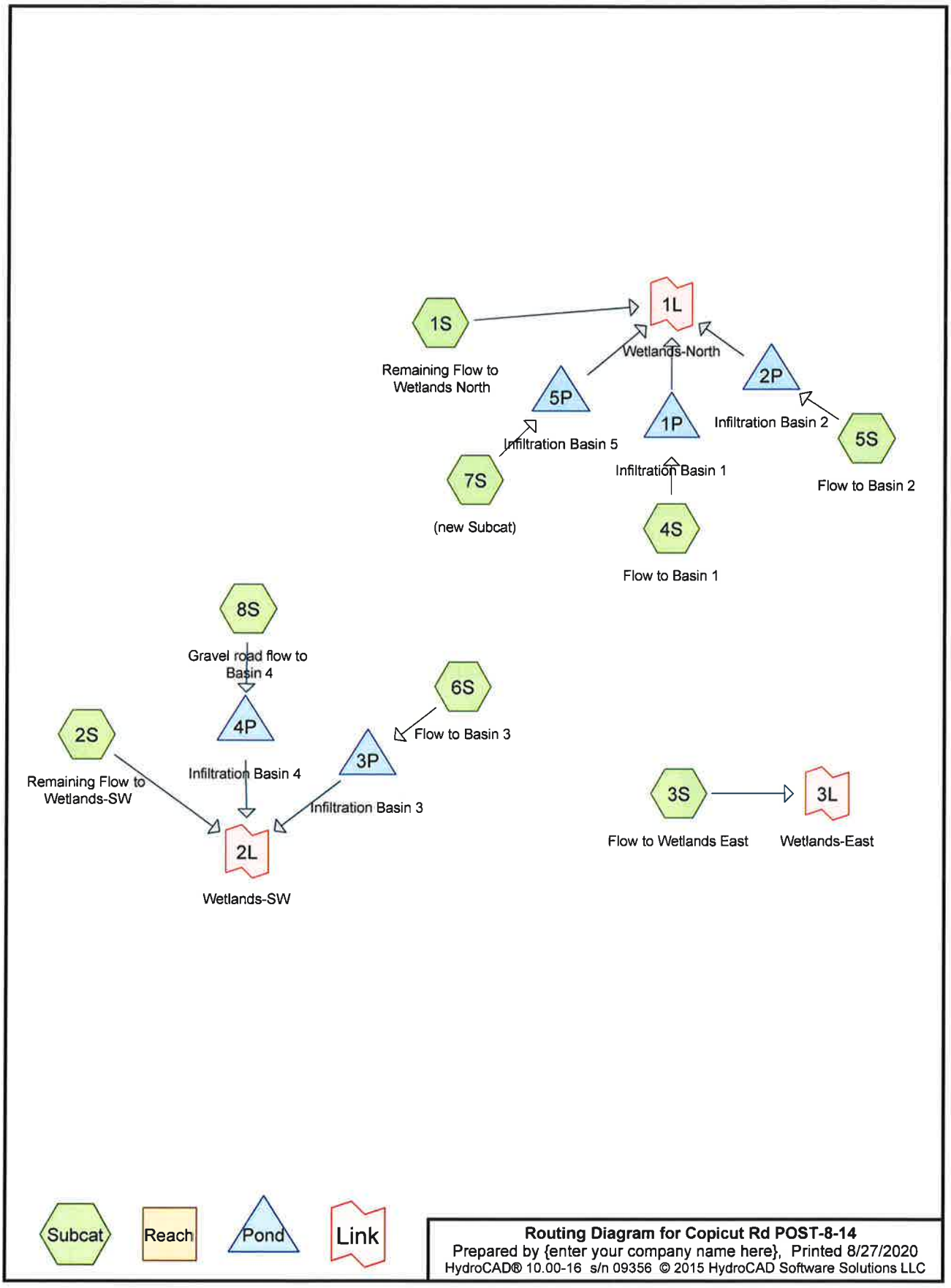
SHEET NAME: POST-DEVELOPMENT DRAINAGE AREAS	DRAWN BY: RLG	DATE: 8/27/2020	REV.	DATE	DESCRIPTION	BY	APP.
PROJECT SITE: 35 COPICUT ROAD FREETOWN, MASSACHUSETTS	DESIGNED BY: RLG	PROJECT NUMBER: 0617-01-01					
CLIENT INFO: KR REZENDES, INC. 3 SAMMY'S LANE ASSONET, MASSACHUSETTS	CHECKED BY: NCZ	DRAWING SCALE: 1"=100'					
	APPROVED BY: NCZ	SHEET ID: POST					

ZCE
ZENITH CONSULTING ENGINEERS, LLC
3 MAIN STREET LAKEVILLE, MA 02347
PHONE: (508) 947-4208

P.E. STAMP

PROGRESS PRINT NOT ISSUED FOR CONSTRUCTION

S:\Civil Engineering Projects\Freetown\Copicut Road\0 Copicut Road\DWG\0 Copicut - Site Base Plan.dwg


1S
Remaining Flow to Wetlands North
1L
Wetlands-North
2P
Infiltration Basin 2
5S
Flow to Basin 2
5P
Infiltration Basin 5
1P
Infiltration Basin 1
7S
(new Subcat)
4S
Flow to Basin 1
8S
Gravel road flow to Basin 4
6S
Flow to Basin 3
2S
Remaining Flow to Wetlands-SW
4P
Infiltration Basin 4
3P
Infiltration Basin 3
2L
Wetlands-SW
3S
Flow to Wetlands East
3L
Wetlands-East
Subcat
Reach
Pond
Link
Routing Diagram for Copicut Rd POST-8-14
Prepared by {enter your company name here}, Printed 8/27/2020
HydroCAD® 10.00-16 s/n 09356 © 2015 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Remaining Flow to Wetlands North

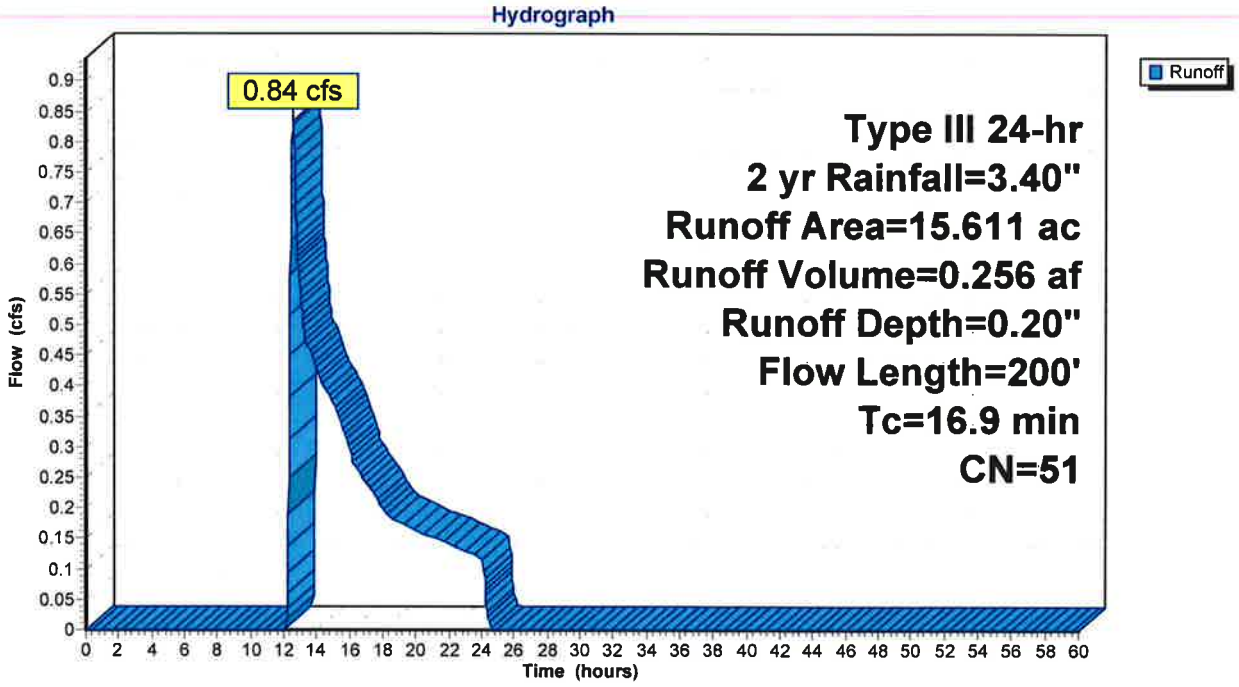
Runoff = 0.84 cfs @ 12.56 hrs, Volume= 0.256 af, Depth= 0.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 yr Rainfall=3.40"

Area (ac)	CN	Description
7.591	36	Woods, Fair, HSG A
5.520	60	Woods, Fair, HSG B
0.845	73	Woods, Fair, HSG C
1.655	79	Woods, Fair, HSG D
15.611	51	Weighted Average
15.611		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.1	150	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.9	200	Total			

Subcatchment 1S: Remaining Flow to Wetlands North



Summary for Subcatchment 2S: Remaining Flow to Wetlands-SW

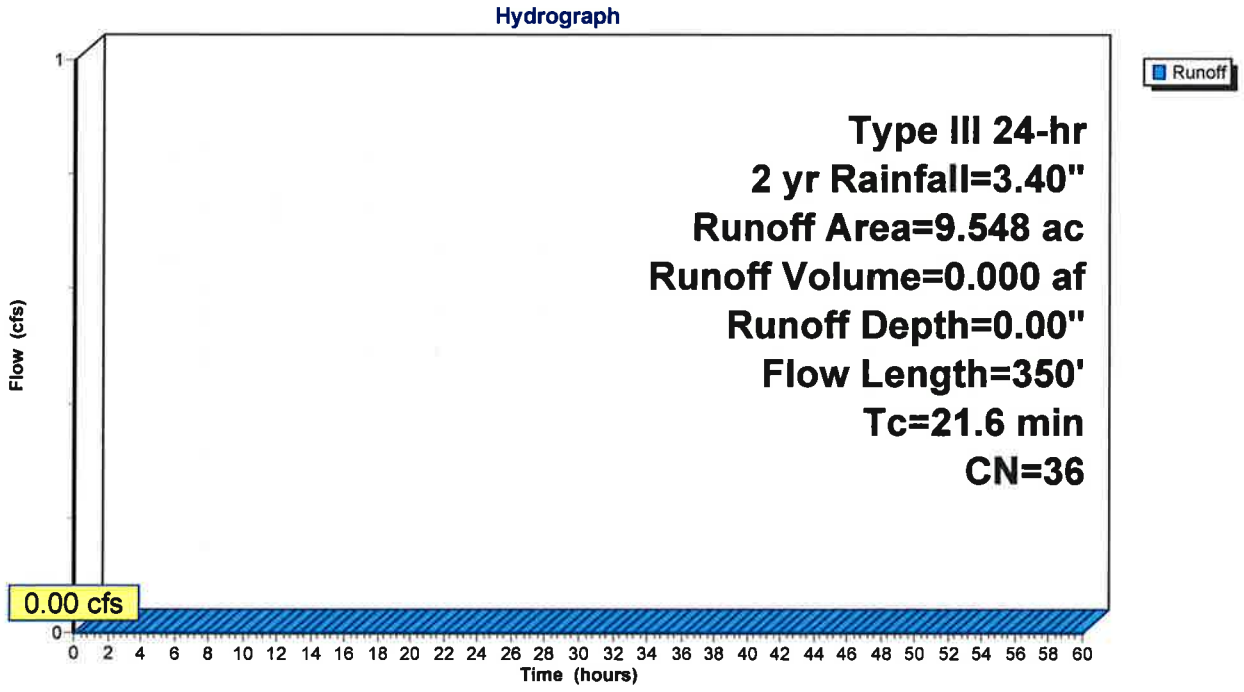
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 yr Rainfall=3.40"

Area (ac)	CN	Description
0.106	60	Woods, Fair, HSG B
9.442	36	Woods, Fair, HSG A
9.548	36	Weighted Average
9.548		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
5.8	300	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.6	350	Total			

Subcatchment 2S: Remaining Flow to Wetlands-SW



Summary for Subcatchment 3S: Flow to Wetlands East

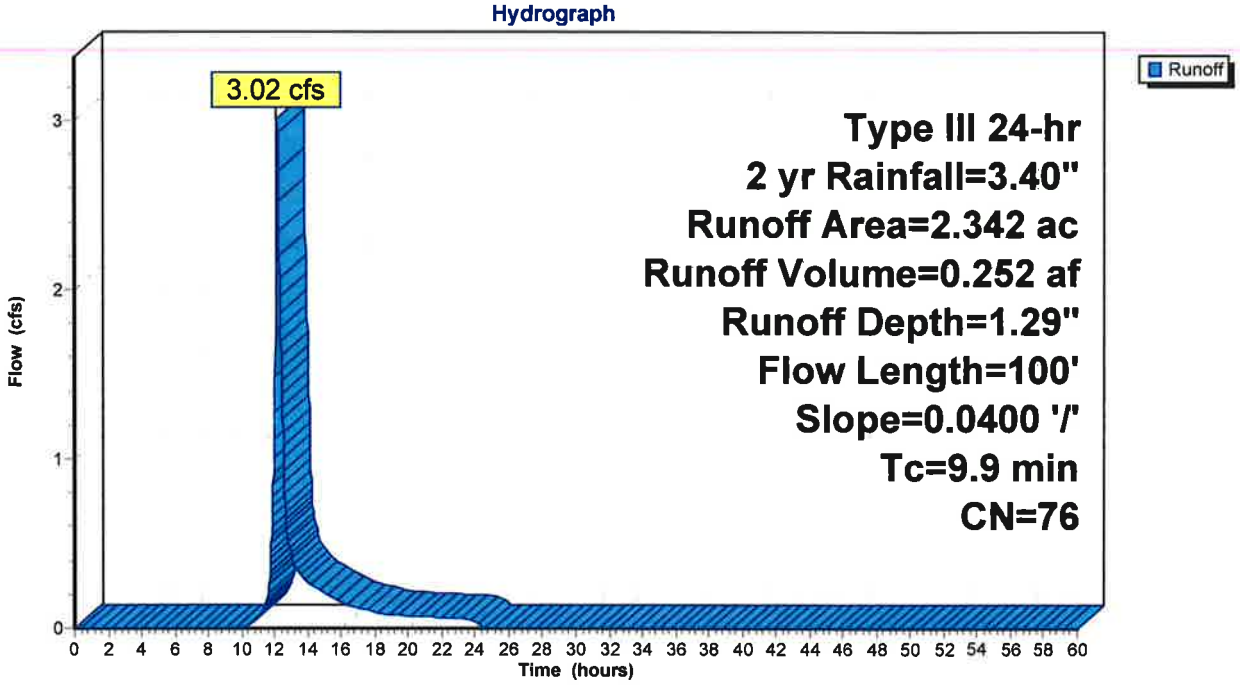
Runoff = 3.02 cfs @ 12.15 hrs, Volume= 0.252 af, Depth= 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 yr Rainfall=3.40"

Area (ac)	CN	Description
0.021	60	Woods, Fair, HSG B
1.169	73	Woods, Fair, HSG C
1.152	79	Woods, Fair, HSG D
2.342	76	Weighted Average
2.342		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	50	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.9	100	Total			

Subcatchment 3S: Flow to Wetlands East



Summary for Subcatchment 4S: Flow to Basin 1

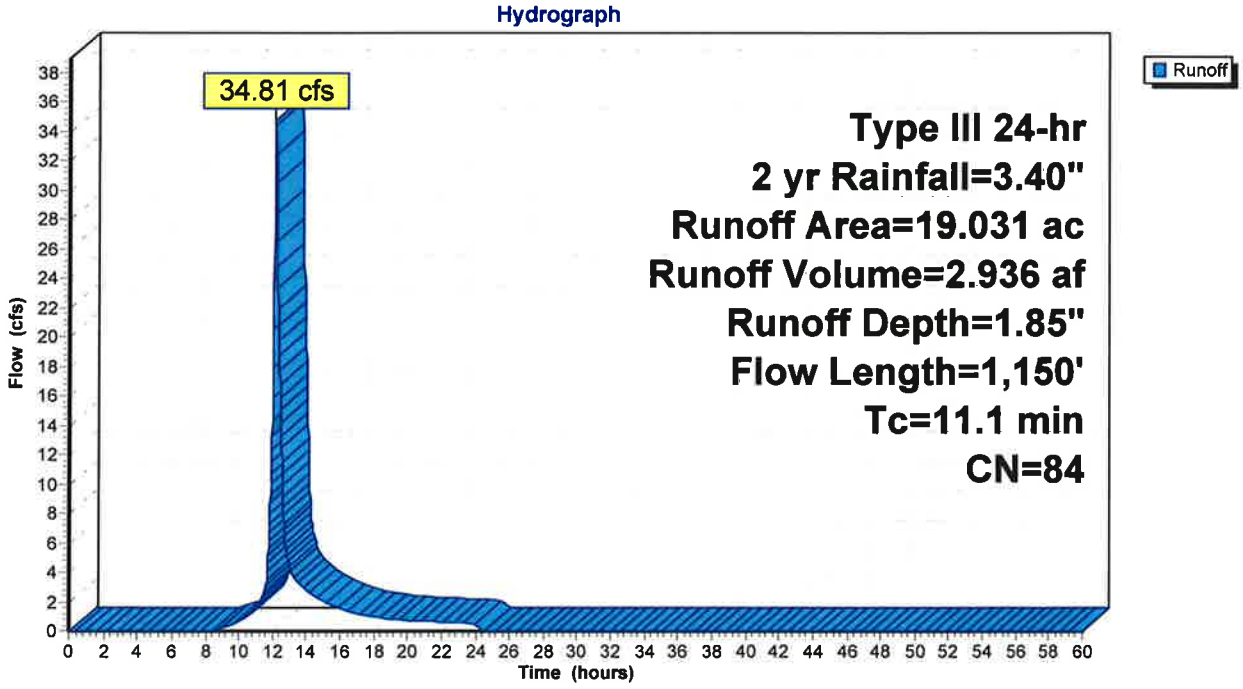
Runoff = 34.81 cfs @ 12.16 hrs, Volume= 2.936 af, Depth= 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 yr Rainfall=3.40"

Area (ac)	CN	Description
8.324	77	Newly graded area, HSG A
4.083	86	Newly graded area, HSG B
6.394	91	Newly graded area, HSG C
0.230	94	Newly graded area, HSG D
19.031	84	Weighted Average
19.031		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	50	0.0100	0.28		**Sheet Flow,** Fallow n= 0.050 P2= 3.40"
8.1	1,100	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.1	1,150	Total			

Subcatchment 4S: Flow to Basin 1



Summary for Subcatchment 5S: Flow to Basin 2

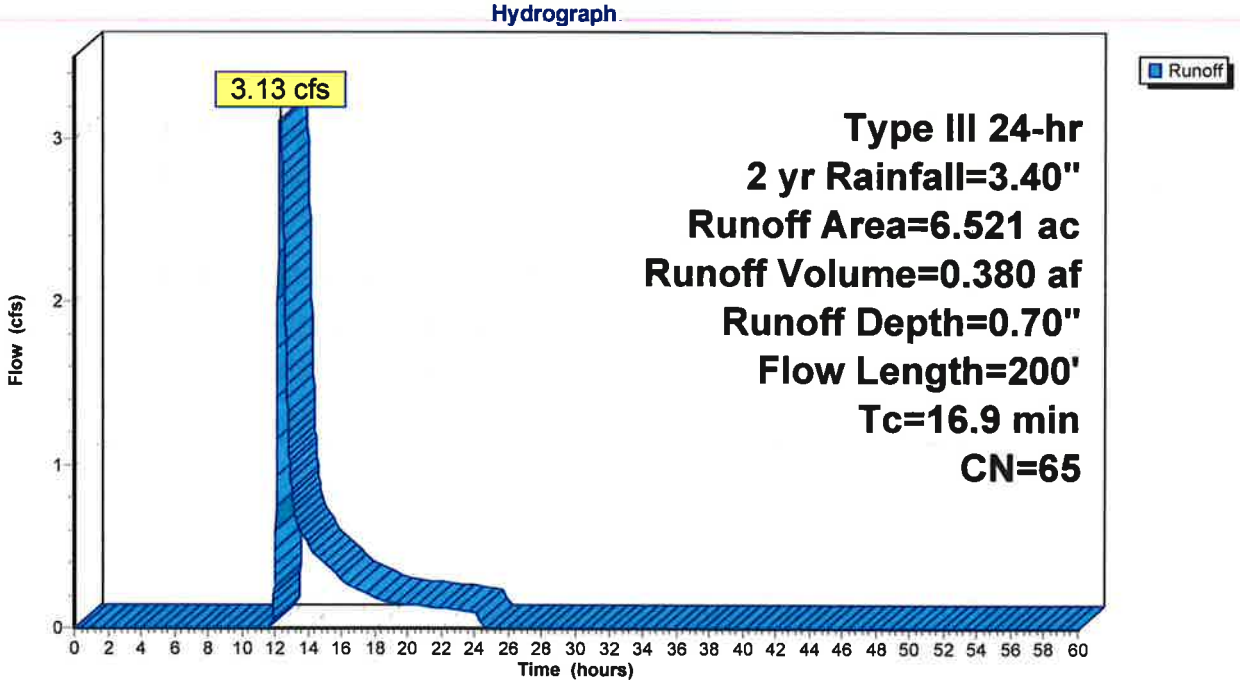
Runoff = 3.13 cfs @ 12.28 hrs, Volume= 0.380 af, Depth= 0.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 yr Rainfall=3.40"

Area (ac)	CN	Description
0.193	36	Woods, Fair, HSG A
3.772	60	Woods, Fair, HSG B
1.895	73	Woods, Fair, HSG C
0.661	79	Woods, Fair, HSG D
6.521	65	Weighted Average
6.521		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.1	150	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.9	200	Total			

Subcatchment 5S: Flow to Basin 2



Summary for Subcatchment 6S: Flow to Basin 3

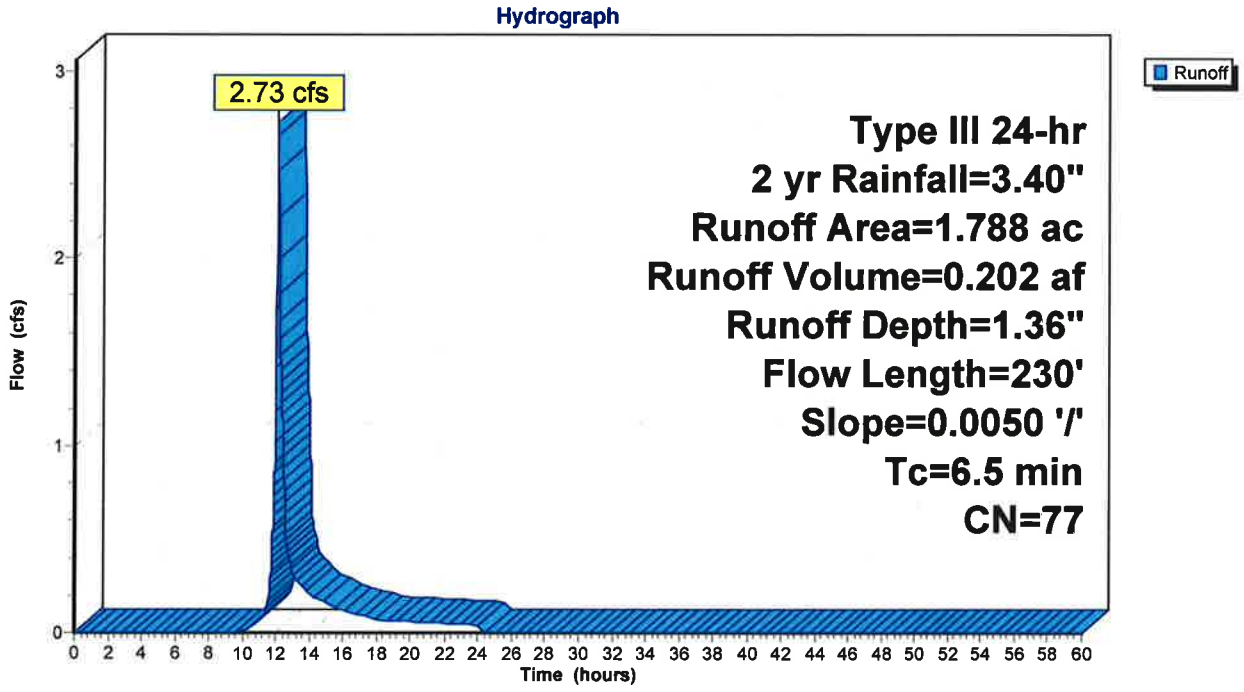
Runoff = 2.73 cfs @ 12.10 hrs, Volume= 0.202 af, Depth= 1.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 yr Rainfall=3.40"

Area (ac)	CN	Description
0.070	86	Newly graded area, HSG B
1.718	77	Newly graded area, HSG A
1.788	77	Weighted Average
1.788		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0050	0.21		**Sheet Flow,** Fallow n= 0.050 P2= 3.40"
2.6	180	0.0050	1.14		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.5	230	Total			

Subcatchment 6S: Flow to Basin 3



Summary for Subcatchment 7S: (new Subcat)

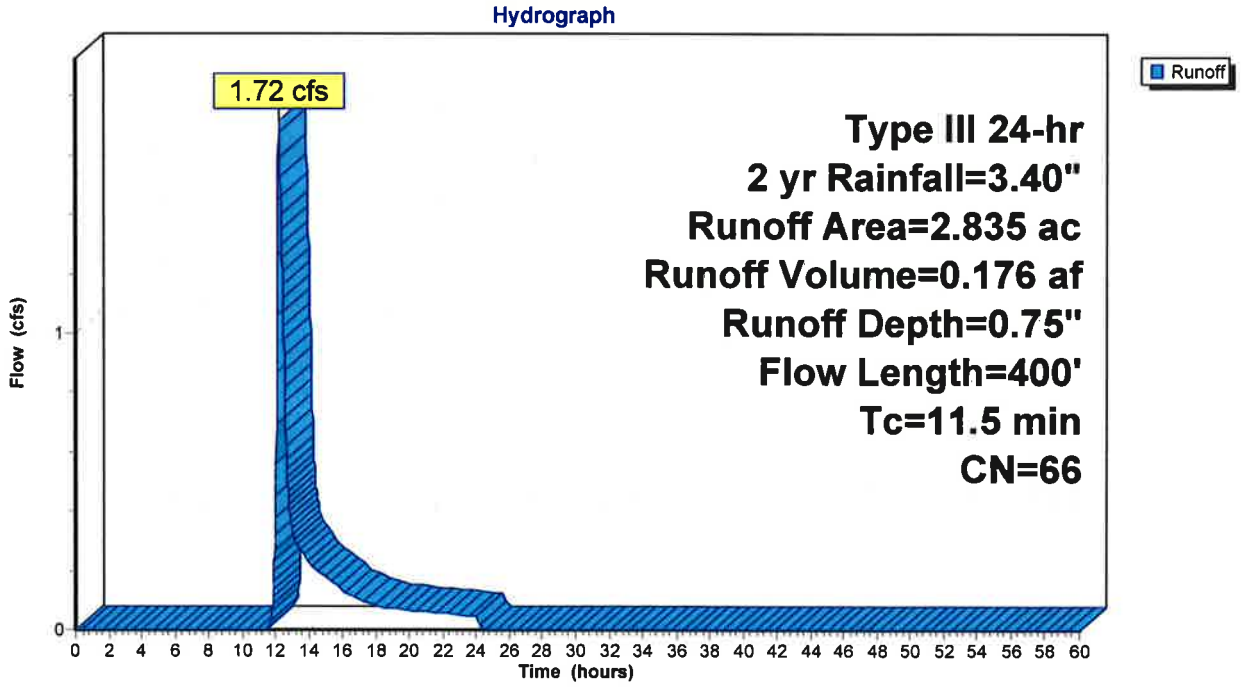
Runoff = 1.72 cfs @ 12.18 hrs, Volume= 0.176 af, Depth= 0.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 yr Rainfall=3.40"

Area (ac)	CN	Description
0.619	96	Gravel surface, HSG B
0.025	96	Gravel surface, HSG A
1.227	60	Woods, Fair, HSG B
0.313	36	Woods, Fair, HSG A
0.619	61	>75% Grass cover, Good, HSG B
0.032	39	>75% Grass cover, Good, HSG A
2.835	66	Weighted Average
2.835		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
3.2	350	0.0130	1.84		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.5	400	Total			

Subcatchment 7S: (new Subcat)



Summary for Subcatchment 8S: Gravel road flow to Basin 4

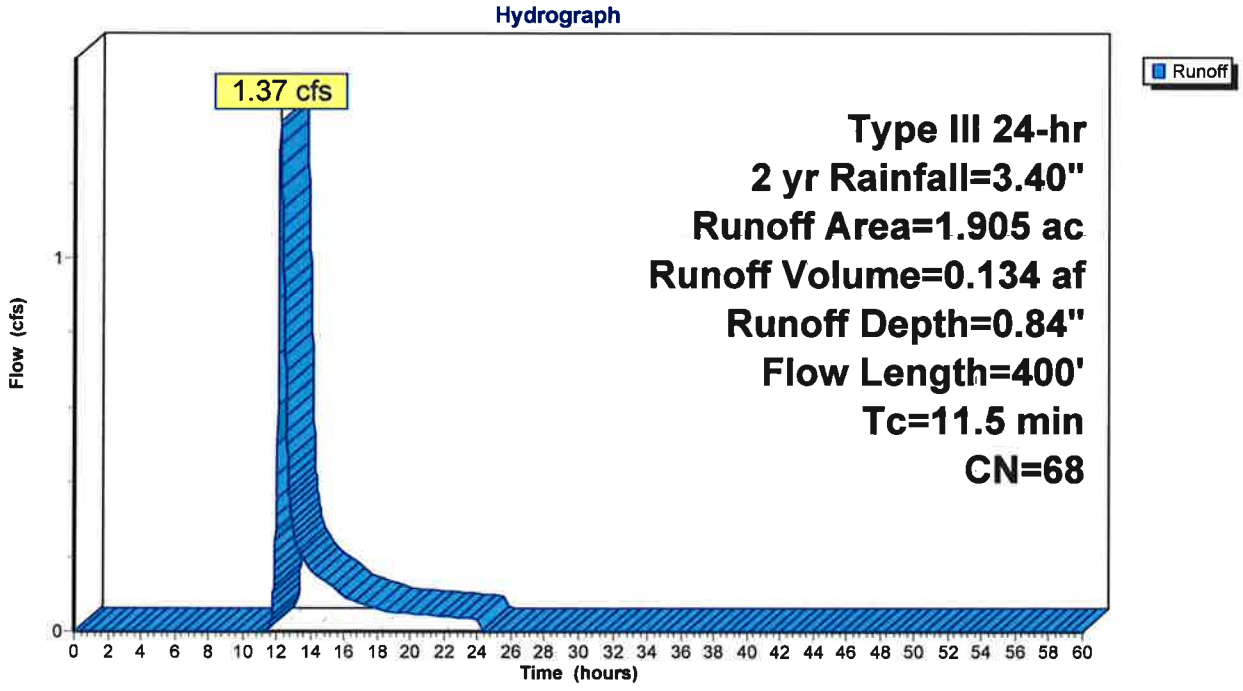
Runoff = 1.37 cfs @ 12.18 hrs, Volume= 0.134 af, Depth= 0.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 yr Rainfall=3.40"

Area (ac)	CN	Description
0.964	96	Gravel surface, HSG A
0.941	39	>75% Grass cover, Good, HSG A
1.905	68	Weighted Average
1.905		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
3.2	350	0.0130	1.84		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.5	400	Total			

Subcatchment 8S: Gravel road flow to Basin 4



Summary for Pond 1P: Infiltration Basin 1

Inflow Area = 19.031 ac, 0.00% Impervious, Inflow Depth = 1.85" for 2 yr event
Inflow = 34.81 cfs @ 12.16 hrs, Volume= 2.936 af
Outflow = 6.38 cfs @ 12.72 hrs, Volume= 2.936 af, Atten= 82%, Lag= 33.7 min
Discarded = 4.89 cfs @ 12.72 hrs, Volume= 2.787 af
Primary = 1.49 cfs @ 12.72 hrs, Volume= 0.148 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Peak Elev= 62.88' @ 12.72 hrs Surf.Area= 25,544 sf Storage= 43,468 cf

Plug-Flow detention time= 66.0 min calculated for 2.935 af (100% of inflow)
Center-of-Mass det. time= 65.9 min (897.5 - 831.5)

Volume	Invert	Avail.Storage	Storage Description
#1	61.00'	136,228 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

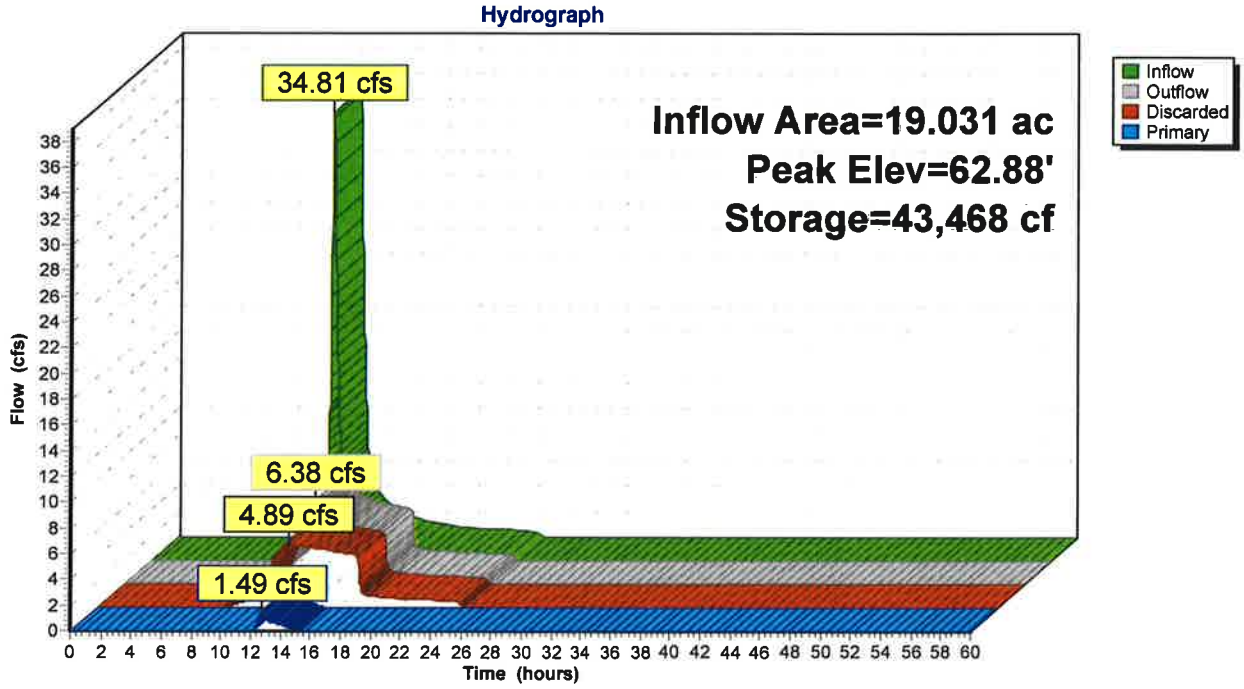
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
61.00	20,824	830.0	0	0	20,824
62.00	23,334	850.0	22,067	22,067	23,627
64.00	28,525	885.0	51,772	73,839	28,761
66.00	33,942	920.0	62,389	136,228	34,103

Device	Routing	Invert	Outlet Devices
#1	Discarded	61.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	61.00'	**18.0" Round Culvert** L= 50.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 61.00' / 60.00' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	62.00'	**6.0" Vert. 6"** C= 0.600
#4	Device 2	62.75'	**5.0' long x 3.25' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.7' Crest Height
#5	Primary	65.00'	**12.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=4.89 cfs @ 12.72 hrs HW=62.88' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 4.89 cfs)

Primary OutFlow Max=1.48 cfs @ 12.72 hrs HW=62.88' (Free Discharge)
├**2=Culvert** (Passes 1.48 cfs of 7.97 cfs potential flow)
│ ├**3=6"** (Orifice Controls 0.75 cfs @ 3.81 fps)
│ └**4=Sharp-Crested Rectangular Weir** (Weir Controls 0.73 cfs @ 1.17 fps)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Infiltration Basin 1



Summary for Pond 2P: Infiltration Basin 2

Inflow Area = 6.521 ac, 0.00% Impervious, Inflow Depth = 0.70" for 2 yr event
Inflow = 3.13 cfs @ 12.28 hrs, Volume= 0.380 af
Outflow = 1.46 cfs @ 12.69 hrs, Volume= 0.380 af, Atten= 53%, Lag= 24.5 min
Discarded = 1.46 cfs @ 12.69 hrs, Volume= 0.380 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Peak Elev= 64.32' @ 12.69 hrs Surf.Area= 7,634 sf Storage= 2,385 cf

Plug-Flow detention time= 10.5 min calculated for 0.380 af (100% of inflow)
Center-of-Mass det. time= 10.5 min (910.2 - 899.7)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	40,142 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

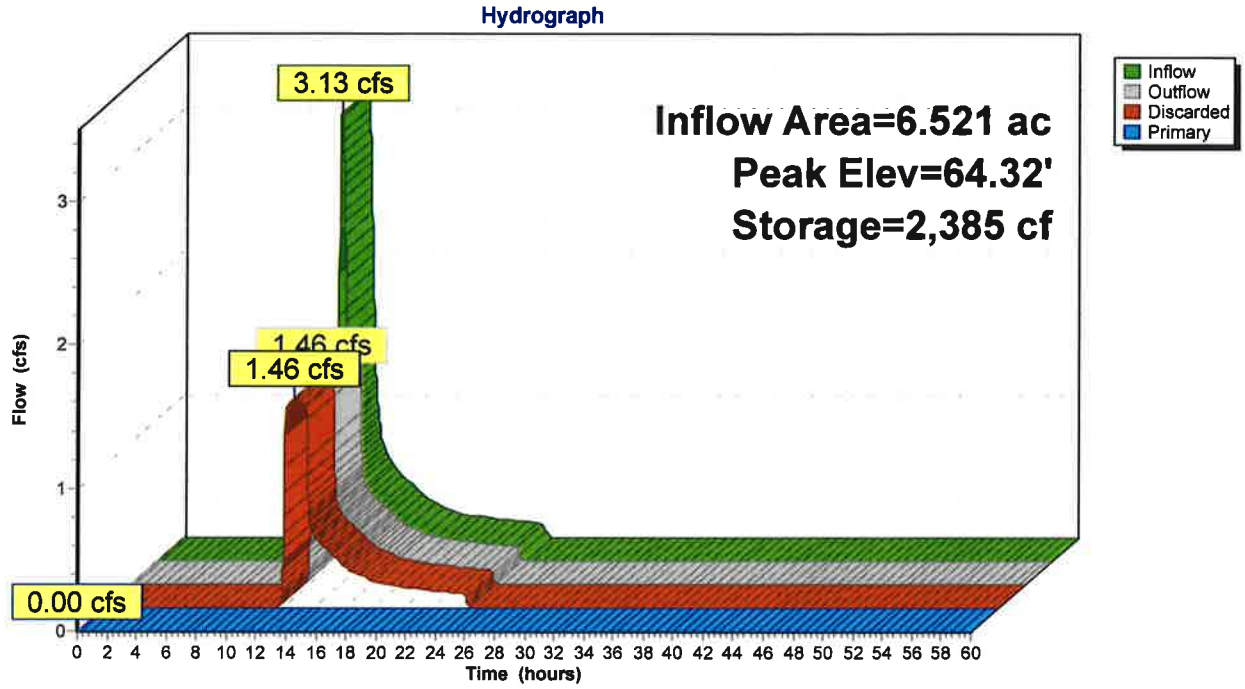
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
64.00	7,215	448.0	0	0	7,215
66.00	10,015	486.0	17,154	17,154	10,190
68.00	13,040	523.0	22,989	40,142	13,327

Device	Routing	Invert	Outlet Devices
#1	Discarded	64.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	64.00'	**12.0" Round Culvert** L= 50.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 64.00' / 63.00' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	65.00'	**6.0" Vert. 6" ORIFICE** C= 0.600
#4	Device 2	67.00'	**2.0' long x 2.00' rise 24" WIDE RECT WEIR** 2 End Contraction(s) 3.0' Crest Height

Discarded OutFlow Max=1.46 cfs @ 12.69 hrs HW=64.32' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 1.46 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=64.00' (Free Discharge)
↑**2=Culvert** (Controls 0.00 cfs)
↑**3=6" ORIFICE** (Controls 0.00 cfs)
4=24" WIDE RECT WEIR (Controls 0.00 cfs)

Pond 2P: Infiltration Basin 2



Summary for Pond 3P: Infiltration Basin 3

Inflow Area = 1.788 ac, 0.00% Impervious, Inflow Depth = 1.36" for 2 yr event
Inflow = 2.73 cfs @ 12.10 hrs, Volume= 0.202 af
Outflow = 0.47 cfs @ 12.62 hrs, Volume= 0.202 af, Atten= 83%, Lag= 31.3 min
Discarded = 0.47 cfs @ 12.62 hrs, Volume= 0.202 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Peak Elev= 65.57' @ 12.62 hrs Surf.Area= 4,778 sf Storage= 2,581 cf

Plug-Flow detention time= 40.9 min calculated for 0.202 af (100% of inflow)
Center-of-Mass det. time= 40.9 min (890.4 - 849.5)

Volume	Invert	Avail.Storage	Storage Description
#1	65.00'	16,909 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

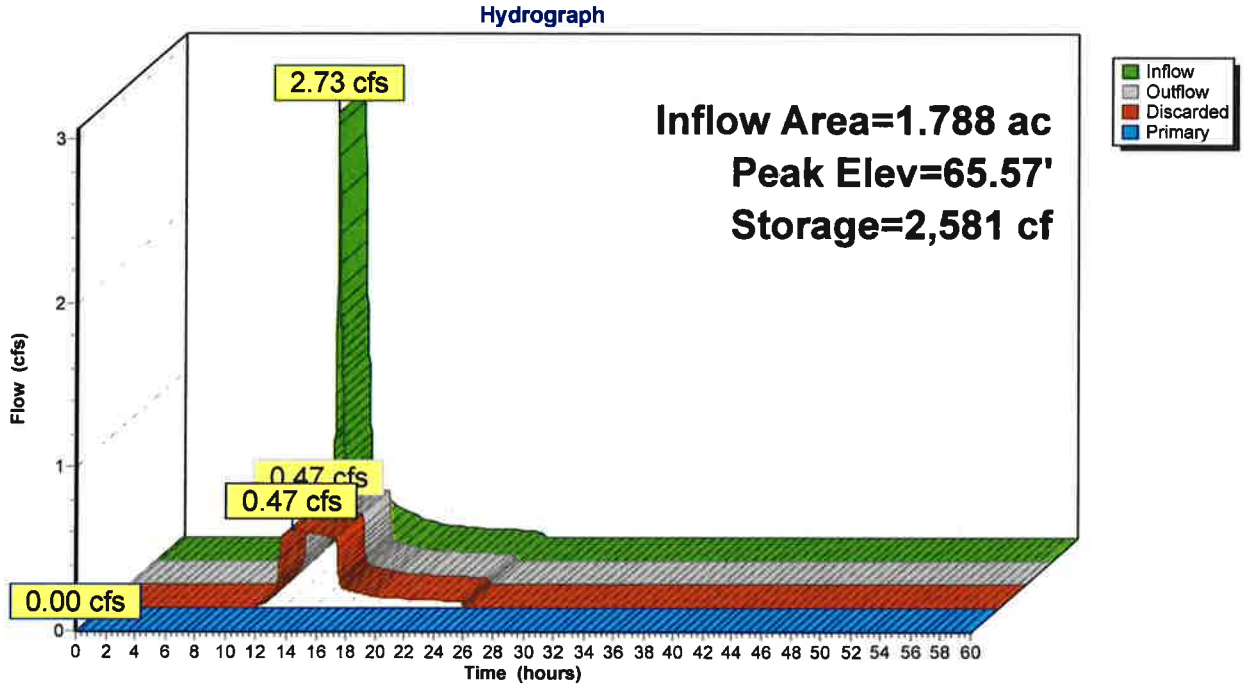
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
65.00	4,305	280.0	0	0	4,305
68.00	7,082	340.0	16,909	16,909	7,408

Device	Routing	Invert	Outlet Devices
#1	Discarded	65.00'	**4.270 in/hr Exfiltration over Surface area**
#2	Primary	67.00'	**3.0' long x 15.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.47 cfs @ 12.62 hrs HW=65.57' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.47 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=65.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Infiltration Basin 3



Summary for Pond 4P: Infiltration Basin 4

Inflow Area = 1.905 ac, 0.00% Impervious, Inflow Depth = 0.84" for 2 yr event
Inflow = 1.37 cfs @ 12.18 hrs, Volume= 0.134 af
Outflow = 0.96 cfs @ 12.36 hrs, Volume= 0.134 af, Atten= 30%, Lag= 11.0 min
Discarded = 0.96 cfs @ 12.36 hrs, Volume= 0.134 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Peak Elev= 60.06' @ 12.36 hrs Surf.Area= 5,000 sf Storage= 320 cf

Plug-Flow detention time= 2.5 min calculated for 0.134 af (100% of inflow)
Center-of-Mass det. time= 2.5 min (885.8 - 883.4)

Volume	Invert	Avail.Storage	Storage Description
#1	60.00'	12,075 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

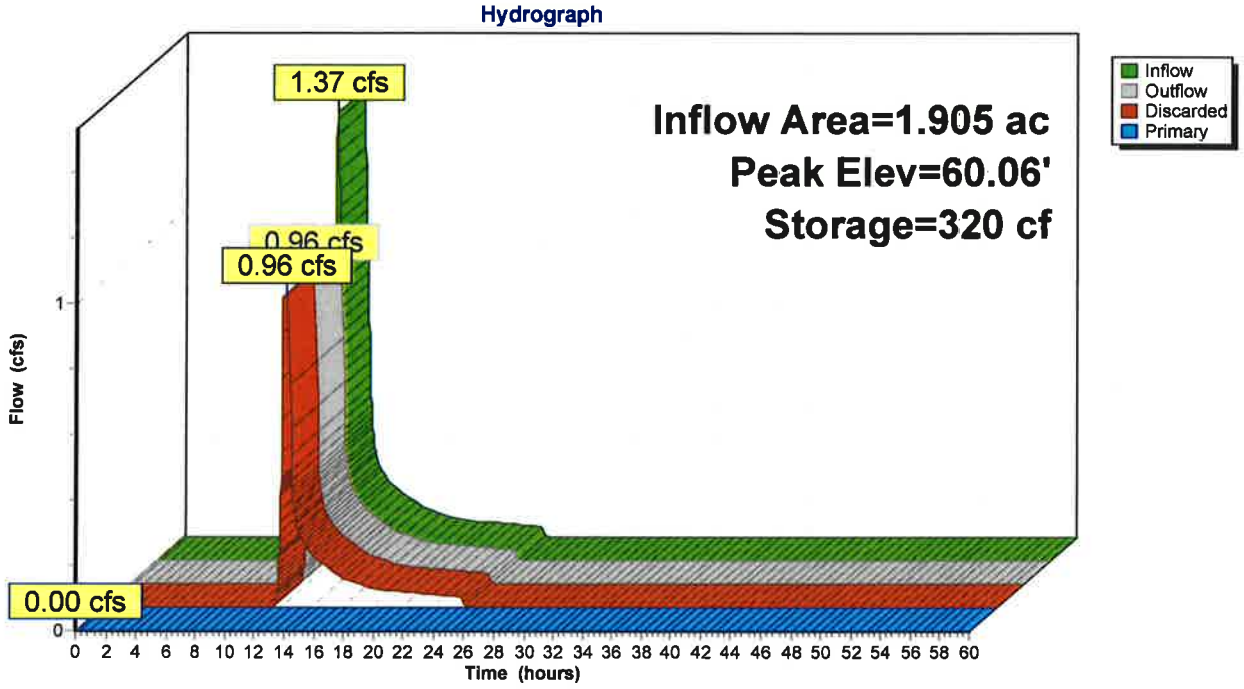
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
60.00	4,933	361.0	0	0	4,933
62.00	7,214	399.0	12,075	12,075	7,354

Device	Routing	Invert	Outlet Devices
#1	Discarded	60.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	61.50'	**5.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.96 cfs @ 12.36 hrs HW=60.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.96 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=60.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4P: Infiltration Basin 4



Summary for Pond 5P: Infiltration Basin 5

Inflow Area = 2.835 ac, 0.00% Impervious, Inflow Depth = 0.75" for 2 yr event
Inflow = 1.72 cfs @ 12.18 hrs, Volume= 0.176 af
Outflow = 0.63 cfs @ 12.62 hrs, Volume= 0.176 af, Atten= 64%, Lag= 26.0 min
Discarded = 0.63 cfs @ 12.62 hrs, Volume= 0.176 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Peak Elev= 60.43' @ 12.62 hrs Surf.Area= 3,270 sf Storage= 1,325 cf

Plug-Flow detention time= 12.3 min calculated for 0.176 af (100% of inflow)
Center-of-Mass det. time= 12.3 min (903.0 - 890.8)

Volume	Invert	Avail.Storage	Storage Description
#1	60.00'	7,762 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

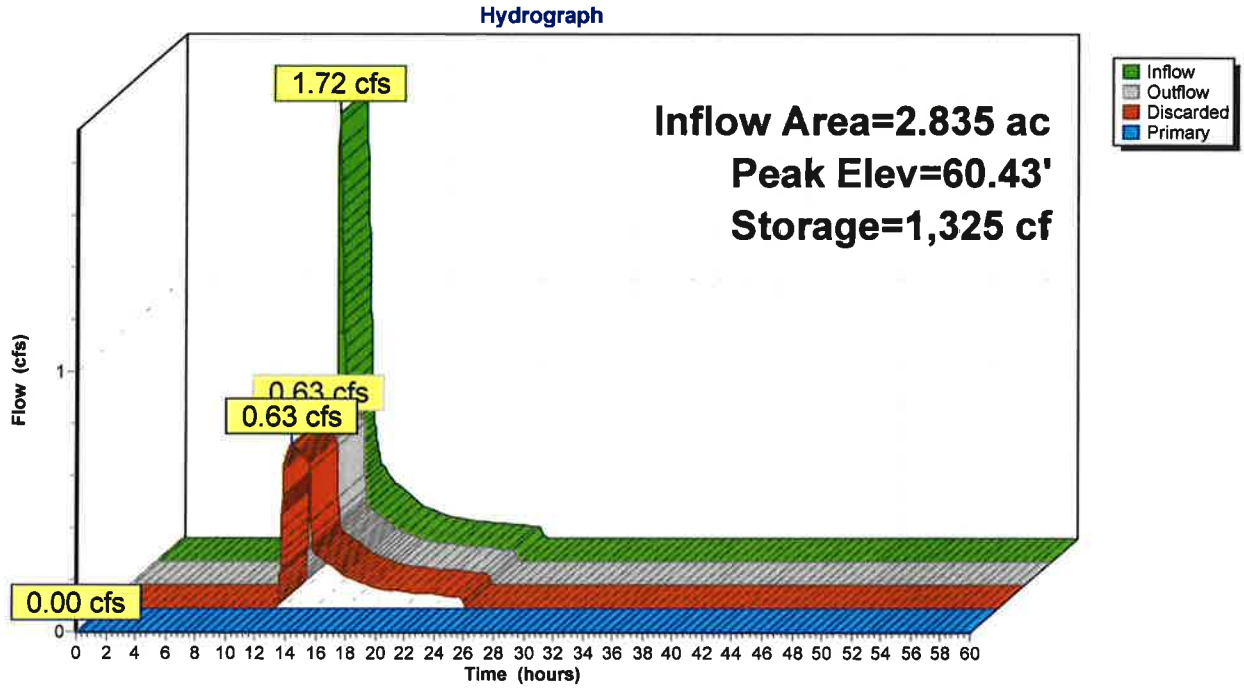
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
60.00	2,855	340.0	0	0	2,855
62.00	5,007	377.0	7,762	7,762	5,085

Device	Routing	Invert	Outlet Devices
#1	Discarded	60.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	61.50'	**10.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.63 cfs @ 12.62 hrs HW=60.43' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.63 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=60.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: Infiltration Basin 5

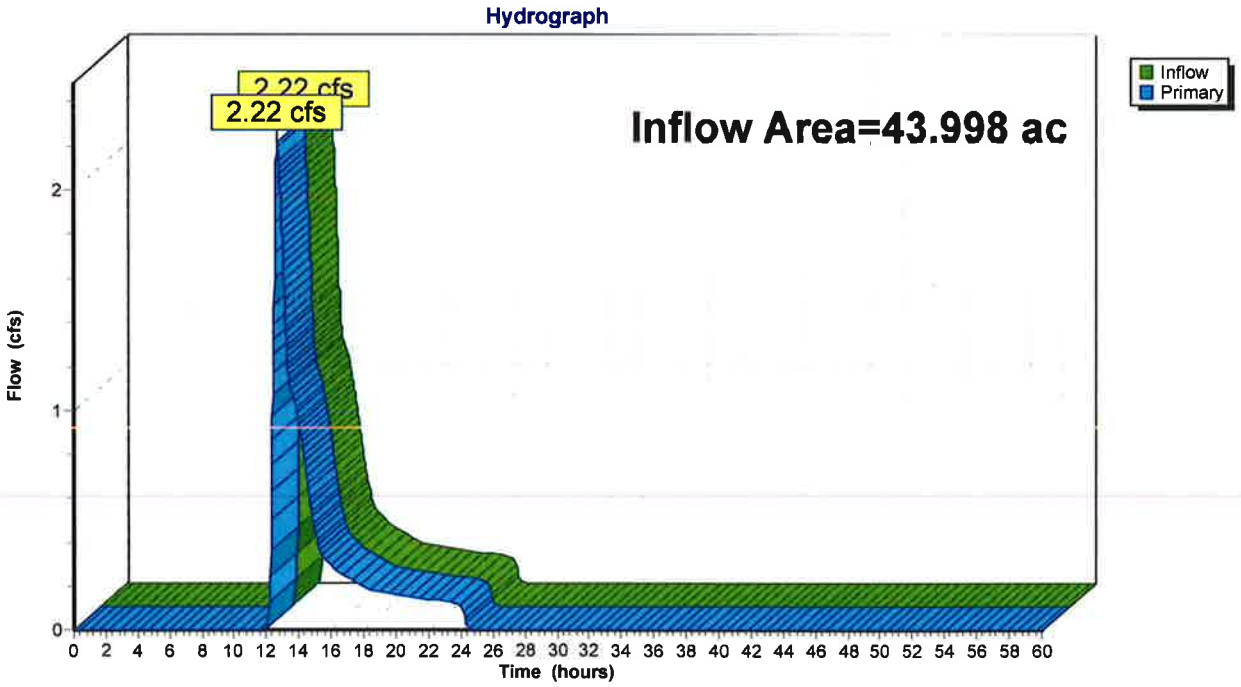


Summary for Link 1L: Wetlands-North

Inflow Area = 43.998 ac, 0.00% Impervious, Inflow Depth = 0.11" for 2 yr event
Inflow = 2.22 cfs @ 12.67 hrs, Volume= 0.405 af
Primary = 2.22 cfs @ 12.67 hrs, Volume= 0.405 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs

Link 1L: Wetlands-North

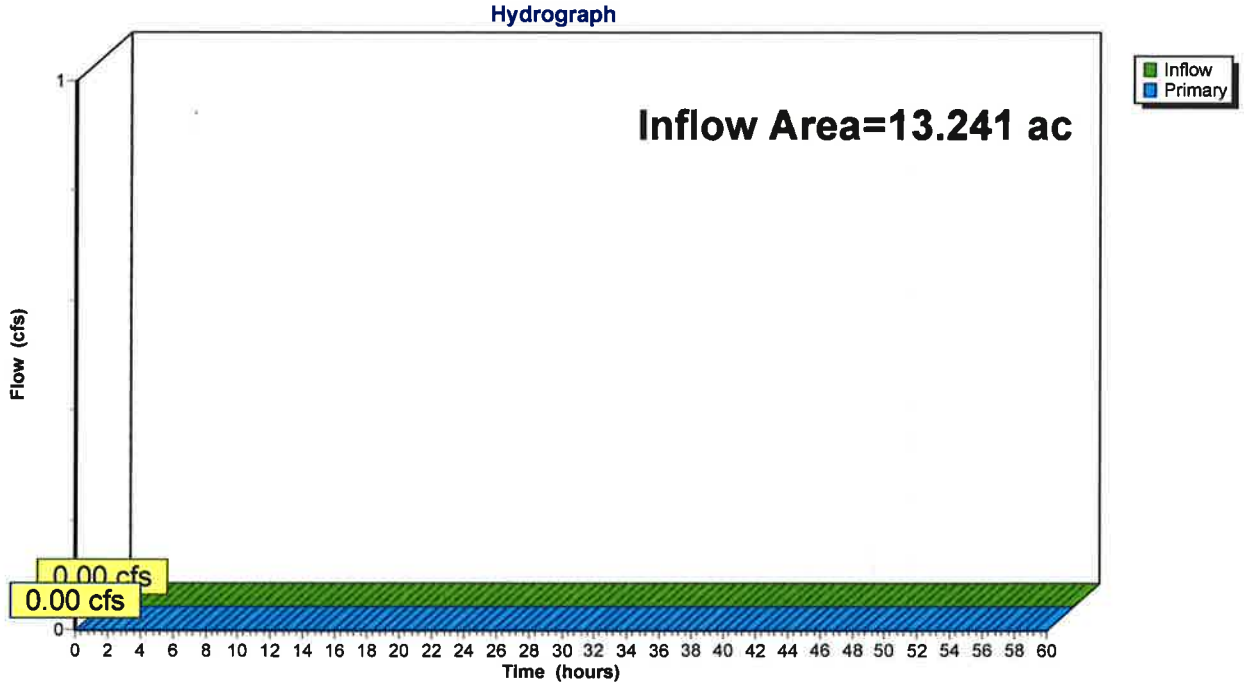


Summary for Link 2L: Wetlands-SW

Inflow Area = 13.241 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2 yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs

Link 2L: Wetlands-SW

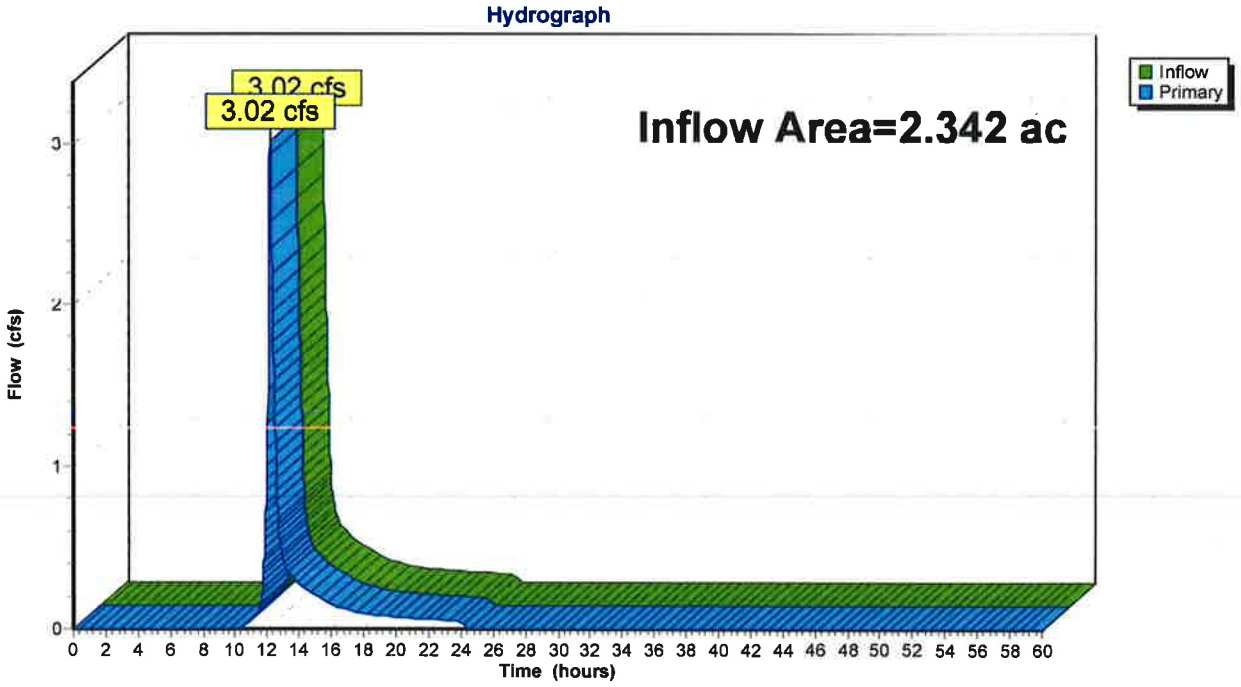


Summary for Link 3L: Wetlands-East

Inflow Area = 2.342 ac, 0.00% Impervious, Inflow Depth = 1.29" for 2 yr event
Inflow = 3.02 cfs @ 12.15 hrs, Volume= 0.252 af
Primary = 3.02 cfs @ 12.15 hrs, Volume= 0.252 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs

Link 3L: Wetlands-East



Summary for Subcatchment 1S: Remaining Flow to Wetlands North

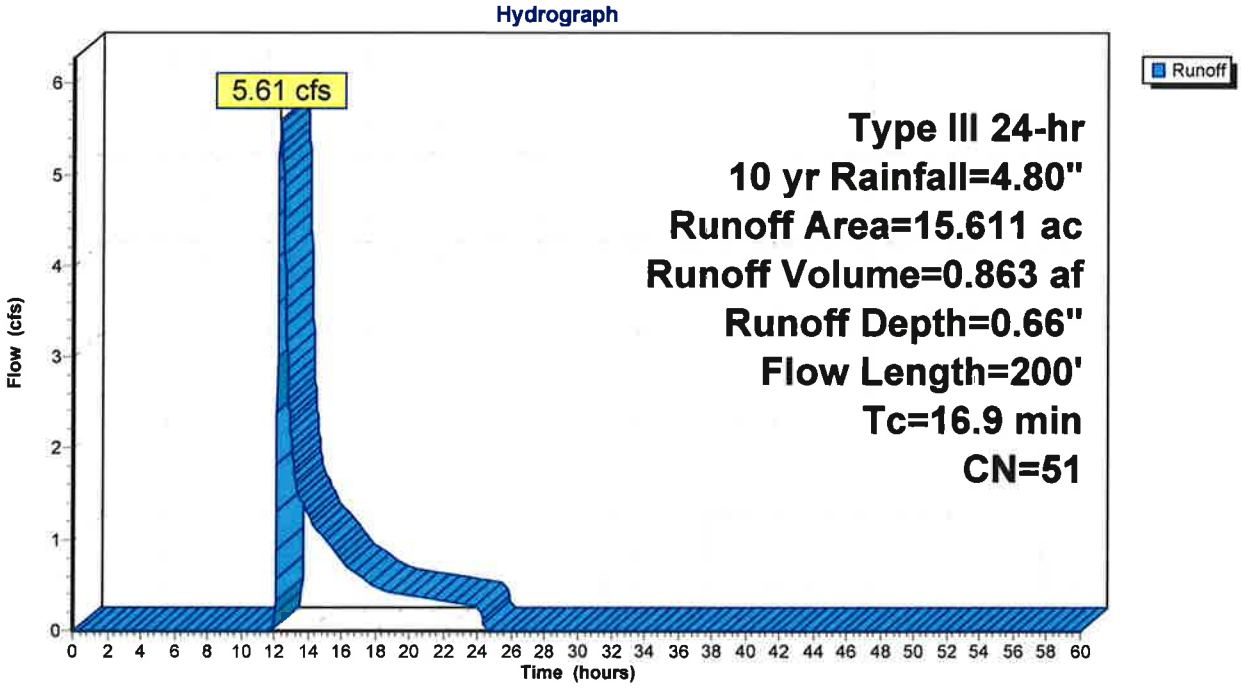
Runoff = 5.61 cfs @ 12.34 hrs, Volume= 0.863 af, Depth= 0.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 yr Rainfall=4.80"

Area (ac)	CN	Description
7.591	36	Woods, Fair, HSG A
5.520	60	Woods, Fair, HSG B
0.845	73	Woods, Fair, HSG C
1.655	79	Woods, Fair, HSG D
15.611	51	Weighted Average
15.611		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.1	150	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.9	200	Total			

Subcatchment 1S: Remaining Flow to Wetlands North



Summary for Subcatchment 2S: Remaining Flow to Wetlands-SW

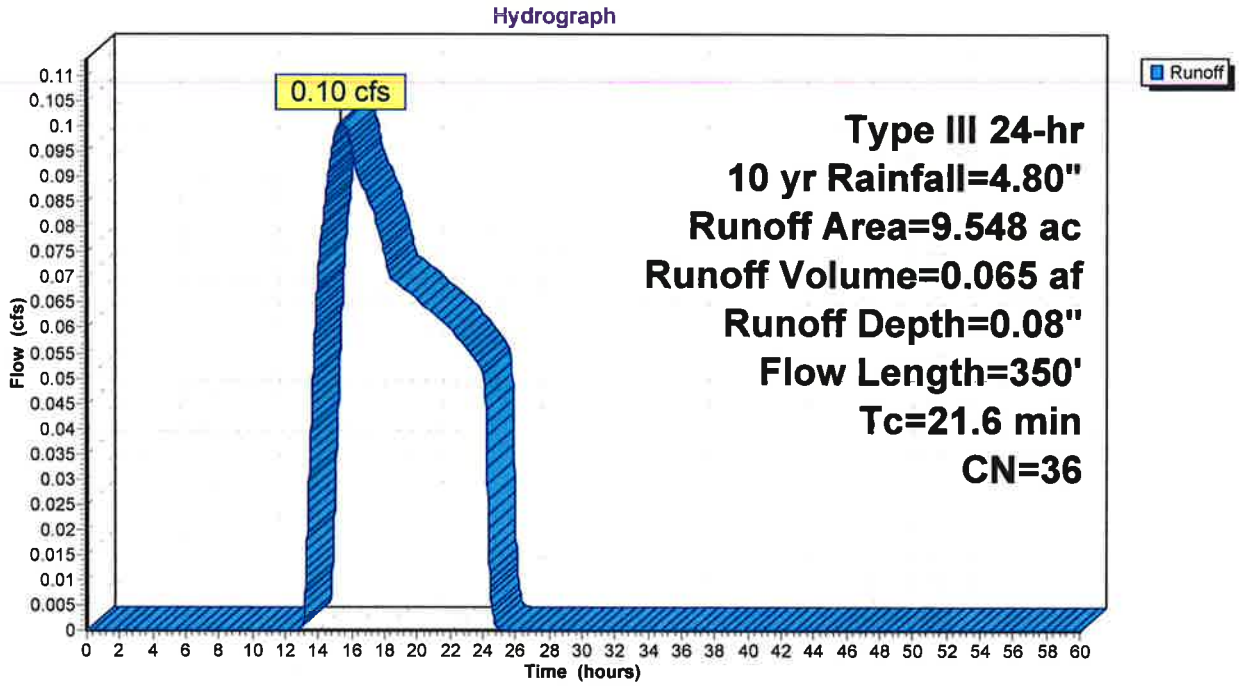
Runoff = 0.10 cfs @ 15.38 hrs, Volume= 0.065 af, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 yr Rainfall=4.80"

Area (ac)	CN	Description
0.106	60	Woods, Fair, HSG B
9.442	36	Woods, Fair, HSG A
9.548	36	Weighted Average
9.548		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
5.8	300	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.6	350	Total			

Subcatchment 2S: Remaining Flow to Wetlands-SW



Summary for Subcatchment 3S: Flow to Wetlands East

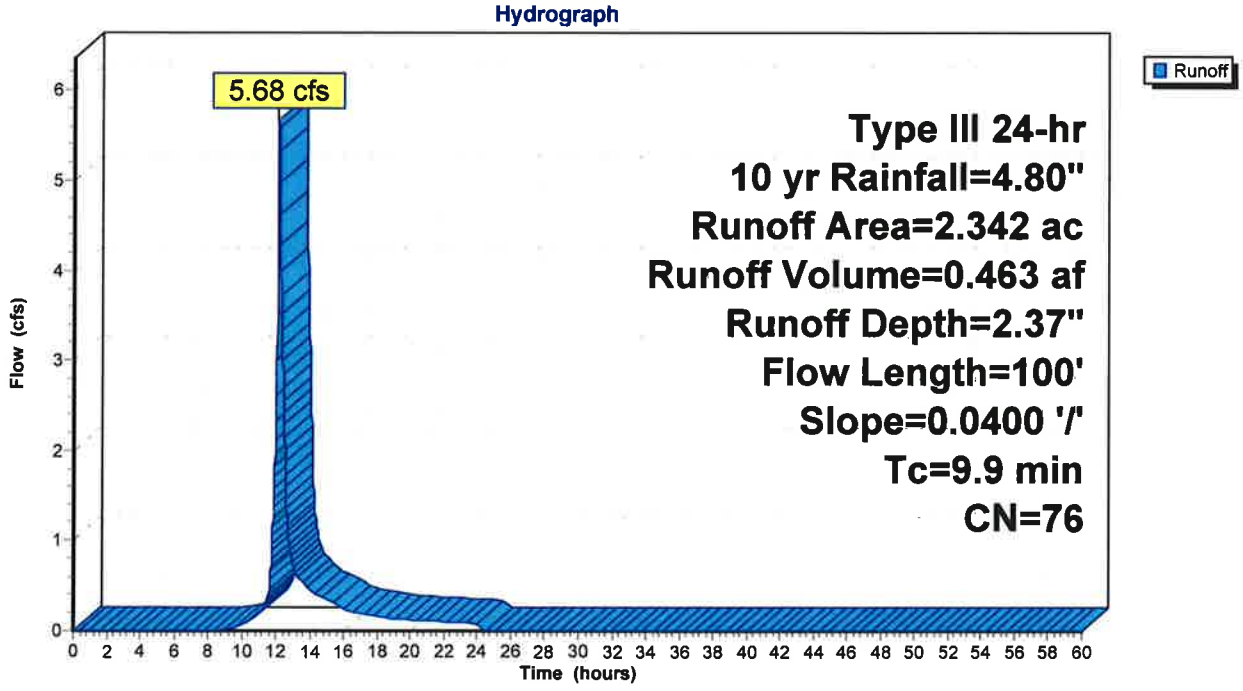
Runoff = 5.68 cfs @ 12.14 hrs, Volume= 0.463 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 yr Rainfall=4.80"

Area (ac)	CN	Description
0.021	60	Woods, Fair, HSG B
1.169	73	Woods, Fair, HSG C
1.152	79	Woods, Fair, HSG D
2.342	76	Weighted Average
2.342		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	50	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.9	100	Total			

Subcatchment 3S: Flow to Wetlands East



Summary for Subcatchment 4S: Flow to Basin 1

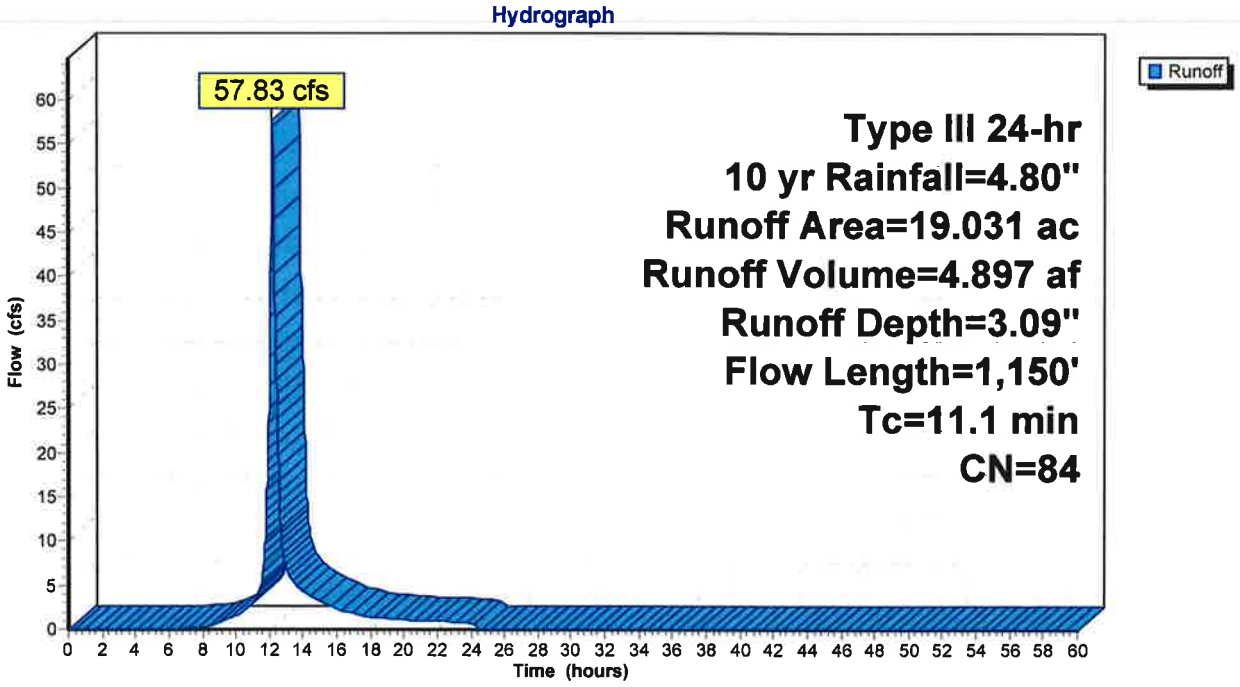
Runoff = 57.83 cfs @ 12.15 hrs, Volume= 4.897 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 yr Rainfall=4.80"

Area (ac)	CN	Description
8.324	77	Newly graded area, HSG A
4.083	86	Newly graded area, HSG B
6.394	91	Newly graded area, HSG C
0.230	94	Newly graded area, HSG D
19.031	84	Weighted Average
19.031		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	50	0.0100	0.28		**Sheet Flow,** Fallow n= 0.050 P2= 3.40"
8.1	1,100	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.1	1,150	Total			

Subcatchment 4S: Flow to Basin 1



Summary for Subcatchment 5S: Flow to Basin 2

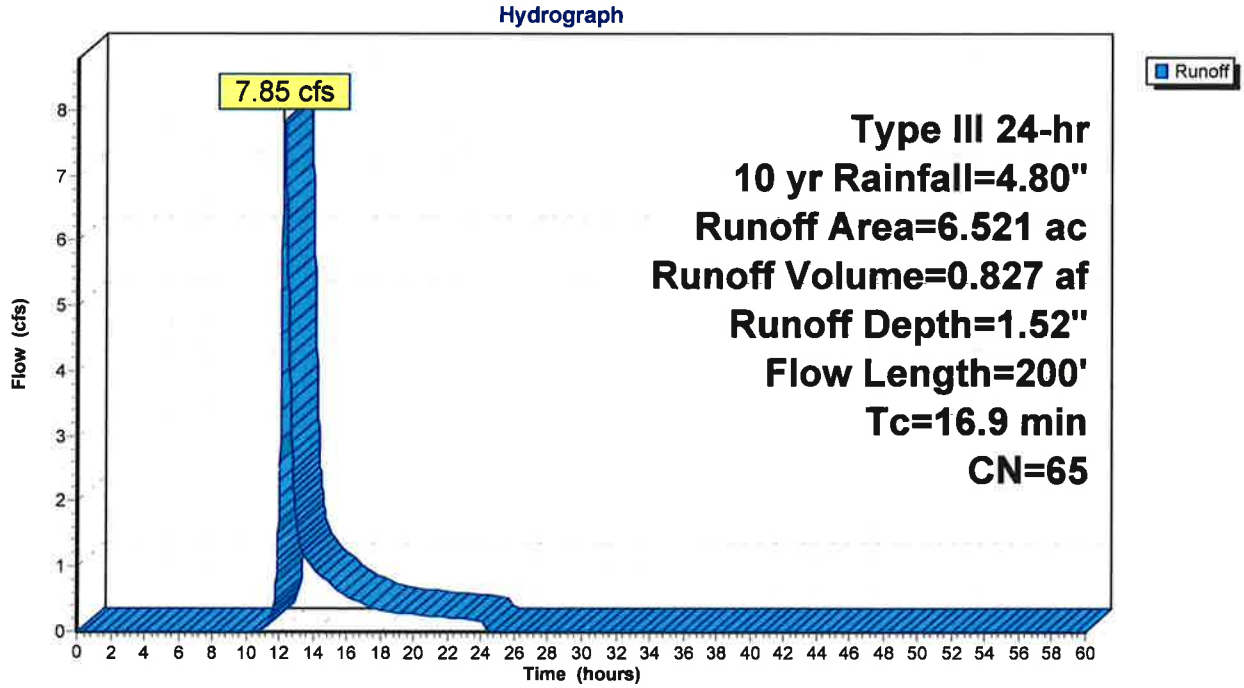
Runoff = 7.85 cfs @ 12.25 hrs, Volume= 0.827 af, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 yr Rainfall=4.80"

Area (ac)	CN	Description
0.193	36	Woods, Fair, HSG A
3.772	60	Woods, Fair, HSG B
1.895	73	Woods, Fair, HSG C
0.661	79	Woods, Fair, HSG D
6.521	65	Weighted Average
6.521		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.1	150	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.9	200	Total			

Subcatchment 5S: Flow to Basin 2



Summary for Subcatchment 6S: Flow to Basin 3

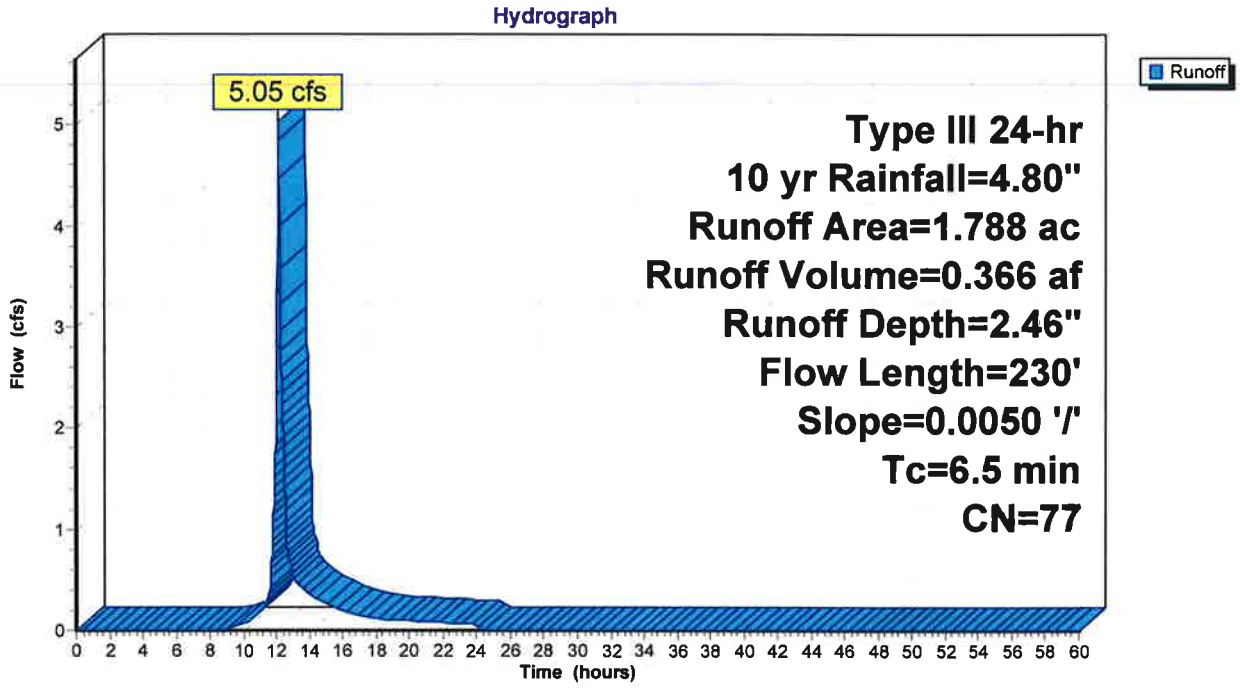
Runoff = 5.05 cfs @ 12.10 hrs, Volume= 0.366 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 yr Rainfall=4.80"

Area (ac)	CN	Description
0.070	86	Newly graded area, HSG B
1.718	77	Newly graded area, HSG A
1.788	77	Weighted Average
1.788		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0050	0.21		**Sheet Flow,** Fallow n= 0.050 P2= 3.40"
2.6	180	0.0050	1.14		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.5	230	Total			

Subcatchment 6S: Flow to Basin 3



Summary for Subcatchment 7S: (new Subcat)

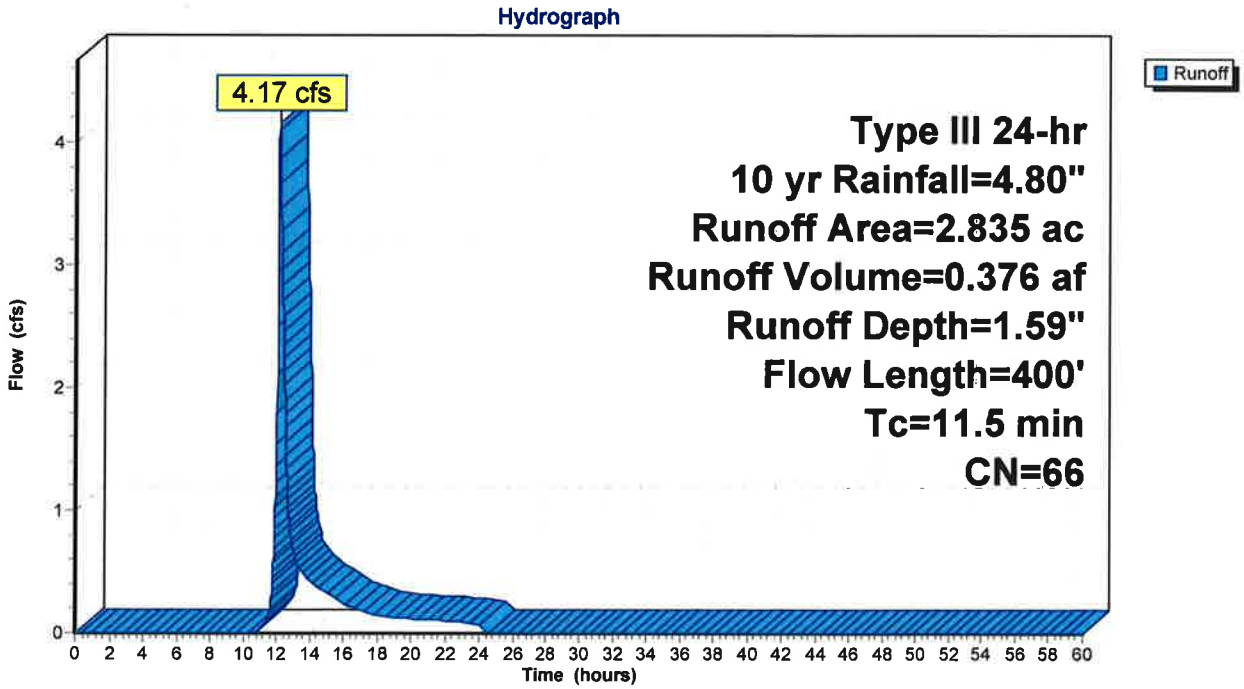
Runoff = 4.17 cfs @ 12.17 hrs, Volume= 0.376 af, Depth= 1.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 yr Rainfall=4.80"

Area (ac)	CN	Description
0.619	96	Gravel surface, HSG B
0.025	96	Gravel surface, HSG A
1.227	60	Woods, Fair, HSG B
0.313	36	Woods, Fair, HSG A
0.619	61	>75% Grass cover, Good, HSG B
0.032	39	>75% Grass cover, Good, HSG A
2.835	66	Weighted Average
2.835		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
3.2	350	0.0130	1.84		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.5	400	Total			

Subcatchment 7S: (new Subcat)



Summary for Subcatchment 8S: Gravel road flow to Basin 4

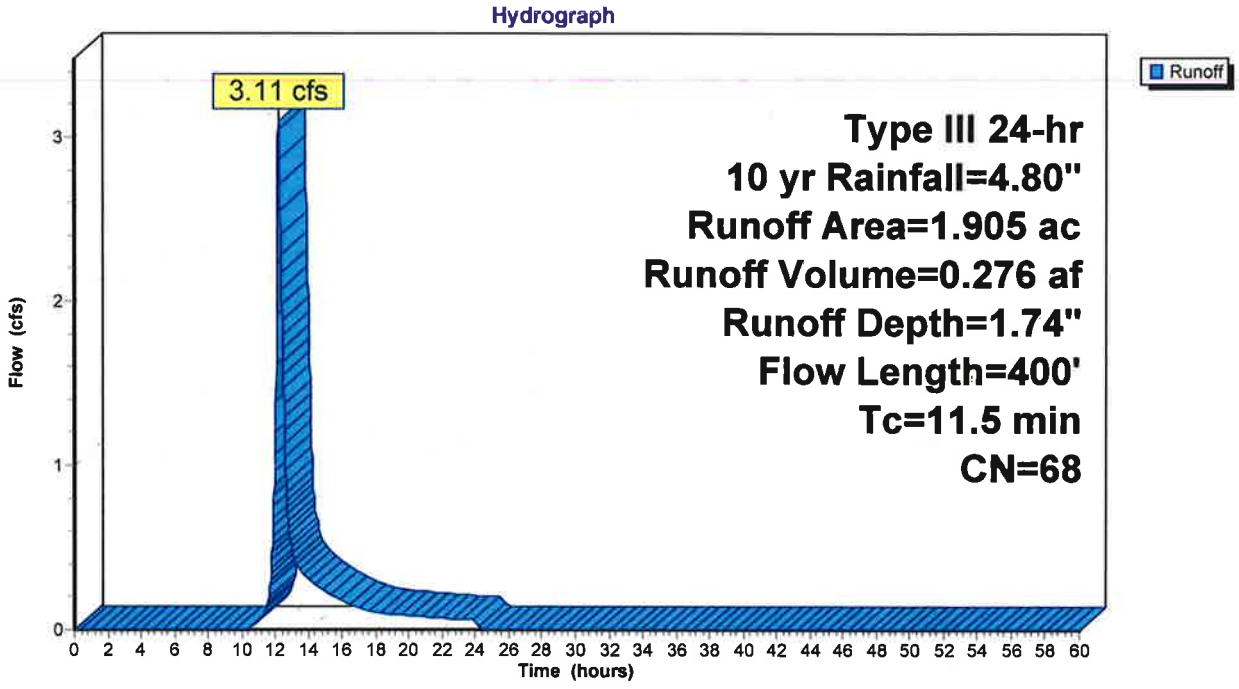
Runoff = 3.11 cfs @ 12.17 hrs, Volume= 0.276 af, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 yr Rainfall=4.80"

Area (ac)	CN	Description
0.964	96	Gravel surface, HSG A
0.941	39	>75% Grass cover, Good, HSG A
1.905	68	Weighted Average
1.905		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
3.2	350	0.0130	1.84		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.5	400	Total			

Subcatchment 8S: Gravel road flow to Basin 4



Summary for Pond 1P: Infiltration Basin 1

Inflow Area = 19.031 ac, 0.00% Impervious, Inflow Depth = 3.09" for 10 yr event
Inflow = 57.83 cfs @ 12.15 hrs, Volume= 4.897 af
Outflow = 16.19 cfs @ 12.57 hrs, Volume= 4.897 af, Atten= 72%, Lag= 25.2 min
Discarded = 5.37 cfs @ 12.57 hrs, Volume= 3.729 af
Primary = 10.82 cfs @ 12.57 hrs, Volume= 1.169 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Peak Elev= 63.83' @ 12.57 hrs Surf.Area= 28,059 sf Storage= 68,984 cf

Plug-Flow detention time= 64.1 min calculated for 4.896 af (100% of inflow)
Center-of-Mass det. time= 64.1 min (881.0 - 816.9)

Volume	Invert	Avail.Storage	Storage Description
#1	61.00'	136,228 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

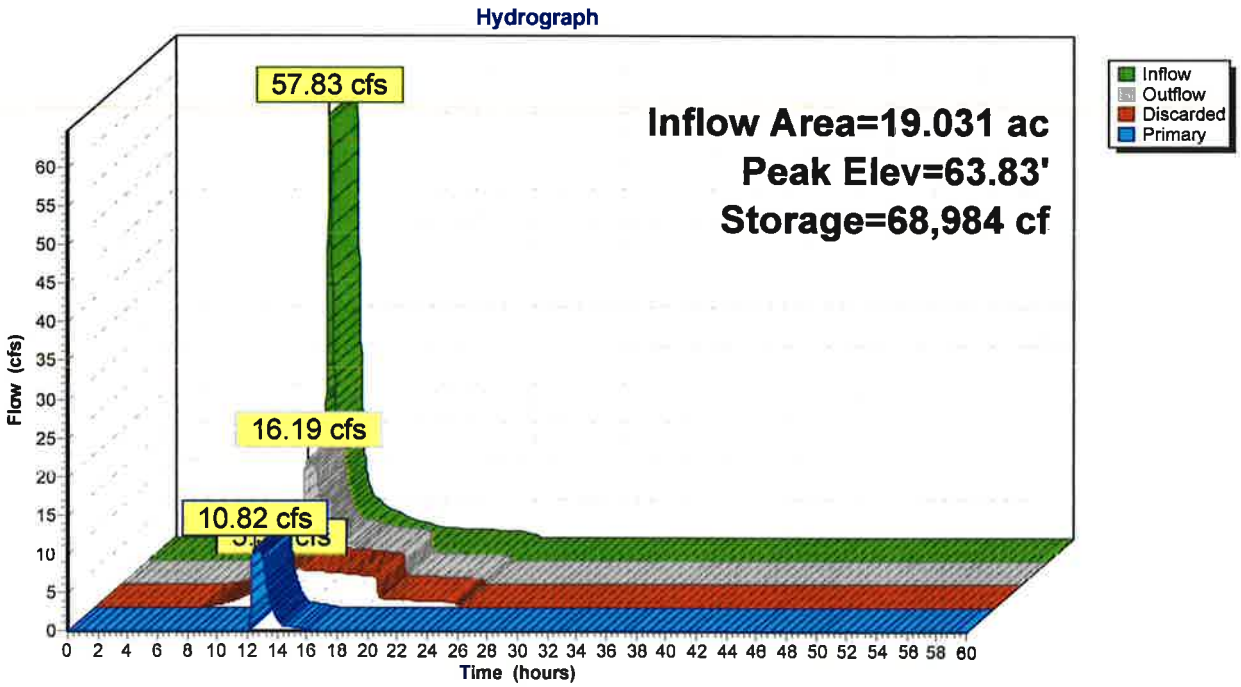
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
61.00	20,824	830.0	0	0	20,824
62.00	23,334	850.0	22,067	22,067	23,627
64.00	28,525	885.0	51,772	73,839	28,761
66.00	33,942	920.0	62,389	136,228	34,103

Device	Routing	Invert	Outlet Devices
#1	Discarded	61.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	61.00'	**18.0" Round Culvert** L= 50.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 61.00' / 60.00' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	62.00'	**6.0" Vert. 6"** C= 0.600
#4	Device 2	62.75'	**5.0' long x 3.25' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.7' Crest Height
#5	Primary	65.00'	**12.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=5.37 cfs @ 12.57 hrs HW=63.83' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 5.37 cfs)

Primary OutFlow Max=10.82 cfs @ 12.57 hrs HW=63.83' (Free Discharge)
├─**2=Culvert** (Inlet Controls 10.82 cfs @ 6.12 fps)
│ └─**3=6"** (Passes < 1.19 cfs potential flow)
│ └─**4=Sharp-Crested Rectangular Weir** (Passes < 18.87 cfs potential flow)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Infiltration Basin 1



Summary for Pond 2P: Infiltration Basin 2

Inflow Area = 6.521 ac, 0.00% Impervious, Inflow Depth = 1.52" for 10 yr event
Inflow = 7.85 cfs @ 12.25 hrs, Volume= 0.827 af
Outflow = 1.93 cfs @ 12.89 hrs, Volume= 0.827 af, Atten= 75%, Lag= 38.3 min
Discarded = 1.72 cfs @ 12.89 hrs, Volume= 0.812 af
Primary = 0.21 cfs @ 12.89 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Peak Elev= 65.28' @ 12.89 hrs Surf.Area= 8,961 sf Storage= 10,372 cf

Plug-Flow detention time= 48.0 min calculated for 0.827 af (100% of inflow)
Center-of-Mass det. time= 48.0 min (921.5 - 873.6)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	40,142 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

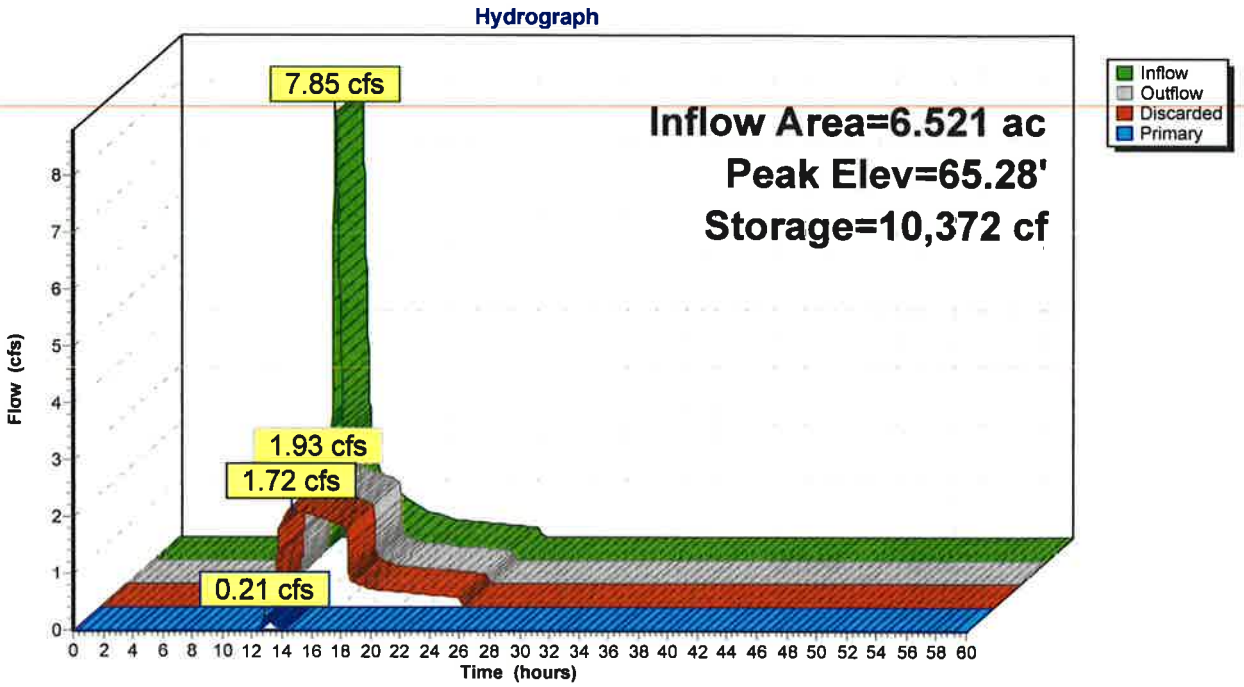
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
64.00	7,215	448.0	0	0	7,215
66.00	10,015	486.0	17,154	17,154	10,190
68.00	13,040	523.0	22,989	40,142	13,327

Device	Routing	Invert	Outlet Devices
#1	Discarded	64.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	64.00'	**12.0" Round Culvert** L= 50.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 64.00' / 63.00' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	65.00'	**6.0" Vert. 6" ORIFICE** C= 0.600
#4	Device 2	67.00'	**2.0' long x 2.00' rise 24" WIDE RECT WEIR** 2 End Contraction(s) 3.0' Crest Height

Discarded OutFlow Max=1.72 cfs @ 12.89 hrs HW=65.28' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 1.72 cfs)

Primary OutFlow Max=0.21 cfs @ 12.89 hrs HW=65.28' (Free Discharge)
↑**2=Culvert** (Passes 0.21 cfs of 2.96 cfs potential flow)
↑**3=6" ORIFICE** (Orifice Controls 0.21 cfs @ 1.82 fps)
4=24" WIDE RECT WEIR (Controls 0.00 cfs)

Pond 2P: Infiltration Basin 2



Summary for Pond 3P: Infiltration Basin 3

Inflow Area = 1.788 ac, 0.00% Impervious, Inflow Depth = 2.46" for 10 yr event
Inflow = 5.05 cfs @ 12.10 hrs, Volume= 0.366 af
Outflow = 0.53 cfs @ 13.00 hrs, Volume= 0.366 af, Atten= 89%, Lag= 54.3 min
Discarded = 0.53 cfs @ 13.00 hrs, Volume= 0.366 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Peak Elev= 66.25' @ 13.00 hrs Surf.Area= 5,379 sf Storage= 6,043 cf

Plug-Flow detention time= 102.8 min calculated for 0.366 af (100% of inflow)
Center-of-Mass det. time= 102.8 min (934.9 - 832.1)

Volume	Invert	Avail.Storage	Storage Description
#1	65.00'	16,909 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

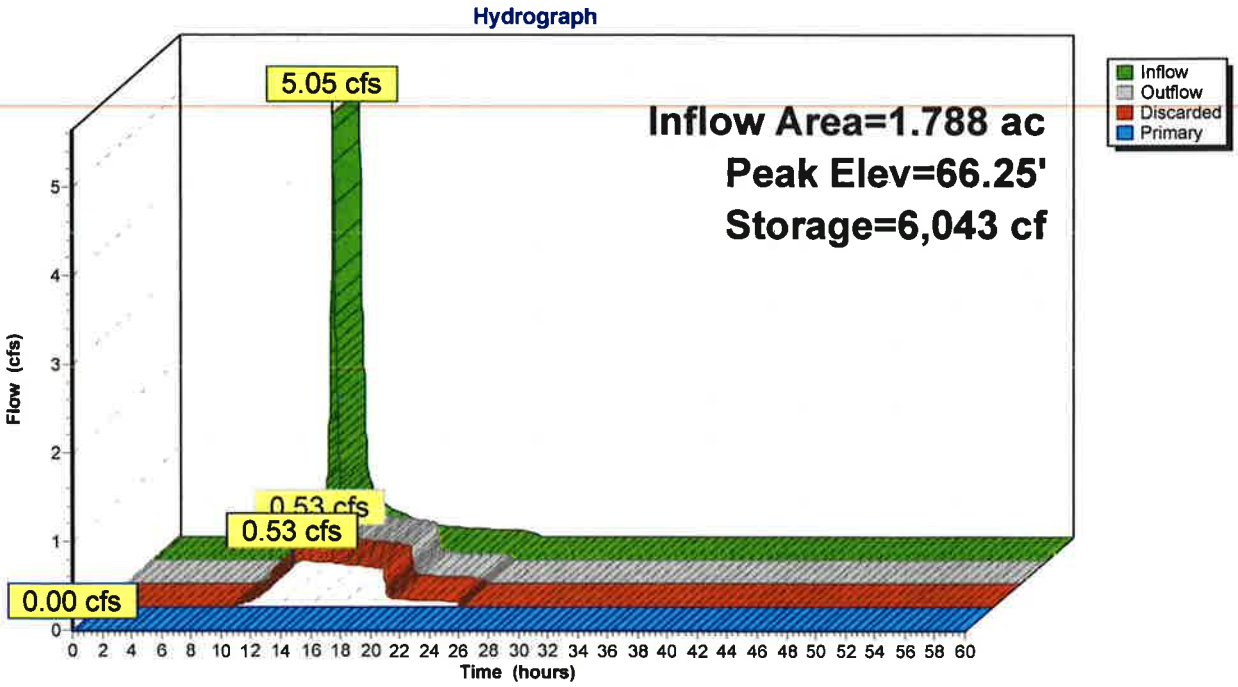
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
65.00	4,305	280.0	0	0	4,305
68.00	7,082	340.0	16,909	16,909	7,408

Device	Routing	Invert	Outlet Devices
#1	Discarded	65.00'	**4.270 in/hr Exfiltration over Surface area**
#2	Primary	67.00'	**3.0' long x 15.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.53 cfs @ 13.00 hrs HW=66.25' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.53 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=65.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Infiltration Basin 3



Summary for Pond 4P: Infiltration Basin 4

Inflow Area = 1.905 ac, 0.00% Impervious, Inflow Depth = 1.74" for 10 yr event
Inflow = 3.11 cfs @ 12.17 hrs, Volume= 0.276 af
Outflow = 1.04 cfs @ 12.58 hrs, Volume= 0.276 af, Atten= 67%, Lag= 24.9 min
Discarded = 1.04 cfs @ 12.58 hrs, Volume= 0.276 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Peak Elev= 60.45' @ 12.58 hrs Surf.Area= 5,413 sf Storage= 2,346 cf

Plug-Flow detention time= 13.2 min calculated for 0.276 af (100% of inflow)
Center-of-Mass det. time= 13.2 min (873.5 - 860.3)

Volume	Invert	Avail.Storage	Storage Description
#1	60.00'	12,075 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

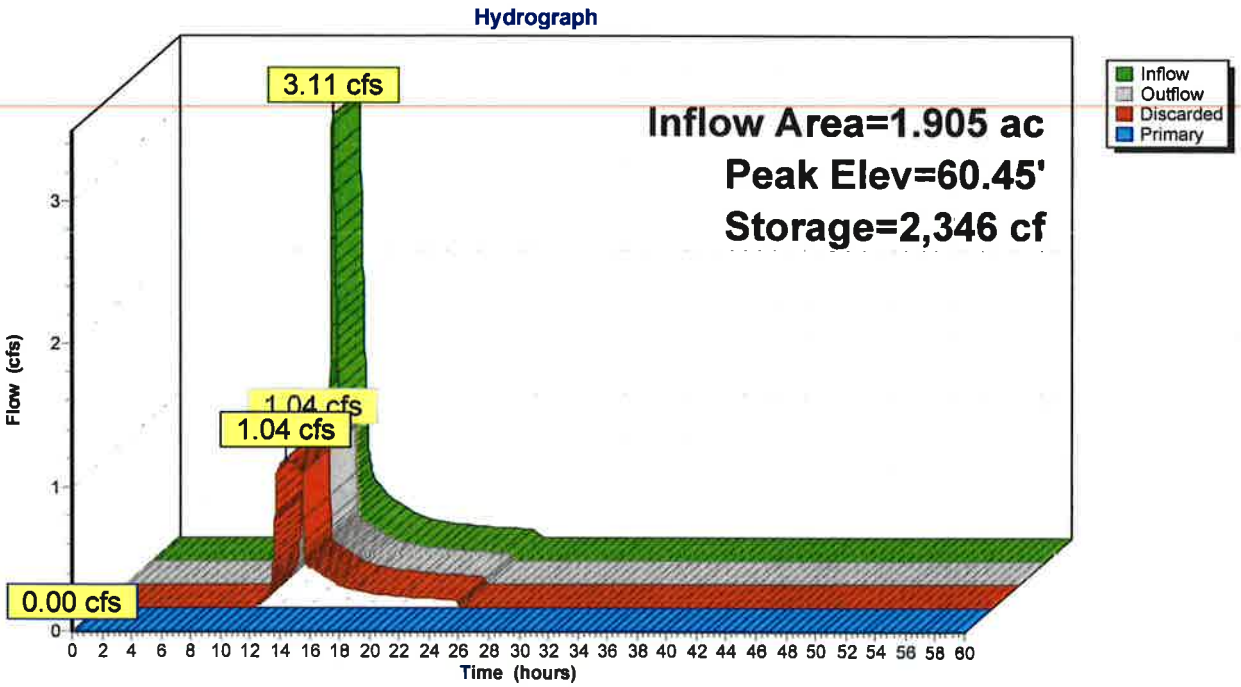
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
60.00	4,933	361.0	0	0	4,933
62.00	7,214	399.0	12,075	12,075	7,354

Device	Routing	Invert	Outlet Devices
#1	Discarded	60.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	61.50'	**5.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=1.04 cfs @ 12.58 hrs HW=60.45' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 1.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=60.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4P: Infiltration Basin 4



Summary for Pond 5P: Infiltration Basin 5

Inflow Area = 2.835 ac, 0.00% Impervious, Inflow Depth = 1.59" for 10 yr event
Inflow = 4.17 cfs @ 12.17 hrs, Volume= 0.376 af
Outflow = 0.82 cfs @ 12.81 hrs, Volume= 0.376 af, Atten= 80%, Lag= 38.2 min
Discarded = 0.82 cfs @ 12.81 hrs, Volume= 0.376 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Peak Elev= 61.38' @ 12.81 hrs Surf.Area= 4,279 sf Storage= 4,900 cf

Plug-Flow detention time= 50.7 min calculated for 0.376 af (100% of inflow)
Center-of-Mass det. time= 50.6 min (916.4 - 865.7)

Volume	Invert	Avail.Storage	Storage Description
#1	60.00'	7,762 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

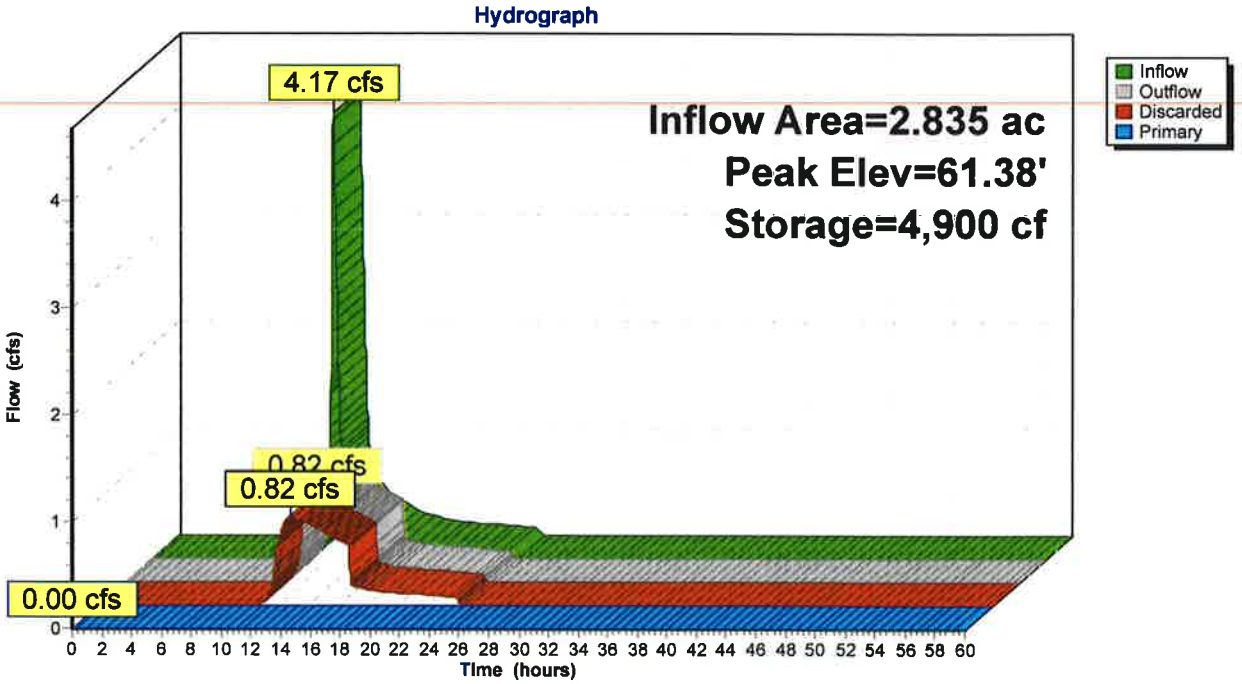
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
60.00	2,855	340.0	0	0	2,855
62.00	5,007	377.0	7,762	7,762	5,085

Device	Routing	Invert	Outlet Devices
#1	Discarded	60.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	61.50'	**10.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.82 cfs @ 12.81 hrs HW=61.38' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.82 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=60.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: Infiltration Basin 5

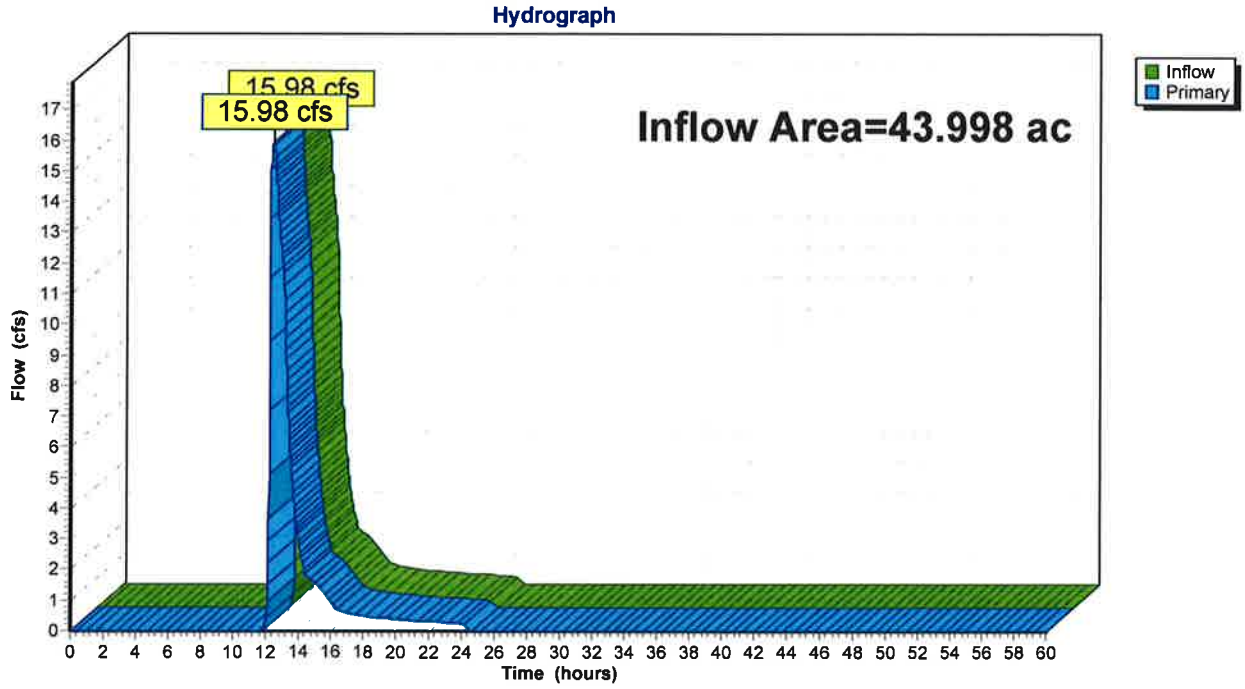


Summary for Link 1L: Wetlands-North

Inflow Area = 43.998 ac, 0.00% Impervious, Inflow Depth = 0.56" for 10 yr event
Inflow = 15.98 cfs @ 12.42 hrs, Volume= 2.046 af
Primary = 15.98 cfs @ 12.42 hrs, Volume= 2.046 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs

Link 1L: Wetlands-North

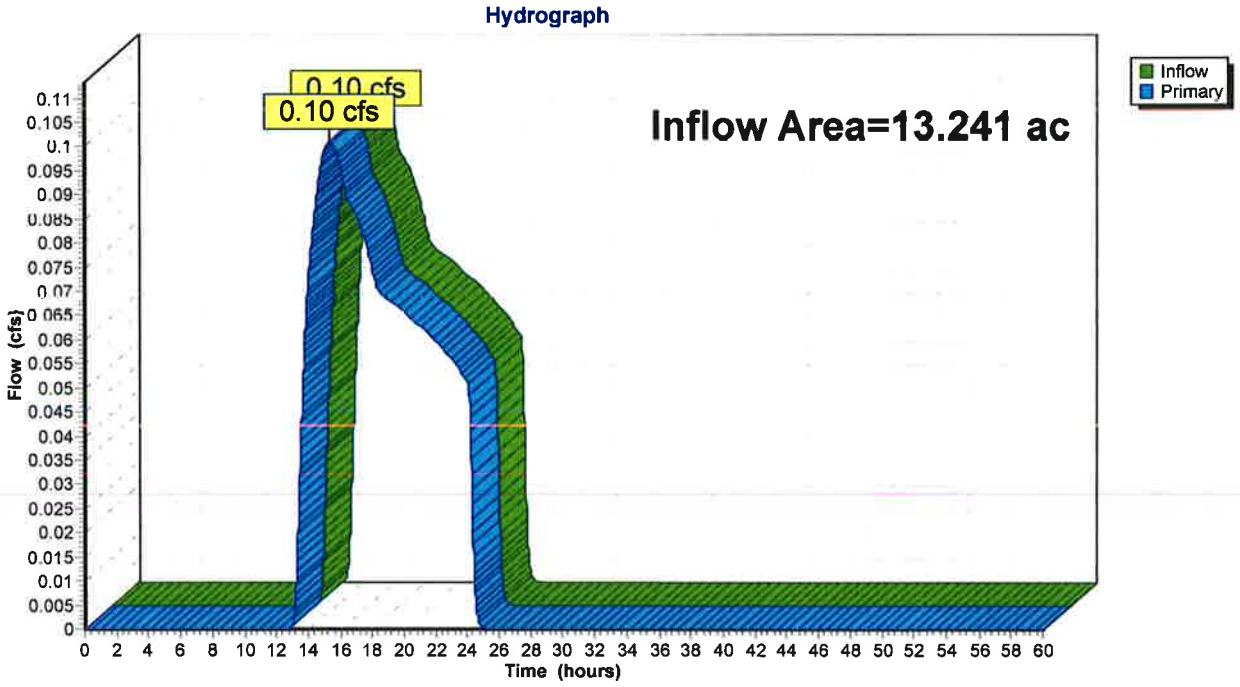


Summary for Link 2L: Wetlands-SW

Inflow Area = 13.241 ac, 0.00% Impervious, Inflow Depth = 0.06" for 10 yr event
Inflow = 0.10 cfs @ 15.38 hrs, Volume= 0.065 af
Primary = 0.10 cfs @ 15.38 hrs, Volume= 0.065 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs

Link 2L: Wetlands-SW

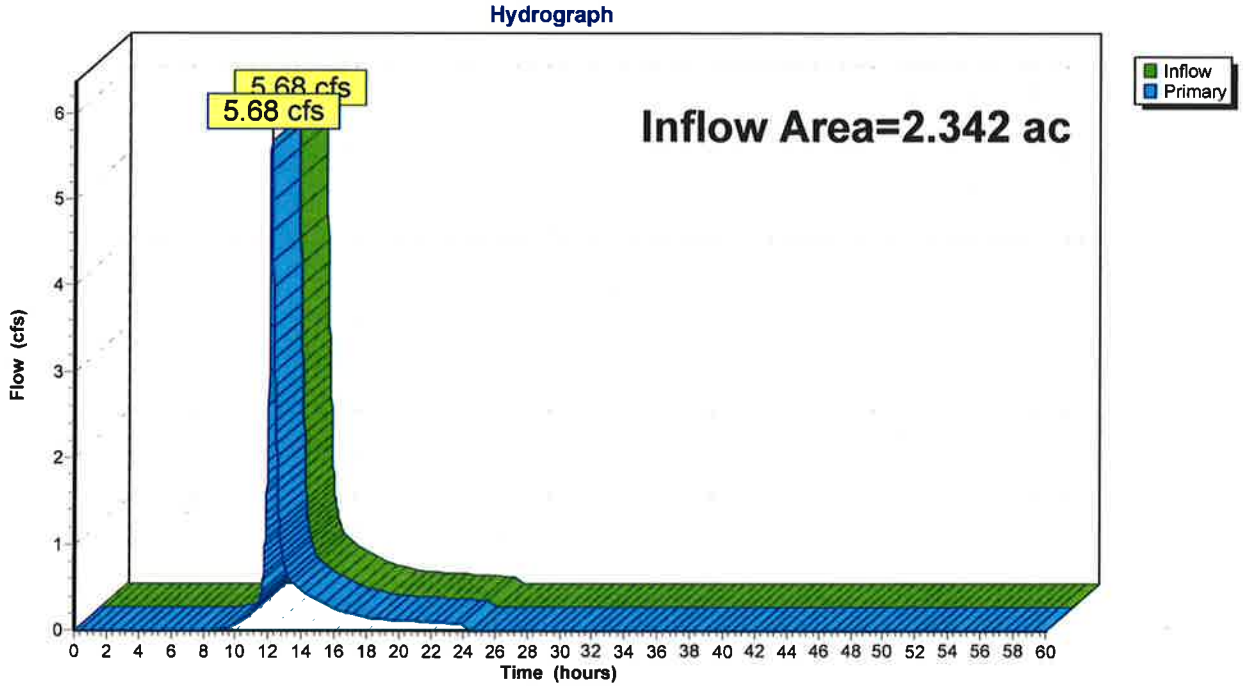


Summary for Link 3L: Wetlands-East

Inflow Area = 2.342 ac, 0.00% Impervious, Inflow Depth = 2.37" for 10 yr event
Inflow = 5.68 cfs @ 12.14 hrs, Volume= 0.463 af
Primary = 5.68 cfs @ 12.14 hrs, Volume= 0.463 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs

Link 3L: Wetlands-East



Summary for Subcatchment 1S: Remaining Flow to Wetlands North

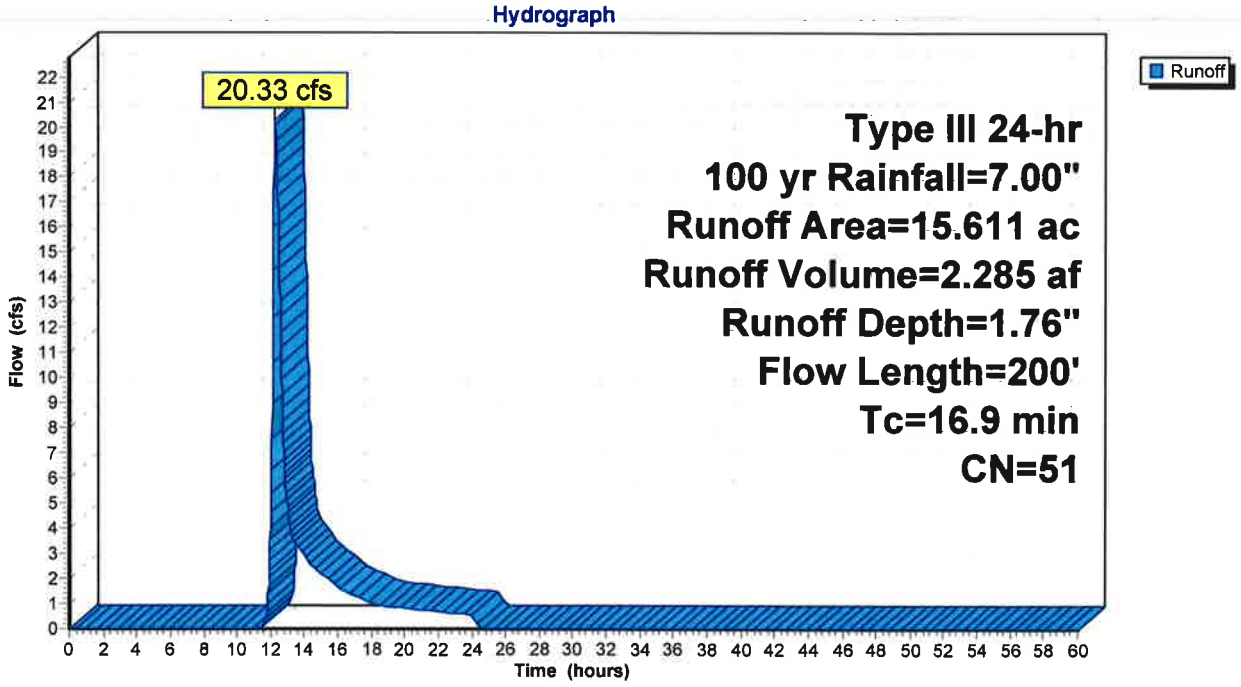
Runoff = 20.33 cfs @ 12.26 hrs, Volume= 2.285 af, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
7.591	36	Woods, Fair, HSG A
5.520	60	Woods, Fair, HSG B
0.845	73	Woods, Fair, HSG C
1.655	79	Woods, Fair, HSG D
15.611	51	Weighted Average
15.611		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.1	150	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.9	200	Total			

Subcatchment 1S: Remaining Flow to Wetlands North



Summary for Subcatchment 2S: Remaining Flow to Wetlands-SW

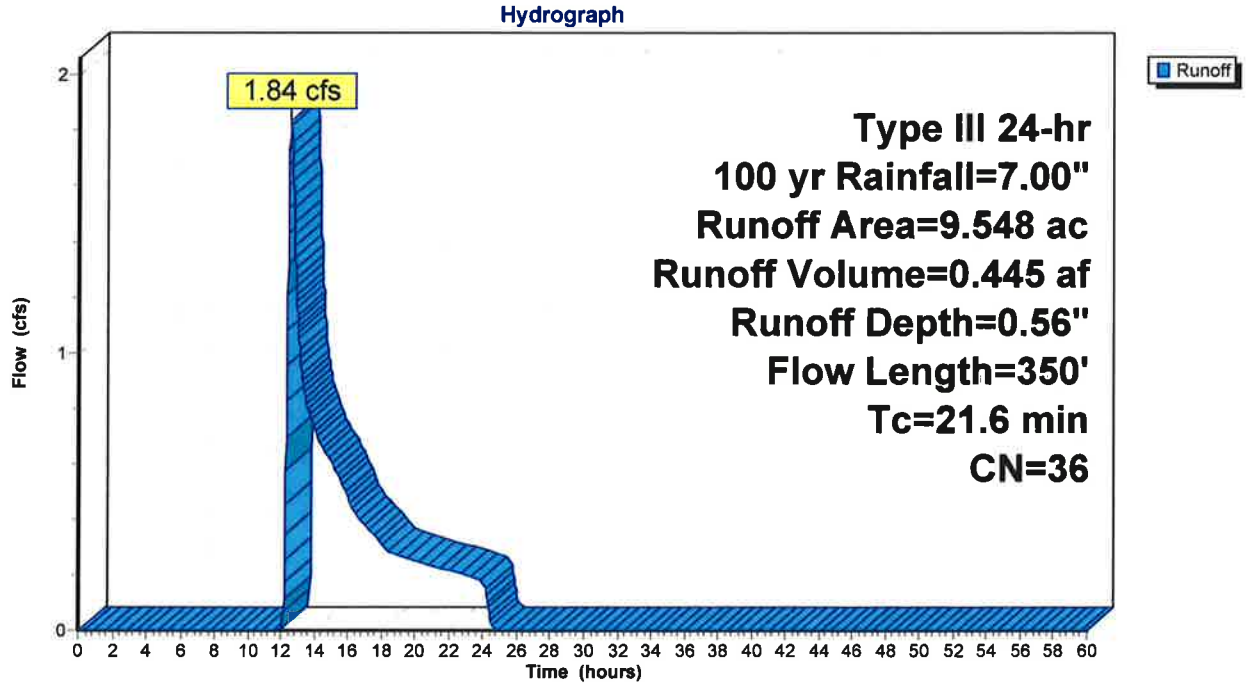
Runoff = 1.84 cfs @ 12.56 hrs, Volume= 0.445 af, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
0.106	60	Woods, Fair, HSG B
9.442	36	Woods, Fair, HSG A
9.548	36	Weighted Average
9.548		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
5.8	300	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.6	350	Total			

Subcatchment 2S: Remaining Flow to Wetlands-SW



Summary for Subcatchment 3S: Flow to Wetlands East

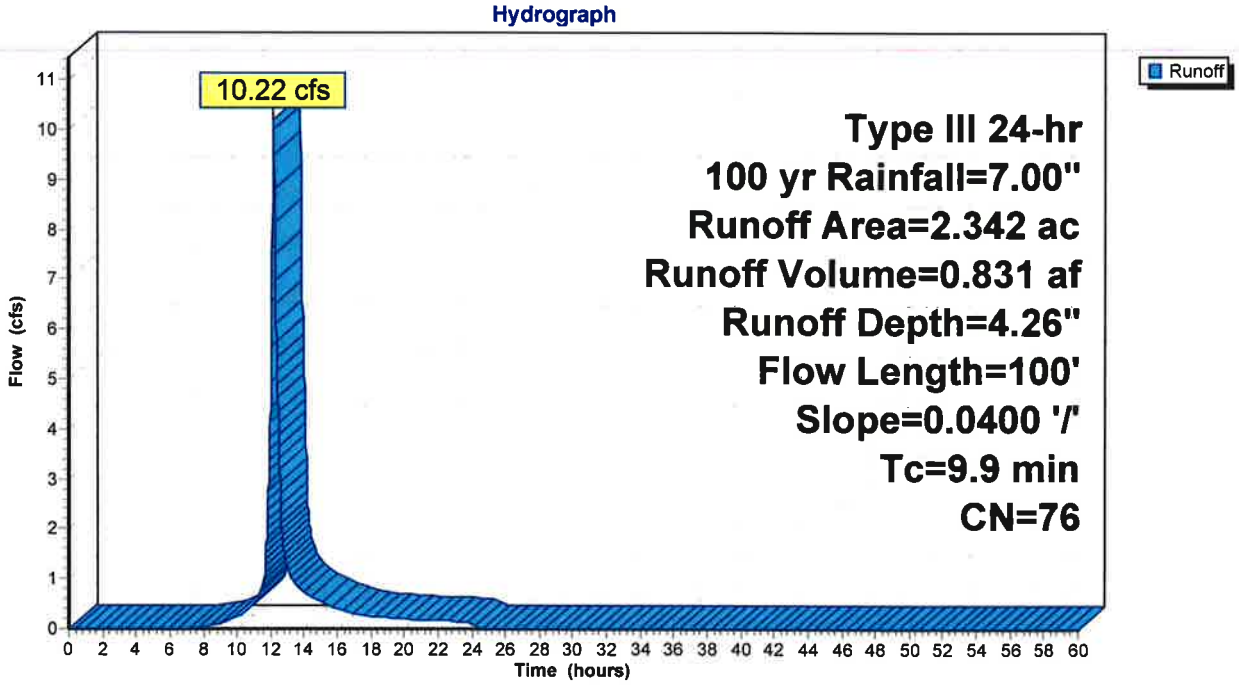
Runoff = 10.22 cfs @ 12.14 hrs, Volume= 0.831 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
0.021	60	Woods, Fair, HSG B
1.169	73	Woods, Fair, HSG C
1.152	79	Woods, Fair, HSG D
2.342	76	Weighted Average
2.342		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	50	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.9	100	Total			

Subcatchment 3S: Flow to Wetlands East



Summary for Subcatchment 4S: Flow to Basin 1

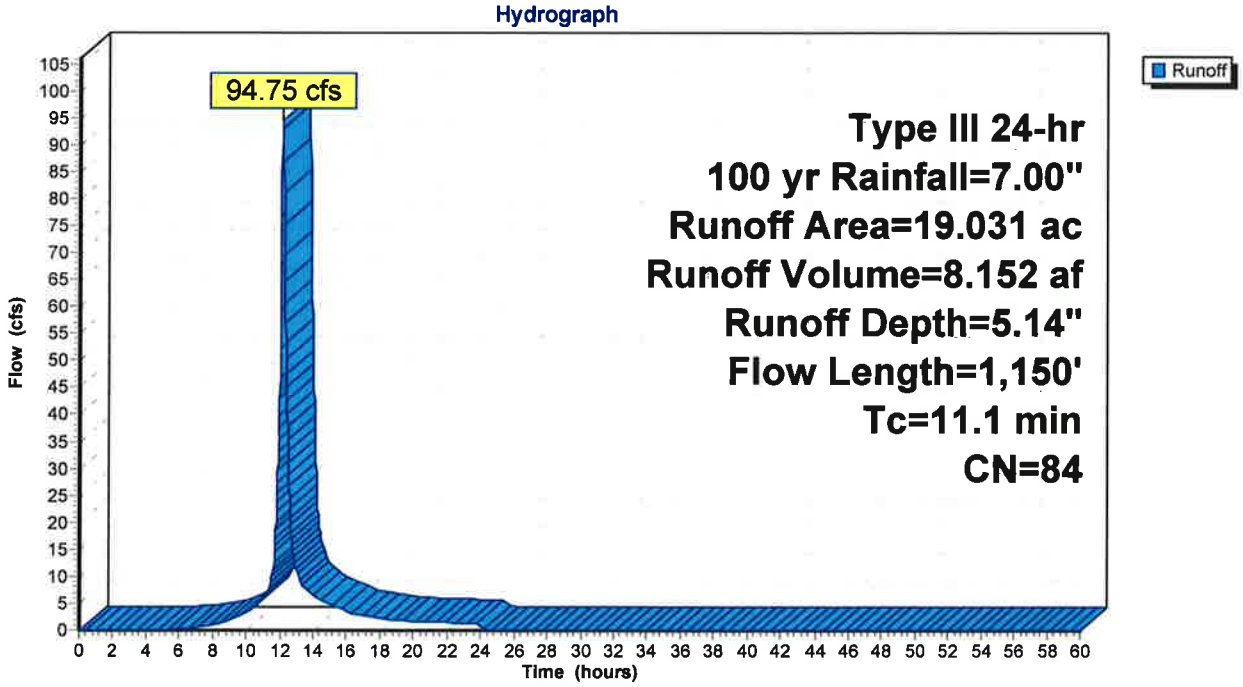
Runoff = 94.75 cfs @ 12.15 hrs, Volume= 8.152 af, Depth= 5.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
8.324	77	Newly graded area, HSG A
4.083	86	Newly graded area, HSG B
6.394	91	Newly graded area, HSG C
0.230	94	Newly graded area, HSG D
19.031	84	Weighted Average
19.031		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	50	0.0100	0.28		**Sheet Flow,** Fallow n= 0.050 P2= 3.40"
8.1	1,100	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.1	1,150	Total			

Subcatchment 4S: Flow to Basin 1



Summary for Subcatchment 5S: Flow to Basin 2

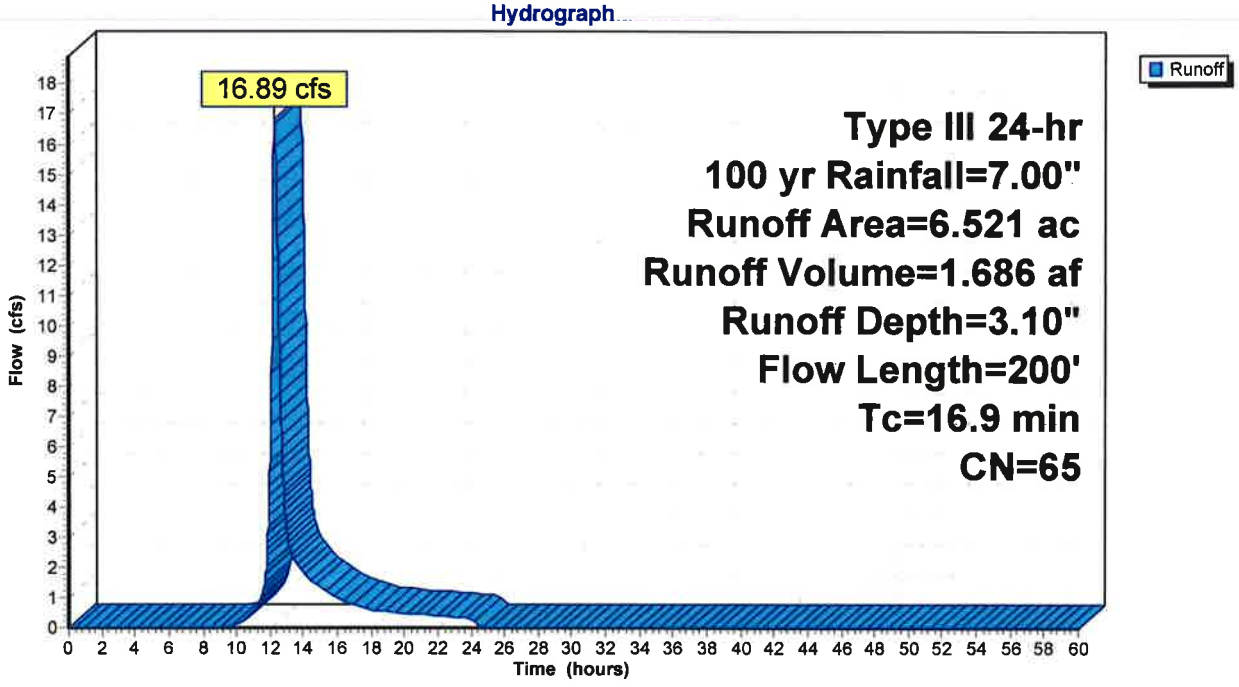
Runoff = 16.89 cfs @ 12.24 hrs, Volume= 1.686 af, Depth= 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
0.193	36	Woods, Fair, HSG A
3.772	60	Woods, Fair, HSG B
1.895	73	Woods, Fair, HSG C
0.661	79	Woods, Fair, HSG D
6.521	65	Weighted Average
6.521		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.1	150	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.9	200	Total			

Subcatchment 5S: Flow to Basin 2



Summary for Subcatchment 6S: Flow to Basin 3

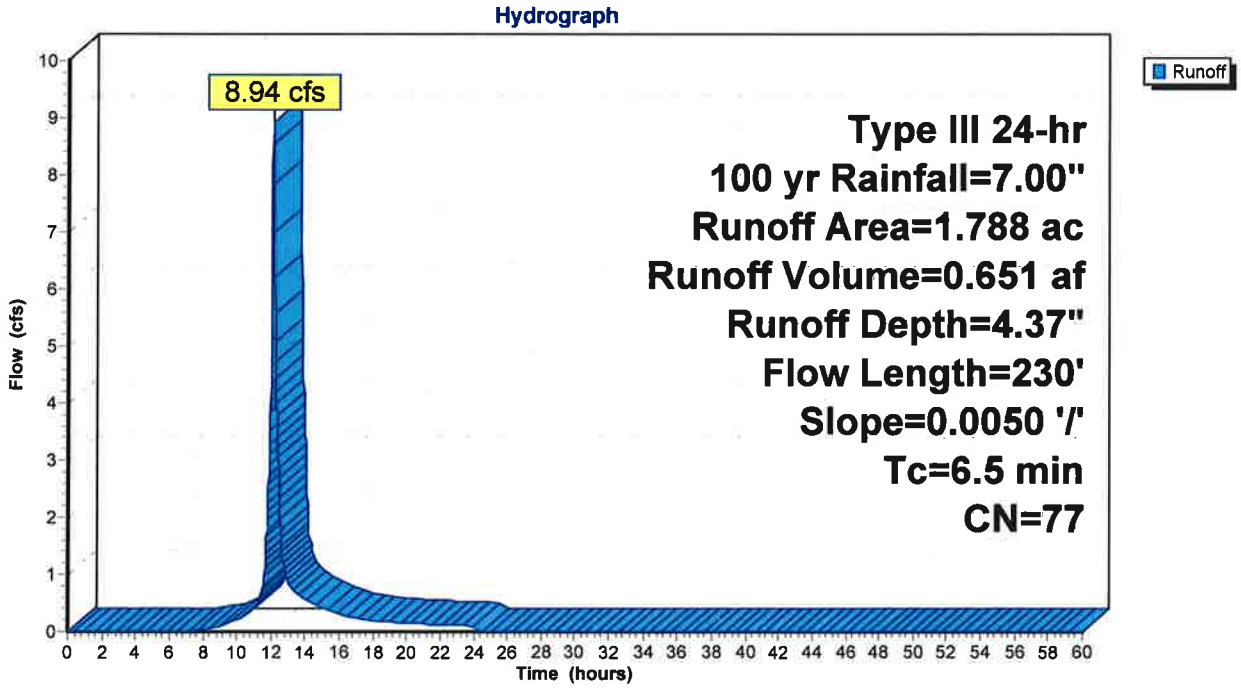
Runoff = 8.94 cfs @ 12.09 hrs, Volume= 0.651 af, Depth= 4.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
0.070	86	Newly graded area, HSG B
1.718	77	Newly graded area, HSG A
1.788	77	Weighted Average
1.788		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0050	0.21		**Sheet Flow,** Fallow n= 0.050 P2= 3.40"
2.6	180	0.0050	1.14		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.5	230	Total			

Subcatchment 6S: Flow to Basin 3



Summary for Subcatchment 7S: (new Subcat)

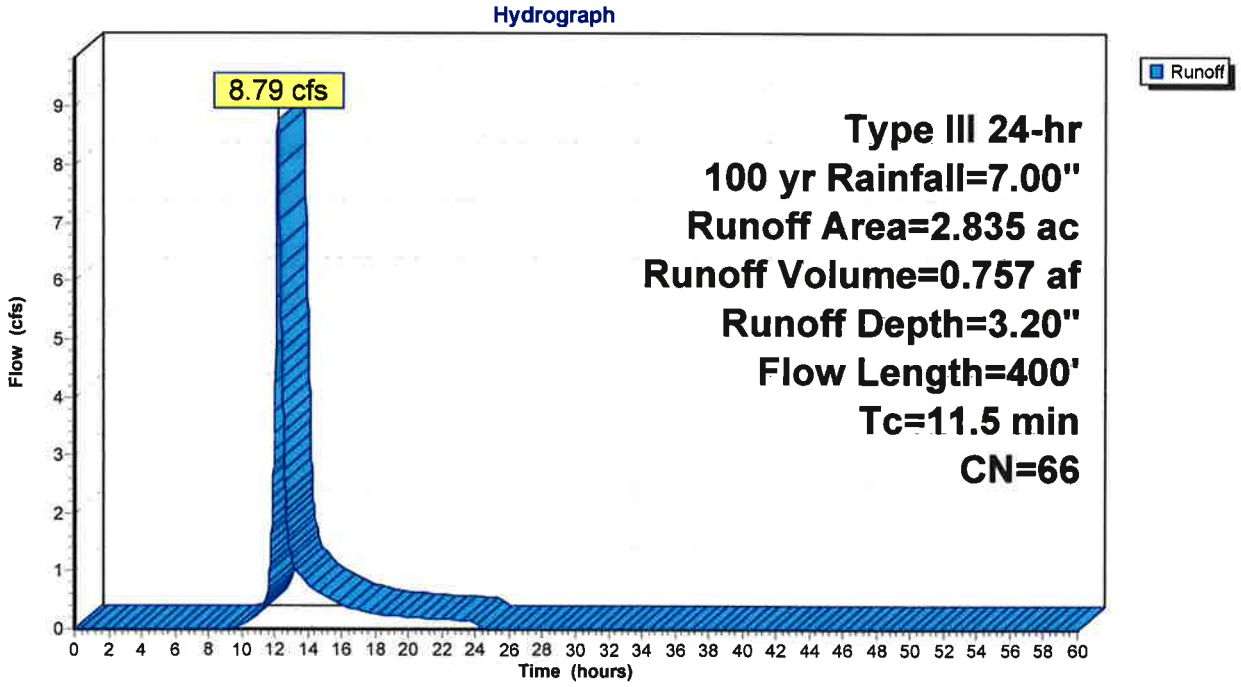
Runoff = 8.79 cfs @ 12.16 hrs, Volume= 0.757 af, Depth= 3.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
0.619	96	Gravel surface, HSG B
0.025	96	Gravel surface, HSG A
1.227	60	Woods, Fair, HSG B
0.313	36	Woods, Fair, HSG A
0.619	61	>75% Grass cover, Good, HSG B
0.032	39	>75% Grass cover, Good, HSG A
2.835	66	Weighted Average
2.835		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
3.2	350	0.0130	1.84		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.5	400	Total			

Subcatchment 7S: (new Subcat)



Summary for Subcatchment 8S: Gravel road flow to Basin 4

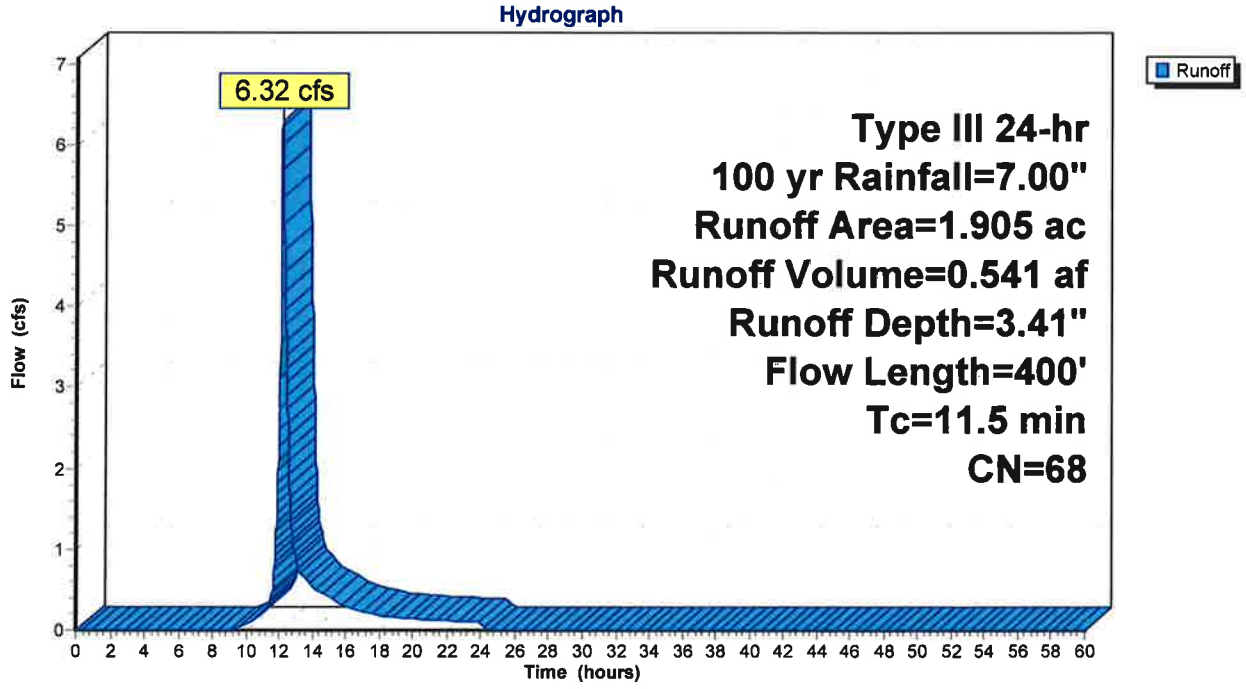
Runoff = 6.32 cfs @ 12.16 hrs, Volume= 0.541 af, Depth= 3.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (ac)	CN	Description
0.964	96	Gravel surface, HSG A
0.941	39	>75% Grass cover, Good, HSG A
1.905	68	Weighted Average
1.905		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
3.2	350	0.0130	1.84		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.5	400	Total			

Subcatchment 8S: Gravel road flow to Basin 4



Summary for Pond 1P: Infiltration Basin 1

Inflow Area = 19.031 ac, 0.00% Impervious, Inflow Depth = 5.14" for 100 yr event
Inflow = 94.75 cfs @ 12.15 hrs, Volume= 8.152 af
Outflow = 32.25 cfs @ 12.51 hrs, Volume= 8.152 af, Atten= 66%, Lag= 21.6 min
Discarded = 6.23 cfs @ 12.51 hrs, Volume= 4.971 af
Primary = 26.02 cfs @ 12.51 hrs, Volume= 3.180 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Peak Elev= 65.50' @ 12.51 hrs Surf.Area= 32,546 sf Storage= 119,634 cf

Plug-Flow detention time= 67.1 min calculated for 8.149 af (100% of inflow)
Center-of-Mass det. time= 67.1 min (869.6 - 802.5)

Volume	Invert	Avail.Storage	Storage Description
#1	61.00'	136,228 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

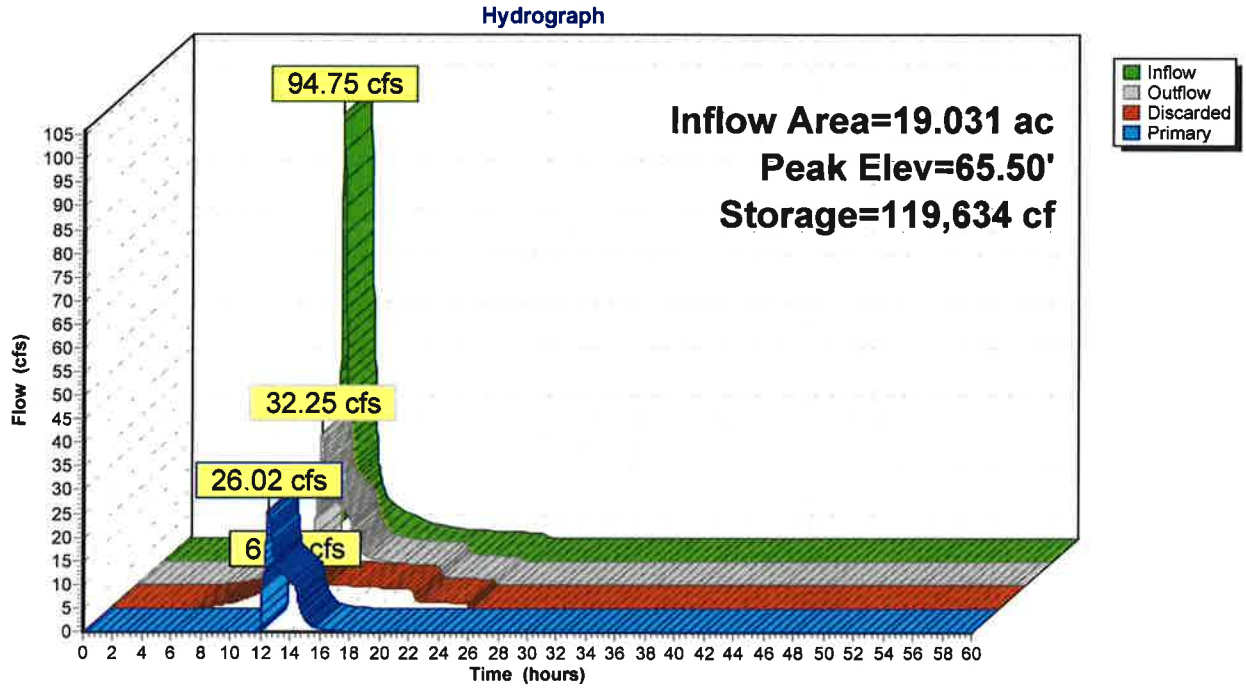
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
61.00	20,824	830.0	0	0	20,824
62.00	23,334	850.0	22,067	22,067	23,627
64.00	28,525	885.0	51,772	73,839	28,761
66.00	33,942	920.0	62,389	136,228	34,103

Device	Routing	Invert	Outlet Devices
#1	Discarded	61.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	61.00'	**18.0" Round Culvert** L= 50.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 61.00' / 60.00' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	62.00'	**6.0" Vert. 6"** C= 0.600
#4	Device 2	62.75'	**5.0' long x 3.25' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.7' Crest Height
#5	Primary	65.00'	**12.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=6.23 cfs @ 12.51 hrs HW=65.50' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 6.23 cfs)

Primary OutFlow Max=26.00 cfs @ 12.51 hrs HW=65.50' (Free Discharge)
├**2=Culvert** (Inlet Controls 14.54 cfs @ 8.23 fps)
│ ├**3=6"** (Passes < 1.70 cfs potential flow)
│ └**4=Sharp-Crested Rectangular Weir** (Passes < 79.50 cfs potential flow)
└**5=Broad-Crested Rectangular Weir** (Weir Controls 11.46 cfs @ 1.91 fps)

Pond 1P: Infiltration Basin 1



Summary for Pond 2P: Infiltration Basin 2

Inflow Area = 6.521 ac, 0.00% Impervious, Inflow Depth = 3.10" for 100 yr event
Inflow = 16.89 cfs @ 12.24 hrs, Volume= 1.686 af
Outflow = 3.34 cfs @ 12.95 hrs, Volume= 1.686 af, Atten= 80%, Lag= 42.5 min
Discarded = 2.15 cfs @ 12.95 hrs, Volume= 1.375 af
Primary = 1.19 cfs @ 12.95 hrs, Volume= 0.311 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Peak Elev= 66.83' @ 12.95 hrs Surf.Area= 11,228 sf Storage= 26,004 cf

Plug-Flow detention time= 81.6 min calculated for 1.686 af (100% of inflow)
Center-of-Mass det. time= 81.5 min (933.6 - 852.1)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	40,142 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

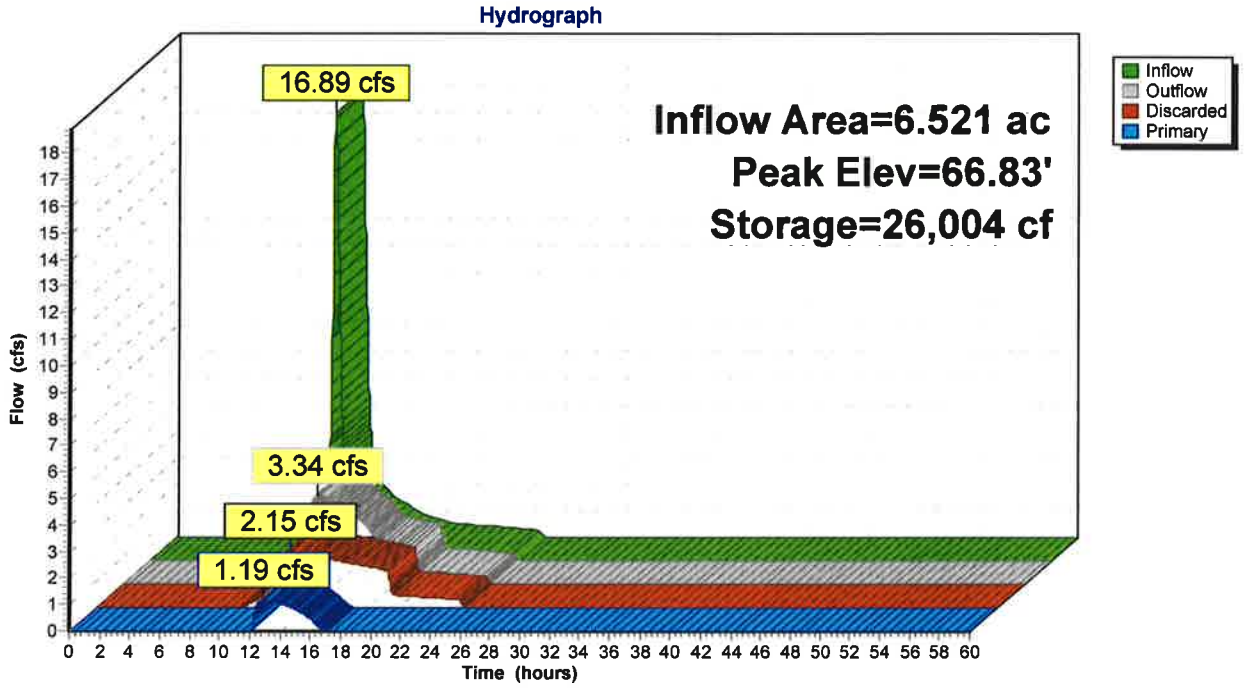
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
64.00	7,215	448.0	0	0	7,215
66.00	10,015	486.0	17,154	17,154	10,190
68.00	13,040	523.0	22,989	40,142	13,327

Device	Routing	Invert	Outlet Devices
#1	Discarded	64.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	64.00'	**12.0" Round Culvert** L= 50.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 64.00' / 63.00' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	65.00'	**6.0" Vert. 6" ORIFICE** C= 0.600
#4	Device 2	67.00'	**2.0' long x 2.00' rise 24" WIDE RECT WEIR** 2 End Contraction(s) 3.0' Crest Height

Discarded OutFlow Max=2.15 cfs @ 12.95 hrs HW=66.83' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 2.15 cfs)

Primary OutFlow Max=1.19 cfs @ 12.95 hrs HW=66.83' (Free Discharge)
└**2=Culvert** (Passes 1.19 cfs of 5.10 cfs potential flow)
  ├**3=6" ORIFICE** (Orifice Controls 1.19 cfs @ 6.06 fps)
  └**4=24" WIDE RECT WEIR** (Controls 0.00 cfs)

Pond 2P: Infiltration Basin 2



Summary for Pond 3P: Infiltration Basin 3

Inflow Area = 1.788 ac, 0.00% Impervious, Inflow Depth = 4.37" for 100 yr event
Inflow = 8.94 cfs @ 12.09 hrs, Volume= 0.651 af
Outflow = 1.31 cfs @ 12.63 hrs, Volume= 0.651 af, Atten= 85%, Lag= 32.0 min
Discarded = 0.62 cfs @ 12.63 hrs, Volume= 0.598 af
Primary = 0.69 cfs @ 12.63 hrs, Volume= 0.052 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Peak Elev= 67.19' @ 12.63 hrs Surf.Area= 6,269 sf Storage= 11,534 cf

Plug-Flow detention time= 163.8 min calculated for 0.651 af (100% of inflow)
Center-of-Mass det. time= 163.7 min (979.3 - 815.6)

Volume	Invert	Avail.Storage	Storage Description
#1	65.00'	16,909 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

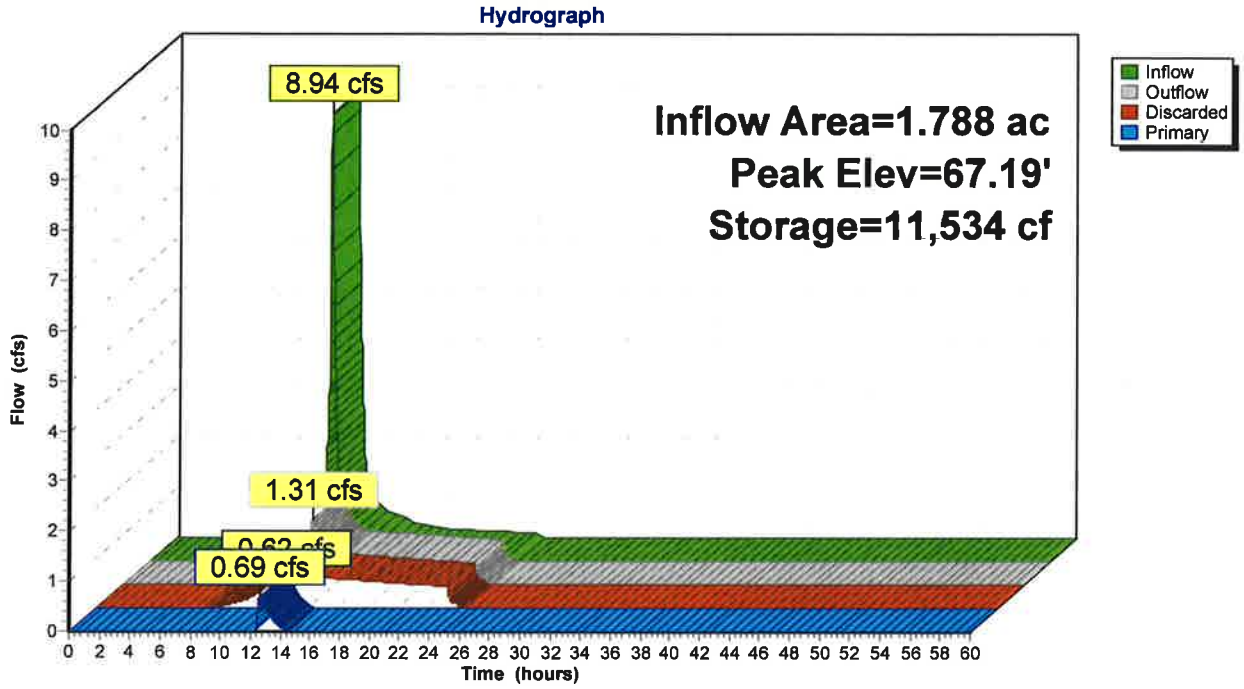
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
65.00	4,305	280.0	0	0	4,305
68.00	7,082	340.0	16,909	16,909	7,408

Device	Routing	Invert	Outlet Devices
#1	Discarded	65.00'	**4.270 in/hr Exfiltration over Surface area**
#2	Primary	67.00'	**3.0' long x 15.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.62 cfs @ 12.63 hrs HW=67.19' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.62 cfs)

Primary OutFlow Max=0.69 cfs @ 12.63 hrs HW=67.19' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.69 cfs @ 1.18 fps)

Pond 3P: Infiltration Basin 3



Summary for Pond 4P: Infiltration Basin 4

Inflow Area = 1.905 ac, 0.00% Impervious, Inflow Depth = 3.41" for 100 yr event
Inflow = 6.32 cfs @ 12.16 hrs, Volume= 0.541 af
Outflow = 1.21 cfs @ 12.73 hrs, Volume= 0.541 af, Atten= 81%, Lag= 33.9 min
Discarded = 1.21 cfs @ 12.73 hrs, Volume= 0.541 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Peak Elev= 61.28' @ 12.73 hrs Surf.Area= 6,344 sf Storage= 7,201 cf

Plug-Flow detention time= 45.1 min calculated for 0.541 af (100% of inflow)
Center-of-Mass det. time= 45.1 min (885.4 - 840.4)

Volume	Invert	Avail.Storage	Storage Description
#1	60.00'	12,075 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

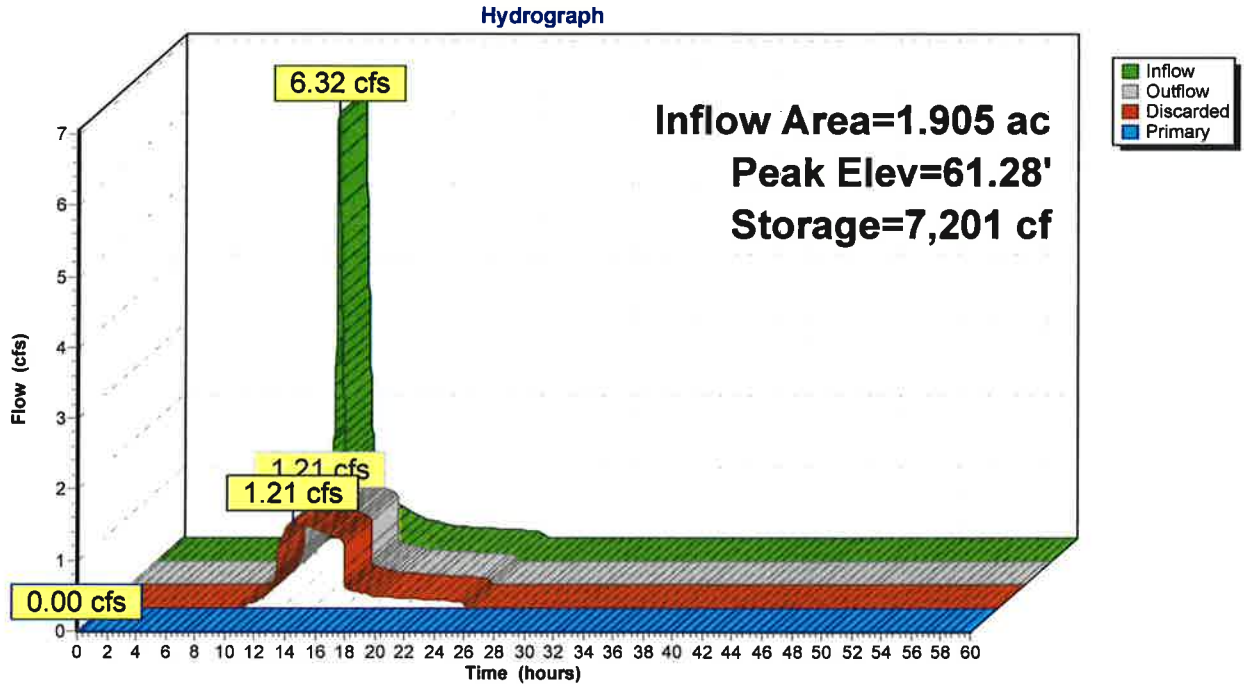
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
60.00	4,933	361.0	0	0	4,933
62.00	7,214	399.0	12,075	12,075	7,354

Device	Routing	Invert	Outlet Devices
#1	Discarded	60.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	61.50'	**5.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=1.21 cfs @ 12.73 hrs HW=61.28' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 1.21 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=60.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4P: Infiltration Basin 4



Summary for Pond 5P: Infiltration Basin 5

Inflow Area = 2.835 ac, 0.00% Impervious, Inflow Depth = 3.20" for 100 yr event
Inflow = 8.79 cfs @ 12.16 hrs, Volume= 0.757 af
Outflow = 6.11 cfs @ 12.31 hrs, Volume= 0.757 af, Atten= 30%, Lag= 8.7 min
Discarded = 0.92 cfs @ 12.31 hrs, Volume= 0.569 af
Primary = 5.19 cfs @ 12.31 hrs, Volume= 0.188 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs
Peak Elev= 61.85' @ 12.31 hrs Surf.Area= 4,825 sf Storage= 7,027 cf

Plug-Flow detention time= 48.9 min calculated for 0.757 af (100% of inflow)
Center-of-Mass det. time= 48.9 min (893.7 - 844.8)

Volume	Invert	Avail.Storage	Storage Description
#1	60.00'	7,762 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

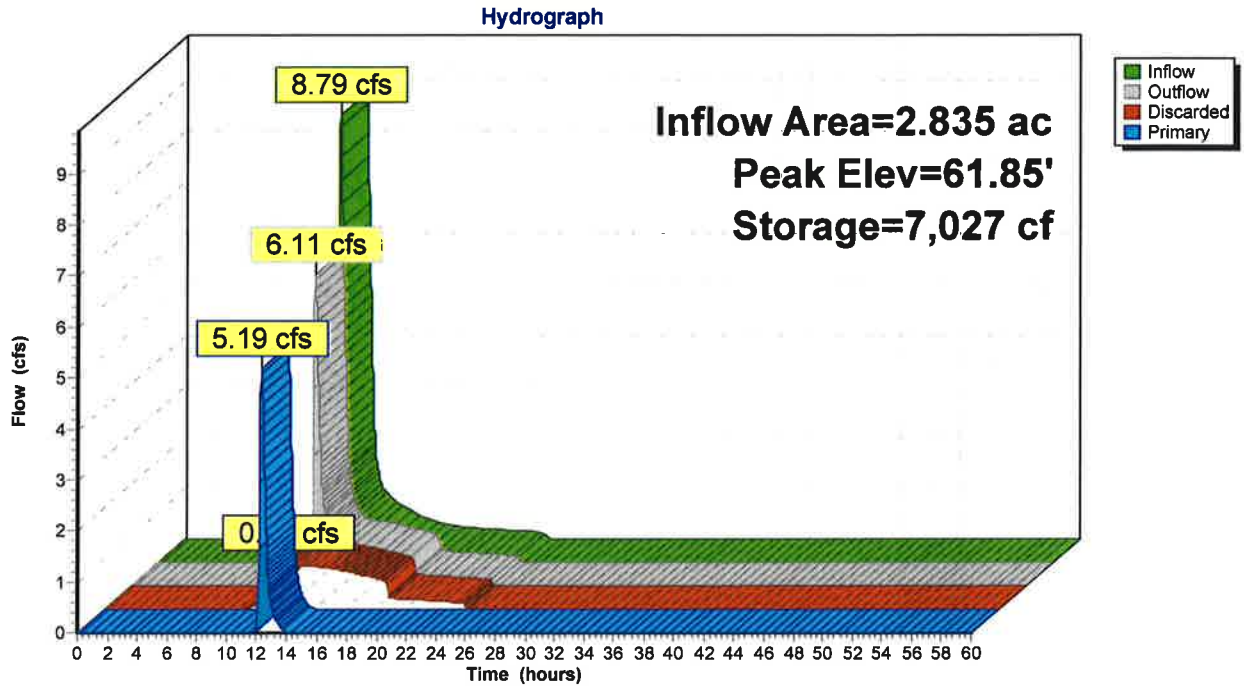
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
60.00	2,855	340.0	0	0	2,855
62.00	5,007	377.0	7,762	7,762	5,085

Device	Routing	Invert	Outlet Devices
#1	Discarded	60.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	61.50'	**10.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.92 cfs @ 12.31 hrs HW=61.85' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.92 cfs)

Primary OutFlow Max=5.17 cfs @ 12.31 hrs HW=61.85' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 5.17 cfs @ 1.48 fps)

Pond 5P: Infiltration Basin 5

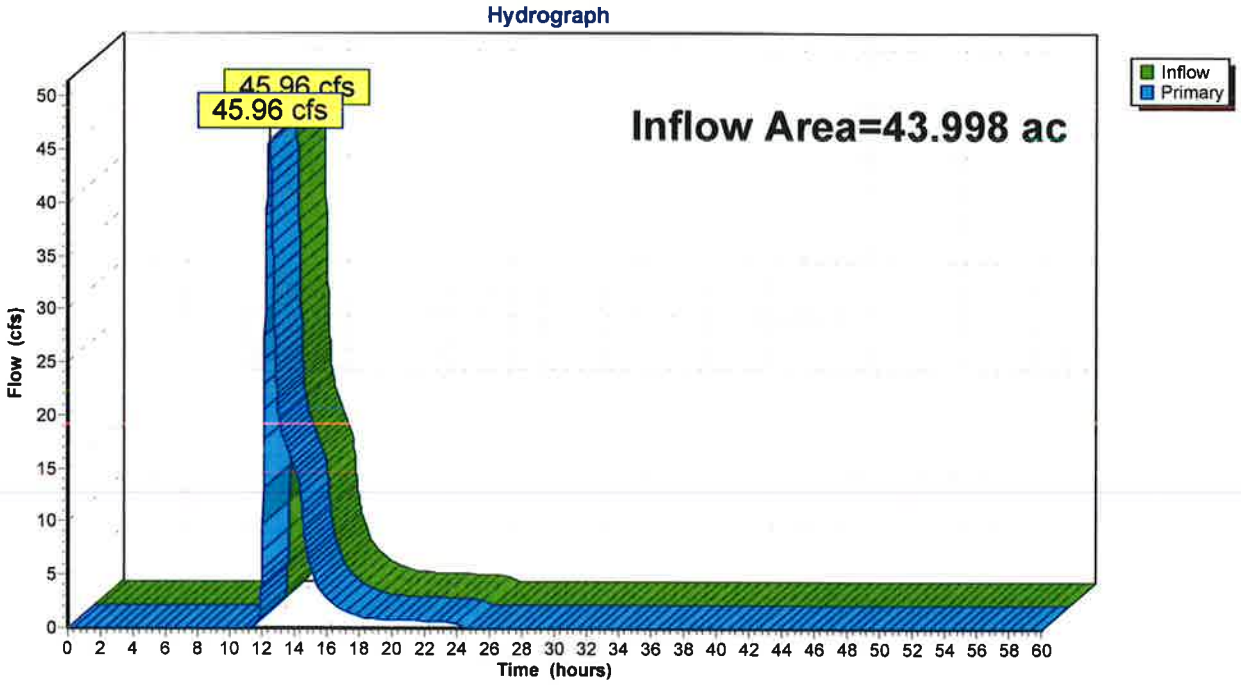


Summary for Link 1L: Wetlands-North

Inflow Area = 43.998 ac, 0.00% Impervious, Inflow Depth = 1.63" for 100 yr event
Inflow = 45.96 cfs @ 12.44 hrs, Volume= 5.964 af
Primary = 45.96 cfs @ 12.44 hrs, Volume= 5.964 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs

Link 1L: Wetlands-North

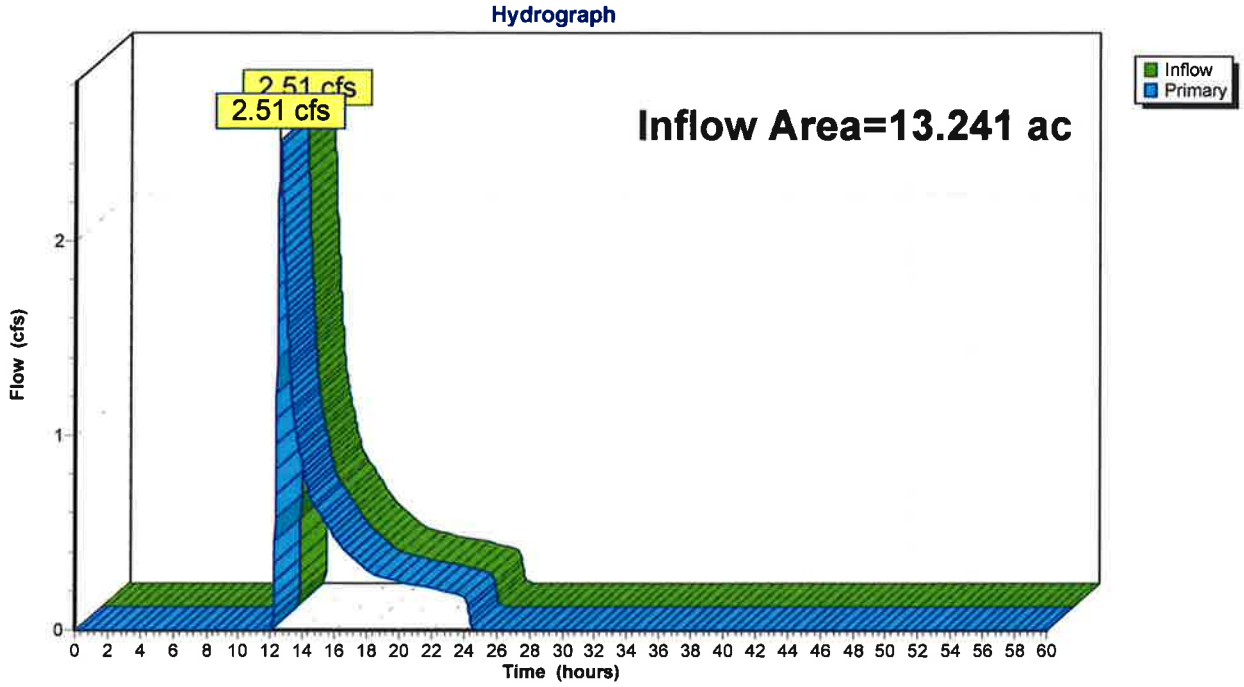


Summary for Link 2L: Wetlands-SW

Inflow Area = 13.241 ac, 0.00% Impervious, Inflow Depth = 0.45" for 100 yr event
Inflow = 2.51 cfs @ 12.58 hrs, Volume= 0.497 af
Primary = 2.51 cfs @ 12.58 hrs, Volume= 0.497 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs

Link 2L: Wetlands-SW

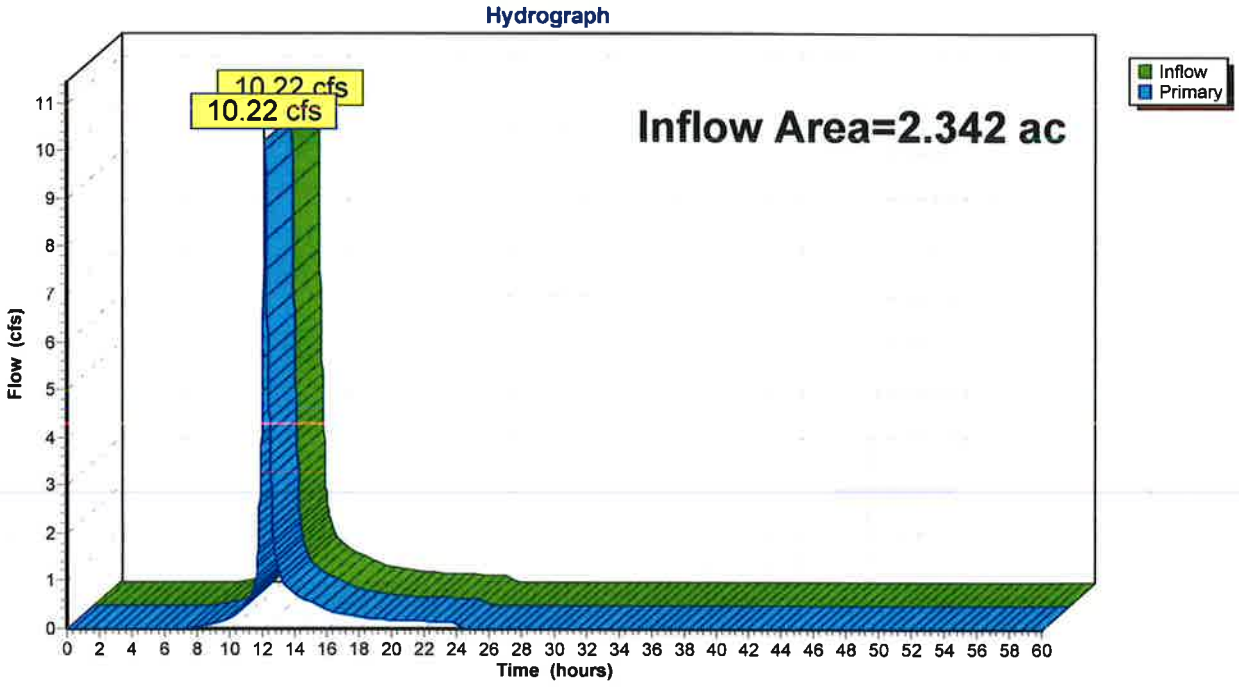


Summary for Link 3L: Wetlands-East

Inflow Area = 2.342 ac, 0.00% Impervious, Inflow Depth = 4.26" for 100 yr event
Inflow = 10.22 cfs @ 12.14 hrs, Volume= 0.831 af
Primary = 10.22 cfs @ 12.14 hrs, Volume= 0.831 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.02 hrs

Link 3L: Wetlands-East



ILLICIT DISCHARGE STATEMENT

Zenith Consulting Engineers, LLC

3 Main Street Lakeville, MA 02347
(508) 947-4208 - www.zcellc.com

- Civil Engineering
- Septic Design (Title 5)
- Septic Inspections (Title 5)
- Commercial and Industrial Site Plans
- Chapter 91 Permitting

ILLICIT DISCHARGE STATEMENT
(STANDARD #10)

RE: 35 COPICUT ROAD, FREETOWN, MASSACHUSETTS

Standard 10 of the Massachusetts Stormwater Handbook prohibits illicit discharges to stormwater management systems. The following is an illicit discharge compliance statement based on existing conditions and design conditions for the proposed project.

EXISTING CONDITIONS

The existing site is a vacant wooded parcel. Based on all the information available to the undersigned, and therefore, to the best of my knowledge, there are no current illicit discharges to the storm drainage system. If during construction, an illicit discharge is discovered, it shall be removed immediately.

PROPOSED DESIGN

The proposed project design does not include any illicit discharges. There are no points in the proposed storm drainage system where illicit discharges are likely to occur.

I hereby certify that the preceding is accurate.

Nyles Zager, P.E.
Zenith Consulting Engineers, LLC.

DEP STORMWATER CHECKLIST

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

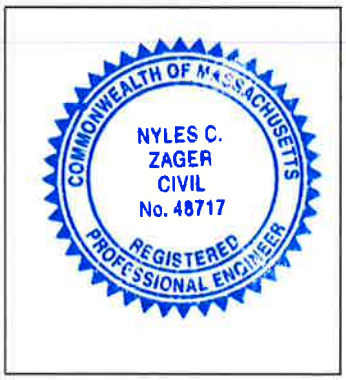
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



9-8-2020
Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☐ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☒ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☒ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☒ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☐ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☒ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☒ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☒ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

OPERATIONS AND MAINTENANCE PLAN

OPERATIONS AND MAINTENANCE PLAN
35 Copicut Road, Freetown, MA

The following is the proposed operation and maintenance plan for the storm water management systems at the earth removal operation located at 35 Copicut Road, Freetown, Massachusetts:

- Owner: KR Rezendes Inc.
  3 Sammy's Lane
  Assonet, MA

- Parties responsible for Operation and Maintenance:
  Same as above

CONTENTS

STORMWATER MANAGEMENT SYSTEMS
OPERATIONS AND MAINTENANCE PLAN
35 Copicut Road, Freetown, MA

The storm water management facilities were designed to require little or no intervention in the operation and to require little or no maintenance once the project is built and stable vegetative cover is established. However, the drainage improvements shall be subject to the following maintenance schedule:

A. Routine Maintenance

1. Debris: All debris and litter are to be removed from all swales, drains, gravel filter berms, checkdams, infiltration basins and surrounding areas at least twice per year.

2. Re-seeding: Embankments that have excessive erosion or slumping are to be re-graded and seeded (with canary grass or tall fescue grass) during the spring or fall growing seasons as needed. Vegetated filter strips are to be reseeded as needed as adequate vegetation is essential to its operation and effectiveness.

3. Inspect: Infiltration basins shall be inspected for signs of proper functioning on a monthly basis.

4. Mowing: The infiltration basin and swale sideslopes shall be mowed at least twice per year. The infiltration basin bottoms shall be inspected at each mowing event. If vegetation has accumulated that could cause a negative impact on the function of the infiltration basin, then it will be removed. Mowing of the vegetated filter strips shall be performed as needed.

B. Periodic Maintenance

1. All gravel filter berms and swale checkdams will be inspected, at a minimum, four times per year. These structures shall be cleaned four times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the unit to the invert of the lowest pipe in the basin. With the four foot sumps that are specified, this depth equals two feet. In this cleaning, the entire contents of the sumps and forebays shall be removed.

C. Non-routine Maintenance

1. Structural: All swales, checkdams, berms, pipes, outfalls, infiltration basin sideslopes and overflow spillways shall be inspected once every four (4) years for proper function, clogging, signs of deterioration and structural inadequacy. Any adverse situations are to be repaired as needed.

D. Non-periodic Inspection

1. The storm water management system shall be inspected after two years of full operation by a Registered Professional Civil Engineer to confirm its adequacy. The inspection shall include an examination of all components of the system including catch basins, trench drain, water quality units and infiltration systems.

E. Annual Budget

1. The estimated annual budget for the O & M is $1,500.

OPERATION AND MAINTENANCE PLAN LOG FORM

Refer to Site Plan for details on the drainage system. Use Log Form that follows as required upon completion of inspections and maintenance tasks, and file.

Earth Removal Operation at 35 Copicut Road, Freetown, MA Drainage System Operation & Maintenance Log Form

STORMWATER BMP'S

STRUCTURE	DATE INSPECTED	SEDIMENT BUILDUP (YES/NO)	IF SEDIMENT BUILDUP, DATE CLEANED
INFILTRATION BASIN 1			
INFILTRATION BASIN 2			
INFILTRATION BASIN 3			
INFILTRATION BASIN 4			
INFILTRATION BASIN 5			
SWALE 1			
SWALE 2			
SWALE 3			
SWALE 4			
SWALE 5			
SWALE 6			
SWALE 7			
FILTER BERM (INFIL 1)			
FILTER BERM (INFIL 2)			
FILTER BERM (INFIL 3)			
SPILLWAY (INFIL 1)			
SPILLWAY (INFIL 2)			
SPILLWAY (INFIL 3)			

SPILLWAY (INFIL 3)			
SPILLWAY (INFIL 4)			
SPILLWAY (INFIL 5)			
OUTLET CONTROL STRUCTURE 1			
OUTLET CONTROL STRUCTURE 2			
OTHER:			

Note:

REQUIRED MAINTENANCE:

_____

_____

_____

_____

_____

_____

_____

_____

TO BE PERFORMED BY:_____ ON_____

INSPECTION BY:_____ DATE_____

STORMWATER BMP PLAN

SHEET NAME: BMP MAP	DRAWN BY: RLG	DATE: 8/27/2020	REV.	DATE	DESCRIPTION	BY	APP.	
PROJECT SITE: 35 COPICUT ROAD FREETOWN, MASSACHUSETTS	DESIGNED BY: RLG	PROJECT NUMBER: 0617-01-01						
CLIENT INFO: KR REZENDES, INC. 3 SAMMY'S LANE ASSONET, MASSACHUSETTS	CHECKED BY: NCZ	DRAWING SCALE: 1"=100'						
	APPROVED BY: NCZ	SHEET ID:						

ZCE
ZENITH CONSULTING ENGINEERS, LLC
3 MAIN STREET LAKEVILLE, MA 02347
PHONE: (508) 947-4208

P.E. STAMP

PROGRESS PRINT NOT ISSUED FOR CONSTRUCTION

J:\Civil Engineering Projects\Freetown\Copicut Road\0 Copicut Road\DWG\0 Copicut - Site Base Plan.dwg

CONSTRUCTION PERIOD POLLUTION PREVENTION PLAN
35 Copicut Road, Freetown, MA

1.0 INTRODUCTION

It is proposed to demolish the existing residential structures at the above-referenced facility and construct a new gas station/convenience store and retail building. There are Bordering Vegetated Wetlands to the north that must be protected from any impacts from the proposed construction activities. The following erosion and sediment control program material management practices and spill control program have been developed to that end.

2.0 PRECONSTRUCTION MEASURES

Prior to the initiation of any construction, erosion control measures shall be installed as shown on the plans. In addition, silt sacks shall be placed in all existing catch basin inlets. A preconstruction conference shall then be held with the Taunton Conservation Agent in order to confirm that sediment control conditions are adequate for construction to start.

3.0 CONSTRUCTION PERIOD MEASURES

The following are the minimal measures required for erosion and sediment control, material handling and for spill control.

3.1 EROSION AND SEDIMENTATION CONTROL

The following measures shall be maintained throughout the site construction phase of the project.

Drainage Swale Haybale Check Dams

Haybales shall also be placed across any temporary ditches constructed by the contractor during construction to limit the transport of sediment into drainage systems and waterways.

Stabilized Construction Entrance

A temporary stabilized construction entrance shall be installed at the locations shown on the erosion control plan. The purpose of the construction entrance is to remove sediment attached to vehicle tires and minimize its transport and deposition onto public road surfaces. The construction entrance shall be composed of a 6-inch thick (minimum) bed of 2-inch diameter crushed stone that extends a minimum of 50 feet. The construction entrance shall be a minimum of 25 feet wide, and shall flare to a minimum width of 45 feet wide at the junction with the roadway. The crushed stone bed shall be removed and replenished as necessary to maintain the proper function.

Erosion and Sediment Control - Maintenance

The project general contractor shall have primary responsibility for implementing temporary and permanent controls described in the plan and shall be responsible for assuring Contractor compliance with contract documents including all erosion and sediment control measures.

- Damaged or deteriorated items shall be repaired or replaced immediately after identification.

- The underside of haybales should be kept in close contact with the earth and reset as necessary.

- Silt Socks shall be inspected after every major rainfall runoff event (over ½" depth of precipitation) or every 14 days, whichever occurs first. All damaged or misaligned fences shall be immediately repaired. Silt shall be immediately removed from all areas of the silt fence when depth of accumulation exceeds 9 inches. Each report shall be documented on the form enclosed in Appendix E.

- Sumps shall be inspected after every major rainfall runoff event (over ½" depth of precipitation) or every 14 days, whichever occurs first. Silt shall be immediately removed from all sumps where the depth of accumulation exceeds 9 inches.

- All exposed construction areas shall be stabilized upon completion in order to minimize the time that these areas are unstabilized.

3.2 MATERIALS MANAGEMENT PRACTICES

The following are the material management practices that shall be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff. The Contractor's Superintendent shall be responsible for ensuring that these procedures are followed:

1. *Good Housekeeping*

   The following good housekeeping practices shall be followed on-site during construction:

   a. An effort shall be made to store only enough products required to do the job.
   b. All materials stored on-site shall be stored in a neat, orderly manner and, if possible, under a roof or in a containment area. At a minimum, all containers shall be stored with their lids on when not in use. Drip pans shall be provided under all dispensers.
   c. Products shall be kept in their original containers with the original manufacturer's label in legible condition.
   d. Substances shall not be mixed with one another unless recommended by the manufacturer.
   e. Whenever possible, all of a product shall be used up before disposing the container.
   f. Manufacturer's recommendations for proper use and disposal shall be followed.

g. The Contractor's Superintendent shall be responsible for daily inspections to ensure proper use and disposal of materials.

2. *Hazardous Substances*

These practices shall be used to reduce the risks associated with Hazardous Substances. Material Safety Data Sheets (MSDS's) for each product with hazardous properties that is used at the Project shall be obtained and used for the proper management of potential wastes that may result from these products. An MSDS shall be posted in the immediate area where such product is stored and/or used and another copy of each MSDS shall be maintained in the job trailer at the Project. Each employee who must handle a Hazardous Substance shall be instructed on the use of MSDS sheets and the specific information in the applicable MSDS for the product he/she is using, particularly regarding spill control techniques.

a. Products shall be kept in original containers with the original labels in legible condition.
b. Original labels and MSDS's shall be procured and used for each product.
c. If surplus product must be disposed, manufacturer's and local/state/federal required methods for proper disposal must be followed.

3. *Hazardous Waste*

It is imperative that all Hazardous Waste be properly identified and handled in accordance with all applicable Hazardous Waste Standards, including the storage, transport and disposal of the Hazardous Wastes. There are significant penalties for the improper handling of Hazardous Wastes. It is important that the Site Superintendent seeks appropriate assistance in making the determination of whether a substance or material is a Hazardous Waste. For example, Hazardous Waste may include certain Hazardous Substances, as well as pesticides, paints, paint solvents, cleaning solvents, pesticides, contaminated soils, and other materials, substances or chemicals that have been discarded (or are to be discarded) as being out-of-date, contaminated, or otherwise unusable, and can include the containers for those substances; other materials and substances can also be or become Hazardous Wastes, however. The Contractor's Superintendent is also responsible for ensuring that all site personnel are instructed as to these Hazardous Waste requirements and also that the requirements are being followed.

4. *Product Specific Practices*

The following product specific practices shall be followed on the job site:

<u>Petroleum Products</u>

All on-site vehicles shall be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage. Petroleum products shall be stored in tightly sealed containers which are clearly labeled. Petroleum storage tanks shall be located at minimum 100 linear feet from drainage ways, inlets and surface waters. Any petroleum storage tanks stored on-site shall be located within a containment area that is designed with an impervious surface between the tank and the ground. The secondary containment must be designed to provide a containment volume that is equal to 110% of the volume of the largest tank. Any mobile petroleum tank shall be parked in a vehicular service area surrounded by a berm that provides a containment volume that is equal to 110% of the volume of the largest tank. Containment must provide sufficient volume to contain expected precipitation and 110% volume of the largest tank. Accumulated rainwater or spills from containment areas are to be promptly pumped into a containment device and disposed properly by a licensed Hazardous Waste transporter. Drip pans shall be provided for all dispensers. Any asphalt substances used on-site shall be applied according to the manufacturer's recommendations. The location of any fuel tanks and/or equipment storage areas must be identified on the Erosion Control Plan by the Contractor once the locations have been determined.

Fertilizers

Fertilizers shall be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer shall be worked in the soil to limit exposure to stormwater. The contents of any partially used bags of fertilizer shall be transferred to a sealable plastic bin to avoid spills.

Cleaning Solvents

All containers shall be tightly sealed and stored when not in use. Excess solvents shall not be discharged to the storm sewer system, but shall be properly disposed of according to manufacturer's instructions or state and federal regulations.

Concrete Wastes

Concrete trucks shall be allowed to wash out or discharge surplus concrete or drum wash water on the project site, but only in specifically designated diked and impervious washouts which have been prepared to prevent contact between the concrete wash and stormwater. Waste generated from concrete wash water shall not be allowed to flow into drainage ways, inlets, receiving waters or any location other than the designated concrete washout. Waste concrete may be poured into forms to make rip-rap or other useful concrete products. Concrete washouts shall be located at minimum 100 linear feet from drainage ways, inlets, surface waters and wetland resource areas.

The hardened residue from the concrete washout diked areas shall be disposed in the same manner as other non-hazardous construction waste materials or may be broken up and used on site as deemed appropriate by the Contractor. Maintenance of the washout is to include removal of hardened concrete. Facility shall not be filled beyond 95% capacity and shall be cleaned out once 75% full unless a new facility is constructed. The Contractor's Superintendent shall be responsible for seeing that these procedures are followed.Saw-cut Portland Cement Concrete (PCC) slurry shall not be allowed to enter storm drains or watercourses. Saw-cut residue should not be left on the surface of pavement or be allowed to flow over and off pavement. Residue from saw-cutting and grinding shall be collected by vacuum and disposed of in the concrete washout facility.

5. Solid and Construction Wastes

All waste materials shall be collected and disposed of at an appropriate solid waste disposal area.

6. Sanitary Wastes

A minimum of one portable sanitary unit shall be provided for every ten (10) workers on the site. All sanitary waste shall be collected from the portable units a minimum of one time per week by a licensed portable facility provider in complete compliance with local and state regulations.

All sanitary waste units shall be located in an area where the likelihood of the unit contributing to stormwater discharges is negligible. Additional containment BMPs must be implemented, such as gravel bags or specially designed plastic skid containers around the base, to prevent wastes from contributing to stormwater discharges.

7. Contaminated Soils

Any contaminated soils (resulting from spills of hazardous substances or oil or discovered during the course of construction) which may result from construction activities shall be contained and cleaned up immediately in accordance with the procedures given in the Material Management Plan and in accordance with applicable state and federal regulations. Contaminated soils not resulting from construction activities, or which pre-existed construction activities, but which are discovered by virtue of construction activities, should be reported in the same manner as spills, but with sufficient information to indicate that the discovery of an existing condition is being reported. If there is a release that occurs by virtue of the discovery of existing contamination, this should be reported as a spill, if it otherwise meets the requirements for a reportable spill.

SOURCE CONTROL AND LONG-TERM POLLUTION PREVENTION PLAN
35 Copicut Road, Freetown, MA

1.0 INTRODUCTION

The development of the above referenced facility has been designed to provide improved stormwater quality compared to existing conditions. In order for this to continue in the long term, it is necessary to implement the following Source Control and Pollution Prevention Plan.

2.0 RESPONSIBLE PARTY

Responsible Party:	KR Rezendes Inc. 3 Sammy's lane Assonet, MA
Attention:	TBD

3.0 SOURCE CONTROL MEASURES

The most effective means of providing clean runoff is to prevent pollutants from coming into contact with the stormwater in the first place. This involves the following:

1. Keeping de-icing agents, fertilizers, stockpiles, etc covered at all times. If practical, all such products shall be stored indoors or off-site.

2. All landscaping, fertilization and other grounds maintenance shall be done by professional groundkeepers who are trained at how to maintain the grounds.

3. Periodic parking lot sweeping program shall be implemented. This program shall include removal of windblown debris and litter from landscaped areas.

4. A supply of speedy dry type oil absorbent material shall be kept on-site to allow for the quick cleanup of minor spills.

4.0 SPILL PREVENTION AND RESPONSE PLAN

The Property Manager, shall train all personnel in the proper handling and cleanup of spilled Hazardous Substances or Oil. No spilled Hazardous Substances or Oil shall be allowed to come in contact with stormwater discharges. If such contact occurs, the stormwater discharge shall be contained on site until appropriate measures in compliance with state and federal regulations are

taken to dispose such contaminated stormwater. It shall be the responsibility of the Property Manager to be properly trained, and to train all personnel in spill prevention and cleanup procedures.

In order to prevent or minimize the potential for a spill of hazardous substances or oil to come into contact with stormwater, the following steps shall be implemented:

a. All hazardous substances or oil (such as pesticides, petroleum products, fertilizers, detergents, chemicals, acids, paints, paint solvents, cleaning solvents, additives for soil stabilization, concrete curing compounds and additives, etc.) shall be stored in a secure location, with their lids on, preferably under cover, when not in use.

b. The minimum practical quantity of all such materials shall be kept at the facility.

c. A spill control and containment kit (containing, for example, absorbent materials, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, plastic and metal trash containers, etc.) shall be provided at the site.

d. Manufacturer's recommended methods for spill cleanup shall be clearly posted and site maintenance personnel shall be trained regarding these procedures and the location of the information and cleanup supplies.

e. It is the Property Manager's responsibility to ensure that all hazardous waste discovered or generated at the Project site are disposed properly by a licensed hazardous material disposal company. The Property Manager is responsible for not exceeding hazardous waste storage requirements mandated by the EPA or state and local authority.

A spill contingency plan shall be implemented including the following provisions:

Equipment necessary to quickly attend to inadvertent spills or shall be stored on-site in a secure but accessible location. Such equipment shall include:

1. Safety goggles.
2. Chemically resistant gloves and overshoe boots.
3. Water and chemical fire extinguishers.
4. Sand and shovels.
5. Suitable absorbent materials.
6. Storage containers.
7. First aid equipment.

In the event of a spill of hazardous substances or oil, the following procedures must be followed:

a. All measures must be taken to contain and abate the spill and to prevent the discharge of the hazardous substance or oil to stormwater or off-site. (The spill area must be kept well ventilated and personnel must wear appropriate protective clothing to prevent injury from contact with the hazardous substances.)

b. For spills of less than five (5) gallons of material, proceed with source control and containment, clean-up with absorbent materials or other applicable means unless an imminent hazard or other circumstances dictate that the spill should be treated by a professional emergency response contractor.

c. For spills greater than five (5) gallons of material immediately contact a Massachusetts Licensed Site Professional L.S.P. Provide information on the type of material spilled, the location of the spill, the quantity spilled, and the time of the spill and proceed with prevention, containment and/or clean-up if so desired.

d. Spills of amounts that exceed reportable quantities of certain substances specifically mentioned in federal regulations 40 CFR 110, 40 CFR 117, and 40 CFR 302 must be immediately reported to the EPA National Response Center, Telephone (800) 242-8802.

The Property Manager shall be the spill prevention and response coordinator. He shall designate the individuals who shall receive spill prevention and response training. These individuals shall each become responsible for a particular phase of prevention and response. The names of these personnel should be posted in the material storage area and in the property office.

5.0 SNOW AND ICE REMOVAL

Snow removal shall be primarily done by mechanical removal rather than chemical application. The judicious use of sand and salt without chemical additives is allowed in order to protect the safety of the public.

SECTION 4

Abutter Information

List of abutters
Tax Collector Signoff

100 foot Abutters List Report

Freetown, MA
August 31, 2020

Subject Property: 233-2

Abutters:

Parcel Number:	214-014	Mailing Address:	FALL RIVER WATER DEPARTMENT
CAMA Number:	214-014		1831 BEDFORD STREET
Property Address:	0 COPICUT RD		FALL RIVER, MA 02723
Parcel Number:	215-011	Mailing Address:	CAMBRA MANUEL - HEIRS
CAMA Number:	215-011		58 HIGH STREET
Property Address:	0 HIGH ST		ASSONET, MA 02702
Parcel Number:	215-016	Mailing Address:	SULLIVAN CHARLES B JR & KAREN
CAMA Number:	215-016		46 HIGH STREET
Property Address:	46 HIGH ST		ASSONET, MA 02702
Parcel Number:	215-040	Mailing Address:	MASS MEDICAL PROPERTIES LLC
CAMA Number:	215-040		P O BOX 558
Property Address:	7 CAMPANELLI DR		WOOD RIVER, IL 62095
Parcel Number:	215-041	Mailing Address:	11 CAMP (MA) LLC C/O REPUBLIC
CAMA Number:	215-041		SERVICES
Property Address:	11 CAMPANELLI DR		P O BOX 29246
			PHOENIX, AZ 85038
Parcel Number:	232-016	Mailing Address:	MASSACHUSETTS COMMONWEALTH
CAMA Number:	232-016		OF FREETOWN STATE FOREST
Property Address:	0 COPICUT RD		108 SLAB BRIDGE RD
			ASSONET, MA 02702
Parcel Number:	232-017	Mailing Address:	COPICUT MANAGEMENT CORP
CAMA Number:	232-017		98 HIGH ST
Property Address:	39 COPICUT RD		ASSONET, MA 02702
Parcel Number:	232-027	Mailing Address:	PECKHAM SHAWN C & LAURIE A
CAMA Number:	232-027		90 HIGH ST
Property Address:	90 HIGH ST		ASSONET, MA 02702
Parcel Number:	233-001	Mailing Address:	BORGES PETER D & THOMAS A
CAMA Number:	233-001		98 HIGH ST
Property Address:	15 COPICUT RD		ASSONET, MA 02702
Parcel Number:	233-004	Mailing Address:	R FIVE CO INC
CAMA Number:	233-004		3 Sammy's Lane
Property Address:	0 ROCKY RD		Assonet, MA 02702
Parcel Number:	233-005	Mailing Address:	R FIVE LIMITED INC
CAMA Number:	233-005		P O BOX 879
Property Address:	35 COPICUT RD		ASSONET, MA 02702

100 foot Abutters List Report

Freetown, MA
August 31, 2020

Parcel Number: 235-011
CAMA Number: 235-011
Property Address: 0 TRACK LAND

Mailing Address: CSX TRANSPORTATION INC TAX DEPARTMENT J910
500 WATER ST
JACKSONVILLE, FL 32202

Michael T. McCue
8-31-2020

100 foot Abutters List Report

Freetown, MA
August 31, 2020

Subject Property: 233-3

Abutters:

Parcel Number:	232-016	Mailing Address:	MASSACHUSETTS COMMONWEALTH
CAMA Number:	232-016		OF FREETOWN STATE FOREST
Property Address:	0 COPICUT RD		108 SLAB BRIDGE RD
			ASSONET, MA 02702
Parcel Number:	232-017	Mailing Address:	COPICUT MANAGEMENT CORP
CAMA Number:	232-017		98 HIGH ST
Property Address:	39 COPICUT RD		ASSONET, MA 02702
Parcel Number:	232-027	Mailing Address:	PECKHAM SHAWN C & LAURIE A
CAMA Number:	232-027		90 HIGH ST
Property Address:	90 HIGH ST		ASSONET, MA 02702
Parcel Number:	233-004	Mailing Address:	R FIVE CO INC
CAMA Number:	233-004		3 Sammy's Lane
Property Address:	0 ROCKY RD		Assonet, MA 02702
Parcel Number:	233-005	Mailing Address:	R FIVE LIMITED INC
CAMA Number:	233-005		P O BOX 879
Property Address:	35 COPICUT RD		ASSONET, MA 02702

Michael T. McCue
8-31-2020

100 foot Abutters List Report

Freetown, MA
August 31, 2020

Subject Property:

Parcel Number: 233-004
CAMA Number: 233-004
Property Address: 0 ROCKY RD

Mailing Address: R FIVE CO INC
3 Sammy's Lane
Assonet, MA 02702

Abutters:

Parcel Number: 215-011
CAMA Number: 215-011
Property Address: 0 HIGH ST

Mailing Address: CAMBRA MANUEL - HEIRS
58 HIGH STREET
ASSONET, MA 02702

Parcel Number: 232-016
CAMA Number: 232-016
Property Address: 0 COPICUT RD

Mailing Address: MASSACHUSETTS COMMONWEALTH
OF FREETOWN STATE FOREST
108 SLAB BRIDGE RD
ASSONET, MA 02702

Parcel Number: 232-017
CAMA Number: 232-017
Property Address: 39 COPICUT RD

Mailing Address: COPICUT MANAGEMENT CORP
98 HIGH ST
ASSONET, MA 02702

Parcel Number: 232-027
CAMA Number: 232-027
Property Address: 90 HIGH ST

Mailing Address: PECKHAM SHAWN C & LAURIE A
90 HIGH ST
ASSONET, MA 02702

Parcel Number: 232-032
CAMA Number: 232-032
Property Address: 0 COPICUT RD

Mailing Address: R FIVE LIMITED INC
P O 879
ASSONET, MA 02702

Parcel Number: 233-005
CAMA Number: 233-005
Property Address: 35 COPICUT RD

Mailing Address: R FIVE LIMITED INC
P O BOX 879
ASSONET, MA 02702

100 foot Abutters List Report

Freetown, MA
August 31, 2020

Subject Property:

Parcel Number: 232-032
CAMA Number: 232-032
Property Address: 0 COPICUT RD

Mailing Address: R FIVE LIMITED INC
P O 879
ASSONET, MA 02702

Abutters:

Parcel Number: 215-011
CAMA Number: 215-011
Property Address: 0 HIGH ST

Mailing Address: CAMBRA MANUEL - HEIRS
58 HIGH STREET
ASSONET, MA 02702

Parcel Number: 232-017
CAMA Number: 232-017
Property Address: 39 COPICUT RD

Mailing Address: COPICUT MANAGEMENT CORP
98 HIGH ST
ASSONET, MA 02702

Parcel Number: 232-027
CAMA Number: 232-027
Property Address: 90 HIGH ST

Mailing Address: PECKHAM SHAWN C & LAURIE A
90 HIGH ST
ASSONET, MA 02702

Parcel Number: 232-031
CAMA Number: 232-031
Property Address: 0 HIGH ST

Mailing Address: PERRY ROBERT J TR RJP REALTY TRUST
76 HIGH ST
ASSONET, MA 02702

Parcel Number: 232-035
CAMA Number: 232-035
Property Address: 72 HIGH ST

Mailing Address: MACOMBER ELIZABETH
72 HIGH ST
ASSONET, MA 02702

Parcel Number: 232-036
CAMA Number: 232-036
Property Address: 68 HIGH ST

Mailing Address: Curtis R. McClurkin &
Elizabeth A. Dooher
68 High Street
Assonet, MA 02702

Parcel Number: 232-037
CAMA Number: 232-037
Property Address: 66 HIGH ST

Mailing Address: REZNEKERVITZ ADOLPH
32 COUNTY RD
E FREETOWN, MA 02717

Parcel Number: 233-004
CAMA Number: 233-004
Property Address: 0 ROCKY RD

Mailing Address: R FIVE CO INC
3 Sammy's Lane
Assonet, MA 02702

Parcel Number: 233-005
CAMA Number: 233-005
Property Address: 35 COPICUT RD

Mailing Address: R FIVE LIMITED INC
P O BOX 879
ASSONET, MA 02702

Freetown Conservation Commission
Tax Collector Sign-Off

Required for all filings on or after July 1, 2019

The Town of Freetown General By-laws provide that licenses and permits may be denied, suspended, or revoked if taxes or charges are owed to the Town of Freetown and are more than twelve months overdue.

Date: 9-1-20

Name of Property Owner: R Five Limited

Name of Applicant: K R Rezendes Inc.

Address of Property: _____

Map: 232 233 Lot: 3 2, 3, 4

Tax Collector:

Please check the appropriate boxes to indicate whether or not taxes are current.

	PROPERTY OWNER		APPLICANT	
	Current	Not Current	Current	Not Current
Real Estate	✓			
Personal Property				
Motor Vehicle				
Vessel (Boat)				

Signature: [signature]

Date: 9/1/20

History Summary As Of 9/1/2020

Town of Freetown
Real Estate

Tuesday, September 1, 2020 1:12:45 PM

Account:	3001
Levy:	2021
Parcel:	232-32
Record Owner:	R FIVE LIMITED INC
Location:	SMUDGE WOODLOT
Balance:	**$0.00**

Debits

Name	BillingDate	DueDate	Billed	Credits	Remainder	Interest	TotalDue	PerDiem
Quarterly Preliminary	7/1/2020	8/3/2020	$291.27	$291.27	$0.00	$0.00	$0.00	$.000
Quarterly Preliminary	10/1/2020	11/2/2020	$291.26	$0.00	$291.26	$0.00	$0.00	$.000
Grand Total			**$582.53**	**$291.27**	**$291.26**	**$0.00**	**$0.00**	**$ 0.000**

Transactions

Name	Eff. Date	Post Date	Batch	Total	Tax	Liens	Fees	Interest	Comments
Payment	8/3/2020	8/5/2020	08/03/2020 B9	$291.27	$291.27	$0.00	$0.00	$0.00	
Grand Total				**$291.27**	**$291.27**	**$0.00**	**$0.00**	**$0.00**	

SECTION 5

Application Distribution and Check Copies

Distribution of Soil Removal Permit Application

Three copies to:

Freetown Soil Board
3 North Main Street
Assonet, MA 02702

Sent by certified mail

Fee of $575.00 payable to Town of Freetown

SECTION 6

Site Plans (reduced copies)

SITE PLAN FOR
35 COPICUT ROAD
FREETOWN, MASSACHUSETTS

SITE NOTES:

1. THE SITE IS SHOWN ON THE TOWN OF FREETOWN ASSESSORS MAP AS MAP 232 LOT 32 AND MAP 233 LOT 4.
2. PROPERTY LINE AND EXISTING CONDITIONS INFORMATION WAS TAKEN FROM A FIELD SURVEY BY MOUNT HOPE ENGINEERING.
3. NORTHERN BRISTOL COUNTY REGISTRY OF DEEDS:
   DEED REFERENCE: BOOK 2478 PAGE 17
   BOOK 8159 PAGE 102
   PLAN REFERENCES: PLAN BOOK 106 PAGE 5
4. A PORTION OF THE SITE IS LOCATED IN A FLOOD PLAIN ZONE A AS INDICATED ON THE F.E.M.A. FLOOD INSURANCE RATE MAP NUMBER 25005C0264F WITH AN EFFECTIVE DATE OF JULY 7, 2009.
5. THE SITE IS NOT LOCATED IN A PRIORITY HABITAT AND ESTIMATED HABITAT AS SHOWN ON THE MASSACHUSETTS NATURAL HERITAGE ATLAS 14TH EDITION EFFECTIVE DATE AUGUST, 2017.
6. AN ORDER OF RESOURCE AREA DELINEATION (ORAD) WAS ISSUED ON 2/2/2009 BY THE FREETOWN CONSERVATION COMMISSION. DEP FILE NUMBER SE 026-0477
7. THE PROJECT IS NOT LOCATED WITHIN AN AREA OF CRITICAL ENVIRONMENTAL CONCERN (ACEC).
8. THE SITE IS NOT LOCATED IN A ZONE II TO A PUBLIC WATER SUPPLY WELL.
9. THE SITE IS NOT IN A ZONE A TO A SURFACE WATER SUPPLY AREA.
10. THE SITE IS NOT LOCATED IN AN OUTSTANDING RESOURCE WATER AREA (ORW).
11. ALL UNDERGROUND UTILITIES ARE TO BE CONSIDERED APPROXIMATE. LOCATIONS WERE TAKEN FROM PLANS OF RECORD WITH THE MUNICIPALITY, DIG SAFE LOCATIONS OR FIELD EVIDENCE. IT IS THE CONTRACTORS RESPONSIBILITY TO CONTACT DIG SAFE (1-888-DIG SAFE) AND ALL UTILITY COMPANIES TO CONFIRM LOCATIONS AND ELEVATIONS PRIOR TO THE START OF WORK.

CONSTRUCTION NOTES:

1. A NPDES FILING MUST BE SUBMITTED FOR THIS PROJECT PRIOR TO CONSTRUCTION.
2. CONTRACTOR TO VERIFY BENCHMARKS FOR CONSISTENCY PRIOR TO CONSTRUCTION AND SHALL NOTIFY ZENITH CONSULTING ENGINEERS, LLC. OF ANY DISCREPANCIES.
3. CONTRACTOR SHALL VERIFY WATER TABLE ELEVATIONS AND NOTIFY THE DESIGN ENGINEER OF ANY DISCREPANCIES FROM THE PLAN.
4. IT IS THE CONTRACTORS RESPONSIBILITY TO CONTACT DIG SAFE (1-888-DIG SAFE) PRIOR TO THE COMMENCEMENT OF WORK AND ALL UNDERGROUND UTILITY COMPANIES TO CONFIRM LOCATIONS AND ELEVATIONS.
5. PROPOSED UTILITIES AND CONSTRUCTION METHODS UNDER AREAS SUBJECT TO TRAFFIC LOADING SHALL BE INSTALLED TO WITHSTAND H-20 LOADING TRAFFIC STANDARDS. CONTRACTOR SHALL VERIFY THAT ALL STRUCTURES COMPLY TO THIS STANDARD.
6. WHERE ALL CONCRETE STRUCTURES INTERCEPT THE SEASONAL HIGH GROUNDWATER TABLE, THE CONTRACTOR SHALL SEAL THE ENTIRE STRUCTURE WITH WATERPROOF SEALER.
7. IF APPLICABLE, ANY RETAINING WALLS SHALL BE DESIGNED BY A MASSACHUSETTS REGISTERED PROFESSIONAL STRUCTURAL ENGINEER.
8. ALL WORK SHALL CONFORM TO THE TOWN OF FREETOWN RULES AND REGULATIONS AND THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION SPECIFICATIONS FOR HIGHWAY AND BRIDGES, MOST CURRENT VERSION OF PLAN SET.
9. AN ESTIMATE 900,000 CUBIC YARDS OF SOIL ARE TO BE REMOVED DURING THE EARTH REMOVAL OPERATION.

LOCUS PLAN
SCALE: 1"=500'

SCHEDULE OF DRAWINGS

DRAWING NUMBER	PLAN TITLE	PLAN PREPARED BY	LATEST PLAN DATE
C1	COVER SHEET	ZENITH CONSULTING ENGINEERS, LLC.	8/27/20
E1	EXISTING CONDITIONS PLAN	ZENITH CONSULTING ENGINEERS, LLC.	8/27/20
G1	GRADING PLAN	ZENITH CONSULTING ENGINEERS, LLC.	8/27/20
G2	GRADING PLAN	ZENITH CONSULTING ENGINEERS, LLC.	8/27/20
G3	GRADING PLAN	ZENITH CONSULTING ENGINEERS, LLC.	8/27/20
G4	GRADING PLAN	ZENITH CONSULTING ENGINEERS, LLC.	8/27/20
G5	GRADING PLAN	ZENITH CONSULTING ENGINEERS, LLC.	8/27/20
WR1	WETLAND REPLICATION PLAN	ZENITH CONSULTING ENGINEERS, LLC.	8/27/20
EC1	EROSION CONTROL PLAN	ZENITH CONSULTING ENGINEERS, LLC.	8/27/20
D1	DETAIL SHEET 1	ZENITH CONSULTING ENGINEERS, LLC.	8/27/20

LEGEND

EXISTING	DESCRIPTION	PROPOSED
98	CONTOURS	72
×69.4	SPOT GRADE	+98.5
	BOUND	
TP 7	TEST PIT	
	WETLAND SYMBOL	
+WF #BVW15	WETLAND FLAG AND NUMBER	
25'B	25' BVW BUFFER	
50'B	50' BVW BUFFER	
100'B	100' BVW BUFFER	
D D D	DRAIN LINE	D D
	DRAIN MANHOLE	D
	CATCH BASIN	
	RETAINING WALL	
OHW OHW	OVERHEAD WIRES	
UP#213	UTILITY POLE	
	LIGHT POLE	
	STONEWALL	
S	SEWER LINE	S
	SIGN	
	CHAIN LINK FENCE	
	HYDRANT	
G G	GAS LINE	GAS GAS

AUGUST 31, 2020

PROJECT MANAGEMENT AND DESIGN ASSISTANCE BY:
HOLMES ENGINEERING
CIVIL ENGINEERING & CONSULTING
622 BERKLEY STREET, BERKLEY, MA 02779
PHONE: (508) 880-6535

SURVEY BY:
MOUNT HOPE ENGINEERING, INC.
CIVIL/ENVIRONMENTAL SERVICES
1788 G.A.R. HIGHWAY, SWANSEA, MA 02777
PHONE: (508) 379-1234

OWNER
R FIVE LIMITED INC.
3 SAMMY'S LANE
ASSONET, MA 02702

APPLICANT
KR REZENDES, INC.
3 SAMMY'S LANE
ASSONET, MA 02702

COMMONWEALTH OF MASSACHUSETTS — KYLES C. ZAGER — 47877 — REGISTERED PROFESSIONAL ENGINEER
P.E. STAMP

ZCE
ZENITH CONSULTING ENGINEERS, LLC
3 MAIN STREET LAKEVILLE, MA 02347
PHONE: (508) 947-4208

REV.	DATE	DESCRIPTION	BY	APP.

DRAWN BY: RLG
DESIGNED BY: RLG
CHECKED BY: NCZ
APPROVED BY: NCZ
DATE: 8/31/2020
PROJECT NUMBER: 0617-01-01
DRAWING SCALE: AS NOTED
SHEET ID: C1

SHEET NAME: **COVER SHEET**
PROJECT SITE: **35 COPICUT ROAD FREETOWN, MASSACHUSETTS**
CLIENT INFO: **KR REZENDES, INC. 3 SAMMY'S LANE ASSONET, MASSACHUSETTS**

S:\Civil Engineering Projects\Freetown\Copicut Road\0 Copicut Road\DWG\0 Copicut - Site Base Plan.dwg

NAD83 NORTH

ASSESS. MAP 215
LOT 41
N/F 11 CAMP (MA) LLC
11 CAMPANELLI DR
DEED BK 8678
PAGE 104

ASSESS. MAP 214
LOT 107
N/F 11 CAMP (MA) LLC
0 CAMPANELLI DR
DEED BK 8678
PAGE 106

ASSESS. MAP 214
LOT 14
N/F FALL RIVER WATER DEPARTMENT
0 COPICUT RD
DEED BK 706
PAGE 150

TERRY BROOK POND

ASSESS. MAP 233
LOT 1
N/F BORGES PETER D & THOMAS
15 COPICUT RD
DEED BK 2329
PAGE 161

FEMA ZONE A

200' RIPARIAN ZONE (TYP)

BEGIN PERENNIAL STREAM

100' RIPARIAN ZONE (TYP)

INTERMITTENT STREAM

BROOK

TERRY

S89°01'36"E
2281.46'

S76°57'02"E
436.27'

BORDERING VEGETATED WETLANDS (SEE NOTE 2)

ASSESS. MAP 232
LOT 32
N/F R FIVE LIMITED INC
0 COPICUT RD
DEED BK 2478
PAGE 17

ASSESS. MAP 233
LOT 4
N/F CAMPANELLI FREETOWN LAND LLC
0 COPICUT RD
DEED BK 8159
PAGE 102

N/F

233.64'

159.35'

N/F

203.24'

101.40'

117.47'

REBAR w/CAP SET

S12°12'24"E
50.00'

N77°47'48"E
400.76'

S12°12'24"E
25.00'

N77°47'48"E
139.80'

BORDERING VEGETATED WETLANDS "A"

EX. TREELINE

ISOLATED VEGETATED WETLANDS "C"

ISOLATED VEGETATED WETLANDS "E"

EXISTING GAS EASEMENT

ROCKY ROAD

ISOLATED VEGETATED WETLANDS "B"

ISOLATED VEGETATED WETLANDS "D"

EXISTING ROCK OUTCROP

S29°29'21"W
1530.13'

413.24'

32.89'

127.98'

110.11'

N61°43'33"W
3634.78'

STONE BOUND FOUND

STONE BOUND FOUND

COPICUT ROAD

ASSESS. MAP 233
LOT 5
N/F R FIVE LIMITED INC
0 COPICUT RD
DEED BK C#5008
PAGE

GRAPHICS SCALE
1 inch = 100 feet
0 100 200 300

SITE NOTES:

1. WETLANDS AND RESOURCE AREAS SHOWN HEREON ON PARCEL 233_04_0 TAKEN FROM "PLAN TO ACCOMPANY ANRAD APPLICATION" BY KELLY ENGINEERING GROUP, INC. DATED 11/14/08, REVISED THRU 1/19/09 AND APPROVED PER AN ORDER OF RESOURCE AREA DELINEATION (ORAD) ISSUED ON **2/2/2009** BY THE **FREETOWN** CONSERVATION COMMISSION. DEP FILE NUMBER **SE 026-0477**
2. WETLANDS SHOWN HEREON ON PARCEL 232_32_0 FLAGGED BY DAVID DURANLEAU OF HOLMES ENGINEERING ON 02/29/2020.
3. THE PROJECT **IS NOT** LOCATED WITHIN AN AREA OF CRITICAL ENVIRONMENTAL CONCERN (ACEC).
4. THE SITE **IS NOT** LOCATED IN A ZONE II TO A PUBLIC WATER SUPPLY WELL.
5. THE SITE **IS NOT** IN A ZONE A TO A SURFACE WATER SUPPLY AREA.
6. THE SITE **IS NOT** LOCATED IN AN OUTSTANDING RESOURCE WATER AREA (ORW).
7. A PORTION OF THE SITE IS LOCATED IN A FLOOD PLAIN ZONE **A** AS INDICATED ON THE F.E.M.A. FLOOD INSURANCE RATE MAP NUMBER **25005C0264F** WITH AN EFFECTIVE DATE OF **JULY 7, 2009**.

COMMONWEALTH OF MASSACHUSETTS
ROBERT ANTHONY PERRUZZI
#37056
REGISTERED PROFESSIONAL ENGINEER AND SURVEYOR

P.E. STAMP

ZCE
ZENITH CONSULTING ENGINEERS, LLC
3 MAIN STREET LAKEVILLE, MA 02347
PHONE: (508) 947-4208

REV.	DATE	DESCRIPTION	BY	APP.

DATE: 8/31/2020
DRAWN BY: RLG
DESIGNED BY: RLG
PROJECT NUMBER: 0617-01-01
CHECKED BY: NCZ
DRAWING SCALE: 1"=100'
APPROVED BY: NCZ
SHEET ID: E1

SHEET NAME: **EXISTING CONDITIONS PLAN**

PROJECT SITE: **35 COPICUT ROAD**
FREETOWN, MASSACHUSETTS

CLIENT INFO: **KR REZENDES, INC.**
3 SAMMY'S LANE
ASSONET, MASSACHUSETTS

SHEET NAME: **GRADING PLAN**	DRAWN BY: RLG	DATE: 8/31/2020	REV.	DATE	DESCRIPTION	BY	APP.
PROJECT SITE: **35 COPICUT ROAD FREETOWN, MASSACHUSETTS**	DESIGNED BY: RLG	PROJECT NUMBER: 0617-01-01					
CLIENT INFO: **KR REZENDES, INC. 3 SAMMY'S LANE ASSONET, MASSACHUSETTS**	CHECKED BY: NCZ	DRAWING SCALE: 1"=100'					
	APPROVED BY: NCZ	SHEET ID: G1					

ZCE
ZENITH CONSULTING ENGINEERS, LLC
3 MAIN STREET LAKEVILLE, MA 02347
PHONE: (508) 947-4208

NYLES C. ZAGER CIVIL No. 48717 REGISTERED PROFESSIONAL ENGINEER

P.E. STAMP

S:\Civil Engineering Projects\Freetown\Copicut Road\0 Copicut Road\DWG\0 Copicut – Site Base Plan.dwg

PLAN VIEW
SCALE 1"=40'

ACCESS DRIVE PROFILE VIEW
SCALE 1"=40'H 1'=4'V

GRAPHICS SCALE
1 inch = 40 feet
0 40 80 120

ZCE
ZENITH CONSULTING ENGINEERS, LLC
3 MAIN STREET LAKEVILLE, MA 02347
PHONE: (508) 947-4208

P.E. STAMP

REV.	DATE	DESCRIPTION

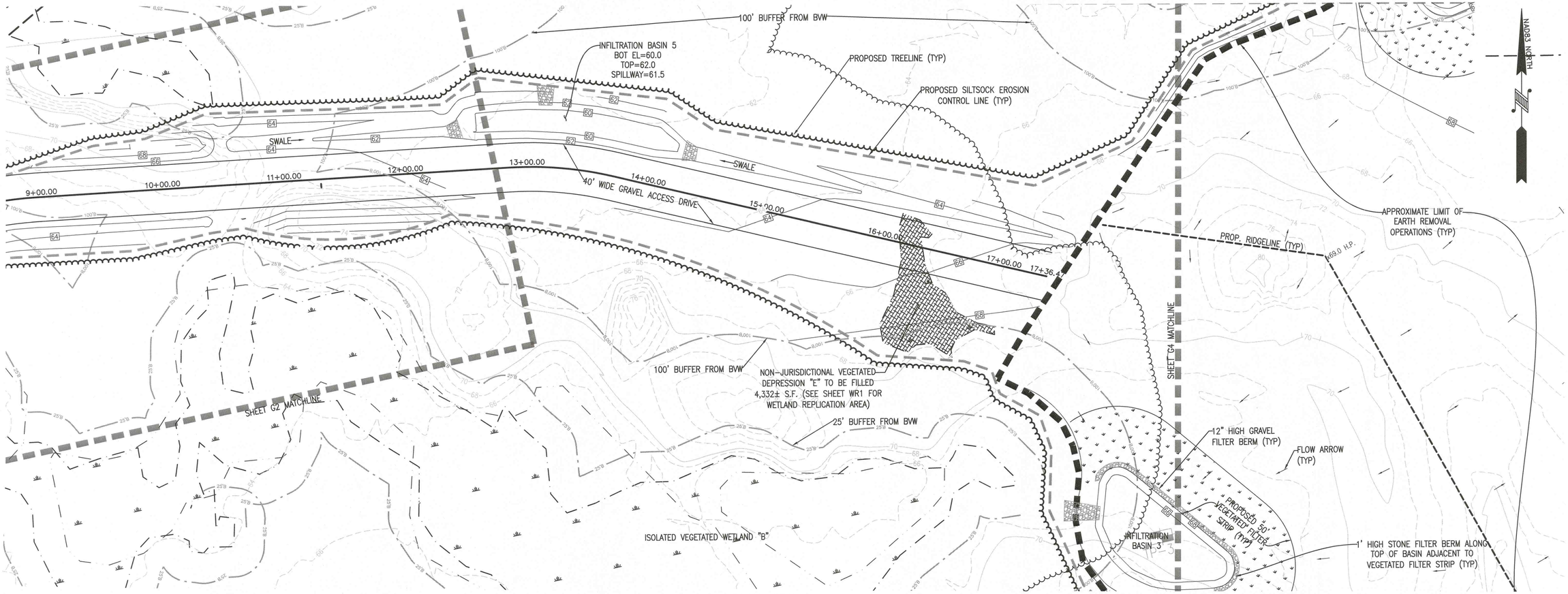
DRAWN BY: RLG
DESIGNED BY: RLG
CHECKED BY: NCZ
APPROVED BY: NCZ
DATE: 8/31/2020
PROJECT NUMBER: 0617-01-01
DRAWING SCALE: 1"=40'
SHEET ID: G2

SHEET NAME: **GRADING PLAN**

PROJECT SITE: **35 COPICUT ROAD FREETOWN, MASSACHUSETTS**

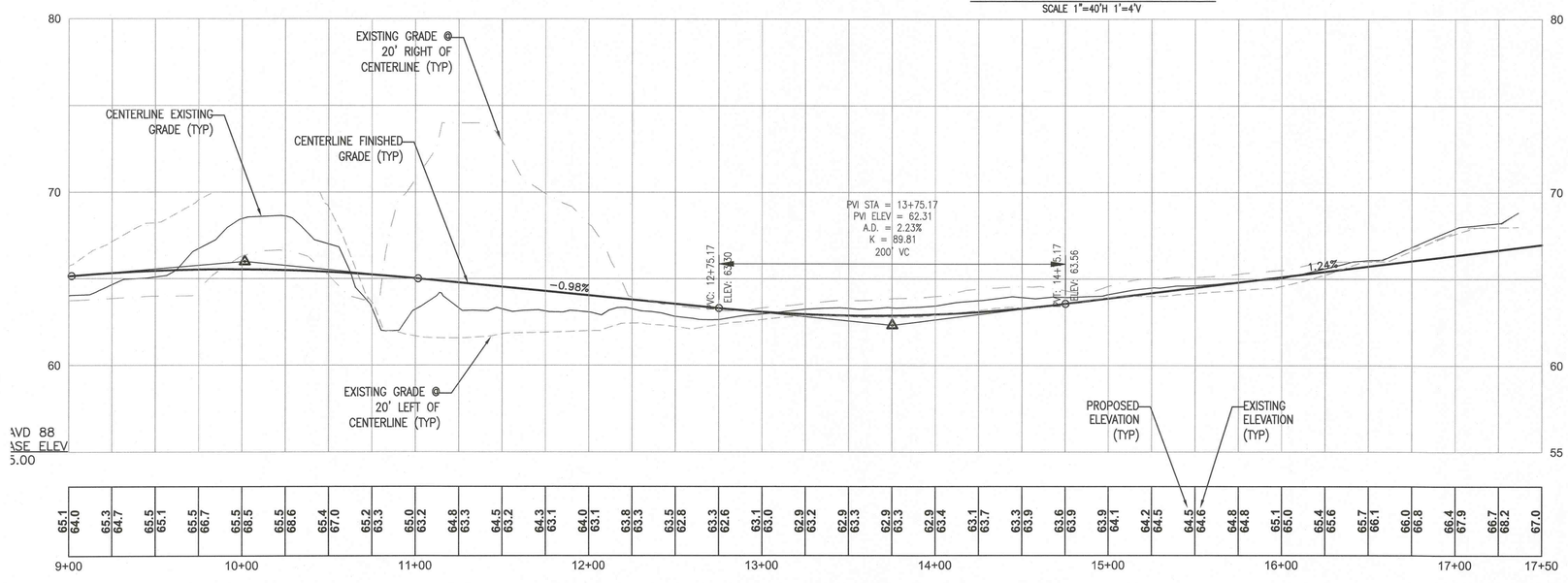
CLIENT INFO: **KR REZENDES, INC. 3 SAMMY'S LANE ASSONET, MASSACHUSETTS**

S:\Civil Engineering Projects\Freetown\Copicut Road\0 Copicut Road\DWG\0 Copicut - Site Base Plan.dwg



PLAN VIEW
SCALE 1"=40'

ACCESS DRIVE PROFILE VIEW
SCALE 1"=40'H 1'=4'V



GRAPHICS SCALE
1 inch = 40 feet
0 40 80 120

ZCE
ZENITH CONSULTING ENGINEERS, LLC
3 MAIN STREET LAKEVILLE, MA 02347
PHONE: (508) 947-4208

KYLES C. ZAGER
CIVIL
No. 49017
COMMONWEALTH OF MASSACHUSETTS
REGISTERED PROFESSIONAL ENGINEER
P.E. STAMP

REV.	DATE	DESCRIPTION	BY	APP.

DATE: 8/31/2020
PROJECT NUMBER: 0617-01-01
DRAWING SCALE: 1"=40'
SHEET ID: G3
DRAWN BY: RLG
DESIGNED BY: RLG
CHECKED BY: NCZ
APPROVED BY: NCZ

SHEET NAME: **GRADING PLAN**
PROJECT SITE: **35 COPICUT ROAD**
FREETOWN, MASSACHUSETTS
CLIENT INFO: **KR REZENDES, INC.**
3 SAMMY'S LANE
ASSONET, MASSACHUSETTS

S:\Civil Engineering Projects\Freetown\Copicut Road\0 Copicut Road\DWG\0 Copicut - Site Base Plan.dwg

SHEET G5 MATCHLINE

APPROXIMATE LIMIT OF EARTH REMOVAL OPERATIONS (TYP)

SWALE

1' HIGH STONE FILTER BERM ALONG TOP OF BASIN ADJACENT TO VEGETATED FILTER STRIP (TYP)

INFILTRATION BASIN 1
TOP=66.0
BOT=62.0

FES-1
INV=60.00

69 LF-12" HDPE
S=1.45%

OCS-1
6" ORIFICE=62.0
60" WIDE RECT.
WEIR=62.75

TP-1

PROPOSED SILTSOCK EROSION CONTROL LINE (TYP)

PROPOSED 50' VEGETATED FILTER STRIP (TYP)

12" HIGH GRAVEL FILTER BERM (TYP)

EXISTING ROCK OUTCROP

BORDERING VEGETATED WETLANDS

FINAL GRADING SHALL BE 2H:1V IN SOIL AND 1H:5V IN BEDROCK (TYP)

NAD83 NORTH

SHEET G3 MATCHLINE

PROP. RIDGELINE (TYP)

69.0 H.P.

APPROXIMATE LIMIT OF EARTH REMOVAL OPERATIONS (TYP)

NON-JURISDICTIONAL VEGETATED DEPRESSION "D" (TO BE REMOVED)

FLOW ARROW (TYP)

12" HIGH GRAVEL FILTER BERM (TYP)

FLOW ARROW (TYP)

PROPOSED 50' VEGETATED FILTER STRIP (TYP)

1' HIGH STONE FILTER BERM ALONG TOP OF BASIN ADJACENT TO VEGETATED FILTER STRIP (TYP)

GRAPHICS SCALE
1 inch = 40 feet
0 40 80 120

COMMONWEALTH OF MASSACHUSETTS
KYLES C. ZENITH
CIVIL
No. 45717
REGISTERED PROFESSIONAL ENGINEER

P.E. STAMP

ZCE
ZENITH CONSULTING ENGINEERS, LLC
3 MAIN STREET LAKEVILLE, MA 02347
PHONE: (508) 947-4208

BY	APP.

REV.	DATE	DESCRIPTION

SHEET NAME: **GRADING PLAN**

PROJECT SITE: **35 COPICUT ROAD**
FREETOWN, MASSACHUSETTS

CLIENT INFO: **KR REZENDES, INC.**
3 SAMMY'S LANE
ASSONET, MASSACHUSETTS

DRAWN BY: RLG	DATE: 8/31/2020		
DESIGNED BY: RLG	PROJECT NUMBER: 0617-01-01		
CHECKED BY: NCZ	DRAWING SCALE: 1"=40'		
APPROVED BY: NCZ	SHEET ID: G4		

S:\Civil Engineering Projects\Freetown\Copicut Road\0 Copicut Road\DWG\0 Copicut - Site Base Plan.dwg

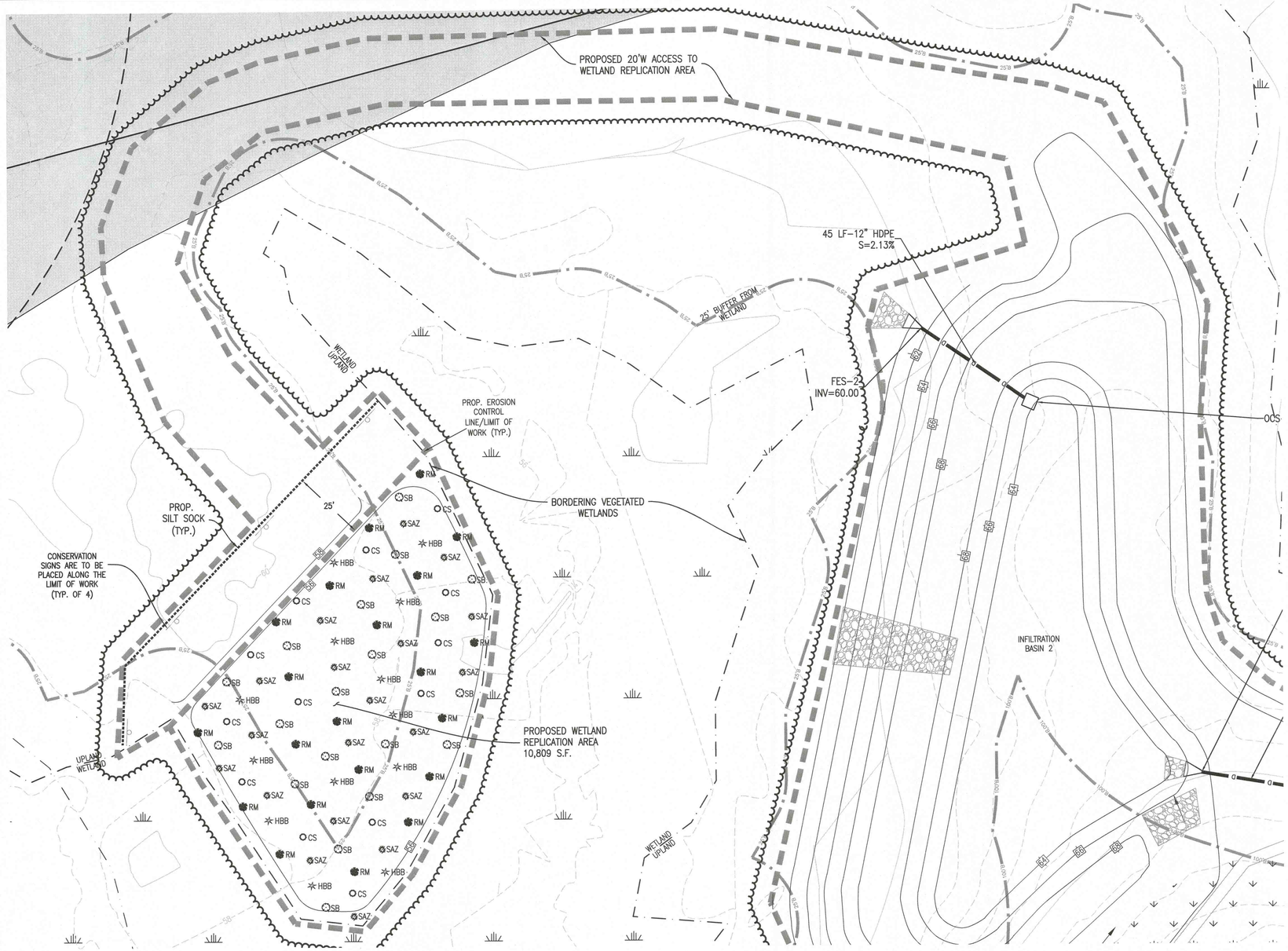
SHEET NAME: **GRADING PLAN**	DRAWN BY: RLG	DATE: 8/31/2020	REV.	DATE	DESCRIPTION	BY	APP.
PROJECT SITE: **35 COPICUT ROAD** **FREETOWN, MASSACHUSETTS**	DESIGNED BY: RLG	PROJECT NUMBER: 0617-01-01					
CLIENT INFO: **KR REZENDES, INC.** **3 SAMMY'S LANE** **ASSONET, MASSACHUSETTS**	CHECKED BY: NCZ	DRAWING SCALE: 1"=40'					
	APPROVED BY: NCZ	SHEET ID: G5					

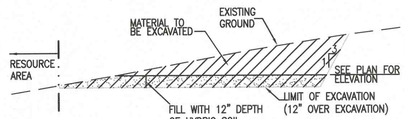
ZCE
ZENITH CONSULTING ENGINEERS, LLC
3 MAIN STREET LAKEVILLE, MA 02347
PHONE: (508) 947-4208

COMMONWEALTH OF MASSACHUSETTS — NYLES C. ZADER — CIVIL — No. 46717 — REGISTERED PROFESSIONAL ENGINEER

P.E. STAMP

S:\Civil Engineering Projects\Freetown\Copicut Road\0 Copicut Road\DWG\0 Copicut – Site Base Plan.dwg





TYPICAL REPLICATION AREA CROSS SECTION

NOT TO SCALE

GRAPHICS SCALE

1 inch = 40 feet

0 40 80 120

LEGEND

69	EXISTING CONTOURS
69	PROPOSED CONTOURS
+100.50	PROPOSED SPOT ELEVATION
	EXISTING TREELINE
	PROPOSED TREELINE
BVW-1-13	WETLANDS FLAG
	EROSION CONTROL
	EXISTING WETLANDS

THE BASE OF THE REPLICATION AREAS AND THE SIDE SLOPES OF THE ACCESS DRIVE AT WETLAND CROSSING ONLY ARE TO BE SEEDED WITH ONE POUND PER 2,500 SQUARE FEET OF NEE WET MIX SUPPLIED BY NEW ENGLAND ENVIRONMENTAL, INC. AMHERST, MA., OR APPROVED EQUAL.

COMMON NAME	SCIENTIFIC NAME	% IN MIX	NWI RATING	COMMENTS
LURID SEDGE	CAREX LURIDA	30	OBL	A LOW GROUND COVER THAT TOLERATES MESIC SITES IN ADDITION TO SATURATED AREAS; PROLIFIC SEEDER IN SECOND GROWING SEASON.
FOWL MEADOW GRASS	GLYCERIA CANADENSIS	25	OBL	PROLIFIC SEED PRODUCER THAT IS A VALUABLE WILDLIFE RESOURCE.
FRINGED SEDGE	CAREX CRINITA	10	OBL	A MEDIUM TO LARGE SEDGE THAT TOLERATES SATURATED AREAS; GOOD SEED PRODUCER.
JOE-PYE WEED	EUPATORIADELPHUS MACULATUS	10	FACW	FLOWERING PLANT THAT IS VALUABLE FOR WILDLIFE COVER; GROWS TO 4 FEET.
BROOM SEDGE	CAREX SPP, OVALES GROUP	10	FACW-OBL	TOLERATES A WIDE RANGE OF HYDROLOGIC CONDITIONS.
WOOLGRASS	SCIRPUS CYPERINUS	5	FACW+	TOLERATES FLUCTUATING HYDROLOGY
BONESET	EUPATORIUM PERFOLIATUM	5	FACW+	FLOWERING PLANT THAT IS VALUABLE FOR WILDLIFE COVER; GROWS TO 3 FEET.
TUSSOCK SEDGE	CAREX STRICTA	<5	OBL	GROWS IN ELEVATED HUMMOCKS ON WET SITES, MAY GROW RHIZOMONOUSLY ON DRIER SITES.
BLUE VERVAIN	VERBENA HASTATA	<5	FACW+	A NATIVE PLANT THAT BEARS ATTRACTIVE BLUE FLOWERS.

WETLAND REPLICATION CONSTRUCTION SEQUENCE:

THE REPLICATION AREA SHALL BE PREPARED SIMULTANEOUSLY WITH THE PROPOSED WETLAND CROSSING AREA USING THE FOLLOWING ESSENTIAL SEQUENCE OF CONSTRUCTION:

1. EROSION CONTROL SHALL BE INSTALLED AND INSPECTED FOR ADEQUACY BY ZENITH CONSULTING ENGINEERING, LLC. AND THE FREETOWN CONSERVATION COMMISSION OR ITS AGENT.
2. THE REPLICATION AREA SHALL THEN BE CLEARED AND GRUBBED.
3. ANY SALVAGEABLE TOPSOIL FROM THE REPLICATED AREA SHALL BE STOCKPILED UPGRADIENT OF THE REPLICATION AREA.
4. THE AREA WILL THEN BE GRADED TO A SUBGRADE ONE FOOT LOWER THAN FINAL GRADES SHOWN.
5. THE SALVAGED TOPSOIL WILL THEN BE SPREAD.
6. THE WETLAND FILLING AREAS WILL THEN BE EXAMINED FOR SALVAGEABLE SHRUBS. ANY SHRUBS DEEMED POTENTIALLY SALVAGEABLE BY THE ENGINEER WILL BE EXCAVATED AND STAGED FOR TRANSPLANTING.
7. ALL ORGANIC TOPSOIL FROM THE WETLAND CROSSING WILL THEN BE SPREAD TO ACHIEVE THE FINAL PROPOSED GRADES. THE AREA IS NOT TO BE RAKED SMOOTH BUT RATHER IS TO BE LEFT WITH BACK HOE TEETH MARKS IN ORDER TO CREATE A MICROTOPOGRAPHY.
9. THE SHRUBS SHALL BE PLANTED AS DIRECTED BY THE ENGINEER.
10. THE AREA WILL THEN IMMEDIATELY BE SEEDED WITH NEE WETLAND MIX AT A RATE OF 1 LB PER 2,500 SQUARE FEET.

TREE & SHRUB PLANTING SCHEDULE

SYMBOL	SCIENTIFIC NAME	COMMON NAME	SIZE	QUANTITY
HBB	VACCINIUM CORYMBOSUM	HIGHBUSH BLUEBERRY	2'	13
SAZ	RHODODENDRON VISCOSUM	SWAMP AZALEA	2'	21
SB	CLETHRA ALNIFOLIA	SWEET PEPPER BUSH	2'	19
CS	LINDERA BENZOIN	COMMON SPICEBUSH	2'	13
RM	ACER RUBRUM	RED MAPLE	3'	21

REPLICATION NOTES:

TOTAL ISOLATED VEGETATED WETLAND TO BE DISTURBED = 4,332 S.F.

TOTAL WETLAND REPLICATION AREA PROVIDED 10,809 S.F.

REPLICATION/DISTURBANCE RATIO = 2.49

P.E. STAMP

KYLES C. ZAGER — COMMONWEALTH OF MASSACHUSETTS — No. 46717 — REGISTERED PROFESSIONAL ENGINEER

ZCE
ZENITH CONSULTING ENGINEERS, LLC
3 MAIN STREET LAKEVILLE, MA 02347
PHONE: (508) 947-4208

REV.	DATE	DESCRIPTION	BY	APP.

DRAWN BY: RLG
DESIGNED BY: RLG
CHECKED BY: NCZ
APPROVED BY: NCZ
DATE: 8/31/2020
PROJECT NUMBER: 0617-01-01
DRAWING SCALE: 1"=40'
SHEET ID: WR1

SHEET NAME: **WETLAND REPLICATION PLAN**

PROJECT SITE: **35 COPICUT ROAD FREETOWN, MASSACHUSETTS**

CLIENT INFO: **KR REZENDES, INC. 3 SAMMY'S LANE ASSONET, MASSACHUSETTS**

S:\Civil Engineering Projects\Freetown\Copicut Road\0 Copicut Road\DWG\0 Copicut - Site Base Plan.dwg

CONSTRUCTION OPERATION AND MAINTENANCE SCHEDULE

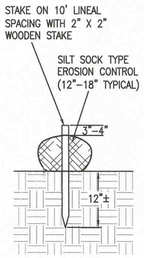
THE OPERATION AND MAINTENANCE (O&M) SCHEDULE DURING THE CONSTRUCTION PHASE IS THE RESPONSIBILITY OF THE DEVELOPER AND/OR SITE CONTRACTOR. THE OUTLINE BELOW SHALL BE ADHERED TO AS CLOSELY AS POSSIBLE TO ENSURE THE PROPER CONSTRUCTION AND FUNCTION OF THE DRAINAGE SYSTEM.

1. PRIOR TO CONSTRUCTION, SILT SOCK SHALL BE INSTALLED PER THE APPROVED PLANS. THE SILT SOCK SHALL BE INSPECTED PRIOR TO A LARGE STORM EVENT TO ENSURE THAT THE EROSION CONTROL WILL FUNCTION AS REQUIRED AND FOLLOWING A STORM TO INSPECT FOR DAMAGE TO THE EROSION CONTROL ELEMENTS. ANY DAMAGE OR IMPROPER INSTALLATION THAT IS NOTICED PRIOR TO OR FOLLOWING A STORM EVENT SHALL BE PROMPTLY REPLACED OR REPAIRED IN A SATISFACTORY MANNER SO AS TO PREVENT SEDIMENT FROM BYPASSING THE EROSION CONTROL BARRIER.
2. THE LIMIT OF CLEARING SHOWN ON THE APPROVED PLAN SHALL BE STRICTLY ADHERED TO. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE LEVEL OF SAFETY OF STANDING TREES.
3. IN CONJUNCTION WITH THE SITE CONSTRUCTION, ALL DRAINAGE STRUCTURES, INCLUDING THE INFILTRATION BASINS, SHALL BE CONSTRUCTED AND STABILIZED AS SOON AS POSSIBLE. METHODS OF STABILIZATION INCLUDE, BUT ARE NOT LIMITED TO, HYDROSEED, LOAM AND SEED, STRAW MULCH, EROSION CONTROL BLANKETS, ETC.
4. THE CATCH BASINS, DRAINAGE MANHOLES, OIL WATER SEPARATORS AND FIRST DEFENSE TREATMENT UNITS SHALL BE INSPECTED WEEKLY DURING CONSTRUCTION. ANY SEDIMENT BUILDUP OF EIGHT (8) INCH DEPTH IN EITHER OF THE STRUCTURES SHALL BE PROMPTLY REMOVED BY HAND OR MECHANICAL METHODS AND ALL DEBRIS REMOVED IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS.
5. THE INFILTRATION BASINS SHALL BE INSPECTED WEEKLY OR AFTER ALL RAINFALL EVENTS GREATER THAN 1/2 INCH, WHICHEVER OCCURS SOONER. ANY EROSION WITHIN THE BASINS SHALL BE FILLED AND RESTABILIZED IN A MANNER TO PREVENT FUTURE EROSION. IN ADDITION, THE OUTER PORTIONS OF THE INFILTRATION BASINS SHALL BE INSPECTED IN A SIMILAR MANNER.

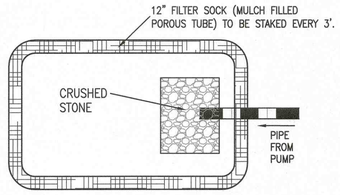
CONSTRUCTION SEQUENCE OF OPERATIONS

THE FOLLOWING SEQUENCE OF OPERATION SHALL BE FOLLOWED TO ENSURE THE PROPER CONSTRUCTION AND FUNCTION OF THE DRAINAGE AND EROSION CONTROL SYSTEMS.

1. PRIOR TO ANY EARTH DISTURBING ACTIVITIES, THE EROSION CONTROL BARRIERS CONSISTING OF SILT FENCE AND SILT SOCK SHALL BE INSTALLED IN THE LOCATIONS SHOWN ON THE SITE PLANS.
2. THE EXISTING TREES AND SHRUBS WITHIN THE LIMIT OF WORK SHALL THEN BE CLEARED AND GRUBBED.
3. THE CONSTRUCTION PHASE OF THE PROJECT SHALL BEGIN WITH THE CONSTRUCTION OF THE INFILTRATION BASIN.
4. THE AREA SHALL THEN BE FILLED AND COMPACTED IN 12 INCH LIFTS TO THE PROPOSED ROUGH GRADE.
5. SIDE SLOPES THAT ARE TO BECOME LAWN IN THE FINAL CONDITION SHALL THEN RECEIVE A 4 INCH LAYER OF LOAM AND THEN BE SEEDED WITH A QUALITY HYDROSEED MIX. THOSE SLOPES THAT ARE DESIGNATED TO RECEIVE SPECIAL SLOPE STABILIZATION AS SHOWN ON SHEET EC1 SHALL BE TREATED AS DESCRIBED FOR THAT METHOD.
6. THROUGHOUT THE REMAINDER OF THE CONSTRUCTION PHASE, THE ENTIRE PROJECT SITE SHALL BE INSPECTED ON A WEEKLY BASIS AND AFTER ANY RAIN EVENT GREATER THAN 1 INCH FOR INDICATIONS OF EROSION. ANY ERODED AREAS SHALL BE REPAIRED IMMEDIATELY AND STABILIZED WITH VEGETATION, GEOGRID OR ANY METHOD THE CONTRACTOR DETERMINES TO BE ADEQUATE.

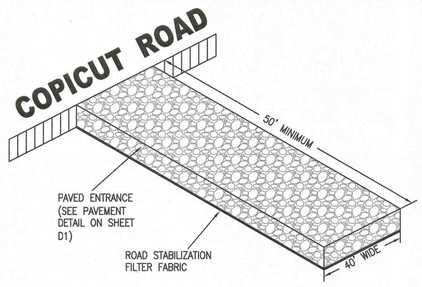


SILT SOCK DETAIL
NOT TO SCALE



DEWATERING BASIN PLAN
NOT TO SCALE

* TO BE USED IF NECESSARY, LOCATION TO BE DETERMINED AT TIME OF CONSTRUCTION



ANTI-TRACKING PAD

STORMWATER MANAGEMENT SYSTEMS LONG-TERM OPERATION AND MAINTENANCE PLAN:

1.0 INTRODUCTION

THE 2318 BAY STREET COMMERCIAL SITE HAS BEEN DESIGNED TO ENSURE STORMWATER QUALITY. IN ORDER FOR THIS TO CONTINUE IN THE LONG TERM, IT IS NECESSARY TO IMPLEMENT THE FOLLOWING LONG TERM OPERATION AND MAINTENANCE PROGRAM.

2.0 RESPONSIBLE PARTY

OWNER:

KR REZENDES INC.
3 SAMMY'S WAY
ASSONET, MA

RESPONSIBLE FOR OPERATION AND MAINTENANCE:

SAME

3.0 MAINTENANCE OF STORMWATER MANAGEMENT FACILITIES

THE STORM WATER MANAGEMENT FACILITIES WERE DESIGNED TO REQUIRE LITTLE OR NO INTERVENTION IN THE OPERATION AND TO REQUIRE LITTLE OR NO MAINTENANCE ONCE THE PROJECT IS BUILT AND STABLE VEGETATIVE COVER IS ESTABLISHED. HOWEVER, THE DRAINAGE IMPROVEMENTS SHALL BE SUBJECT TO THE FOLLOWING MAINTENANCE SCHEDULE:

3.1 ROUTINE MAINTENANCE

1. DEBRIS: ALL DEBRIS AND LITTER ARE TO BE REMOVED FROM ALL CATCH BASINS, DRAINS, INFILTRATION BASINS AND SURROUNDING AREAS AT LEAST TWICE PER YEAR.
2. RE-SEEDING: EMBANKMENTS THAT HAVE EXCESSIVE EROSION OR SLUMPING ARE TO BE RE-GRADED AND SEEDED (WITH CANARY GRASS OR TALL FESCUE GRASS) DURING THE SPRING OR FALL GROWING SEASONS AS NEEDED.
3. INSPECT: INFILTRATION BASINS SHALL BE INSPECTED FOR SIGNS OF PROPER FUNCTIONING ON A MONTHLY BASIS. ANY POTENTIAL BLOCKAGES IN THE ROOF DOWN SPOUTS WILL BE REMOVED IF DISCOVERED. GUTTERS WILL BE CLEANED AT LEAST TWICE PER YEAR.
4. MOWING: THE INFILTRATION BASIN SIDESLOPES SHALL BE MOWED AT LEAST TWICE PER YEAR. THE INFILTRATIONS BASIN BOTTOMS SHALL BE INSPECTED AT EACH MOWING EVENT. IF VEGETATION HAS ACCUMULATED THAT COULD CAUSE A NEGATIVE IMPACT ON THE FUNCTION OF THE BASIN, THEN IT SHALL BE REMOVED.

3.2 PERIODIC MAINTENANCE

ALL GRAVEL BERMS AND CHECKDAMS WILL BE CLEANED A MINIMUM OF ONCE PER YEAR AND INSPECTED MONTHLY DURING THE ACTIVE CONSTRUCTION STAGE.

3.3 NON-ROUTINE MAINTENANCE

1. STRUCTURAL: ALL PIPES AND INFILTRATION BASIN SIDESLOPES AND OVERFLOW SPILLWAYS SHALL BE INSPECTED ONCE EVERY FOUR (4) YEARS FOR PROPER FUNCTION, CLOGGING, SIGNS OF DETERIORATION AND STRUCTURAL INADEQUACY. ANY ADVERSE SITUATIONS ARE TO BE REPAIRED AS NEEDED.

3.4 NON-PERIODIC INSPECTION

1. THE STORM WATER MANAGEMENT SYSTEM SHALL BE INSPECTED AFTER TWO YEARS OF FULL OPERATION BY A REGISTERED PROFESSIONAL CIVIL ENGINEER TO CONFIRM ITS ADEQUACY. THE INSPECTION SHALL INCLUDE AN EXAMINATION OF ALL COMPONENTS OF THE SYSTEM INCLUDING ALL INFILTRATION SYSTEMS.

4.0 PUBLIC SAFETY FEATURES

THE STORMWATER MANAGEMENT FACILITIES WERE DESIGNED TO BE INHERENTLY SAFE. ALL OF THE ACCESSIBLE STORMWATER CONTROLS (I.E., LOW POINTS, ETC.) WERE DESIGNED WITH 3:1 MINIMUM SIDE SLOPES TO ALLOW FOR PEDESTRIAN ACCESS IN AND OUT OF THE STORMWATER CONTROLS.

5.0 ESTIMATED O&M BUDGET

THE ESTIMATED ANNUAL BUDGET TO CONDUCT THE SPECIFIED OPERATION AND MAINTENANCE IS APPROXIMATELY $4,000.00.

EROSION & SEDIMENT CONTROL NOTES:

IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONTROL EROSION AND PREVENT SEDIMENTATION BEYOND THE LIMIT OF WORK OR OFFSITE PROPERTIES. IT IS INTENDED THAT THE IMPLEMENTATION OF THE FOLLOWING MEASURES WILL MEET THIS GOAL. WHEN IT IS CLEAR TO THE DESIGNER THAT EROSION AND SEDIMENTATION HAVE BEEN ADEQUATELY CONTROLLED WITHOUT THE IMPLEMENTATION OF EVERY MEASURE, ADDITIONAL MEASURES NEED NOT BE IMPLEMENTED. ALTERNATIVELY, IF ALL OF THE FOLLOWING MEASURES HAVE BEEN IMPLEMENTED AND THE CONTROL OF EROSION AND SEDIMENTATION IS INADEQUATE, THE CONTRACTOR MUST EMPLOY SUFFICIENT SUPPLEMENTAL MEASURES BEYOND THE SCOPE OF THIS PLAN.

1. EROSION AND SEDIMENT CONTROL MEASURES WILL BE INSTALLED PRIOR TO STUMP REMOVAL AND CONSTRUCTION. STABILIZATION OF ALL REGRADED AND SOIL STOCKPILE AREAS WILL BE INITIATED AND MAINTAINED DURING ALL PHASES OF CONSTRUCTION.
2. ALL EROSION AND SEDIMENT CONTROL MEASURES WILL BE CONSTRUCTED IN ACCORDANCE WITH LOCAL MUNICIPAL REGULATIONS. ALL EROSION CONTROL MEASURES ARE TO BE MAINTAINED AND UPGRADED AS REQUIRED TO ACHIEVE PROPER SEDIMENT CONTROL DURING CONSTRUCTION. A STAKED SILT SOCK SHALL BE INSTALLED DOWN GRADIENT OF ALL DRAINAGE OUTFALLS.
3. ADDITIONAL CONTROL MEASURES WILL BE INSTALLED DURING THE CONSTRUCTION PERIOD, IF DEEMED NECESSARY BY THE OWNER OR AGENTS OF THE OWNER.
4. CATCH BASINS WILL BE PROTECTED WITH HAYBALE FILTERS THROUGHOUT THE CONSTRUCTION PERIOD UNTIL ALL DISTURBED AREAS ARE THOROUGHLY STABILIZED. SILT SOCKS SHOULD BE INSTALLED UNDER GRATE OPENING UNTIL PAVEMENT IS IN PLACE AND GROUND SURFACE IS STABILIZED.
5. SEEDING MIXTURE FOR FINISHED GRASSED AREAS WILL BE AS FOLLOWS:

KENTUCKY BLUE GRASS	45%
CREEPING RED FESCUE	45%
PERENNIAL RYEGRASS	10%

SEED TO BE APPLIED AT A RATE OF 4 LBS./1000 SQ. FT.
PLANTING SEASONS SHALL BE APRIL 1 TO JUNE 1 AND AUGUST 1 TO OCTOBER 15. AFTER OCTOBER 15, AREAS WILL BE STABILIZED WITH HAYBALE CHECK, FILTER FABRIC, OR WOODCHIP MULCH, AS REQUIRED, TO CONTROL EROSION.

6. STABILIZATION OF SLOPES IN CUT AREAS (USING MULCH OR GRASS) AND THE INSTALLATION OF CONTROL LINE (HAYBALE CHECK OR FILTER FABRIC) AT THE TOE OF SLOPE SHALL BE INITIATED WITHIN THIRTY (30) DAYS OF COMPLETION.
7. SEDIMENT REMOVED FROM CONTROL STRUCTURES WILL BE DISPOSED IN A MANNER WHICH IS CONSISTENT WITH THE INTENT OF THE PLAN. ALL HAYBALES OR SILT FENCE RETAINING SEDIMENT OVER 1/2 THEIR HEIGHT SHALL HAVE THE SEDIMENT REMOVED AND ALL DAMAGED EROSION CONTROLS SHALL BE REPAIRED OR REPLACED.
8. CONTRACTOR WILL BE ASSIGNED THE RESPONSIBILITY FOR IMPLEMENTING THIS EROSION AND SEDIMENT CONTROL PLAN. THIS RESPONSIBILITY INCLUDES THE INSTALLATION AND MAINTENANCE OF CONTROL MEASURES, INFORMING ALL PARTIES ENGAGED ON THE CONSTRUCTION SITE OF THE REQUIREMENTS AND OBJECTIVES OF THE PLAN. THE OWNER SHALL BE RESPONSIBLE FOR CONVEYING A COPY OF THE EROSION AND SEDIMENT CONTROL PLAN IF THE TITLE TO THE LAND IS TRANSFERRED.
9. THE CONTRACTOR SHALL BE RESPONSIBLE TO CONTROL DUST AND WIND EROSION THROUGHOUT THE LIFE OF HIS CONTRACT. DUST CONTROL SHALL INCLUDE, BUT IS NOT LIMITED TO SPRINKLING OF WATER ON EXPOSED SOILS AND HAUL ROADS. CONTRACTOR SHALL CONTROL DUST TO PREVENT A HAZARD TO TRAFFIC.
10. WHERE DEWATERING IS NECESSARY, THERE SHALL NOT BE A DISCHARGE DIRECTLY INTO WETLANDS OR WATERCOURSES. PROPER METHODS AND DEVICES SHALL BE UTILIZED TO THE EXTENT PERMITTED BY LAW, SUCH AS PUMPING WATER INTO A TEMPORARY SEDIMENTATION BOWL, PROVIDING SURGE PROTECTION AT THE INLET AND THE OUTLET OF PUMPS, OR FLOATING THE INTAKE OF THE PUMP, OR OTHER METHODS TO MINIMIZE AND RETAIN THE SUSPENDED SOLIDS. IF A PUMPING OPERATION IS CAUSING TURBIDITY PROBLEMS, SAID OPERATION SHALL CEASE UNTIL SUCH TIME AS FEASIBLE MEANS OF CONTROLLING TURBIDITY ARE DETERMINED AND IMPLEMENTED. SAID DISCHARGE POINTS SHALL BE LOCATED OVER 100 FEET FROM THE DELINEATED WETLANDS AS INDICATED ON THIS PLAN.

P.E. STAMP

KYLES C. ZUKER CIVIL No. 48717 REGISTERED PROFESSIONAL ENGINEER COMMONWEALTH OF MASSACHUSETTS

ZCE
ZENITH CONSULTING ENGINEERS, LLC
3 MAIN STREET LAKEVILLE, MA 02347
PHONE: (508) 947-4208

REV.	DATE	DESCRIPTION	BY	APP.

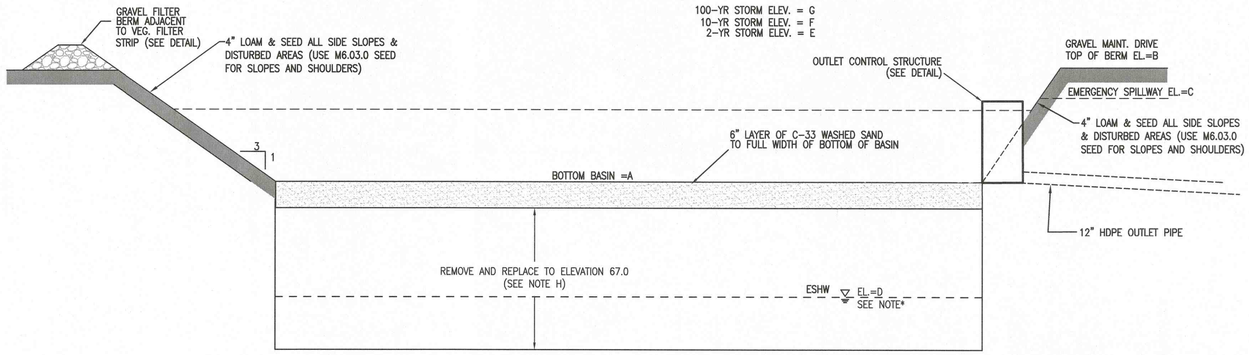
SHEET NAME: **EROSION CONTROL PLAN**

PROJECT SITE: **35 COPICUT ROAD**
FREETOWN, MASSACHUSETTS

CLIENT INFO: **KR REZENDES, INC.**
3 SAMMY'S LANE
ASSONET, MASSACHUSETTS

DRAWN BY: RLG | DESIGNED BY: RLG | CHECKED BY: NCZ | APPROVED BY: NCZ
DATE: 8/31/2020 | PROJECT NUMBER: 0617-01-01 | DRAWING SCALE: 1"=40' | SHEET ID: EC1

S:\Civil Engineering Projects\Freetown\Copicut Road\0 Copicut Road\DWG\0 Copicut - Site Base Plan.dwg



INFILTRATION BASIN CROSS SECTION DETAIL
NOT TO SCALE

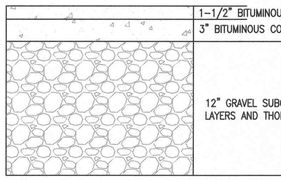
INFILTRATION BASIN NOTES:

THE CONTRACTOR IS CAUTIONED THAT THE DETENTION BASIN IS DESIGNED TO INFILTRATE/RECHARGE STORMWATER PRIMARILY THROUGH THE BOTTOM AND SIDES OF THE BASIN. CONSTRUCTION TECHNIQUES THAT WOULD POTENTIALLY DIMINISH THE FILTRATION CAPACITY OF THE UNDERLYING SOILS ARE TO BE AVOIDED. COMPACTION AND SILTATION OF THE BASIN DURING CONSTRUCTION IS PROHIBITED.

A. DO NOT UTILIZE ANY PORTION OF THE BASIN FLOOR AS A HAUL ROAD FOR MATERIAL AND HEAVY EQUIPMENT.
B. DO NOT COMPACT SOILS IN THE BASIN FLOOR.
C. DO NOT PLACE GRAVEL OR OTHER MATERIALS TO STABILIZE THE BASIN FLOOR FOR CONSTRUCTION VEHICULAR TRAVEL ACCESS.
D. STRICT COMPLIANCE WITH THE EROSION CONTROL PLAN AND THE STORMWATER OPERATIONS AND MAINTENANCE PLAN IS NECESSARY.
E. BASIN CONSTRUCTION SHALL OCCUR AT THE EARLY STAGES OF THE PROJECT CONSTRUCTION SO THAT THEY ARE FULLY VEGETATED AND STABILIZED PRIOR TO RECEIVING STORMWATER.
F. RIP-RAP IN THE FOREBAYS TO BE PLACED, NOT DUMPED. DO NOT COMPACT.
G. DO NOT USE THE INFILTRATION BASIN AS A TEMPORARY SEDIMENT BASIN OR DE-WATERING BASIN.
H. AS PART OF THE INFILTRATION BASIN CONSTRUCTION, THE CONTRACTOR SHALL REMOVE TOPSOIL, SUBSOIL, AND OTHER UNSUITABLE SOIL THAT MAY BE ENCOUNTERED DOWN TO APPROPRIATELY DRAINING SOILS. TEST PITS SHALL BE DUG WITHIN THE INFITRATION BASIN AREAS PRIOR TO EARTH REMOVAL OPERATIONS. THE REMOVED MATERIAL SHALL BE REPLACED BY CLEAN SAND WHICH MEETS TITLE V (310 CMR 15.255) REQUIREMENTS. AFTER THE REMOVAL OF UNSUITABLE MATERIAL AND PRIOR TO THE PLACEMENT OF THE CLEAN SAND, AN INSPECTION BY THE DESIGN ENGINEER SHALL BE COMPLETED TO CONFIRM CONDITIONS. SIEVE ANALYSIS OF THE CLEAN SAND SHALL BE SUBMITTED TO THE DESIGN ENGINEER FOR APPROVAL PRIOR TO PLACEMENT AND SAMPLED ONSITE BY THE DESIGN ENGINEER.

ELEVATION TABLE							
BASIN #	A	B	C	D	E	F	G
1	62.00	66.50	65.00	57.50	62.88	63.83	65.50
2	64.00	68.00	67.00	59.20	64.32	65.28	66.83
3	65.00	68.00	67.00	61.00	65.57	66.25	67.19
4	60.00	62.50	61.50	58.00	60.06	60.45	61.28
5	60.00	62.50	61.50	58.00*	60.43	61.38	61.98

* ESGW ELEVATION TO BE CONFIRMED VIA TEST PITS PRIOR TO THE ONSET OF CONSTRUCTION



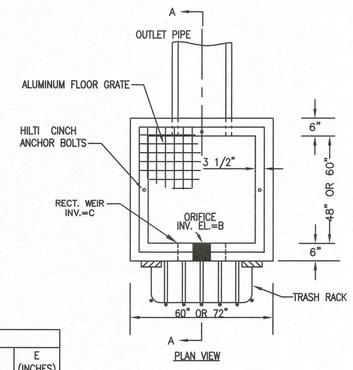
BITUMINOUS CONCRETE PAVEMENT AT DRIVEWAY ENTRANCE
NOT TO SCALE

* SEE ENTRANCE PAD DETAIL ON SHEET EC1

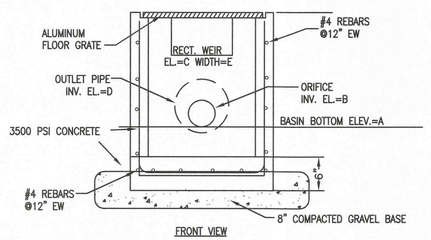
NOTES:

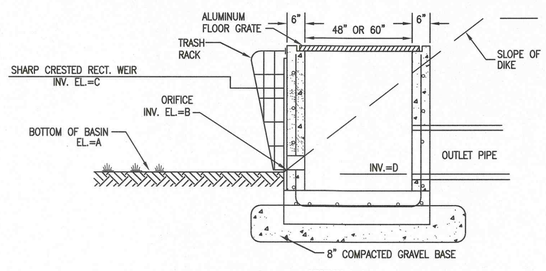
1. COVER GRATE SHALL BE SET FLUSH WITH THE TOP OF STRUCTURE AND SHALL HAVE A HINGED, CLEAR ACCESS OPENING OF 24" X 24" WITH A HASP AND LOCK.
2. THE GRATE SHALL BE DESIGNED FOR A UNIFORM LOAD OF 100 #/FT , SHALL BE SUPPORTED ON ANGLE FRAME WITH FASTENERS, AND SHALL BE ALUMINUM OR LIGHT DUTY STEEL THAT IS HOT-DIPPED GALVANIZED AFTER FABRICATION.

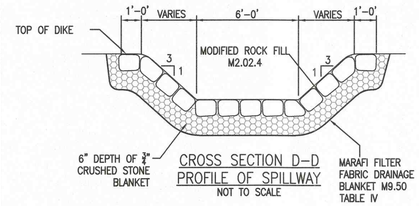
	GRATING	ANGLE FRAMES
ALUMINUM:	ASTM-B221	6063-T6
LIGHT DUTY STEEL:	ASTM-A1011 ASTM-A510	ASTM-A36



ELEVATION TABLE					
BASIN #	A	B	C	D	E (INCHES)
1	61.00	62.00	62.75	61.00	60
2	64.00	65.00	67.00	64.00	24

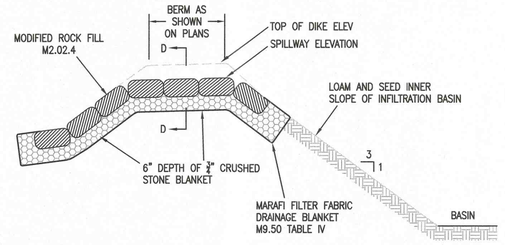




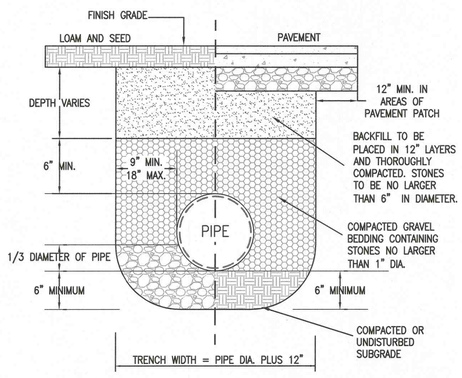


CROSS SECTION D-D
PROFILE OF SPILLWAY
NOT TO SCALE

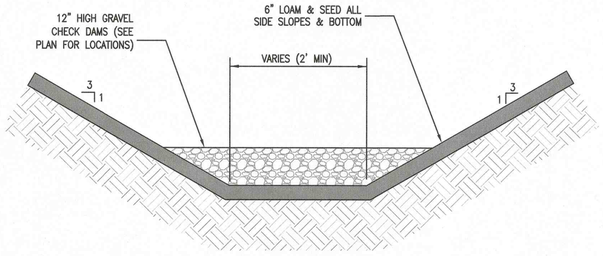
NOTE:
A 6" THICK CRUSHED STONE DRAINAGE BLANKET SHALL UNDERLAY ALL RIP RAP ALONG WITH A GEOTEXTILE FABRIC, M9.50, TABLE IV



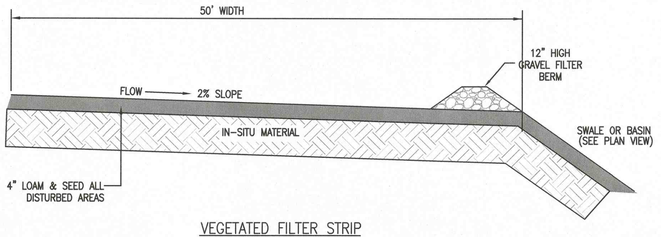
DETENTION BASIN SPILL WAY
NOT TO SCALE



DRAINAGE PIPE TRENCH DETAIL
NOT TO SCALE



GRASSED SWALE
NOT TO SCALE



VEGETATED FILTER STRIP
NOT TO SCALE

OUTLET CONTROL STRUCTURE
NOT TO SCALE

SOIL LOGS:

DATE: 8-31-2020
PERFORMED BY: NYLES ZAGER, ZENITH CONSULTING ENGINEERS, LLC.

DEPTH (INCHES)	TP 1	ELEV. (FEET)
0		65.0
	A SANDY LOAM	
6		64.5
	B SANDY LOAM	
16		63.7
	C1 FINE-MEDIUM SANDS	
90		57.5
	C2 MEDIUM-COARSE SANDS & GRAVEL	
130		54.2

MOTTLING @ 90"
WEEPING @ 90"
ESHW EL.= 57.5

DEPTH (INCHES)	TP 2	ELEV. (FEET)
0		68.0
	C1 FINE-MEDIUM SANDS	
46		64.2
	C2 MEDIUM-COARSE SANDS & GRAVEL	
132		57.0

MOTTLING @ 106"
WEEPING @ 106"
ESHW EL.= 59.2

DEPTH (INCHES)	TP 3	ELEV. (FEET)
0		68.0
	FILL	
68		62.3
	A SANDY LOAM	
72		62.0
	B SANDY LOAM	
84		61.0
	C MEDIUM SANDS & GRAVEL	
120		58.0

MOTTLING @ 84"
WEEPING @ 84"
ESHW EL.= 61.0

DEPTH (INCHES)	TP 4	ELEV. (FEET)
0		65.0
	FILL	
70		59.2
	C FINE SANDS	
132		54.0

MOTTLING @ 84"
WEEPING @ 84"
ESHW EL.= 58.0

NOTES:

1. UNLESS OTHERWISE NOTED, ALL MATERIAL AND CONSTRUCTION SHALL CONFORM TO THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION CONSTRUCTION STANDARD DETAILS AND THE MASSACHUSETTS STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES.
2. UNLESS OTHERWISE NOTED, ALL DRAINAGE PIPE IS TO BE ADS N-12 STYLE PIPE OR EQUAL.

ZCE
ZENITH CONSULTING ENGINEERS, LLC
3 MAIN STREET LAKEVILLE, MA 02347
PHONE: (508) 947-4208

P.E. STAMP

REV.	DATE	DESCRIPTION	BY	APP.

DRAWN BY: RLG
DATE: 8/31/2020
DESIGNED BY: RLG
PROJECT NUMBER: 0617-01-01
CHECKED BY: NCZ
DRAWING SCALE: AS NOTED
APPROVED BY: NCZ
SHEET ID: D1

SHEET NAME: **DETAIL SHEET**
PROJECT SITE: **35 COPICUT ROAD**
FREETOWN, MASSACHUSETTS
CLIENT INFO: **KR REZENDES, INC.**
3 SAMMY'S LANE
ASSONET, MASSACHUSETTS

S:\Civil Engineering Projects\Freetown\Copicut Road\0 Copicut Road\DWG\0 Copicut - Site Base Plan.dwg