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March 11, 2020
HAND DELIVERED

~~Anna-Marques~~ Nicole Croteau asm
Conservation Administrator
Town of Ware
126 Main Street
Ware, MA 01082

Re: Ware Solar III LLC c/o Melink Solar Development
Proposed Solar Array
Greenwich Road (35-0-12), Ware, MA
BE 18M-216

Dear Anna,

There has been a minor change to the grading and drainage for this project.
There has been no change to the proposed solar field and associated equipment.
As you are aware, the installation of the solar field is to follow a major excavation project. Whereas the grading design for the prior submission was based upon proposed final grades for the excavation project, the new plans show final grading for the solar field based upon existing conditions. This will avoid any conflicts should the final grades for the excavation project be different than anticipated.

In addition, landscaping is provided along the street to compensate for trees to be removed for the excavation project.

Please accept the following documents in support of the proposed solar array application:

2	Full sized sets of site plans, revised 3/5/20
2	Drainage Reports, Revised 3/5/20

Should you require any other documentation, please advise.

Thank you for your assistance.

Yours truly,
Bertin Engineering

Calisto J. Bertin, PE

C Colin Derhammer via email
Jeremy Chapman via email

BERTIN ENGINEERING

DRAINAGE REPORT

Solar Array
Parcel Number 35-0-12
Greenwich Road
Ware, MA

File 18M-216

Prepared On: October 21, 2019
Revised On: October 28, 2019
Revised on: March 05, 2020

Applicant:

Ware Solar III LLC
c/o Melink Solar Development
276 N. Forest Avenue NE
Marietta, GA 30060

Owner:

F. T. Smith Trucking and Excavating
P.O. Box 124
New Braintree, MA, 01531

Prepared By:

COMMONWEALTH OF MASSACHUSETTS
CALISTO J. BERTIN
CIVIL
No. 40595
REGISTERED PROFESSIONAL ENGINEER

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317-463

Site Overview

Existing Condition

The project is located in Ware, MA and is approximately 37 acres. The existing site consists of primarily woods and meadows. There are a few wetlands located on the site. The site generally slopes to the southeast towards existing wetland systems and a river.

The property owner will perform a significant amount of site grading and tree clearing as per special permit issued by Ware Planning Board (SP 2008-004). The existing conditions of the site are based off the "approved" drawings. According to the drawings, the site will be cleared of trees and lowered in elevation. Upon completion the site is to be loamed and seeded.

The soils on site consist of primarily Hydrologic Soil Group A unit soil according to the "Soil Map of Hampden and Hampshire Counties, Massachusetts, Eastern Part". This condition was confirmed in the field by John Turner Consulting in their Geotechnical Investigation Report dated October 9, 2019, attached.

Proposed Condition

The proposed use of the site is to install a large ground mounted solar array within a fenced enclosure. While the majority of the site is composed of meadow as per the approved special permit, there will some tree clearing within the proposed fenced line. Upon removal of the existing wooded areas, those areas will be loamed and seeded. An access drive will be installed.

Drainage Analysis Summary

The existing site is located in primarily Hydrologic Soil Group A and is made up of sandy soils. Once the existing conditions are removed and replaced with grass (meadow), the proposed curve number value of the site will decrease thus improving the on-site drainage. One open basin and two infiltration trenches have been added for safe measure and for water quality volume. Runoff from the gravel and concrete pad will be routed to Basin 1 via a swale and sheet flow. Infiltration trench #1 and #2 will capture runoff from the solar field. Proposed peak rates of runoff will be less than under the existing conditions. Thus this project will not have a negative impact on stormwater flooding. On the following page you will find the runoff rates for the project.

The following is a comparison of the rates of runoff for the project.

Drainage Area 1				
Frequency (year)	Existing (cfs)	Proposed (cfs)	Change (cfs)	% Exist.
2	0	0	0	N/A
10	0.228	0.142	0.086	62.3%
25	1.431	0.702	0.729	49.1%
100	7.918	5.224	2.694	66.0%

The peak rate of site runoff is reduced for all storm events. See attached Existing & Proposed Runoff Calculations for drainage area descriptions and hydrographs.

Stormwater Management Standards

Standard #1, No New Untreated Discharges:

No new untreated discharges are proposed to existing wetland resources. The proposed site development will follow the same drainage patterns as the existing.

Standard #2, Post-Development Peak Discharge Rates:

Post-development peak discharge rates are demonstrated on the Summary page of this report. Post-development peak discharge rates do not exceed pre-development rates on the site at the points of discharge.

Standard #3, Recharge to Groundwater

The Hydrologic Soil Group in combination with the sandy soils, proposed grass, and infiltration trenches will provide recharge to groundwater.

Standard #4, 80% TSS Removal

There are no paved areas for vehicular traffic other than a seldom used gravel maintenance driveway. After initial installation, no TSS will be generated from the site. A grassed swale is proposed to remove TSS from a portion of the gravel driveway and the flow will be directed into the proposed above ground basin. Otherwise, no additional TSS removal is required.

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

The proposed Land Use is not a listed Higher Potential Pollutant Load.

Standard #6, Critical Areas

The site does not discharge to a critical area.

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

The site is not a re-development project.

Standard #8, Construction Period Pollution Prevention and Erosion and Sedimentation Control

Plans that provide stormwater and erosion control measures are included in the drawing set.

Standard #9, Operation/maintenance plan

See attached Operation/maintenance plan.

Stormwater Operation and Maintenance Plan

This is an Operation and Maintenance Plan for the Definitive Site plan.

Current Operator:

Ware Solar LLC
c/o Melink Solar Development
276 N. Forest Avenue NE
Marrietta, GA 30060

Long-term Operator of Stormwater System:

Owner of the Site

Stormwater Management Systems

The stormwater management system for the site is as follows:

- Above Ground Infiltration Basin
- Infiltration Trenches (Cultec chambers)
- Grass Swale

Inspection Schedule

The inspection log shall be completed after every inspection of each component listed below. (See attached Inspection Log sheet)

Above Ground Infiltration Basin

Inspect basins at least once per year to ensure that the basins are operating as intended. Inspect basins during and after major storms to determine if the basin is meeting the expected drain down times. Examine the spillway for evidence of clogging or outflow release velocities that are greater than design flow. Potential problems that should be checked include: subsidence, erosion, cracking or tree growth on the embankment; damage to the spillway; sediment accumulation around; inadequacy of the inlet/outlet channel erosion control measures; changes in the condition of the pilot channel; and erosion within the basin and banks. Make any necessary repairs immediately.

Infiltration Basins

Chamber rows shall be inspected via the inspection ports for excessive debris and sediment accumulation semi-annually as well as after every storm exceeding 1 inch of rainfall in a one hour period.

Grass Swale

Grass swales shall be inspected at least once per year to ensure that the swales are draining and there is no erosion. Inspect swales after major storms to determine if debris has accumulated in and around the swale.

Maintenance Procedures

Maintenance log shall be completed after any maintenance is performed on any component listed. (See attached Maintenance Log sheet)

Above Ground Infiltration Basin

Make any necessary repairs immediately after inspection. Mow the side slopes, embankment, and spillway at least twice per year. Remove trash and debris at this time. Remove sediment from the basin as necessary, and at least once every 10 years or when the basin is 50% full. Provide for an on-site sediment disposal area to reduce the overall sediment removal costs. Inspect and repair any erosion or low spots in spillway.

Infiltration Trenches

The CULTEC system may be equipped with an inspection port located on the inlet row. The inspection port is a circular cast box placed in a rectangular concrete collar. When the lid is removed, a 6-inch (150 mm) pipe with a screw-in plug will be exposed. Remove the plug. This will provide access to the CULTEC Chamber row below. From the surface, through this access, the sediment may be measured at this location. A stadia rod may be used to measure the depth of sediment if any in this row. If the depth of sediment is in excess of 3 inches (76 mm), then this row should be cleaned with high pressure water through a culvert cleaning nozzle. This would be carried out through the inspection port. CCTV inspection of this row can be deployed through this access port to deter mine if any sediment has accumulated in the inlet row.

Grass Swale

Grass should be mowed seasonally no shorter than 3". Remove or compost tall grass clippings. Manually remove any weeds or invasive plants. Remove or compost leaves in the Fall. Reseed any bare areas as needed.

Plans

Plans indicating the location and features of the stormwater management system can be found on the Grading Plans (sheets C2.3 & 2.4) in the plan set titled "Large Scale Solar Array".

Description of Public Safety Features

All features associated with the stormwater controls that are located above ground are designed with a maximum of 3:1 slopes, and surrounded by chain link fence, so they should not pose any danger to the public.

Operation and Maintenance Budget

The owner will have to pay for a service to perform the operation and maintenance described above; therefore the budget is mainly for labor and disposal of sediment collected.

The Estimated Yearly Cost

Approximately $2,000.00

Stormwater Operation & Maintenance Inspection Log

Log of Operation and Maintenance Activities For
Parcel Number 35-0-12 – Ware, MA

Date	Inspector	Observations	Action Required

Long-Term Pollution Prevention Plan

This is a Long-term Pollution Prevention Plan for the Definitive Site plan. Though there is no stormwater BMPs proposed as part of the site development, maintenance of the site overall is important to protecting the site from negative stormwater impacts such as scouring.

This plan is to be maintained by the operator of the facility. In the event that the operator fails to perform, the property owner is responsible.

Good Housekeeping

The following good housekeeping practices will be used on site:

1. An effort will be made to store only enough products that will be needed.
2. All materials stored on site will be stored neatly, in their appropriate containers, and, if possible, under a roof or other enclosure.
3. Products will be kept in their original containers with the original manufacturer's label.
4. Substances will not be mixed with one another unless recommended by the manufacturer.
5. Whenever possible, all of a product will be used up before disposing of the container.
6. Manufacturer's recommendations for proper use and disposal will be followed.

Routine Inspections

Routine inspections and procedures are outlined in the Stormwater Operation & Maintenance Plan.

Waste Materials

All waste materials will be collected and stored in a metal dumpster. All trash and debris from the site will be deposited in the dumpsters. Dumpsters will be emptied weekly or more often if necessary, and the trash will be hauled off-site to an approved waste facility. No construction waste materials will be buried on site. All personnel will be instructed regarding the correct procedures for waste disposal. Individual(s) managing day-to-day operations will be responsible for seeing that these procedures are followed.

Hazardous Waste

Any hazardous waste materials will be disposed of in the manner specified by local or state regulation or by the manufacturer. Site personnel will be instructed in these practices and the individual managing day-to-day operations will be responsible for implementing these practices.

Hazardous Materials

These practices will be used to reduce the risks associated with hazardous materials.

Products will be kept in original containers unless they are not re-sealable. Original labels and material safety data sheets (MSDS) will be retained; they contain important product information.

Manufacturers' and local and/or state recommended methods for proper disposal of excess materials will be followed.

Spill Control Practices

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be used for spill prevention and cleanup:

Manufacturers' recommended methods for spill cleanup will be clearly posted and site personnel will be familiar with the procedures and location of the information and cleanup supplies.

Materials and equipment necessary for spill cleanup will be kept in the material storage area on site. Equipment and materials will include, but not be limited to, brooms, dustpans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.

All spills will be cleaned up immediately upon discovery.

Spill areas will be kept well ventilated, and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.

Spills of toxic or hazardous material will be reported to the appropriate state or local government agency, regardless of the size of the spill.

A spill prevention plan will be developed to include measures to prevent this type of spill from re-occurring and how to clean up the spill if there is another one. A description of the spill, what caused it, and the cleanup measures will also be included.

Snow and Ice Management

Any deicing materials will be stored indoors and used per manufacturer's recommendations. Site personnel will be instructed in these practices and the individual managing day-to-day operations will be responsible for implementing these practices.

Grass Cutting

The grass shall be cut to a depth of no less than 6 inches and should be cut not more than twice per growing season.

Illicit Discharge Compliance Statement

October 18, 2019

This statement is to document that, to the best of my knowledge and belief, there are no and will be no Illicit Discharges for the Proposed Solar Arrays installation located on Greenwich Road in Ware, MA and operated by Melink Solar Development of Marietta, GA.

Melink Solar Development Agent

10/21/19

Date

Attachments

Stormwater Check List
Hydrologic Soil Map(s)
Existing & Proposed Runoff Calculations
Hydraflow Hydrographs & Routing Summary
Cultec Volume Sheets
Existing Watershed Map
Proposed Watershed Map

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.

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[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

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.

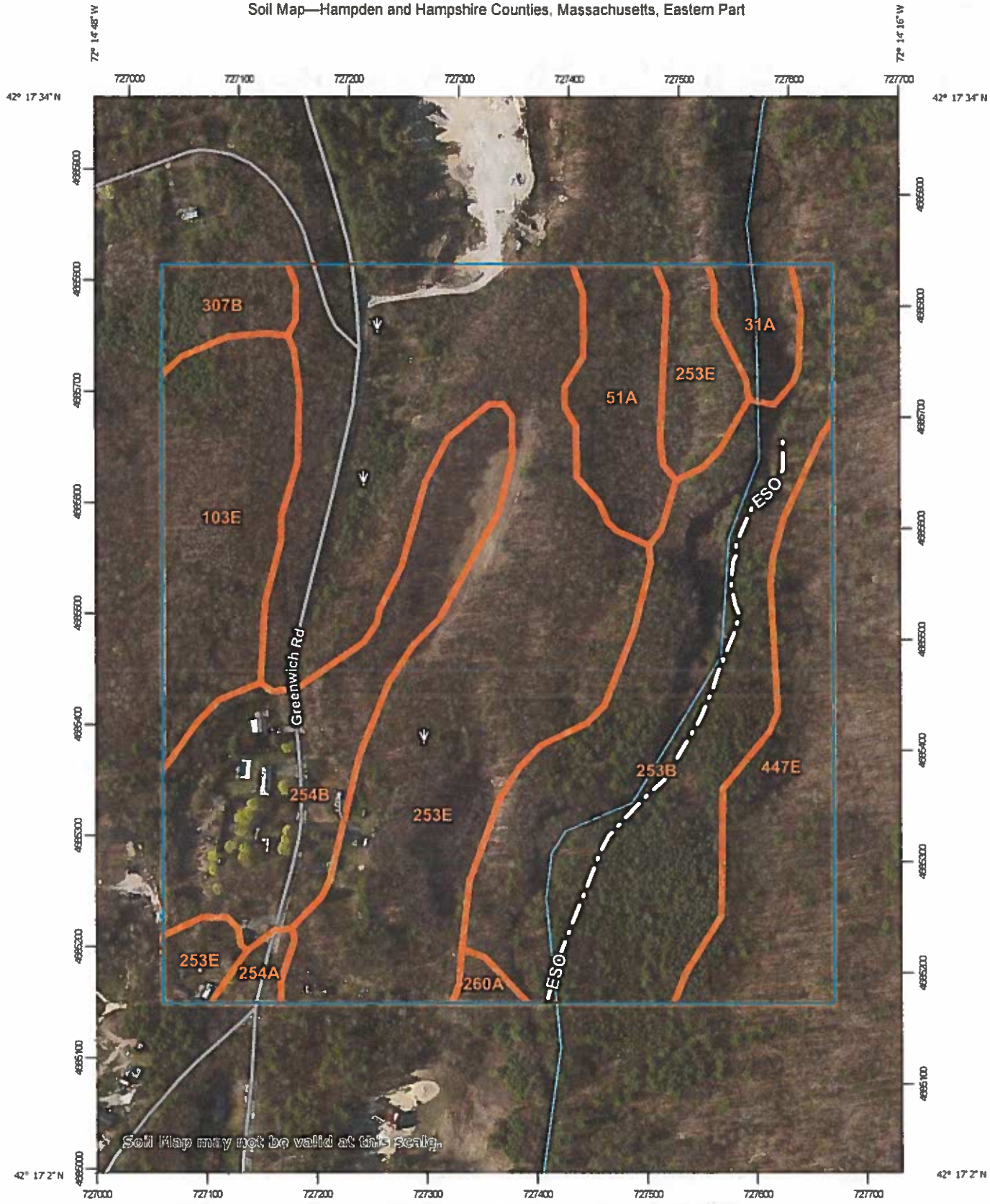
Standard 10: Prohibition of Illicit Discharges

☒ 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.

Soil Map—Hampden and Hampshire Counties, Massachusetts, Eastern Part



Map Scale: 1:4,720 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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: Hampden and Hampshire Counties, Massachusetts, Eastern Part
Survey Area Data: Version 14, Sep 13, 2019

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

Date(s) aerial images were photographed: Apr 9, 2011—May 12, 2011

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
31A	Walpole sandy loam, 0 to 3 percent slopes	1.9	1.9%
51A	Swansea muck, 0 to 1 percent slopes	4.6	4.5%
103E	Charlton-Hollis-Rock outcrop complex, steep	8.9	8.9%
253B	Hinckley loamy sand, 3 to 8 percent slopes	22.2	22.0%
253E	Hinckley loamy sand, 25 to 35 percent slopes	38.0	37.7%
254A	Merrimac fine sandy loam, 0 to 3 percent slopes	0.7	0.7%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	12.3	12.2%
260A	Sudbury fine sandy loam, 0 to 3 percent slopes	0.5	0.5%
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	2.1	2.1%
447E	Gloucester and Canton soils, steep, extremely stony	9.5	9.4%
Totals for Area of Interest		**100.6**	**100.0%**

BERTIN ENGINEERING
39 ELM STREET
SOUTHBRIDGE, MA 01550
(508) 765-0195
FAX (508) 765-0193

JOB	18M-216: Ware, MA		
SHEET NO.	1	OF	4
CALCULATED BY	EQ	DATE	3/5/2020
CHECKED BY	CJB	DATE	3/5/2020
SCALE			

EXISTING & PROPOSED RUNOFF CALCULATIONS

1. DESIGN CRITERIA

All hydrographs and peak flow rates were calculated utilizing the Technical Release 55 (TR-55) method.

for *TR-55*

Rainfall distribution = III
A_m= drainage area (mi^2)
Q = runoff (in)
F_p = pond and swamp adjustment factor

$q_p = q_u A_m Q F_p$
q_p = peak discharge (cfs)
q_u = unit peak discharge (cfs)

2. EXISING RUNOFF

I) Area of Concern:

Drainage Area	Total (acres)	Woods (A) (acres)	Woods (B) (acres)	Grass (A) (acres)	Dirt (A) (acres)	Impervious (acres)
EX-DA-1	19.721	14.128	0.854	4.440	0.274	0.025

CN Values

Woods (A) =	30
Woods (B) =	55
Grass (A) =	49
Dirt (A) =	72
Impervious =	98

II) Peak Discharge (as determined by TR-55):

Existing Drainage Area 1				
Frequency (year)	Rainfall, P (in)	Curve Number	T_c (min)	Peak Discharge (cfs)
2	3.02	36	10.9	0
10	4.84			0.228
25	5.97			1.431
100	7.72			7.918

3. PROPOSED RUNOFF

Drainage Area	Total (acres)	Meadow (A) (acres)	Meadow (B) (acres)	Grass(A) (acres)	Grass(B) (acres)	Gravel (A) (acres)	Imp. (acres)
Basin 1	0.447	0.216	0	0	0	0.159	0.073
PR-INF-1	1.119	1.119	0	0	0	0	0
PR-INF-2	2.082	2.082	0	0	0	0	0

Drainage Area	Total (acres)	Meadow (A) (acres)	Meadow (B) (acres)	Grass(A) (acres)	Grass(B) (acres)	Gravel (A) (acres)	Imp. (acres)
Bypass	16.072	10.388	0.455	4.831	0.397	0	0

CN Values

Meadow (A) =	30
Meadow (B) =	58
Grass (A) =	39
Grass (B) =	61
Gravel (A) =	76
Impervious =	98

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JOB	18M-216: Ware, MA		
SHEET NO.	2	OF	4
CALCULATED BY	EQ	DATE	3/5/2020
CHECKED BY	CJB	DATE	3/5/2020
SCALE			

II) Peak Discharge (as determined by TR-55):

Proposed Drainage Area - Basin 1					
Frequency (year)	Rainfall, P (in)	Curve Number	T_c (min)	Peak Discharge Inflow (cfs)	Peak Discharge Outflow (cfs)
2	3.02	57	6.0	0.050	0
10	4.84			0.462	0.055
25	5.97			0.826	0.347
100	7.72			1.479	1.332

Proposed Drainage Area - PR-INF-1					
Frequency (year)	Rainfall, P (in)	Curve Number	T_c (min)	Peak Discharge Inflow (cfs)	Peak Discharge Outflow (cfs)
2	3.02	30	6.0	0	0
10	4.84			0.001	0
25	5.97			0.012	0
100	7.72			0.098	0

Proposed Drainage Area - PR-INF-2					
Frequency (year)	Rainfall, P (in)	Curve Number	T_c (min)	Peak Discharge Inflow (cfs)	Peak Discharge Outflow (cfs)
2	3.02	30	6.0	0	0
10	4.84			0.001	0
25	5.97			0.023	0
100	7.72			0.182	0

Proposed Drainage Area - Bypass				
Frequency (year)	Rainfall, P (in)	Curve Number	T_c (min)	Peak Discharge Outflow (cfs)
2	3.02	34	6.0	0
10	4.84			0.125
25	5.97			0.470
100	7.72			4.502

III) Combined Proposed Discharge:

Proposed Drainage Area					
Storm (year)	Basin 1 Peak (cfs)	PR-INF-1 Peak (cfs)	PR-INF-2 Peak (cfs)	Bypass Peak (cfs)	Total Peak (cfs)
2	0	0	0	0	0
10	0.055	0	0	0.125	0.142
25	0.347	0	0	0.470	0.702
100	1.332	0	0	4.502	5.224

4. EXISTING VS. PROPOSED RUNOFF

Drainage Area 1				
Frequency (year)	Existing (cfs)	Proposed (cfs)	Change (cfs)	% Exist.
2	0	0	0	N/A
10	0.228	0.142	0.086	62.3%
25	1.431	0.702	0.729	49.1%
100	7.918	5.224	2.694	66.0%

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JOB	18M-216: Ware, MA		
SHEET NO.	3	OF	4
CALCULATED BY	EQ	DATE	3/5/2020
CHECKED BY	CJB	DATE	3/5/2020
SCALE			

5. WATER QUALITY VOLUME

I) Required Water Quality Volume:

Water Quality Volume = Total Proposed Impervious Area x 0.5 inches

Impervious Area	
Gravel Roadway	6,904 sf
Solar Panel Legs	95 sf
Concrete Pad	3,186 sf
Total	10,185 sf

Vol_{WQ} = 10,185 sf x 0.5 in = 424.4 cf

II) Provided Infiltration Volume:

Basin 1:	1,777 cf
Infiltration Trenchs 1-2:	8,738 cf
	10,515 cf > Vol_{WQ}

6. DRAW DOWN CALCULATION

As per the attached test pit information performed by Johnson Soils Company on June 27, 2018, the minimum permeability is 5 in/hr.

Basin 1:

Time to Drain Volume Above Lowest Orifice:

Time to Drain (T): Volume Below Lowest Orifice / Inftration Area x Design Permeability Rate

Time to Drain Volume Below Lowest Orifice:

Test Infiltration Rate at Bottom of Stone:	5 in/hr (Assumed)	
Design Infiltration Rate (1/2 Test Rate)	2.5 in/hr =	0.210 ft/hr
Volume below discharge:	878 cf	
Area of Infiltration	184.0 sf	

Time to Drain: 878 cf / (184 cfs x 0.210 ft/hr)
= 22.72 hours

PR-INF-1:

Time to Drain 100 Year Volume:

Test Infiltration Rate at Bottom of Stone:	5 in/hr (Assumed)	
Design Infiltration Rate (1/2 Test Rate)	2.5 in/hr =	0.210 ft/hr
Chamber Volume:	3,441 cf	
Area of Infiltration	1,485 sf	

Time to Drain: 3,441.0 cf / (1485 cfs x 0.210 ft/hr)
= 11.03 hours

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CALCULATED BY	EQ	DATE	3/5/2020
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SCALE			

PR-INF-2:

Time to Drain 100 Year Volume:

Test Infiltration Rate at Bottom of Stone:	5 in/hr (Assumed)		
Design Infiltration Rate (1/2 Test Rate)	2.5 in/hr	=	0.210 ft/hr
Chamber Volume:	5,296 cf		
Area of Infiltration	2,283 sf		

Time to Drain: 5,296.0 cf / (2283 cfs x 0.210 ft/hr)

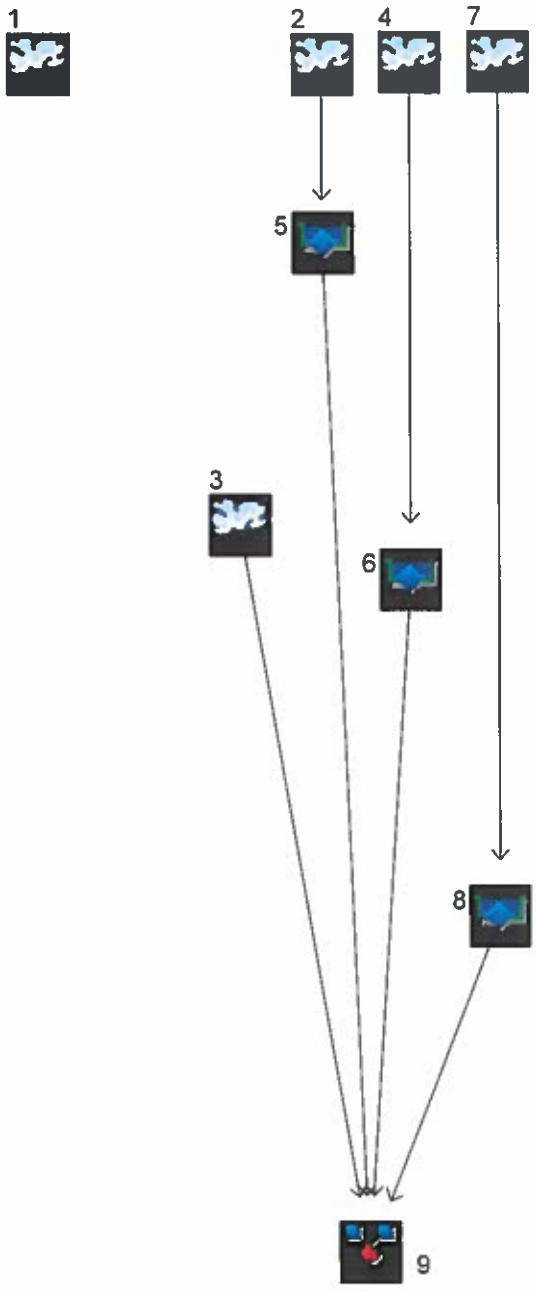
= 11.05 hours

Hydraflow Table of Contents

18M-216 (03-06-2020).gpw

Hydraflow Hydrographs by Intelisolve v9.25 — Friday, Mar 6, 2020

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	EX-DA-1
2	SCS Runoff	BASIN 1
3	SCS Runoff	Bypass
4	SCS Runoff	PR-INF-1
5	Reservoir	BASIN 1 OUTFLOW
6	Reservoir	PR-INF-1 OUTFLOW
7	SCS Runoff	PR-INF-2
8	Reservoir	PR-INF-2 OUTFLOW
9	Combine	PROPOSED DA-1 OUTFLOW

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.25

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.000	1	n/a	0	------	------	------	EX-DA-1
2	SCS Runoff	0.050	1	738	422	------	------	------	BASIN 1
3	SCS Runoff	0.000	1	n/a	0	------	------	------	Bypass
4	SCS Runoff	0.000	1	n/a	0	------	------	------	PR-INF-1
5	Reservoir	0.000	1	n/a	0	2	489.21	422	BASIN 1 OUTFLOW
6	Reservoir	0.000	1	n/a	0	4	100.00	0.000	PR-INF-1 OUTFLOW
7	SCS Runoff	0.000	1	n/a	0	------	------	------	PR-INF-2
8	Reservoir	0.000	1	n/a	0	7	100.00	0.000	PR-INF-2 OUTFLOW
9	Combine	0.000	1	n/a	0	3, 5, 6, 8	------	------	PROPOSED DA-1 OUTFLOW

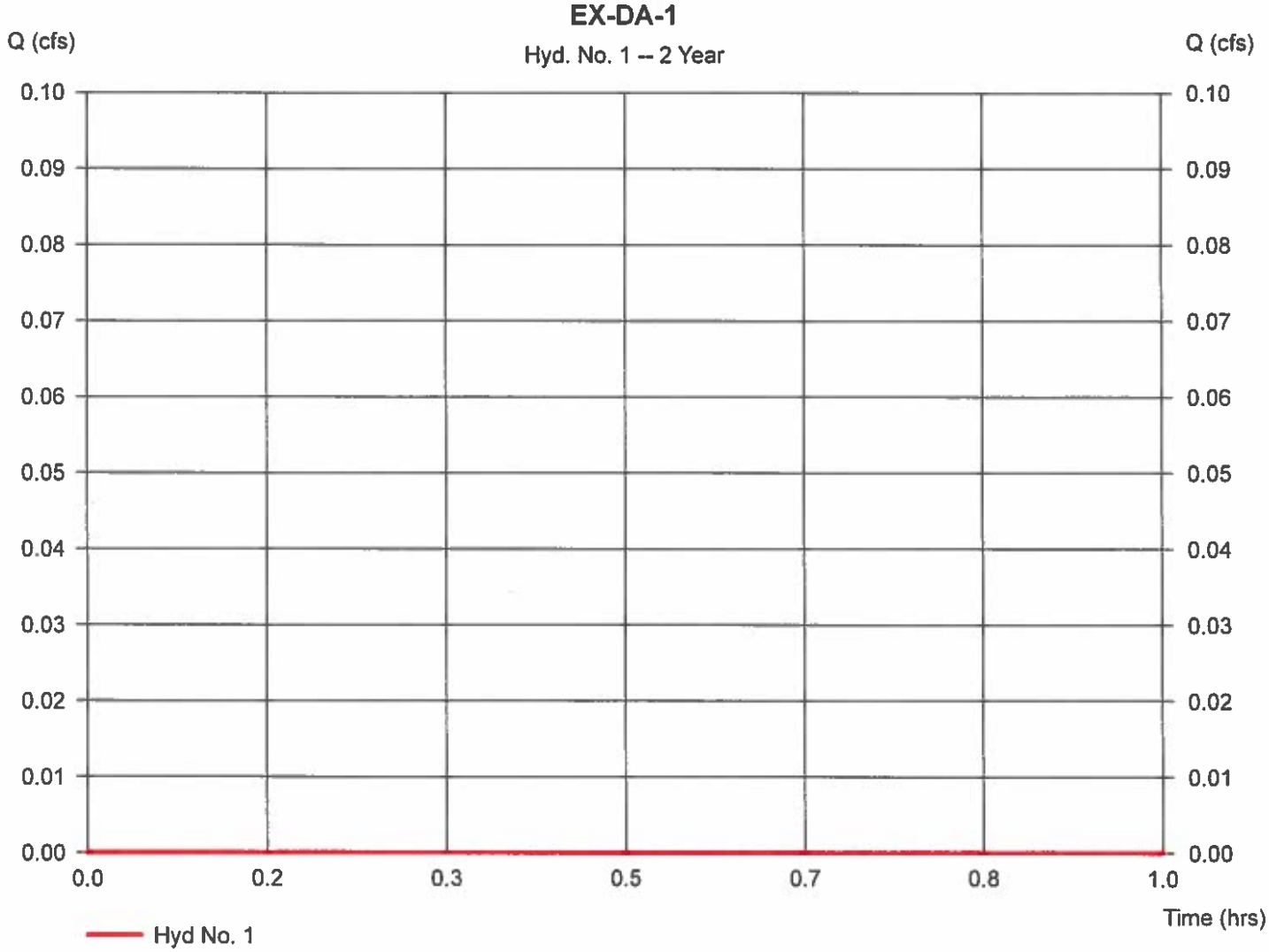
Hydrograph Report

Hyd. No. 1

EX-DA-1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 19.721 ac	Curve number	= 36*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.90 min
Total precip.	= 3.02 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.025 x 98) + (0.854 x 55) + (14.128 x 30) + (0.274 x 72) + (4.440 x 49)] / 19.721



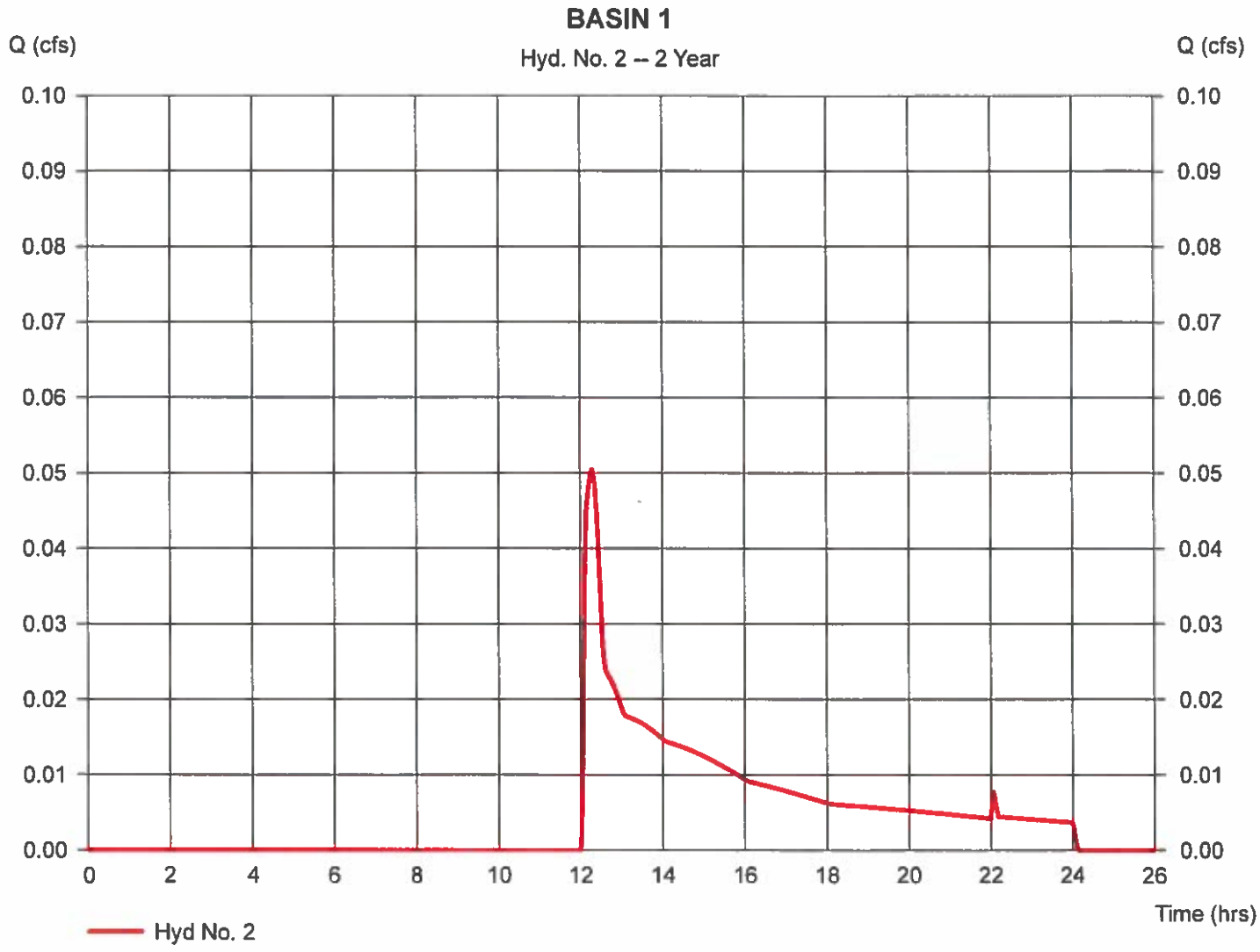
Hydrograph Report

Hyd. No. 2

BASIN 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.050 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.30 hrs
Time interval	= 1 min	Hyd. volume	= 422 cuft
Drainage area	= 0.447 ac	Curve number	= 57*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.02 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.159 x 76) + (0.073 x 98) + (0.216 x 30)] / 0.447



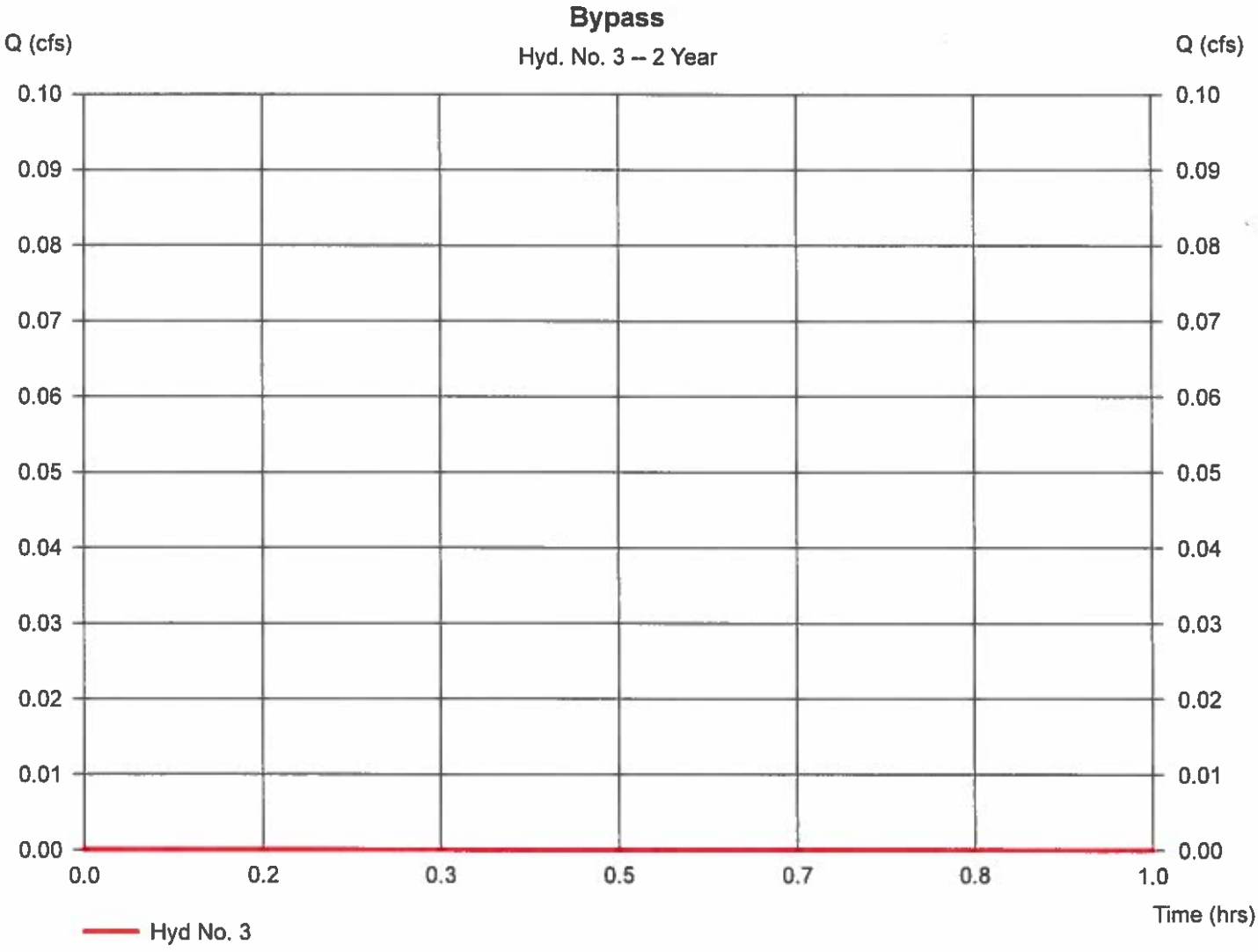
Hydrograph Report

Hyd. No. 3

Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 16.072 ac	Curve number	= 34*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.02 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.455 x 58) + (10.388 x 30) + (0.397 x 61) + (4.831 x 39)] / 16.072

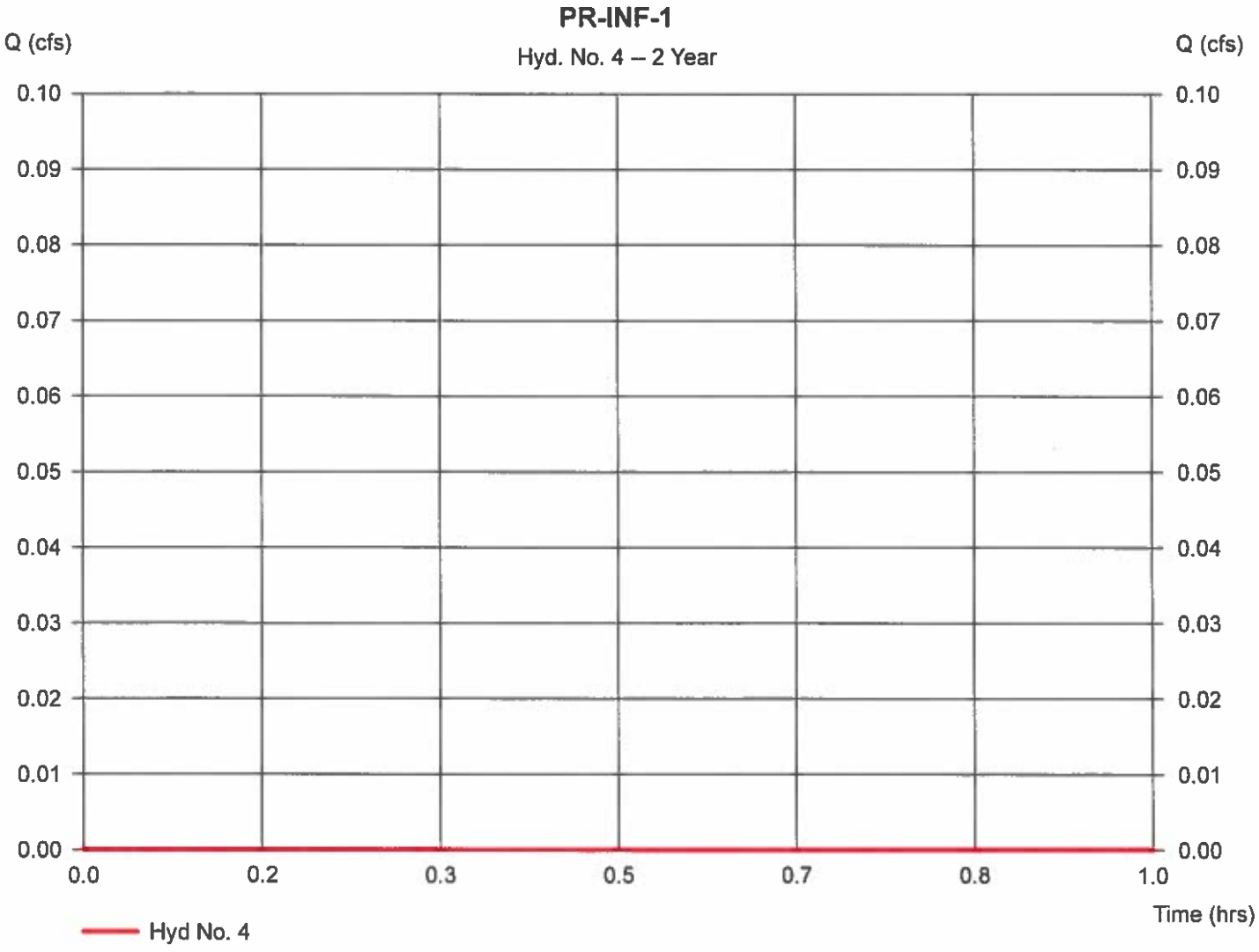


Hydrograph Report

Hyd. No. 4

PR-INF-1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 1.119 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.02 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



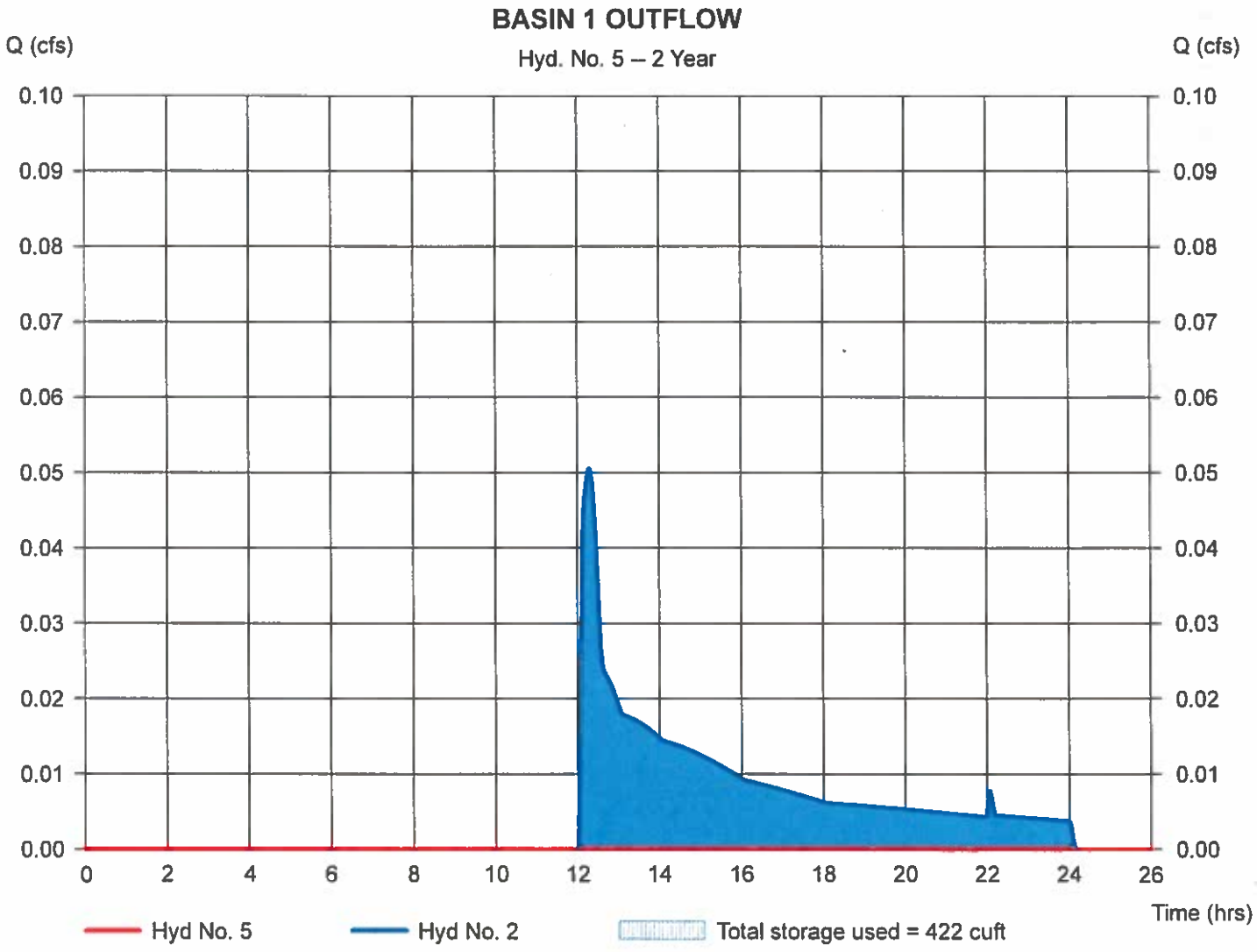
Hydrograph Report

Hyd. No. 5

BASIN 1 OUTFLOW

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 2 - BASIN 1	Max. Elevation	= 489.21 ft
Reservoir name	= BASIN 1	Max. Storage	= 422 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.25

Friday, Mar 6, 2020

Pond No. 3 - BASIN 1

Pond Data

Contours - User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 488.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	488.00	184	0	0
1.00	489.00	425	305	305
2.00	490.00	722	574	878
3.00	491.00	1,076	899	1,777

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	0.00	0.00	0.00
Crest El. (ft)	= 490.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	488.00	---	---	---	---	0.00	---	---	---	---	---	0.000
1.00	305	489.00	---	---	---	---	0.00	---	---	---	---	---	0.000
2.00	878	490.00	---	---	---	---	0.00	---	---	---	---	---	0.000
3.00	1,777	491.00	---	---	---	---	26.00	---	---	---	---	---	26.00

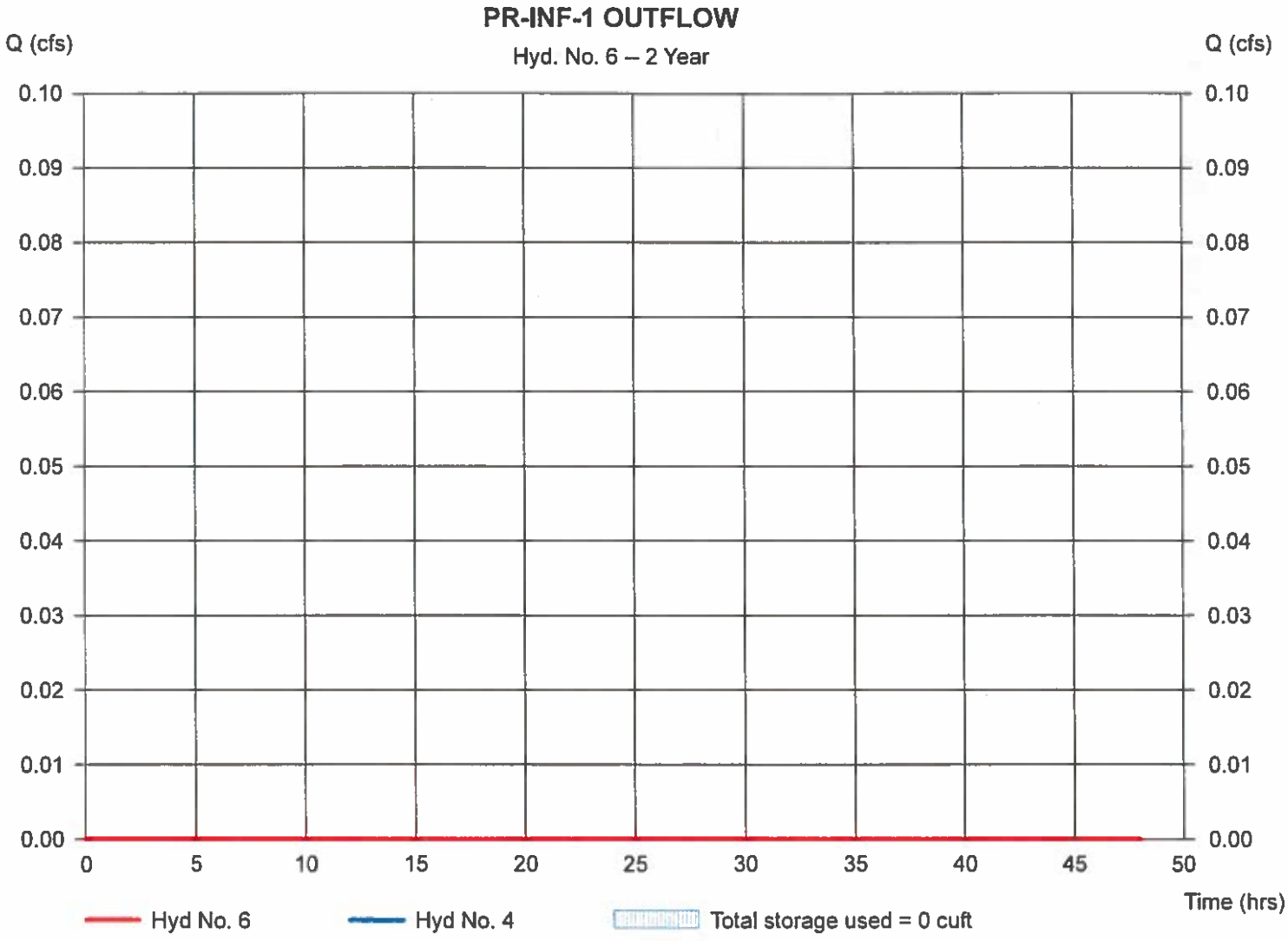
Hydrograph Report

Hyd. No. 6

PR-INF-1 OUTFLOW

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - PR-INF-1	Max. Elevation	= 100.00 ft
Reservoir name	= PR-INF-1 (234.50)	Max. Storage	= 0 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - PR-INF-1 (234.50)

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	n/a	0	0
0.25	100.25	n/a	149	149
0.50	100.50	n/a	148	297
0.75	100.75	n/a	149	446
1.00	101.00	n/a	148	594
1.25	101.25	n/a	286	880
1.50	101.50	n/a	284	1,164
1.75	101.75	n/a	279	1,443
2.00	102.00	n/a	275	1,718
2.25	102.25	n/a	273	1,991
2.50	102.50	n/a	263	2,254
2.75	102.75	n/a	250	2,504
3.00	103.00	n/a	235	2,739
3.25	103.25	n/a	211	2,950
3.50	103.50	n/a	170	3,120
3.54	103.54	n/a	25	3,145
3.79	103.79	n/a	148	3,293
4.04	104.04	n/a	149	3,442
4.29	104.29	n/a	373	3,815

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 30.00	0.00	0.00	0.00
Crest El. (ft)	= 104.04	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

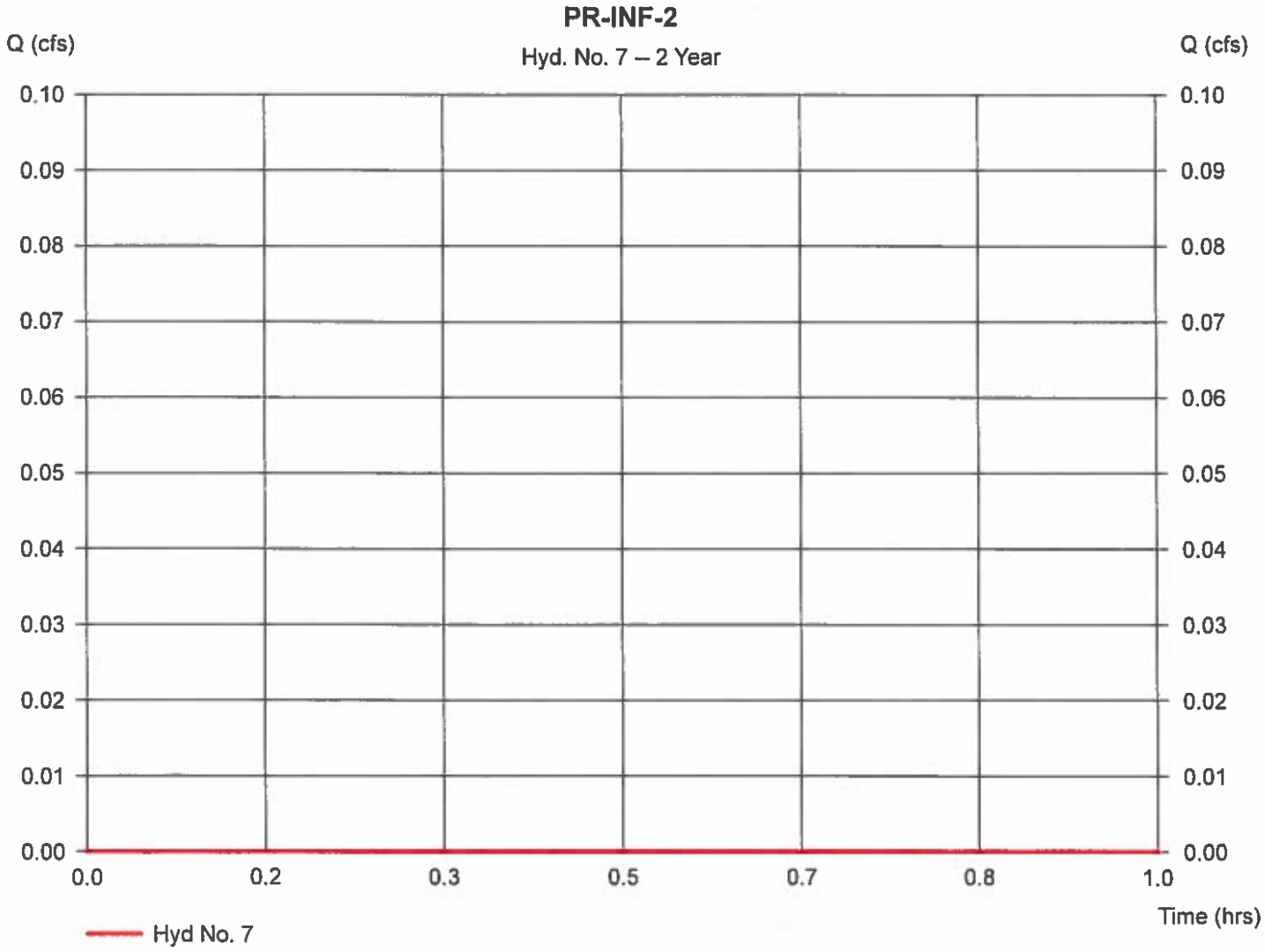
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	---	---	---	---	0.00	---	---	---	---	---	0.000
0.25	149	100.25	---	---	---	---	0.00	---	---	---	---	---	0.000
0.50	297	100.50	---	---	---	---	0.00	---	---	---	---	---	0.000
0.75	446	100.75	---	---	---	---	0.00	---	---	---	---	---	0.000
1.00	594	101.00	---	---	---	---	0.00	---	---	---	---	---	0.000
1.25	880	101.25	---	---	---	---	0.00	---	---	---	---	---	0.000
1.50	1,164	101.50	---	---	---	---	0.00	---	---	---	---	---	0.000
1.75	1,443	101.75	---	---	---	---	0.00	---	---	---	---	---	0.000
2.00	1,718	102.00	---	---	---	---	0.00	---	---	---	---	---	0.000
2.25	1,991	102.25	---	---	---	---	0.00	---	---	---	---	---	0.000
2.50	2,254	102.50	---	---	---	---	0.00	---	---	---	---	---	0.000
2.75	2,504	102.75	---	---	---	---	0.00	---	---	---	---	---	0.000
3.00	2,739	103.00	---	---	---	---	0.00	---	---	---	---	---	0.000
3.25	2,950	103.25	---	---	---	---	0.00	---	---	---	---	---	0.000
3.50	3,120	103.50	---	---	---	---	0.00	---	---	---	---	---	0.000
3.54	3,145	103.54	---	---	---	---	0.00	---	---	---	---	---	0.000
3.79	3,293	103.79	---	---	---	---	0.00	---	---	---	---	---	0.000
4.04	3,442	104.04	---	---	---	---	0.00	---	---	---	---	---	0.000
4.29	3,815	104.29	---	---	---	---	9.75	---	---	---	---	---	9.750

Hydrograph Report

Hyd. No. 7

PR-INF-2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 2.082 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.02 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



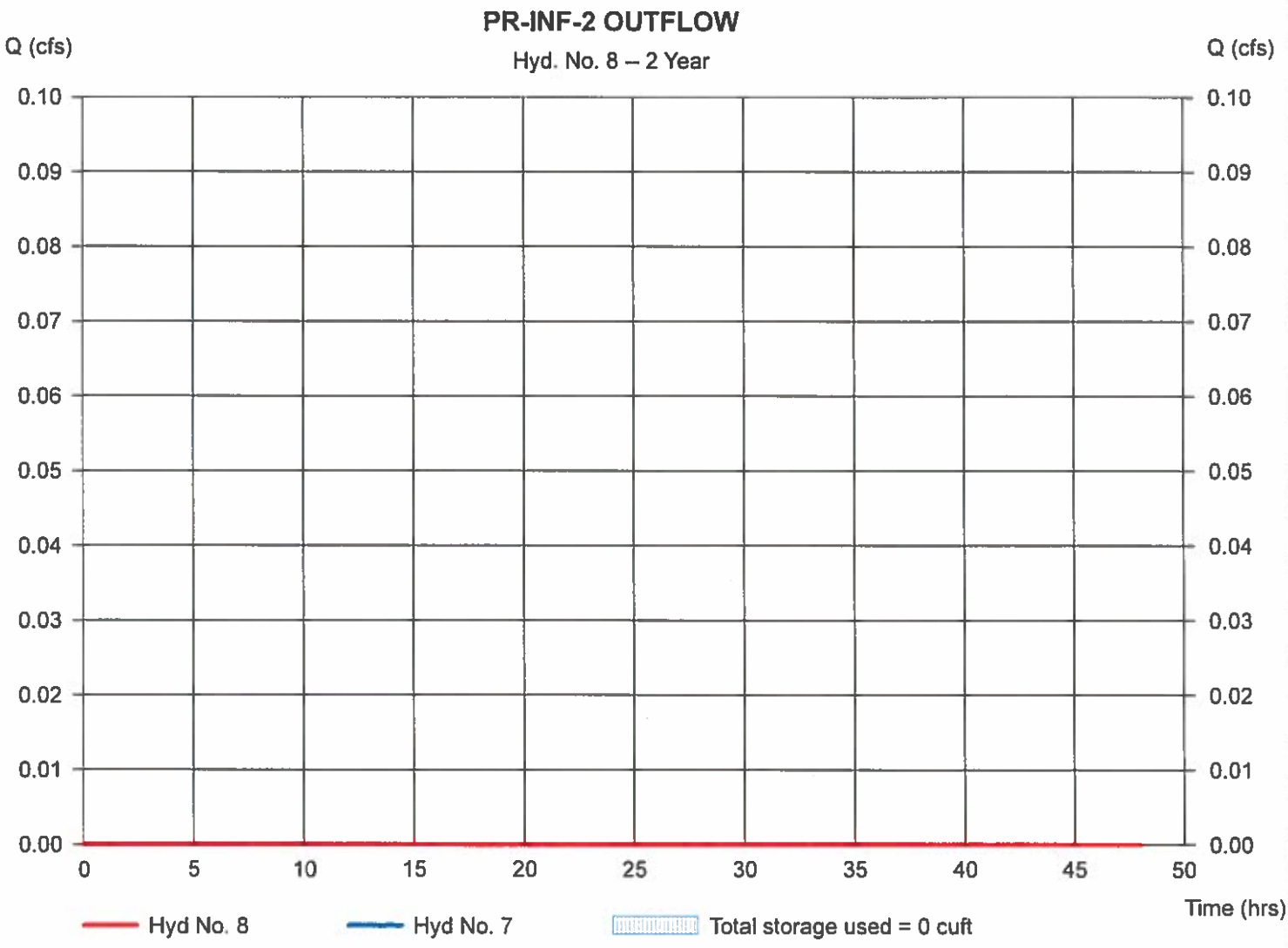
Hydrograph Report

Hyd. No. 8

PR-INF-2 OUTFLOW

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 7 - PR-INF-2	Max. Elevation	= 100.00 ft
Reservoir name	= PR-INF-2 (360.50)	Max. Storage	= 0 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - PR-INF-2 (360.50)

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	n/a	0	0
0.25	100.25	n/a	228	228
0.50	100.50	n/a	229	457
0.75	100.75	n/a	228	685
1.00	101.00	n/a	228	913
1.25	101.25	n/a	440	1,353
1.50	101.50	n/a	437	1,790
1.75	101.75	n/a	431	2,221
2.00	102.00	n/a	424	2,645
2.25	102.25	n/a	419	3,064
2.50	102.50	n/a	404	3,468
2.75	102.75	n/a	385	3,853
3.00	103.00	n/a	362	4,215
3.25	103.25	n/a	324	4,539
3.50	103.50	n/a	262	4,801
3.54	103.54	n/a	38	4,839
3.79	103.79	n/a	228	5,067
4.04	104.04	n/a	229	5,296
4.29	104.29	n/a	570	5,866

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 30.00	0.00	0.00	0.00
Crest El. (ft)	= 104.04	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

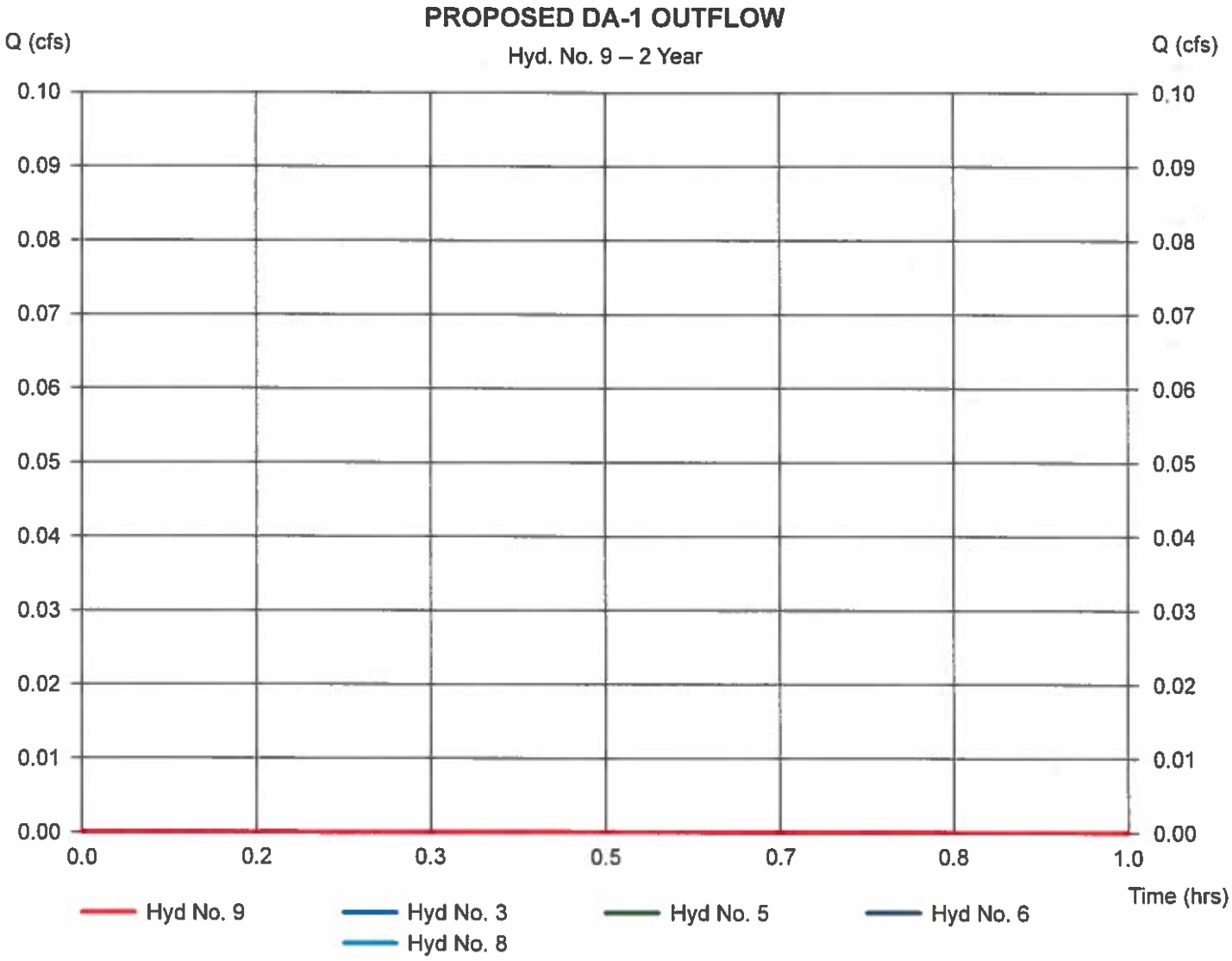
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	---	---	---	---	0.00	---	---	---	---	---	0.000
0.25	228	100.25	---	---	---	---	0.00	---	---	---	---	---	0.000
0.50	457	100.50	---	---	---	---	0.00	---	---	---	---	---	0.000
0.75	685	100.75	---	---	---	---	0.00	---	---	---	---	---	0.000
1.00	913	101.00	---	---	---	---	0.00	---	---	---	---	---	0.000
1.25	1,353	101.25	---	---	---	---	0.00	---	---	---	---	---	0.000
1.50	1,790	101.50	---	---	---	---	0.00	---	---	---	---	---	0.000
1.75	2,221	101.75	---	---	---	---	0.00	---	---	---	---	---	0.000
2.00	2,645	102.00	---	---	---	---	0.00	---	---	---	---	---	0.000
2.25	3,064	102.25	---	---	---	---	0.00	---	---	---	---	---	0.000
2.50	3,468	102.50	---	---	---	---	0.00	---	---	---	---	---	0.000
2.75	3,853	102.75	---	---	---	---	0.00	---	---	---	---	---	0.000
3.00	4,215	103.00	---	---	---	---	0.00	---	---	---	---	---	0.000
3.25	4,539	103.25	---	---	---	---	0.00	---	---	---	---	---	0.000
3.50	4,801	103.50	---	---	---	---	0.00	---	---	---	---	---	0.000
3.54	4,839	103.54	---	---	---	---	0.00	---	---	---	---	---	0.000
3.79	5,067	103.79	---	---	---	---	0.00	---	---	---	---	---	0.000
4.04	5,296	104.04	---	---	---	---	0.00	---	---	---	---	---	0.000
4.29	5,866	104.29	---	---	---	---	9.75	---	---	---	---	---	9.750

Hydrograph Report

Hyd. No. 9

PROPOSED DA-1 OUTFLOW

Hydrograph type	= Combine	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyds.	= 3, 5, 6, 8	Contrib. drain. area	= 16.072 ac



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.25

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.228	1	907	6,306	------	------	------	EX-DA-1
2	SCS Runoff	0.462	1	726	1,707	------	------	------	BASIN 1
3	SCS Runoff	0.125	1	1324	2,709	------	------	------	Bypass
4	SCS Runoff	0.001	1	1440	5	------	------	------	PR-INF-1
5	Reservoir	0.055	1	820	829	2	490.01	884	BASIN 1 OUTFLOW
6	Reservoir	0.000	1	n/a	0	4	100.01	5.35	PR-INF-1 OUTFLOW
7	SCS Runoff	0.001	1	1440	10	------	------	------	PR-INF-2
8	Reservoir	0.000	1	n/a	0	7	100.01	9.96	PR-INF-2 OUTFLOW
9	Combine	0.142	1	1324	3,538	3, 5, 6, 8	------	------	PROPOSED DA-1 OUTFLOW

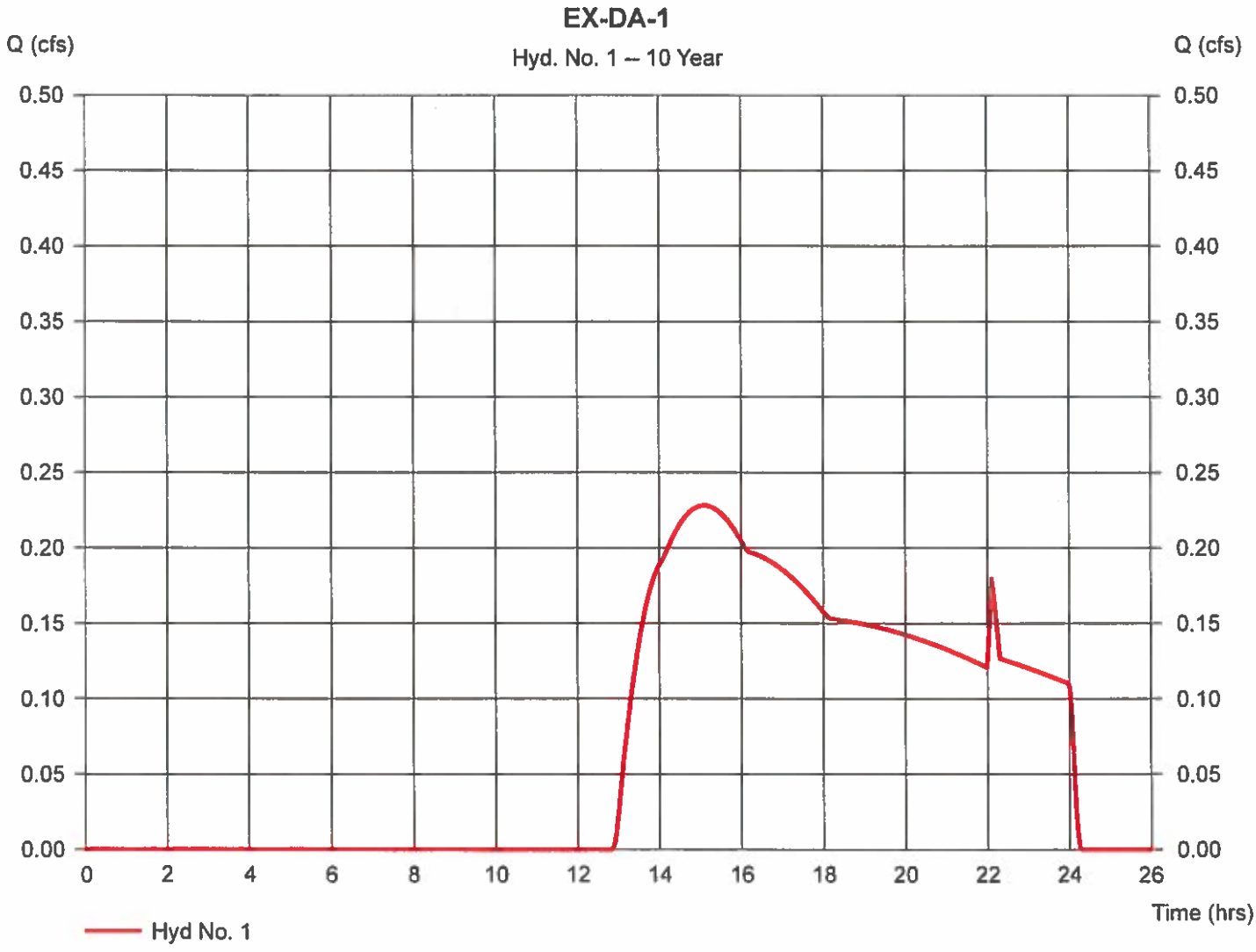
Hydrograph Report

Hyd. No. 1

EX-DA-1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.228 cfs
Storm frequency	= 10 yrs	Time to peak	= 15.12 hrs
Time interval	= 1 min	Hyd. volume	= 6,306 cuft
Drainage area	= 19.721 ac	Curve number	= 36*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.90 min
Total precip.	= 4.84 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.025 x 98) + (0.854 x 55) + (14.128 x 30) + (0.274 x 72) + (4.440 x 49)] / 19.721



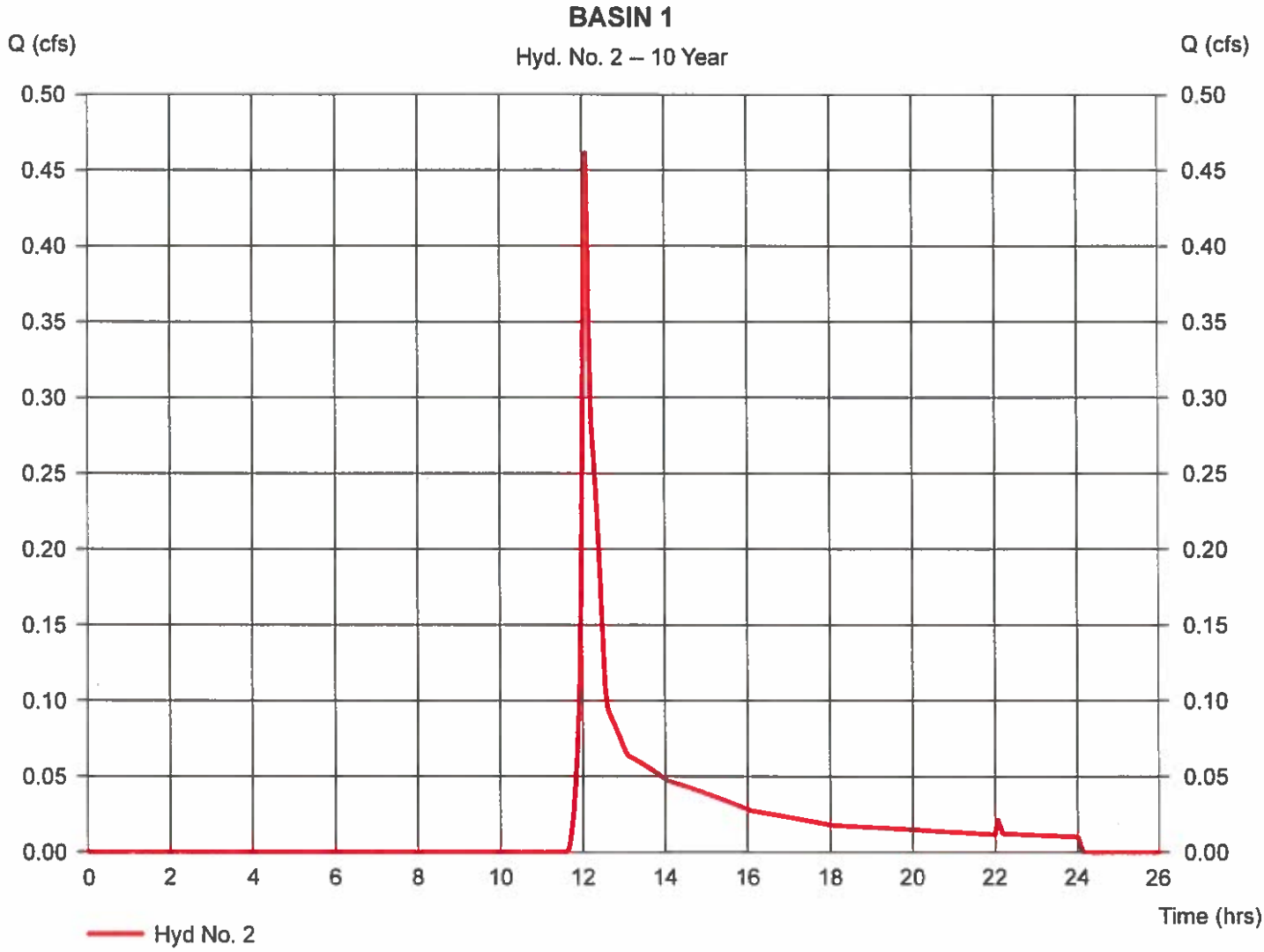
Hydrograph Report

Hyd. No. 2

BASIN 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.462 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 1,707 cuft
Drainage area	= 0.447 ac	Curve number	= 57*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.84 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.159 x 76) + (0.073 x 98) + (0.216 x 30)] / 0.447



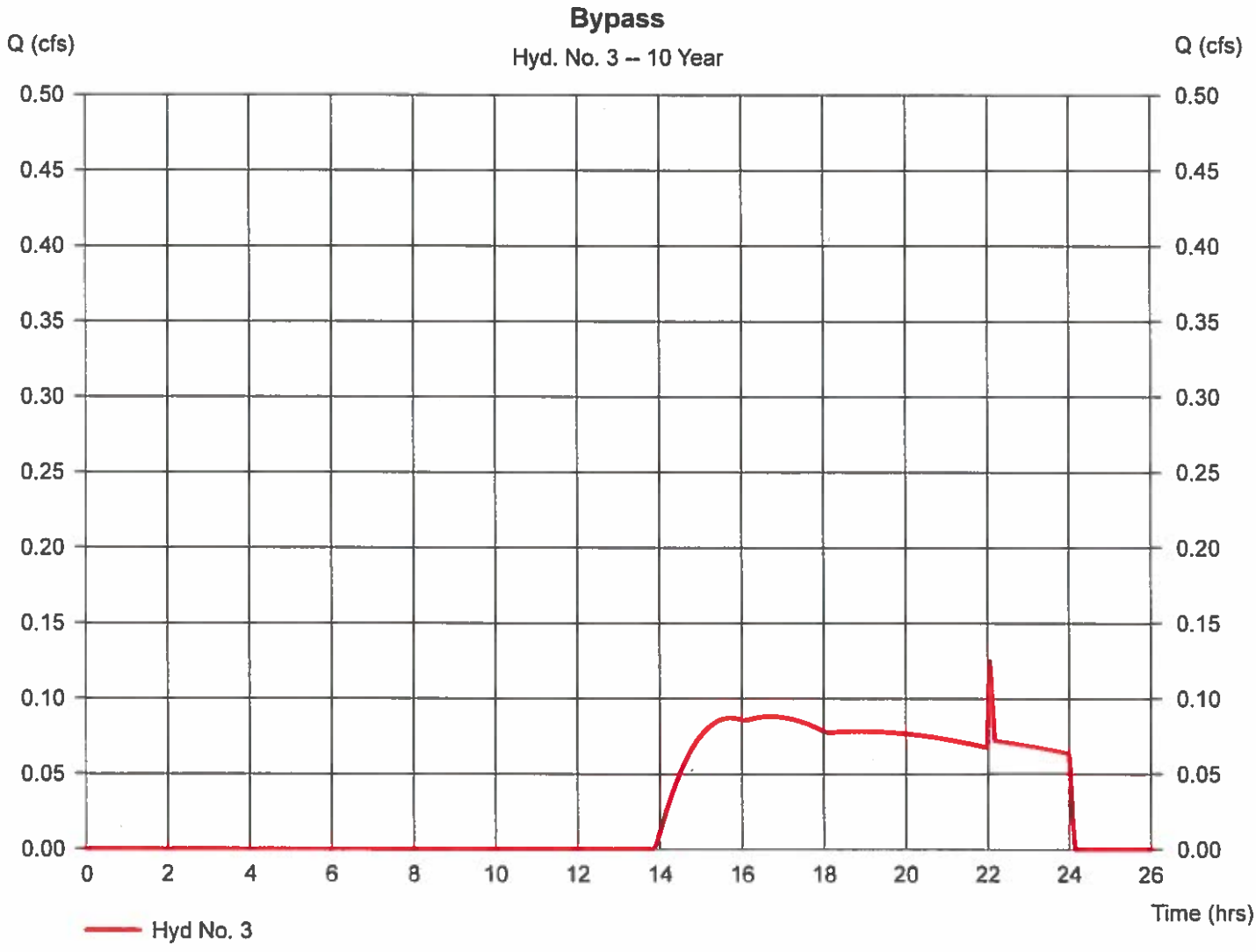
Hydrograph Report

Hyd. No. 3

Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 0.125 cfs
Storm frequency	= 10 yrs	Time to peak	= 22.07 hrs
Time interval	= 1 min	Hyd. volume	= 2,709 cuft
Drainage area	= 16.072 ac	Curve number	= 34*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.84 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.455 x 58) + (10.388 x 30) + (0.397 x 61) + (4.831 x 39)] / 16.072

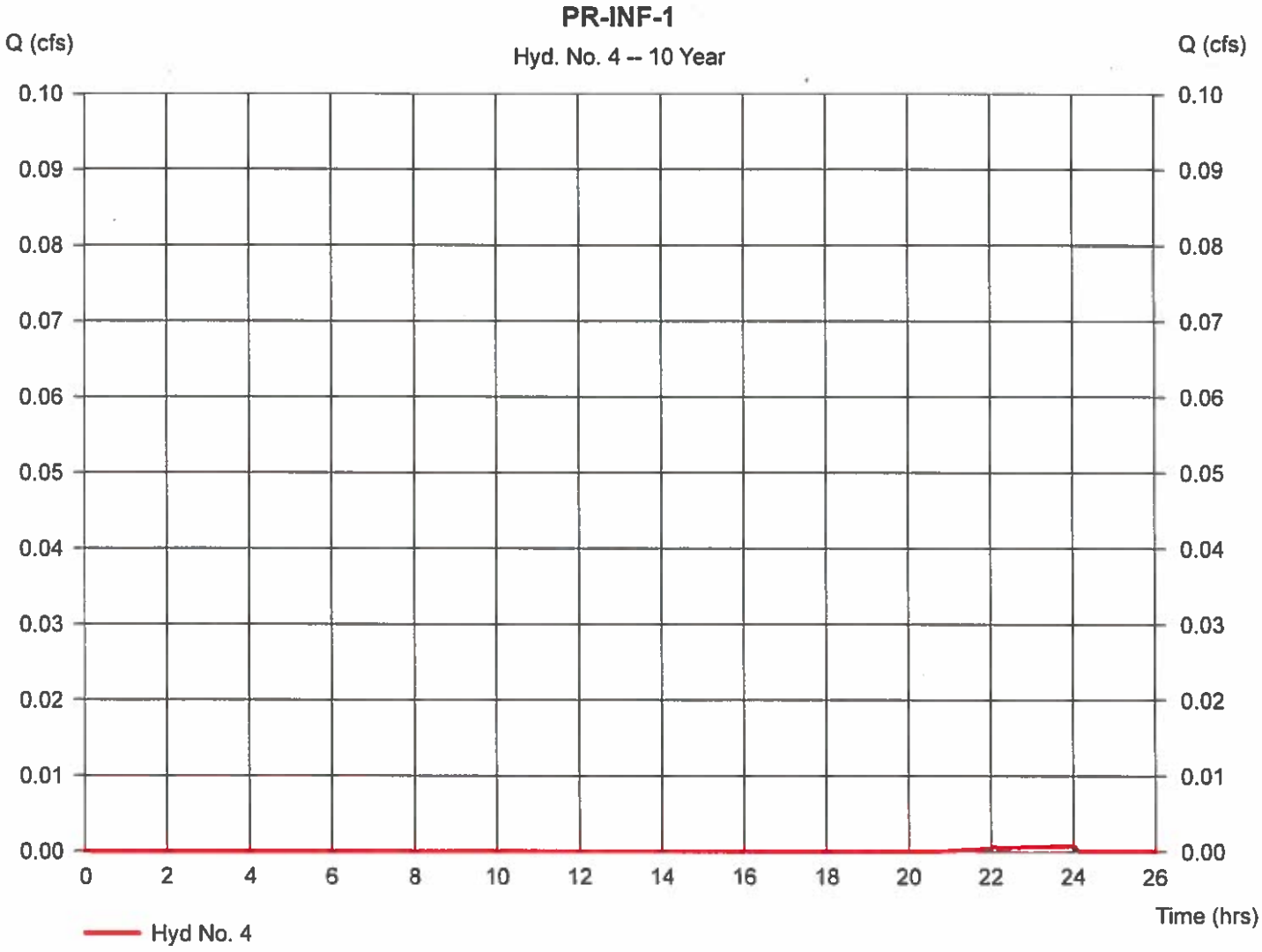


Hydrograph Report

Hyd. No. 4

PR-INF-1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 10 yrs	Time to peak	= 24.00 hrs
Time interval	= 1 min	Hyd. volume	= 5 cuft
Drainage area	= 1.119 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.84 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



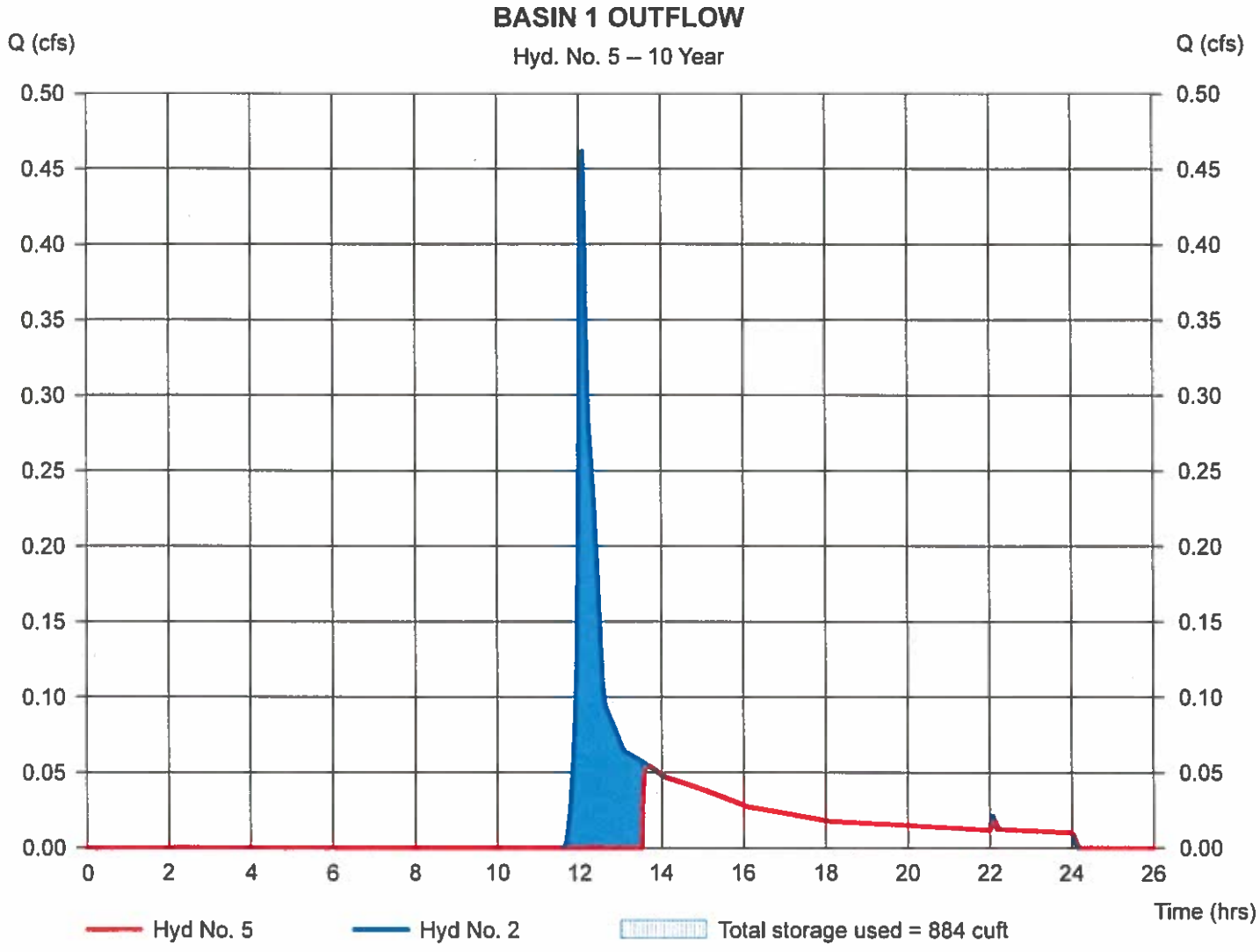
Hydrograph Report

Hyd. No. 5

BASIN 1 OUTFLOW

Hydrograph type	= Reservoir	Peak discharge	= 0.055 cfs
Storm frequency	= 10 yrs	Time to peak	= 13.67 hrs
Time interval	= 1 min	Hyd. volume	= 829 cuft
Inflow hyd. No.	= 2 - BASIN 1	Max. Elevation	= 490.01 ft
Reservoir name	= BASIN 1	Max. Storage	= 884 cuft

Storage Indication method used.



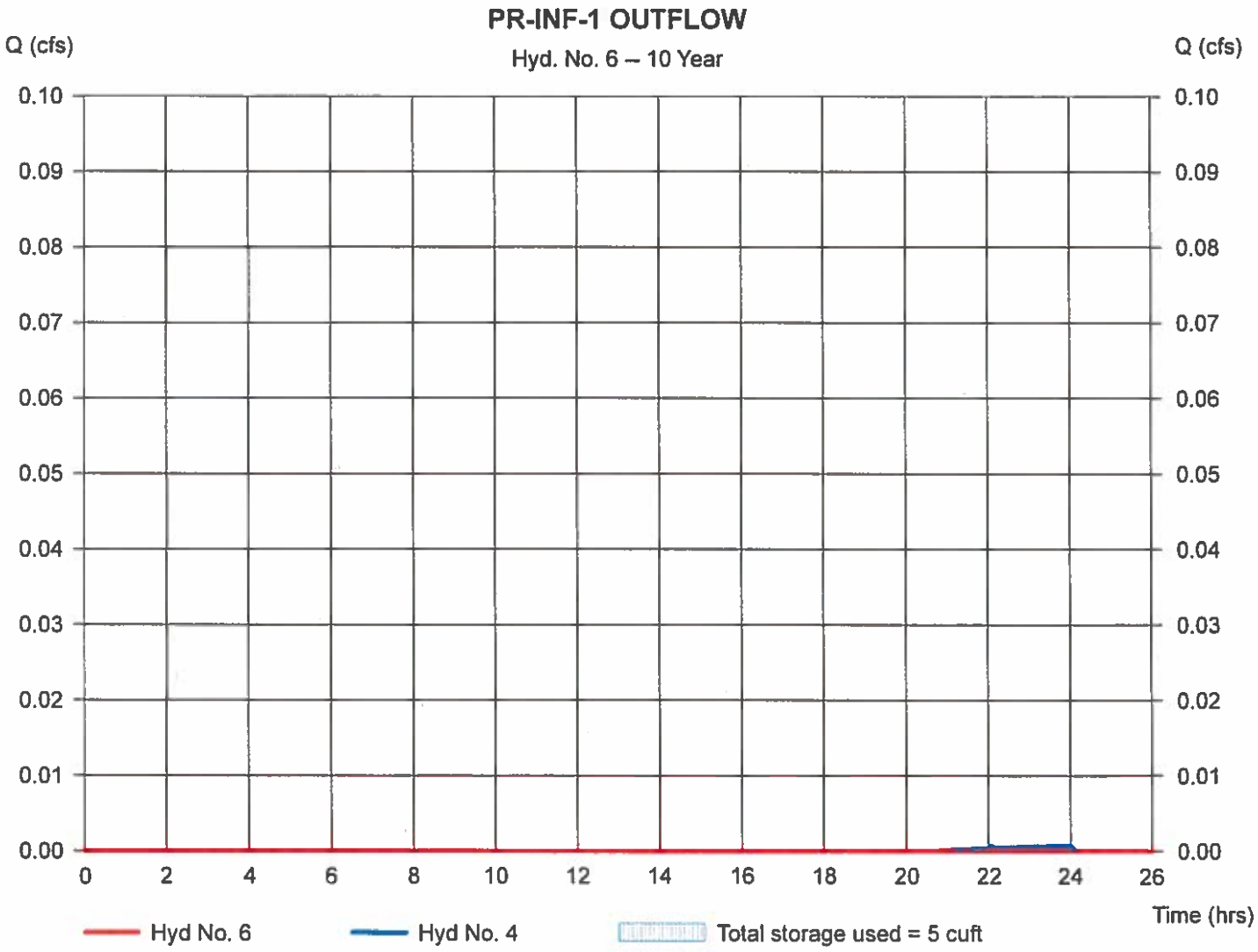
Hydrograph Report

Hyd. No. 6

PR-INF-1 OUTFLOW

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - PR-INF-1	Max. Elevation	= 100.01 ft
Reservoir name	= PR-INF-1 (234.50)	Max. Storage	= 5 cuft

Storage Indication method used.

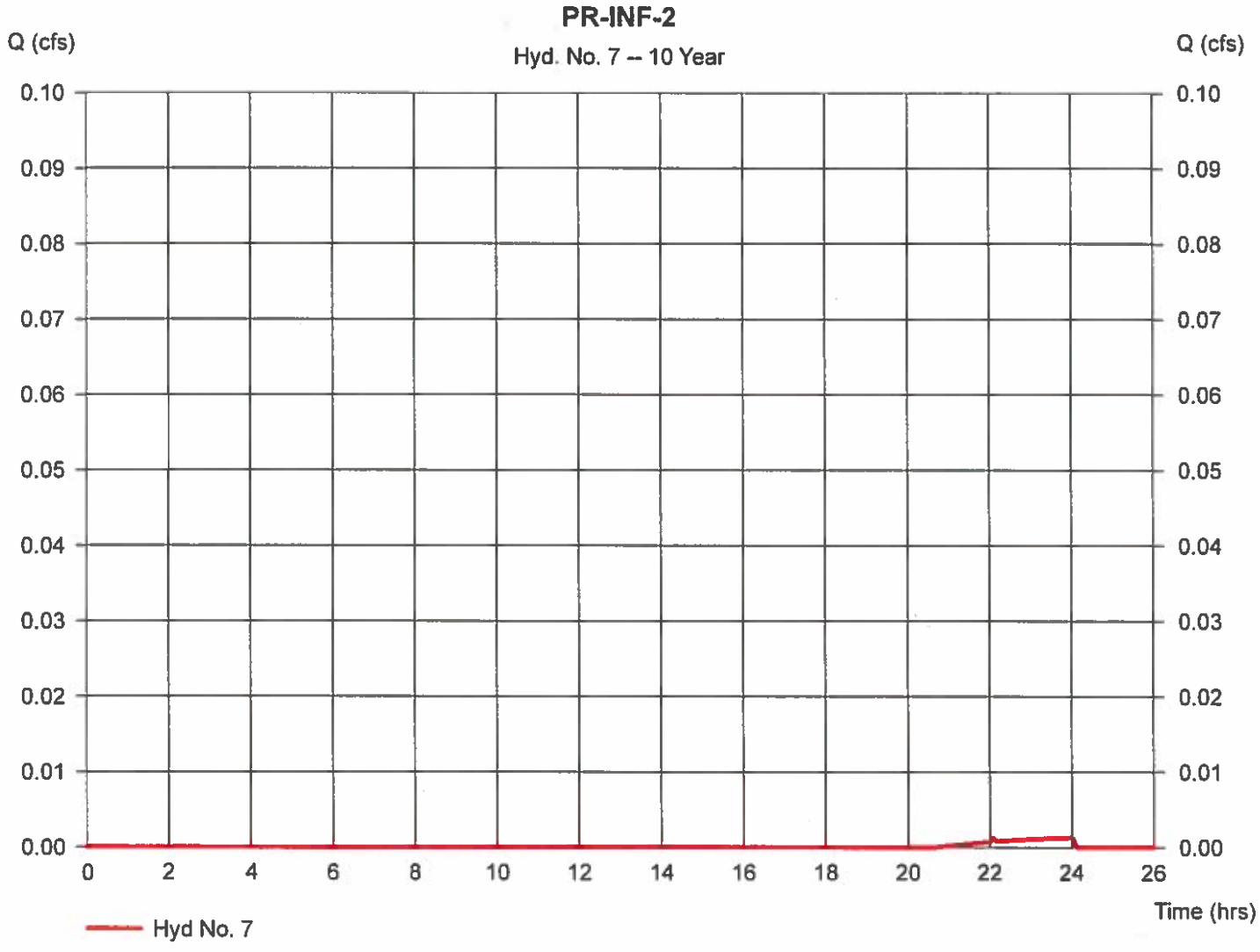


Hydrograph Report

Hyd. No. 7

PR-INF-2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 10 yrs	Time to peak	= 24.00 hrs
Time interval	= 1 min	Hyd. volume	= 10 cuft
Drainage area	= 2.082 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.84 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



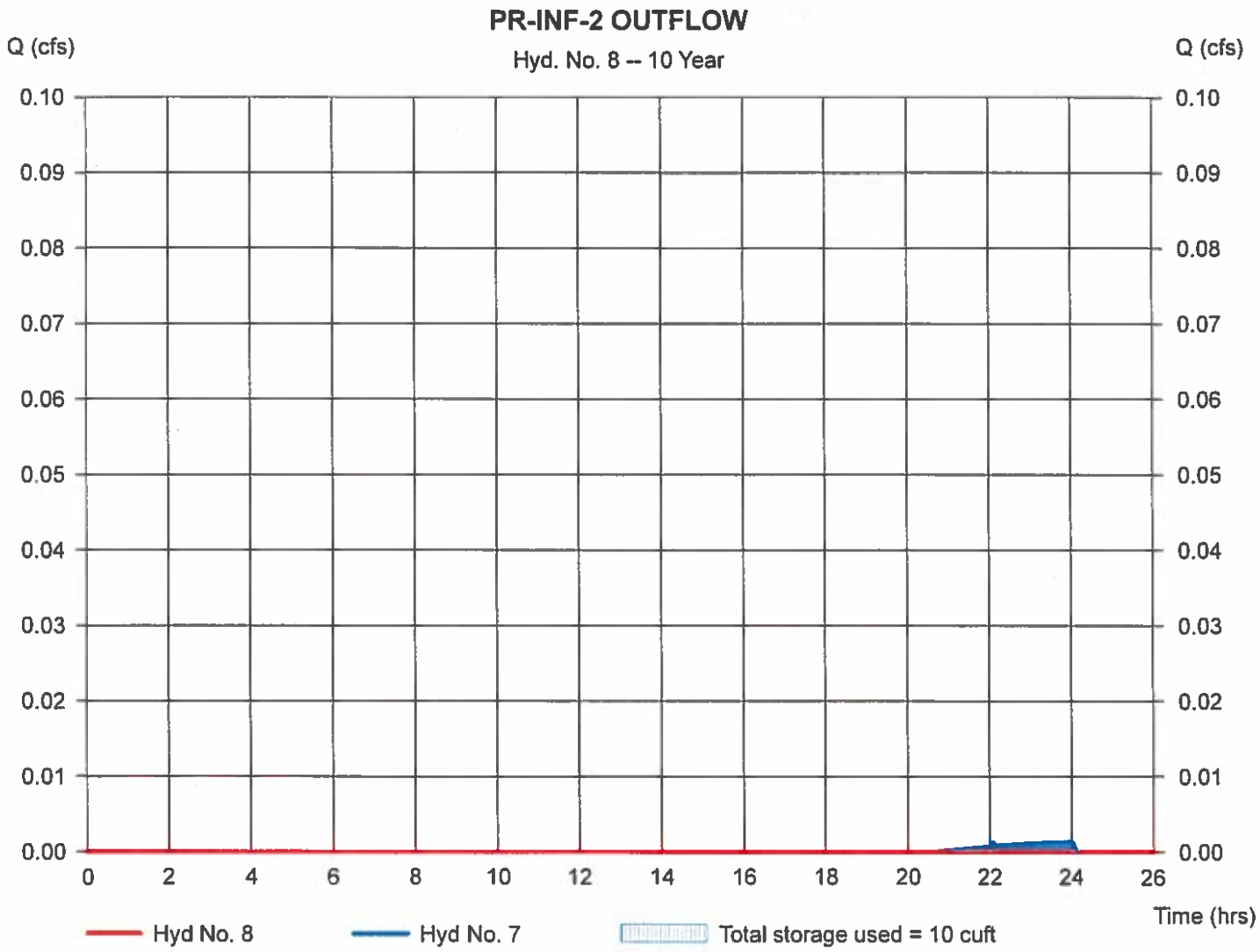
Hydrograph Report

Hyd. No. 8

PR-INF-2 OUTFLOW

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 7 - PR-INF-2	Max. Elevation	= 100.01 ft
Reservoir name	= PR-INF-2 (360.50)	Max. Storage	= 10 cuft

Storage Indication method used.

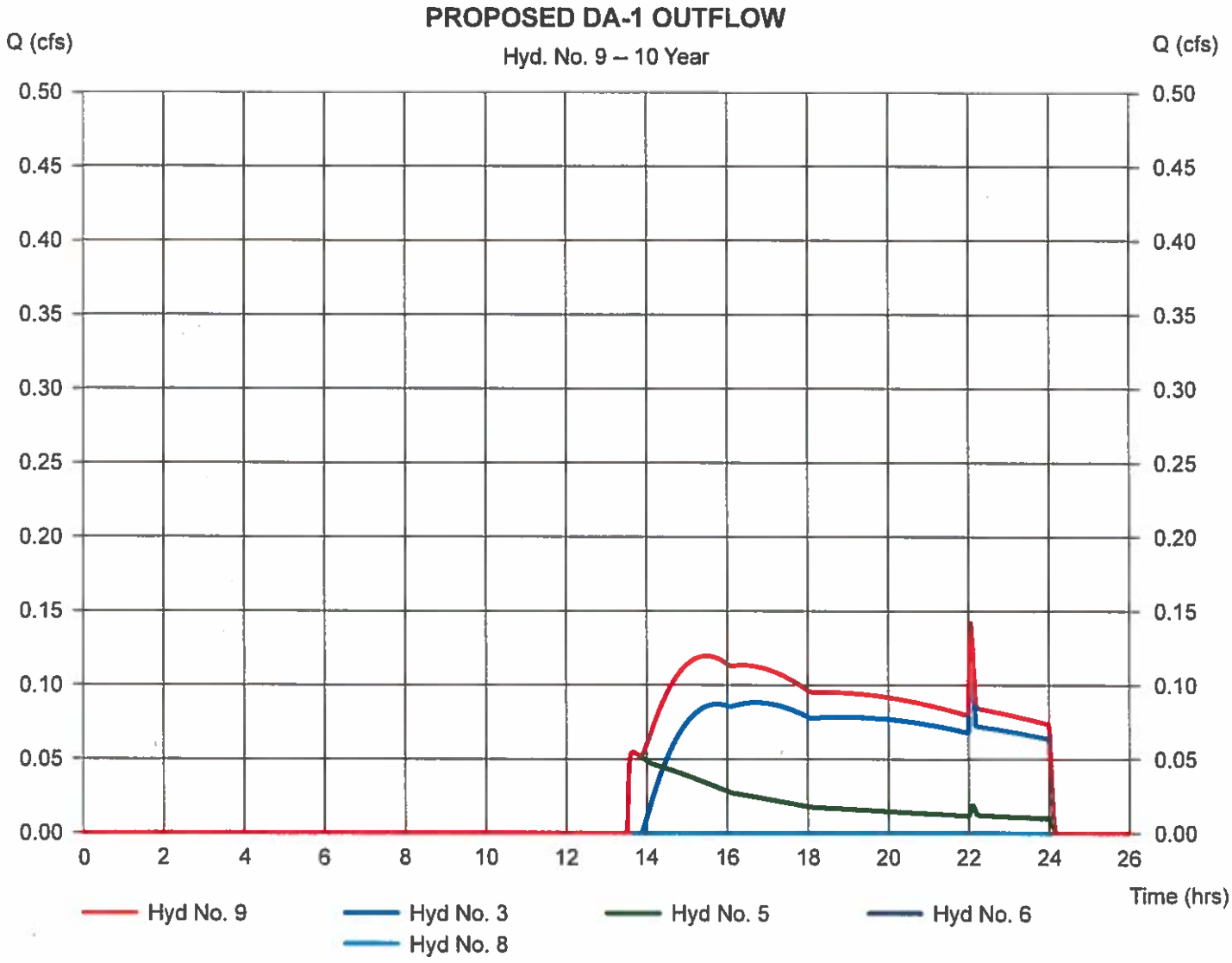


Hydrograph Report

Hyd. No. 9

PROPOSED DA-1 OUTFLOW

Hydrograph type	= Combine	Peak discharge	= 0.142 cfs
Storm frequency	= 10 yrs	Time to peak	= 22.07 hrs
Time interval	= 1 min	Hyd. volume	= 3,538 cuft
Inflow hyds.	= 3, 5, 6, 8	Contrib. drain. area	= 16.072 ac



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.25

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	1.431	1	749	21,035	------	------	------	EX-DA-1
2	SCS Runoff	0.826	1	725	2,774	------	------	------	BASIN 1
3	SCS Runoff	0.470	1	819	12,196	------	------	------	Bypass
4	SCS Runoff	0.012	1	1324	289	------	------	------	PR-INF-1
5	Reservoir	0.347	1	743	1,896	2	490.04	916	BASIN 1 OUTFLOW
6	Reservoir	0.000	1	n/a	0	4	100.49	289	PR-INF-1 OUTFLOW
7	SCS Runoff	0.023	1	1324	537	------	------	------	PR-INF-2
8	Reservoir	0.000	1	n/a	0	7	100.59	537	PR-INF-2 OUTFLOW
9	Combine	0.702	1	748	14,092	3, 5, 6, 8	------	------	PROPOSED DA-1 OUTFLOW

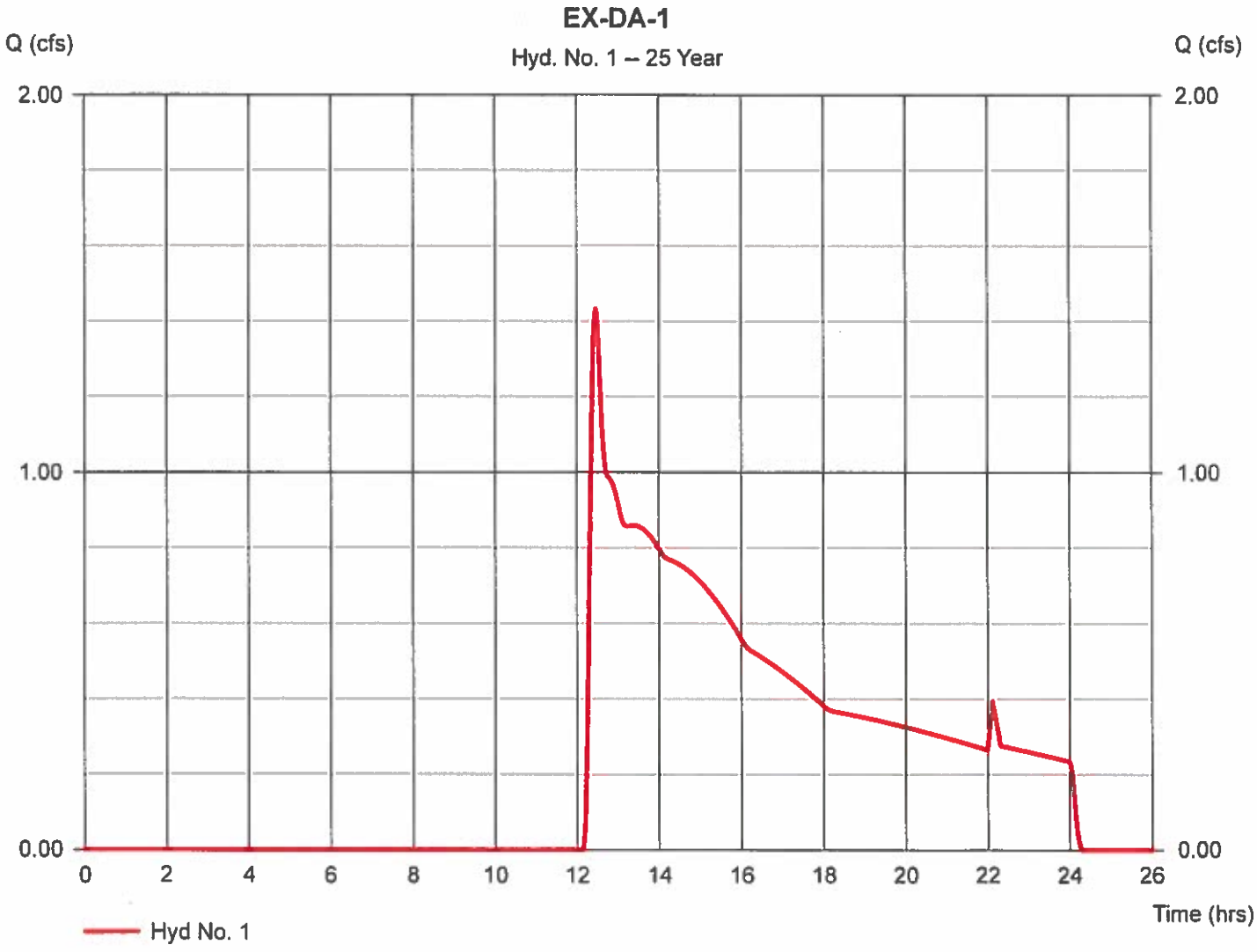
Hydrograph Report

Hyd. No. 1

EX-DA-1

Hydrograph type	= SCS Runoff	Peak discharge	= 1.431 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.48 hrs
Time interval	= 1 min	Hyd. volume	= 21,035 cuft
Drainage area	= 19.721 ac	Curve number	= 36*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.90 min
Total precip.	= 5.97 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.025 x 98) + (0.854 x 55) + (14.128 x 30) + (0.274 x 72) + (4.440 x 49)] / 19.721



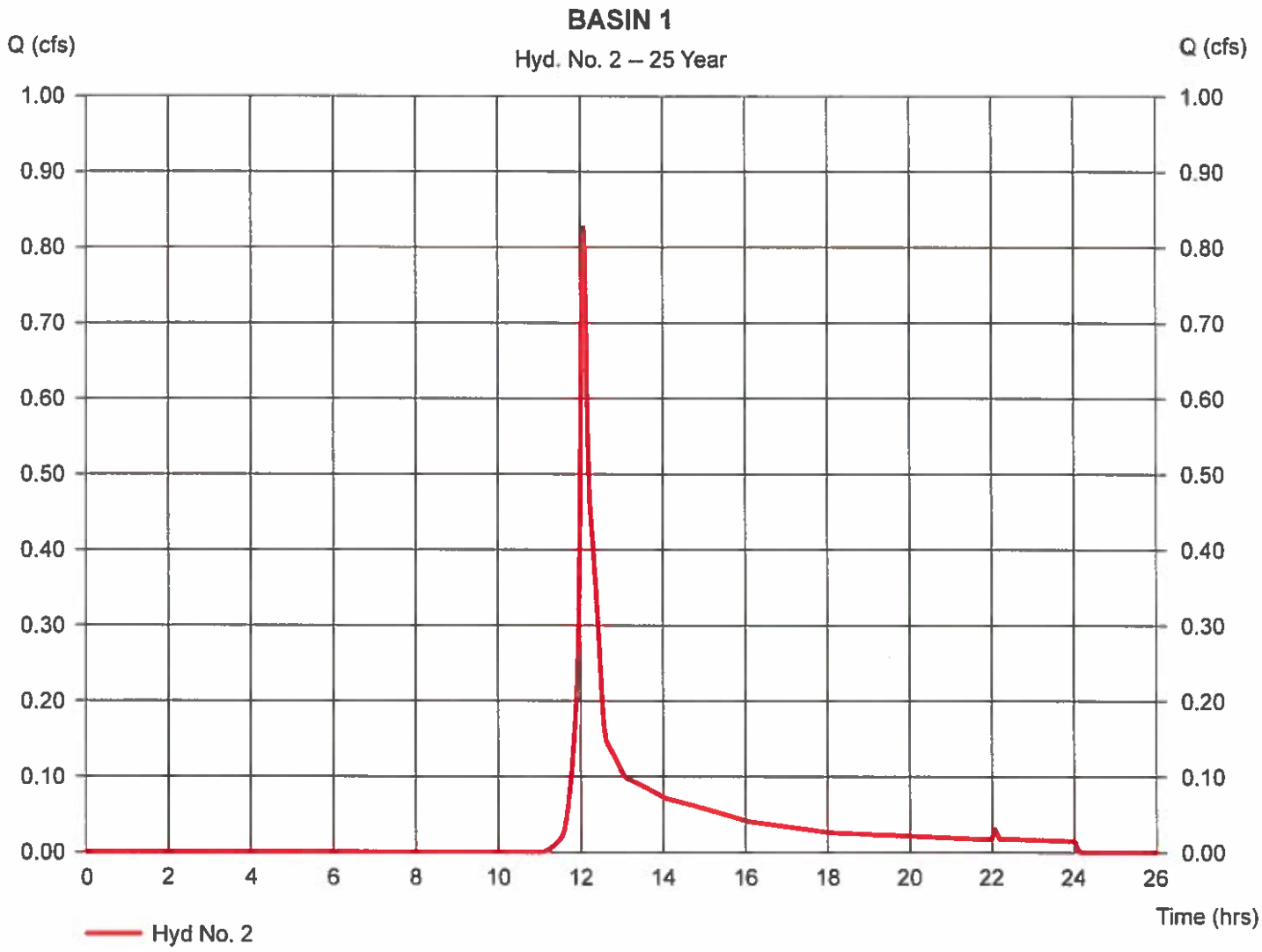
Hydrograph Report

Hyd. No. 2

BASIN 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.826 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 2,774 cuft
Drainage area	= 0.447 ac	Curve number	= 57*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.97 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.159 x 76) + (0.073 x 98) + (0.216 x 30)] / 0.447



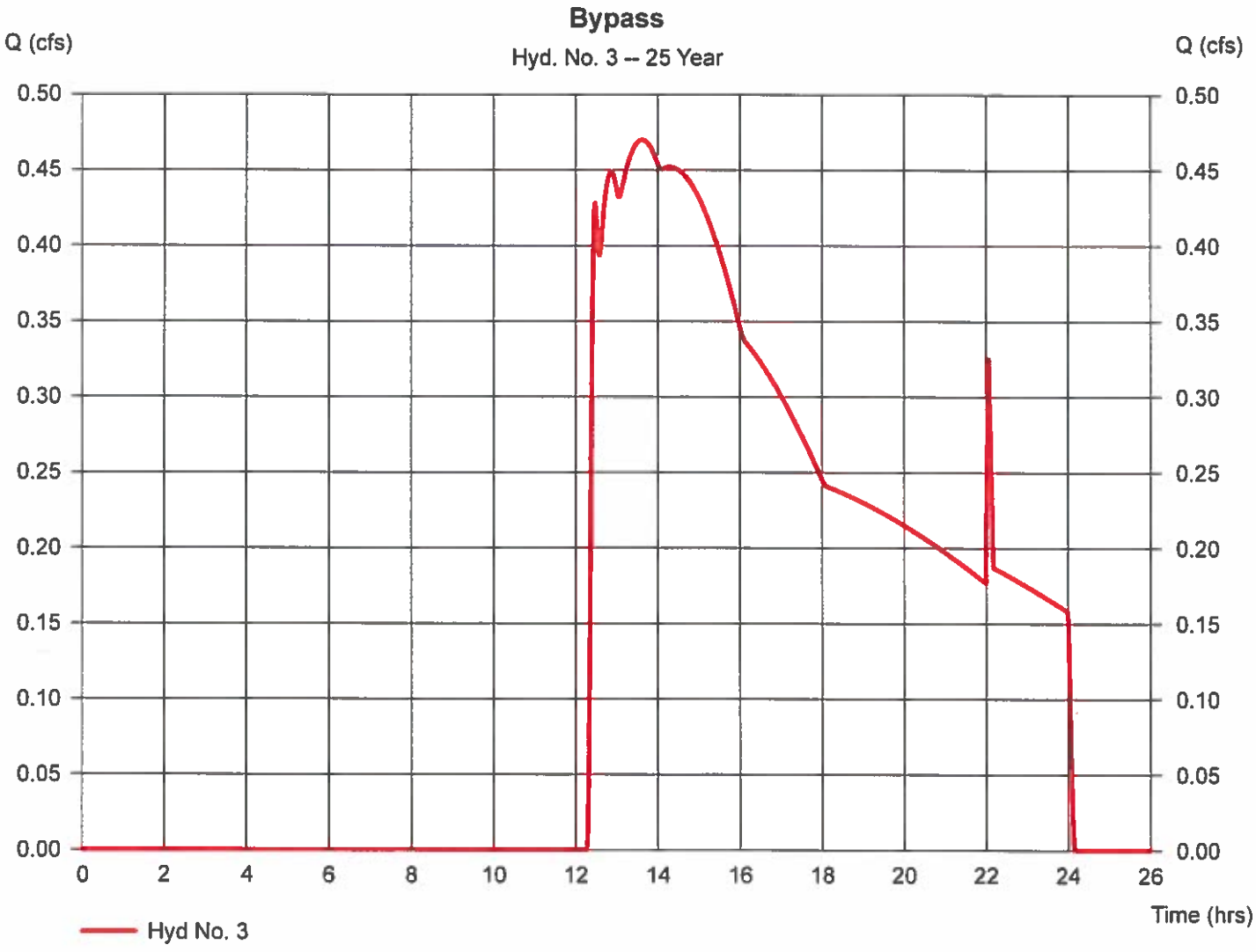
Hydrograph Report

Hyd. No. 3

Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 0.470 cfs
Storm frequency	= 25 yrs	Time to peak	= 13.65 hrs
Time interval	= 1 min	Hyd. volume	= 12,196 cuft
Drainage area	= 16.072 ac	Curve number	= 34*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.97 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.455 x 58) + (10.388 x 30) + (0.397 x 61) + (4.831 x 39)] / 16.072

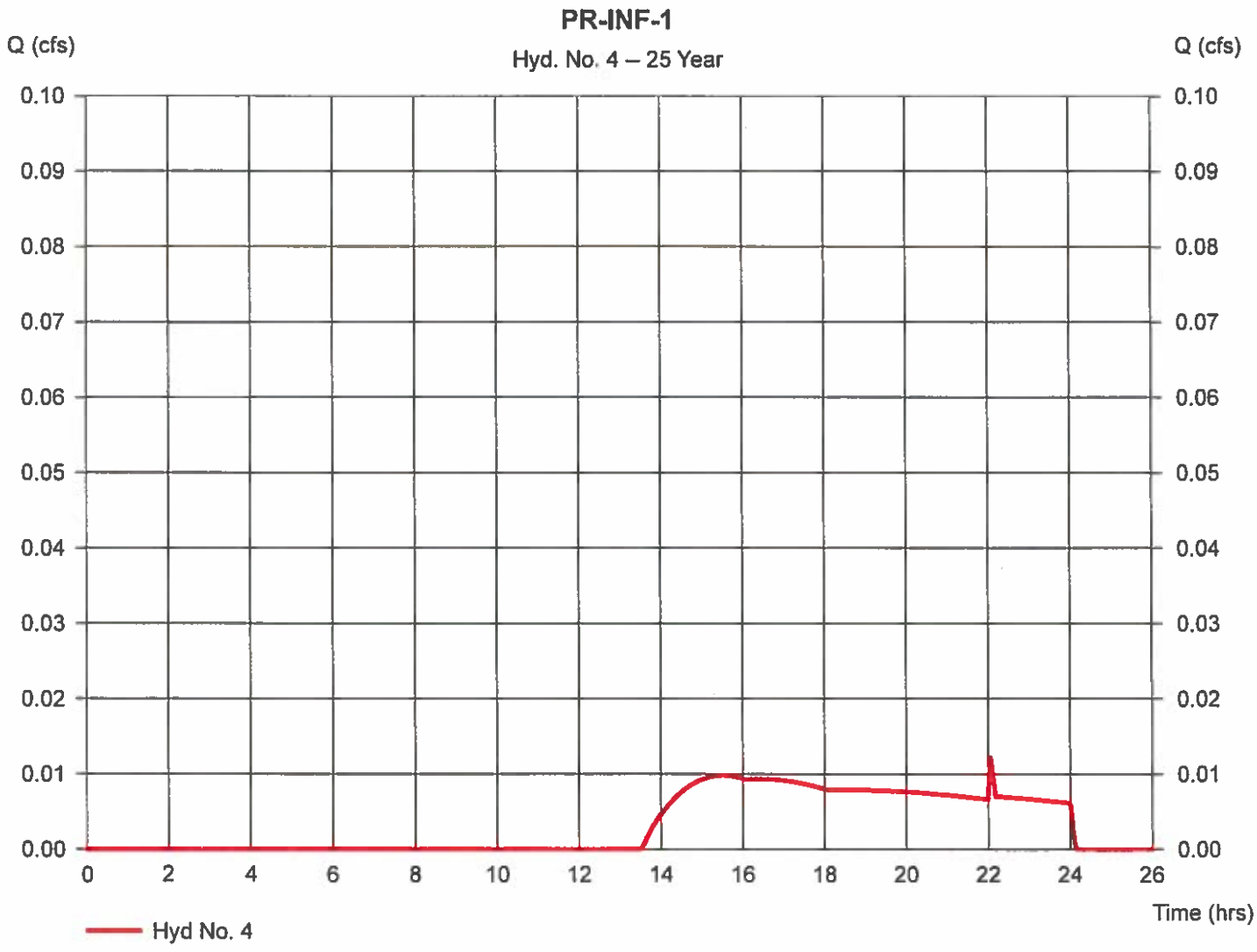


Hydrograph Report

Hyd. No. 4

PR-INF-1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.012 cfs
Storm frequency	= 25 yrs	Time to peak	= 22.07 hrs
Time interval	= 1 min	Hyd. volume	= 289 cuft
Drainage area	= 1.119 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.97 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



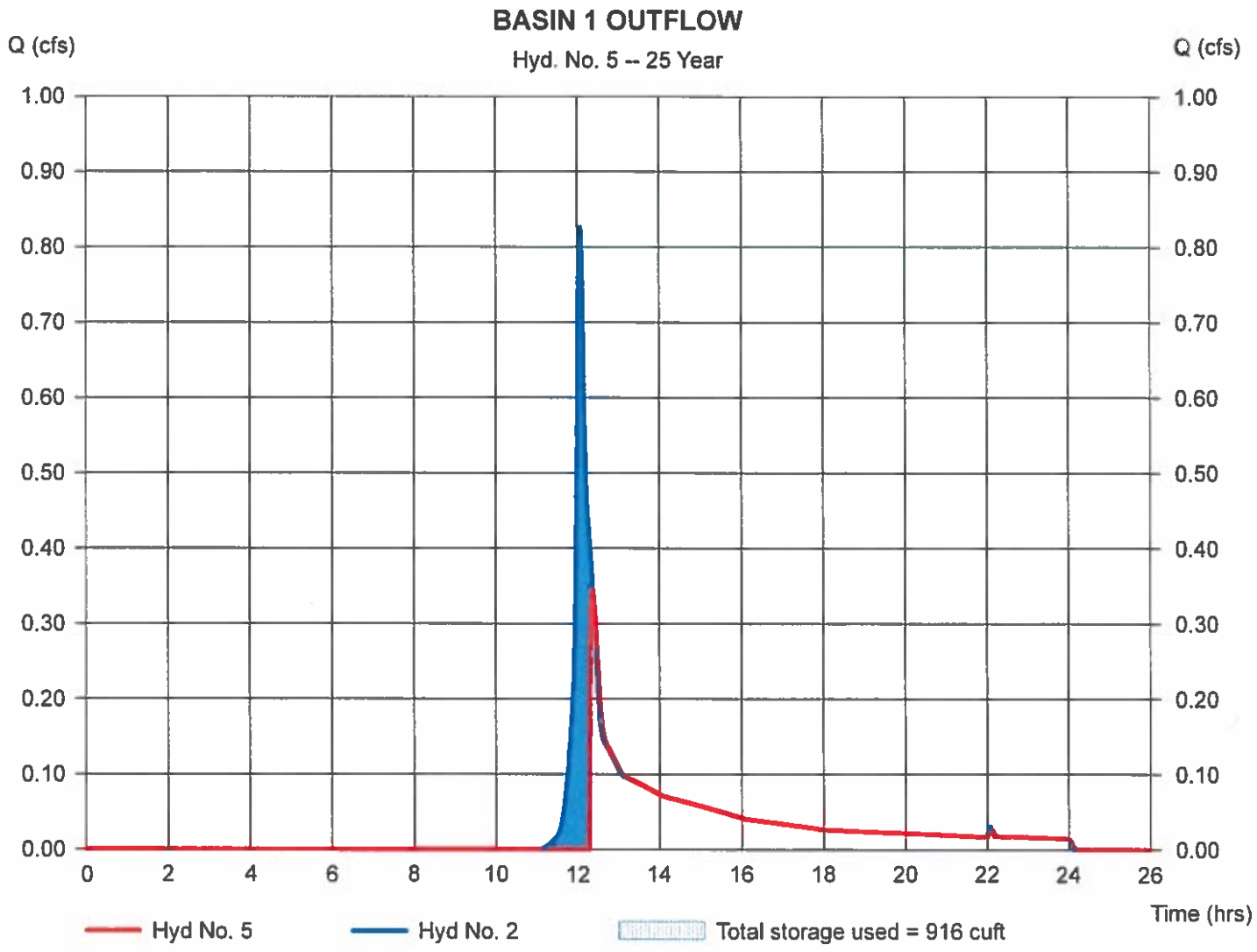
Hydrograph Report

Hyd. No. 5

BASIN 1 OUTFLOW

Hydrograph type	= Reservoir	Peak discharge	= 0.347 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.38 hrs
Time interval	= 1 min	Hyd. volume	= 1,896 cuft
Inflow hyd. No.	= 2 - BASIN 1	Max. Elevation	= 490.04 ft
Reservoir name	= BASIN 1	Max. Storage	= 916 cuft

Storage Indication method used.



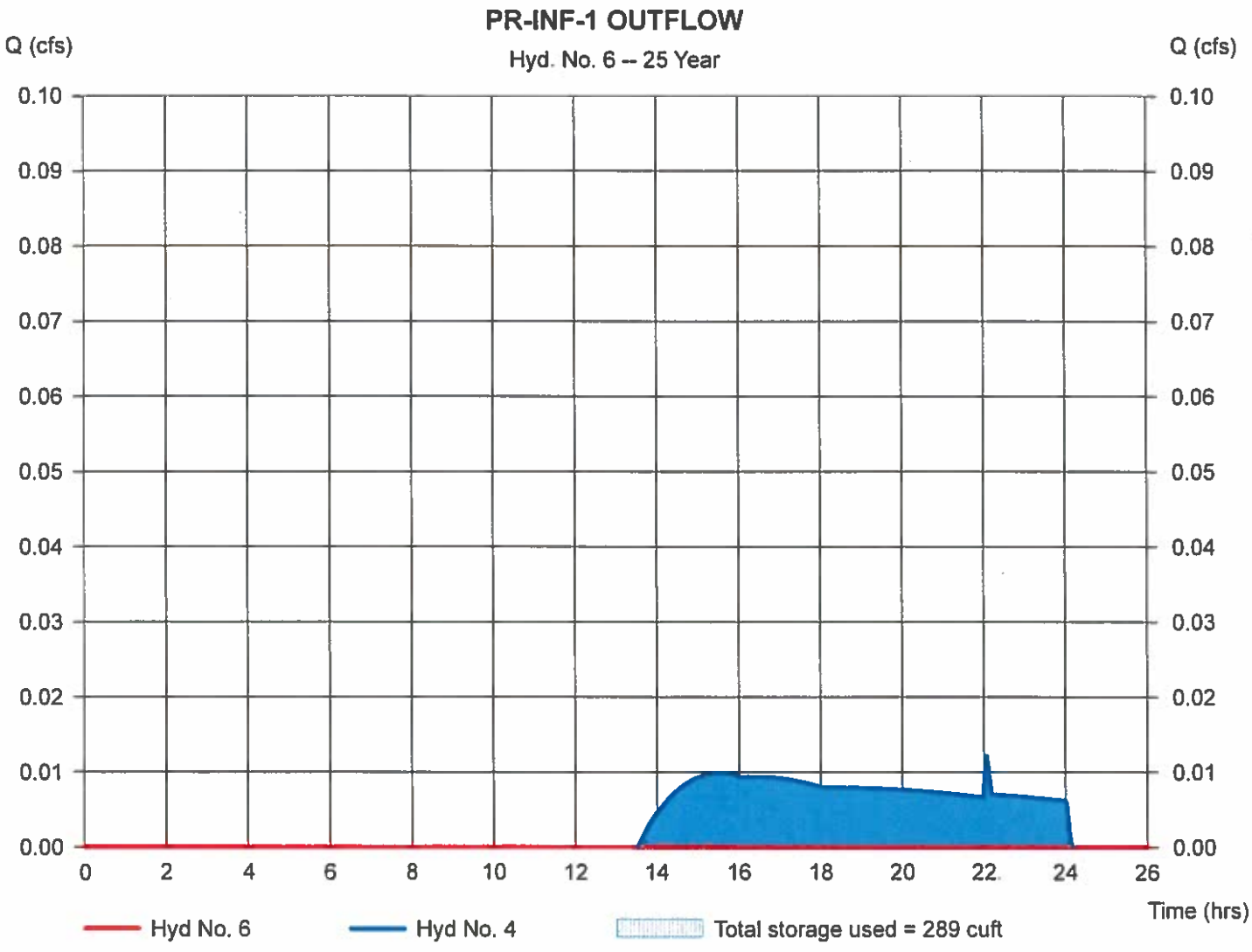
Hydrograph Report

Hyd. No. 6

PR-INF-1 OUTFLOW

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - PR-INF-1	Max. Elevation	= 100.49 ft
Reservoir name	= PR-INF-1 (234.50)	Max. Storage	= 289 cuft

Storage Indication method used.

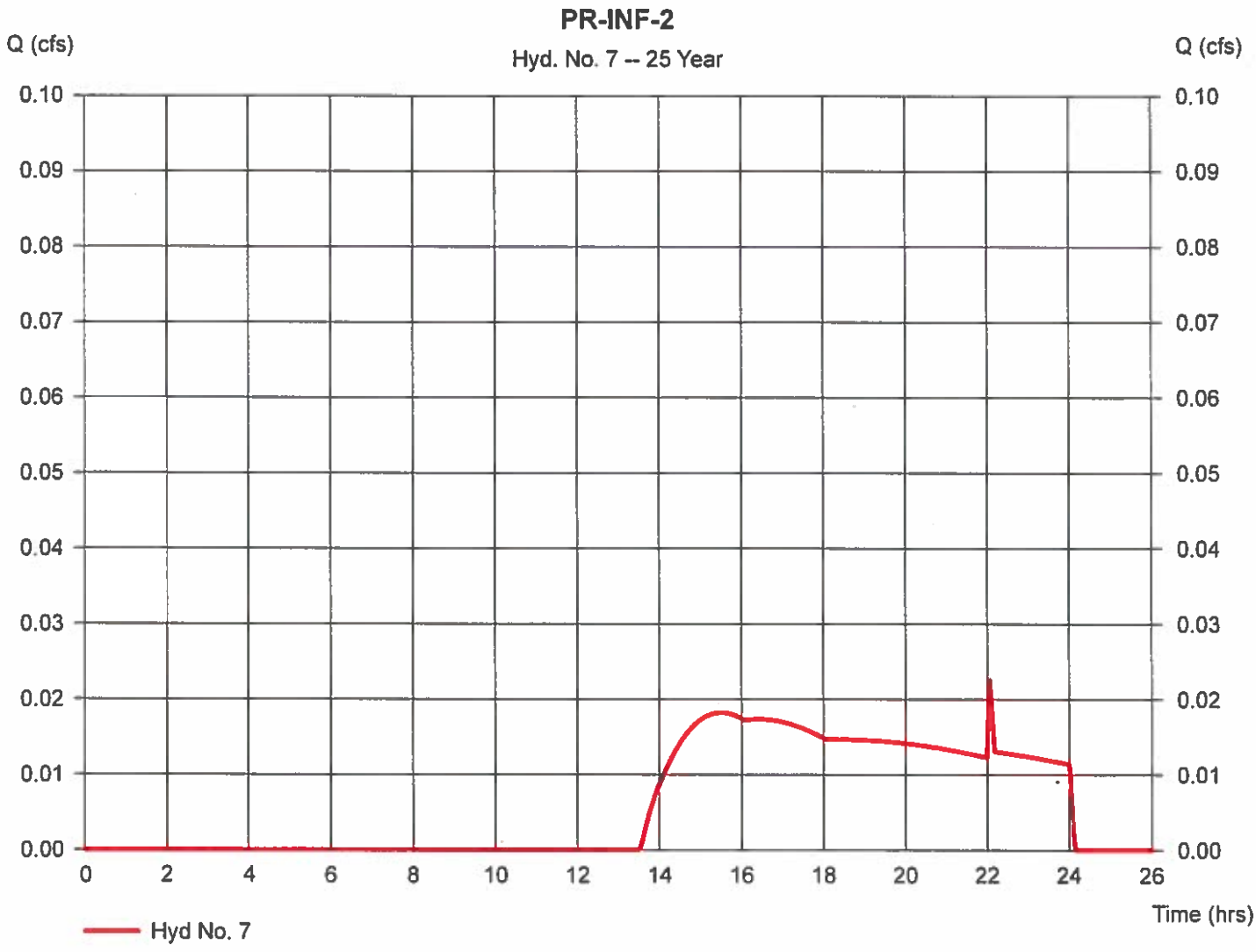


Hydrograph Report

Hyd. No. 7

PR-INF-2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.023 cfs
Storm frequency	= 25 yrs	Time to peak	= 22.07 hrs
Time interval	= 1 min	Hyd. volume	= 537 cuft
Drainage area	= 2.082 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.97 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



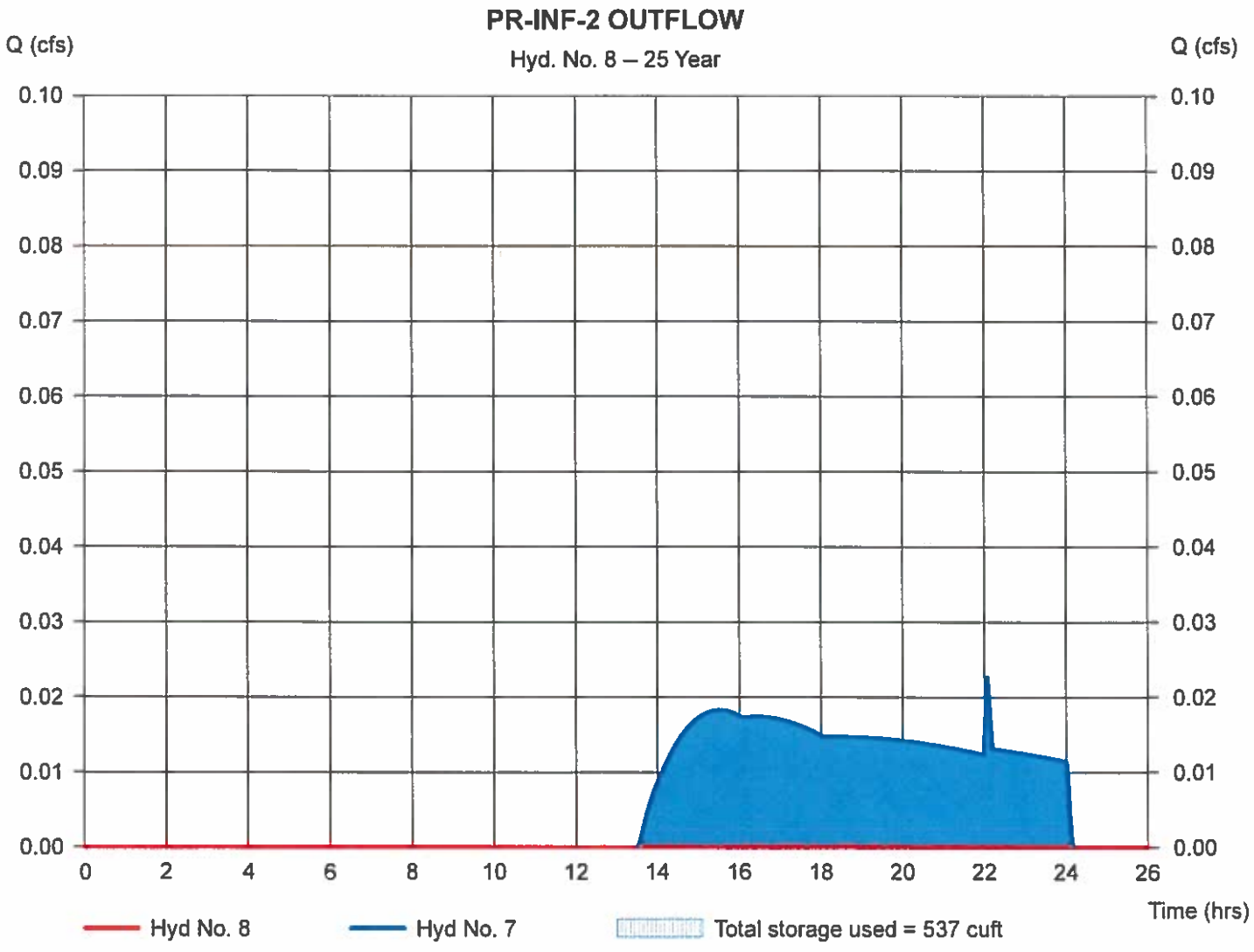
Hydrograph Report

Hyd. No. 8

PR-INF-2 OUTFLOW

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 7 - PR-INF-2	Max. Elevation	= 100.59 ft
Reservoir name	= PR-INF-2 (360.50)	Max. Storage	= 537 cuft

Storage Indication method used.

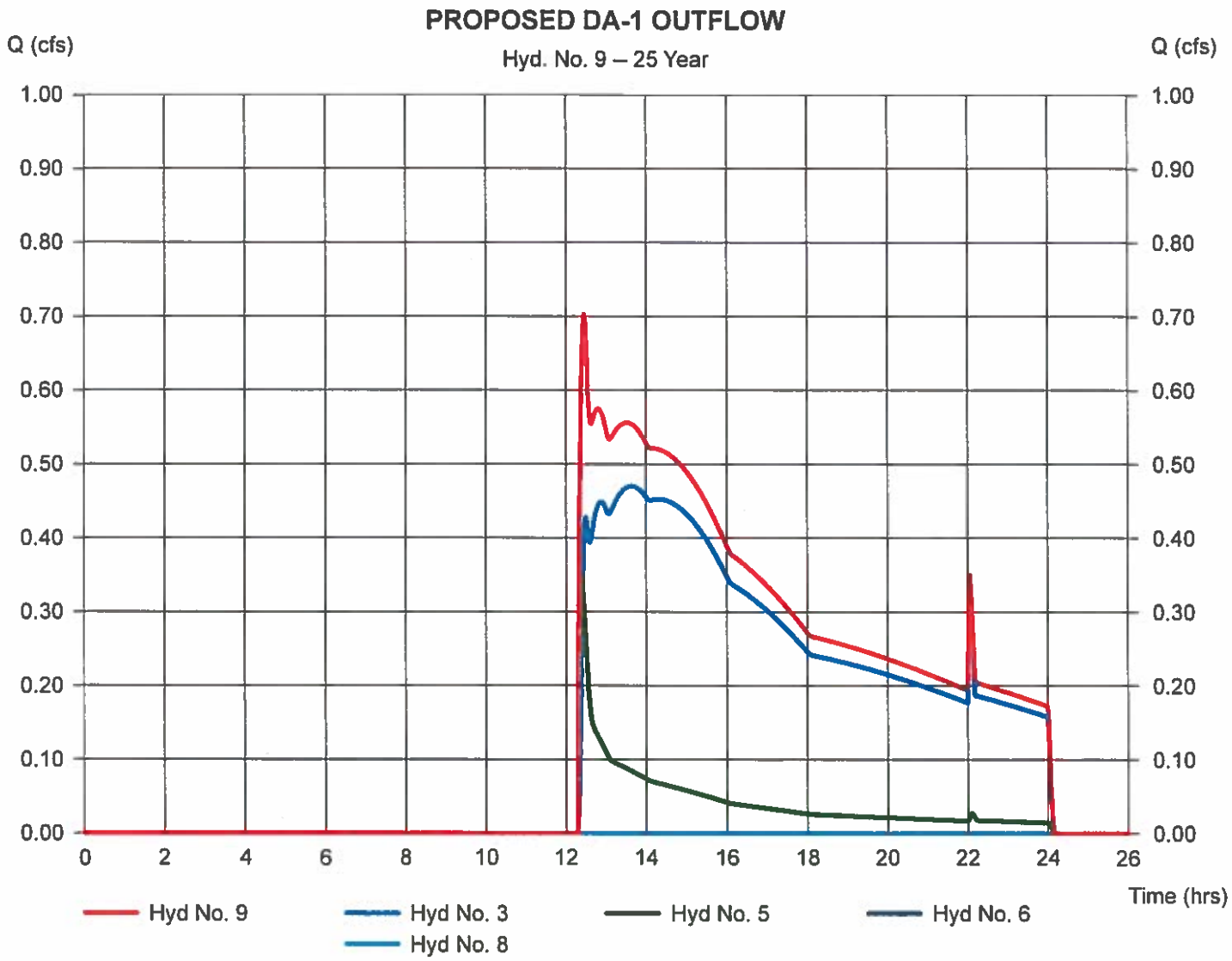


Hydrograph Report

Hyd. No. 9

PROPOSED DA-1 OUTFLOW

Hydrograph type	= Combine	Peak discharge	= 0.702 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.47 hrs
Time interval	= 1 min	Hyd. volume	= 14,092 cuft
Inflow hyds.	= 3, 5, 6, 8	Contrib. drain. area	= 16.072 ac



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.25

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	7.918	1	737	57,589	------	------	------	EX-DA-1
2	SCS Runoff	1.479	1	725	4,693	------	------	------	BASIN 1
3	SCS Runoff	4.502	1	738	38,110	------	------	------	Bypass
4	SCS Runoff	0.098	1	746	1,480	------	------	------	PR-INF-1
5	Reservoir	1.332	1	727	3,815	2	490.14	998	BASIN 1 OUTFLOW
6	Reservoir	0.000	1	n/a	0	4	101.78	1,480	PR-INF-1 OUTFLOW
7	SCS Runoff	0.182	1	746	2,754	------	------	------	PR-INF-2
8	Reservoir	0.000	1	n/a	0	7	102.06	2,754	PR-INF-2 OUTFLOW
9	Combine	5.224	1	737	41,925	3, 5, 6, 8	------	------	PROPOSED DA-1 OUTFLOW

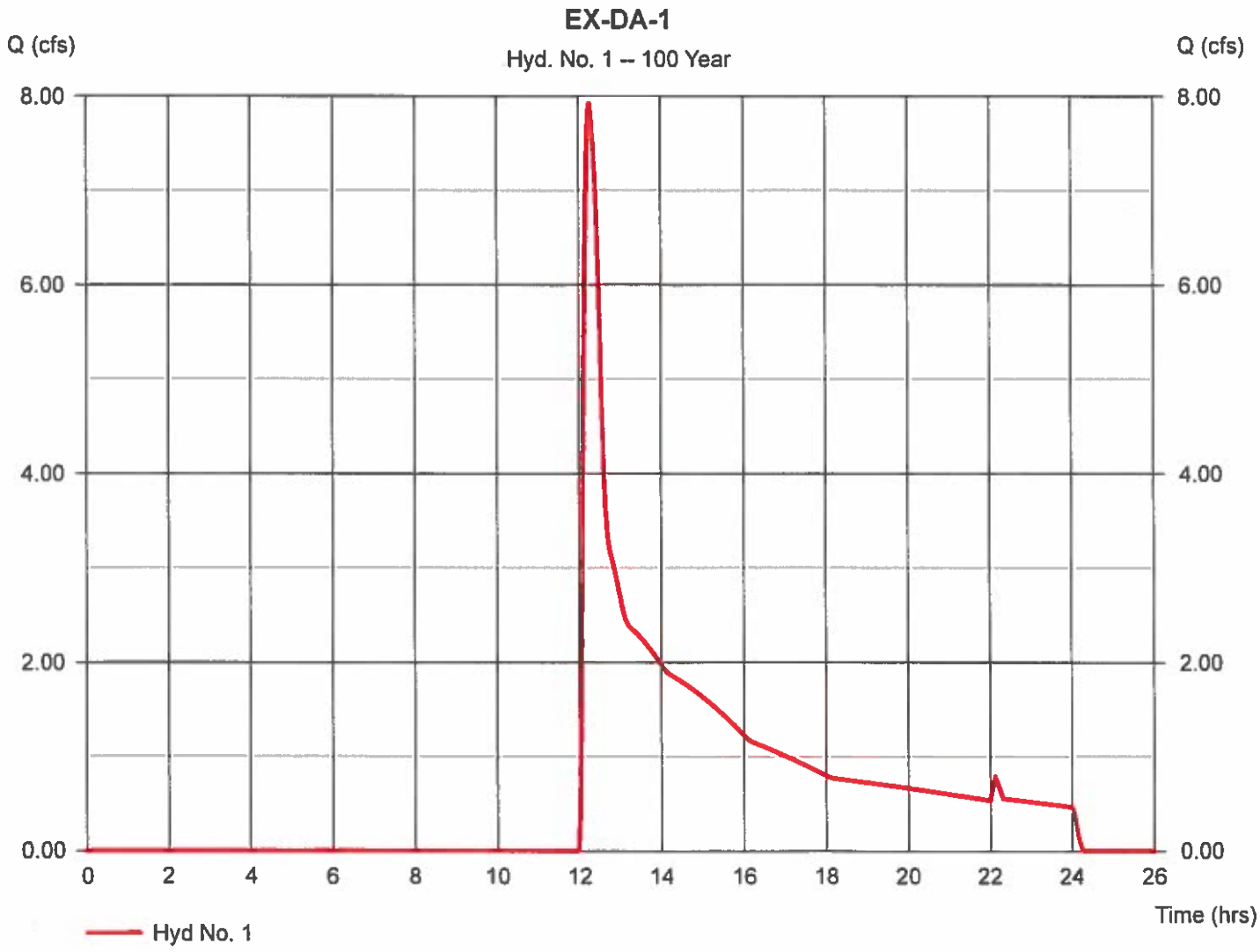
Hydrograph Report

Hyd. No. 1

EX-DA-1

Hydrograph type	= SCS Runoff	Peak discharge	= 7.918 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.28 hrs
Time interval	= 1 min	Hyd. volume	= 57,589 cuft
Drainage area	= 19.721 ac	Curve number	= 36*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.90 min
Total precip.	= 7.72 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.025 x 98) + (0.854 x 55) + (14.128 x 30) + (0.274 x 72) + (4.440 x 49)] / 19.721



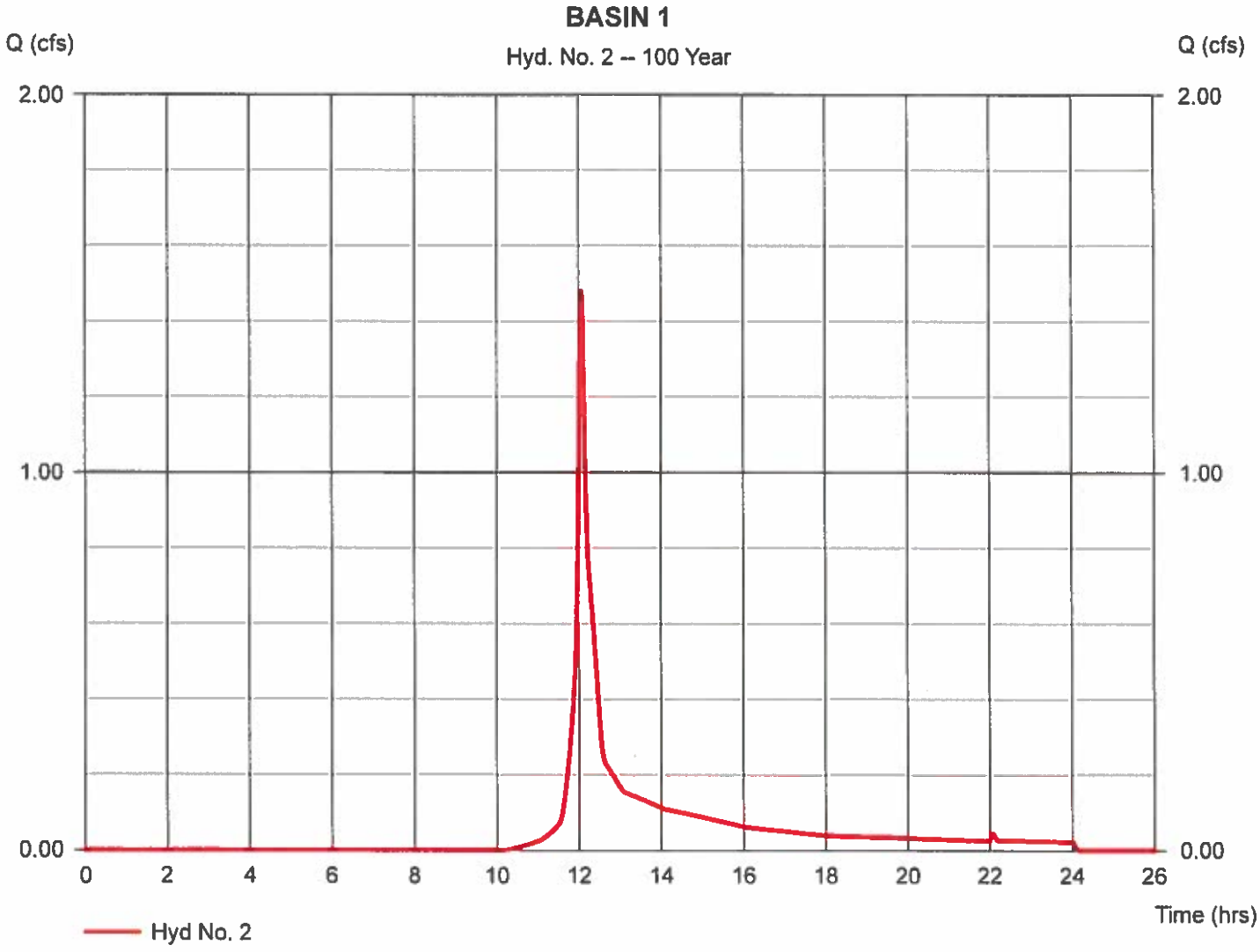
Hydrograph Report

Hyd. No. 2

BASIN 1

Hydrograph type	= SCS Runoff	Peak discharge	= 1.479 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 4,693 cuft
Drainage area	= 0.447 ac	Curve number	= 57*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.72 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.159 x 76) + (0.073 x 98) + (0.216 x 30)] / 0.447



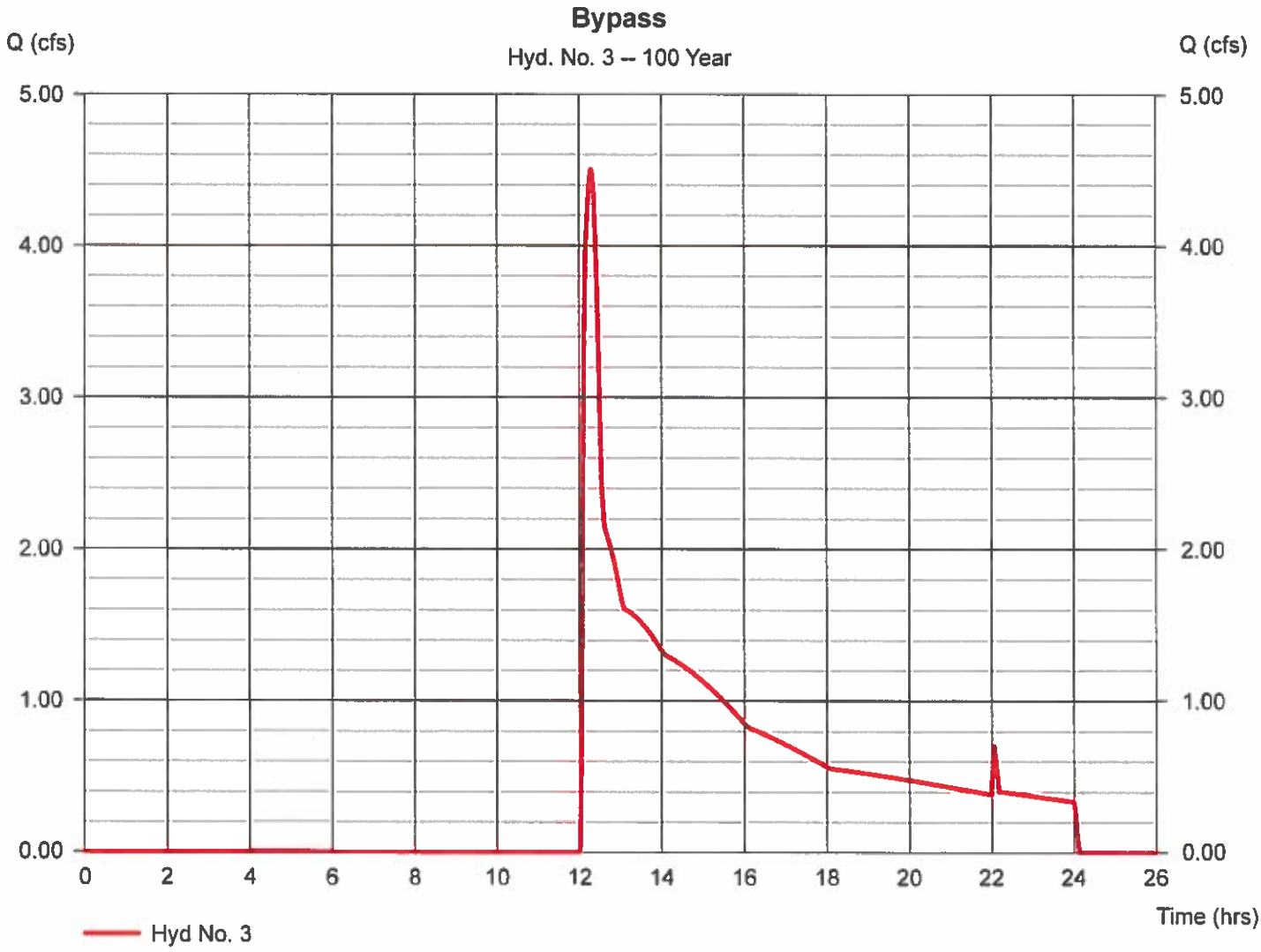
Hydrograph Report

Hyd. No. 3

Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 4.502 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.30 hrs
Time interval	= 1 min	Hyd. volume	= 38,110 cuft
Drainage area	= 16.072 ac	Curve number	= 34*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.72 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.455 x 58) + (10.388 x 30) + (0.397 x 61) + (4.831 x 39)] / 16.072

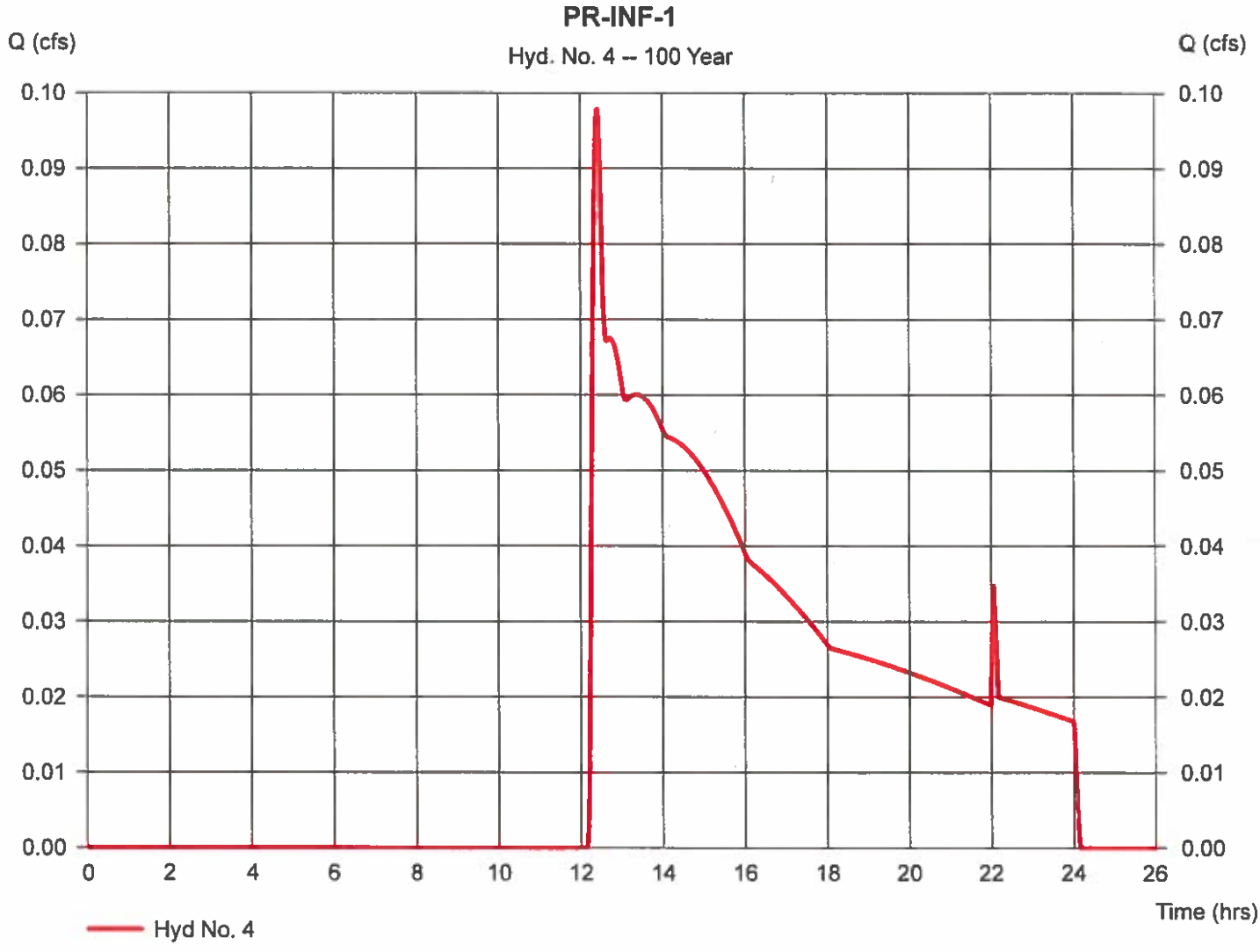


Hydrograph Report

Hyd. No. 4

PR-INF-1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.098 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.43 hrs
Time interval	= 1 min	Hyd. volume	= 1,480 cuft
Drainage area	= 1.119 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.72 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



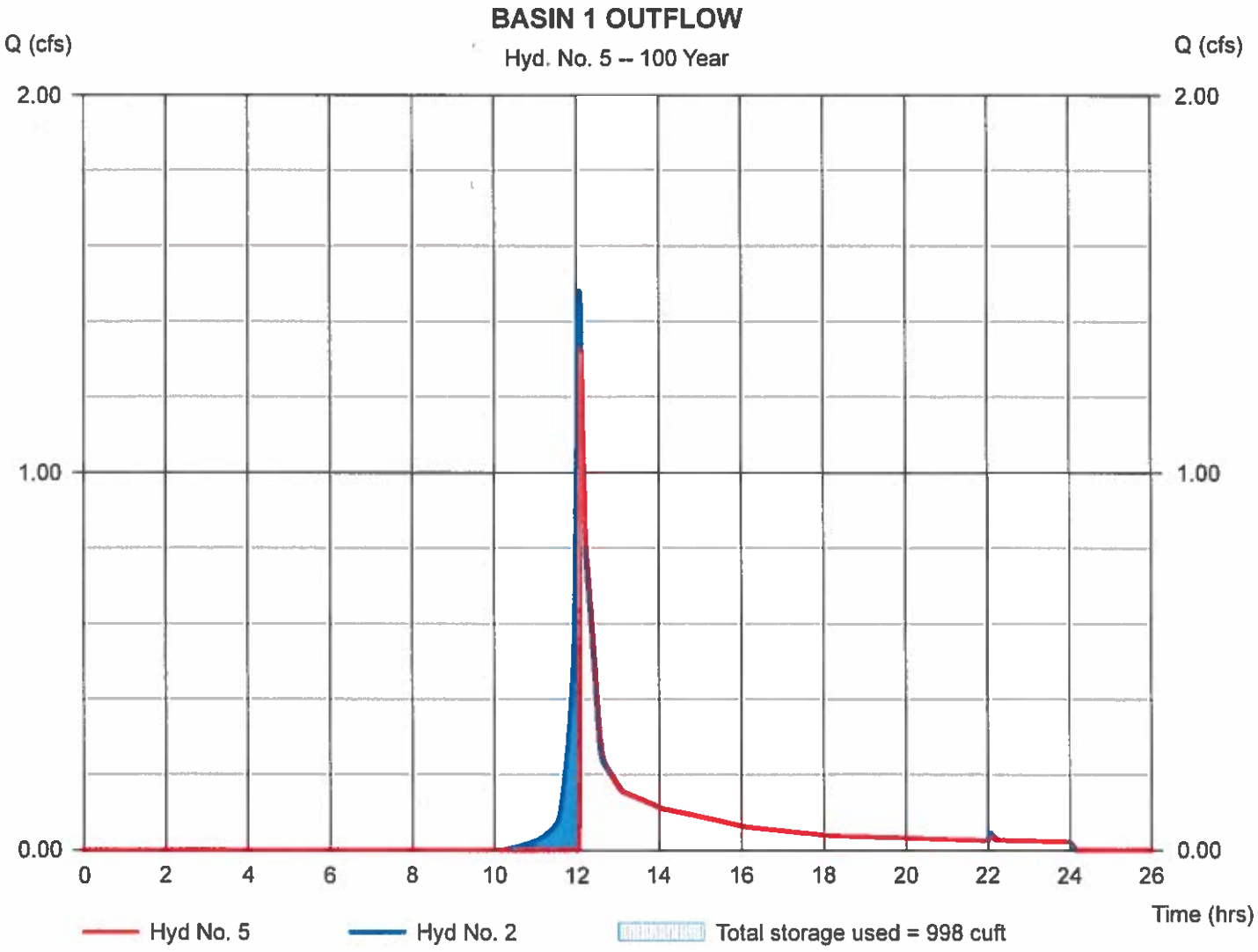
Hydrograph Report

Hyd. No. 5

BASIN 1 OUTFLOW

Hydrograph type	= Reservoir	Peak discharge	= 1.332 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.12 hrs
Time interval	= 1 min	Hyd. volume	= 3,815 cuft
Inflow hyd. No.	= 2 - BASIN 1	Max. Elevation	= 490.14 ft
Reservoir name	= BASIN 1	Max. Storage	= 998 cuft

Storage Indication method used.



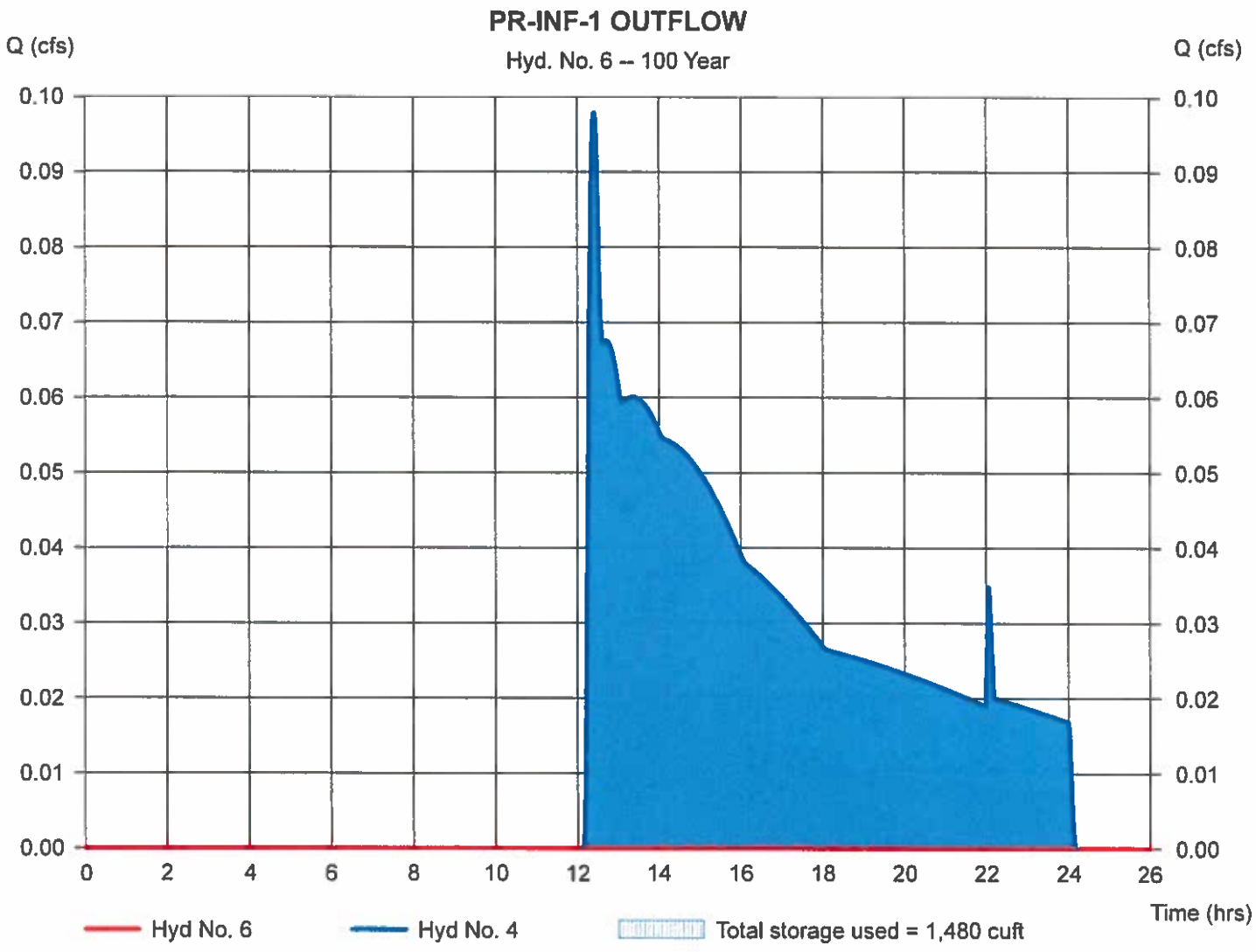
Hydrograph Report

Hyd. No. 6

PR-INF-1 OUTFLOW

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - PR-INF-1	Max. Elevation	= 101.78 ft
Reservoir name	= PR-INF-1 (234.50)	Max. Storage	= 1,480 cuft

Storage Indication method used.

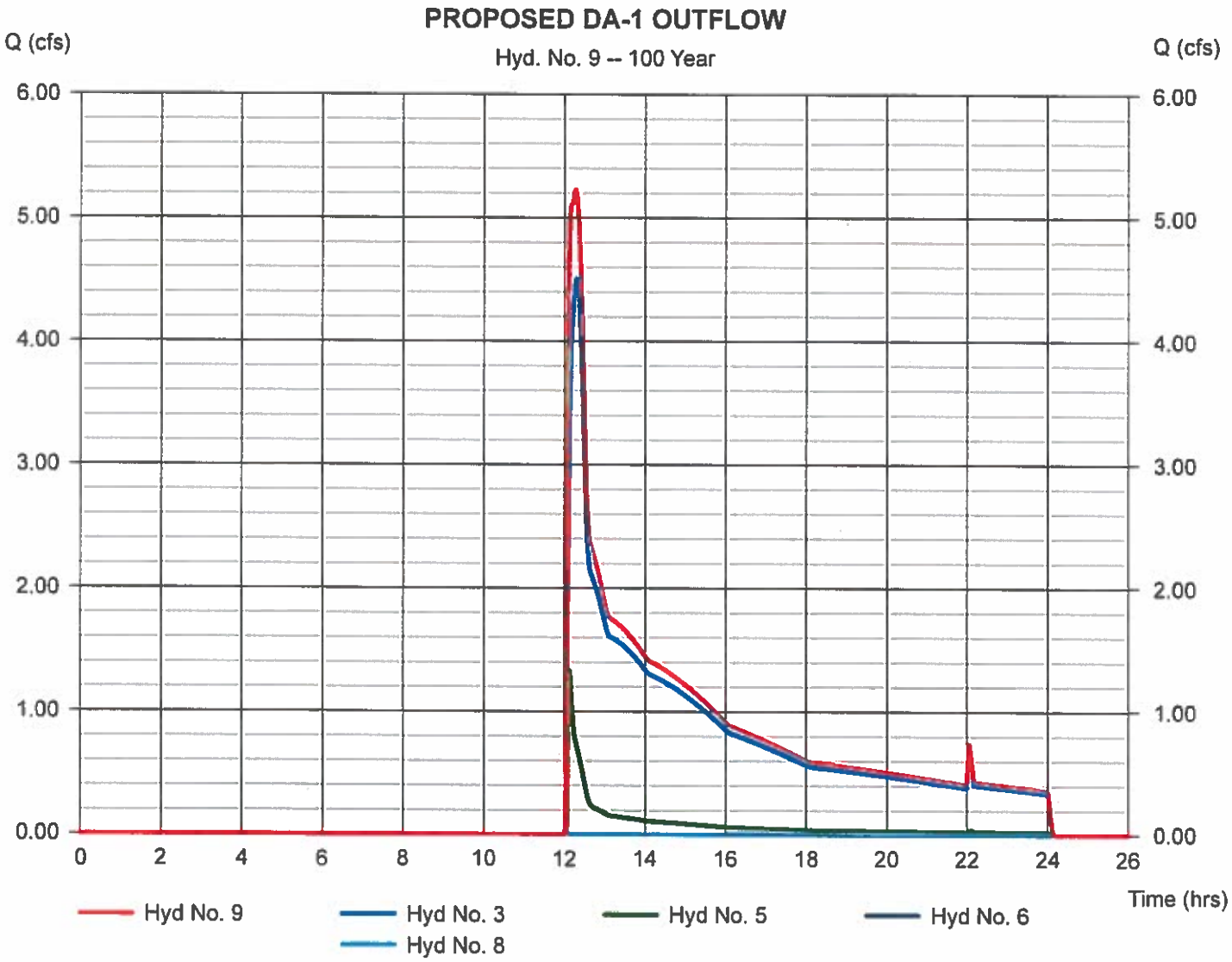


Hydrograph Report

Hyd. No. 9

PROPOSED DA-1 OUTFLOW

Hydrograph type	= Combine	Peak discharge	= 5.224 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.28 hrs
Time interval	= 1 min	Hyd. volume	= 41,925 cuft
Inflow hyds.	= 3, 5, 6, 8	Contrib. drain. area	= 16.072 ac



The following information is based on a CULTEC Recharger 330XL Stormwater System with these parameters:

40% stone void (%)
1 number of rows
1485.17 sq. ft. of area *(including stone borders)*
232.5 lineal feet of chambers

The system includes the following components:

1 pcs of Recharger 330XLSHD Starter Units
1 pcs of Recharger 330XLEHD End Units
31 pcs of Recharger 330XLIHD Intermediate Units

INCREMENTAL STORAGE FOR SYSTEM WITH 12" STONE BASE

	ELEVATION TOP OF SYSTEM Inches	inches	feet	Chamber Volume per Inch	Stone Volume per Inch	Cummulative Storage per Inch	Total Cummulative Storage per Inch
STONE ABOVE	48.5	6	104.0042	0.00	49.51	49.51	3441.55
	47.5	5	103.9208	0.00	49.51	49.51	3392.04
	46.5	4	103.8375	0.00	49.51	49.51	3342.54
	45.5	3	103.7542	0.00	49.51	49.51	3293.03
	44.5	2	103.6708	0.00	49.51	49.51	3243.53
	43.5	1	103.5875	0.00	49.51	49.51	3194.02
CHAMBER HEIGHT	42.5	30.5	103.5042	0.00	24.75	24.75	3144.52
	42	30	103.5	4.42	47.74	52.16	3119.76
	41	29	103.4167	11.86	44.76	56.62	3067.61
	40	28	103.3333	19.53	41.69	61.22	3010.99
	39	27	103.25	28.83	37.97	66.80	2949.76
	38	26	103.1667	34.88	35.56	70.43	2882.96
	37	25	103.0833	40.22	33.42	73.64	2812.53
	36	24	103	44.41	31.74	76.15	2738.89
	35	23	102.9167	48.13	30.25	78.38	2662.74
	34	22	102.8333	51.38	28.95	80.34	2584.36
	33	21	102.75	54.17	27.84	82.01	2504.02
	32	20	102.6667	56.73	26.81	83.54	2422.01
	31	19	102.5833	59.06	25.88	84.94	2338.47
	30	18	102.5	61.38	24.95	86.33	2253.53
	29	17	102.4167	63.01	24.30	87.31	2167.20
	28	16	102.3333	65.80	23.19	88.98	2079.89
	27	15	102.25	68.36	22.16	90.52	1990.91
	26	14	102.1667	68.82	21.98	90.80	1900.39
	25	13	102.0833	69.52	21.70	91.22	1809.59
	24	12	102	69.98	21.51	91.50	1718.37
	23	11	101.9167	70.45	21.33	91.77	1626.88
	22	10	101.8333	70.68	21.23	91.91	1535.10
	21	9	101.75	71.15	21.05	92.19	1443.19
	20	8	101.6667	72.77	20.40	93.17	1351.00
	19	7	101.5833	74.63	19.65	94.29	1257.83
	18	6	101.5	74.87	19.56	94.42	1163.54
	17	5	101.4167	75.10	19.47	94.56	1069.12
	16	4	101.3333	75.33	19.37	94.70	974.55
	15	3	101.25	75.56	19.28	94.84	879.85
	14	2	101.1667	76.03	19.09	95.12	785.01
	13	1	101.0833	77.19	18.63	95.82	689.89
STONE BASE	12	12	101	0.00	49.51	49.51	594.07
	11	11	100.9167	0.00	49.51	49.51	544.56
	10	10	100.8333	0.00	49.51	49.51	495.06
	9	9	100.75	0.00	49.51	49.51	445.55
	8	8	100.6667	0.00	49.51	49.51	396.04
	7	7	100.5833	0.00	49.51	49.51	346.54
	6	6	100.5	0.00	49.51	49.51	297.03
	5	5	100.4167	0.00	49.51	49.51	247.53
	4	4	100.3333	0.00	49.51	49.51	198.02
	3	3	100.25	0.00	49.51	49.51	148.52
	2	2	100.1667	0.00	49.51	49.51	99.01
	1	1	100.0833	0.00	49.51	49.51	49.51
	0	0	100	0.00	0.00	0.00	0.00
BOTTOM OF SYSTEM				1734.22 cu. ft.	1707.33 cu. ft.	3441.55 cu. ft.	3441.55 cu. ft.

CULTEC, Inc.
P.O. Box 280
Brookfield, CT 06804

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www.cultec.com

The following information is based on a CULTEC Recharger 330XL Stormwater System with these parameters.

40% stone void (%)
1 number of rows
2283.17 sq. ft. of area *(including stone borders)*
358.5 lineal feet of chambers

The system includes the following components:
1 pcs of Recharger 330XLSHD Starter Units
1 pcs of Recharger 330XLEHD End Units
49 pcs of Recharger 330XLIHD Intermediate Units

INCREMENTAL STORAGE FOR SYSTEM WITH 12" STONE BASE

	ELEVATION TOP OF SYSTEM inches	inches	feet	Chamber Volume per Inch	Stone Volume per Inch	Cummulative Storage per Inch	Total Cummulative Storage per Inch
STONE ABOVE	48.5	6	104.0042	0.00	76.11	76.11	5295.55
	47.5	5	103.9208	0.00	76.11	76.11	5219.44
	46.5	4	103.8375	0.00	76.11	76.11	5143.34
	45.5	3	103.7542	0.00	76.11	76.11	5067.23
	44.5	2	103.6708	0.00	76.11	76.11	4991.13
	43.5	1	103.5875	0.00	76.11	76.11	4915.02
CHAMBER HEIGHT	42.5	30.5	103.5042	0.00	38.05	38.05	4838.92
	42	30	103.5	6.81	73.38	80.19	4800.86
	41	29	103.4167	18.28	68.79	87.08	4720.67
	40	28	103.3333	30.11	64.06	94.17	4633.60
	39	27	103.25	44.45	58.32	102.78	4539.42
	38	26	103.1667	53.78	54.60	108.37	4436.64
	37	25	103.0833	62.02	51.30	113.32	4328.27
	36	24	103	68.47	48.72	117.19	4214.96
	35	23	102.9167	74.21	46.42	120.63	4097.77
	34	22	102.8333	79.23	44.41	123.64	3977.13
	33	21	102.75	83.53	42.69	126.22	3853.49
	32	20	102.6667	87.47	41.12	128.59	3727.27
	31	19	102.5833	91.06	39.68	130.74	3598.68
	30	18	102.5	94.84	38.25	132.89	3467.94
	29	17	102.4167	97.15	37.24	134.40	3335.05
	28	16	102.3333	101.48	35.52	136.98	3200.65
	27	15	102.25	105.40	33.95	139.34	3063.67
	26	14	102.1667	106.12	33.66	139.78	2924.32
	25	13	102.0833	107.19	33.23	140.42	2784.55
	24	12	102	107.91	32.94	140.85	2644.13
	23	11	101.9167	108.63	32.66	141.28	2503.28
	22	10	101.8333	108.98	32.51	141.50	2362.00
	21	9	101.75	109.70	32.23	141.93	2220.50
	20	8	101.6667	112.21	31.22	143.43	2078.57
	19	7	101.5833	115.08	30.07	145.15	1935.14
	18	6	101.5	115.44	29.93	145.37	1789.99
	17	5	101.4167	115.80	29.79	145.58	1644.62
	16	4	101.3333	116.15	29.64	145.80	1499.04
	15	3	101.25	116.51	29.50	146.01	1353.24
	14	2	101.1667	117.23	29.21	146.44	1207.23
	13	1	101.0833	119.02	28.50	147.52	1060.79
STONE BASE	12	12	101	0.00	76.11	76.11	913.27
	11	11	100.9167	0.00	76.11	76.11	837.16
	10	10	100.8333	0.00	76.11	76.11	761.06
	9	9	100.75	0.00	76.11	76.11	684.95
	8	8	100.6667	0.00	76.11	76.11	608.84
	7	7	100.5833	0.00	76.11	76.11	532.74
	6	6	100.5	0.00	76.11	76.11	456.63
	5	5	100.4167	0.00	76.11	76.11	380.53
	4	4	100.3333	0.00	76.11	76.11	304.42
	3	3	100.25	0.00	76.11	76.11	228.32
	2	2	100.1667	0.00	76.11	76.11	152.21
	1	1	100.0833	0.00	76.11	76.11	76.11
	0	0	100	0.00	0.00	0.00	0.00
BOTTOM OF SYSTEM				2674.05 cu. ft.	2621.50 cu. ft.	5295.55 cu. ft.	5295.55 cu. ft.

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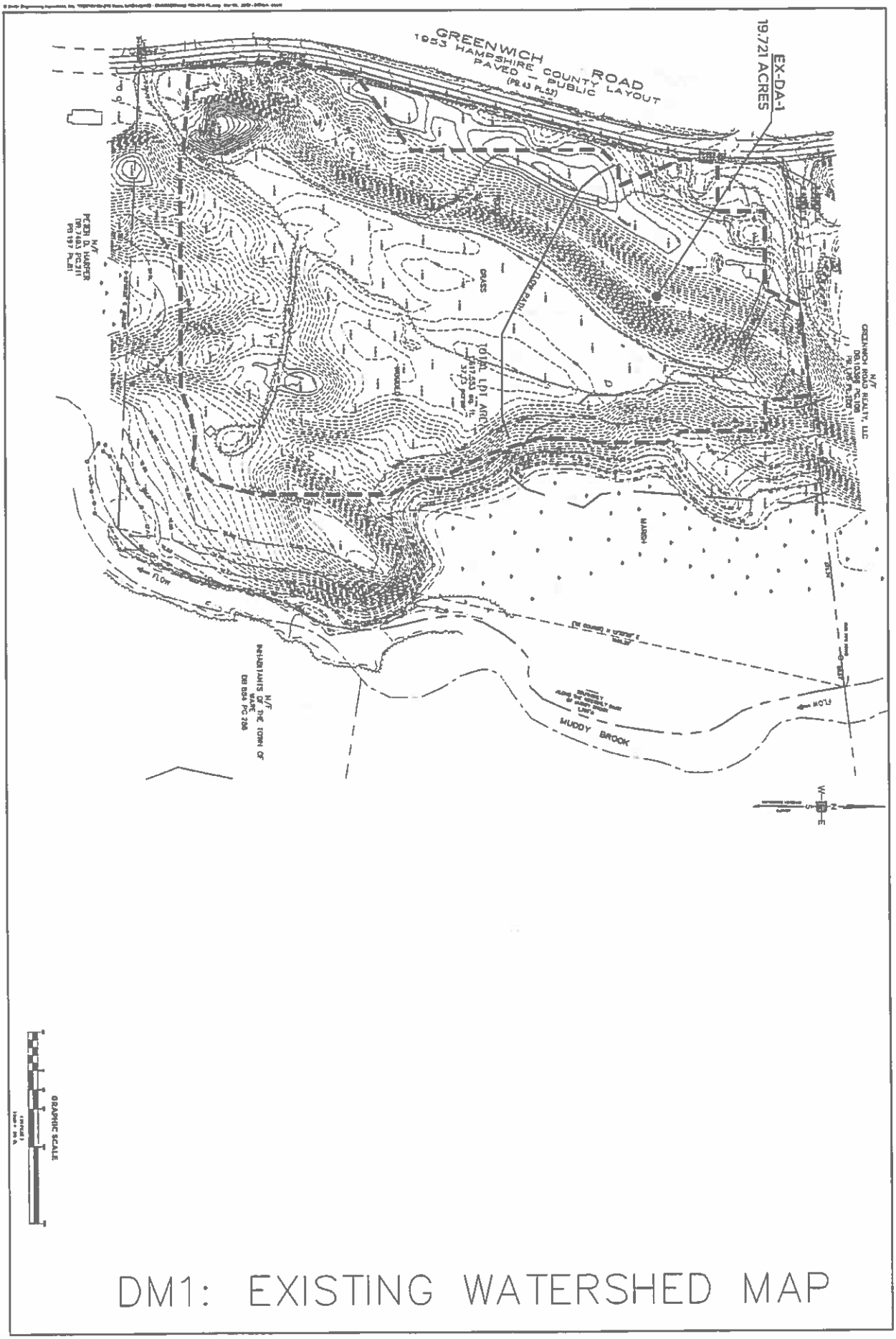
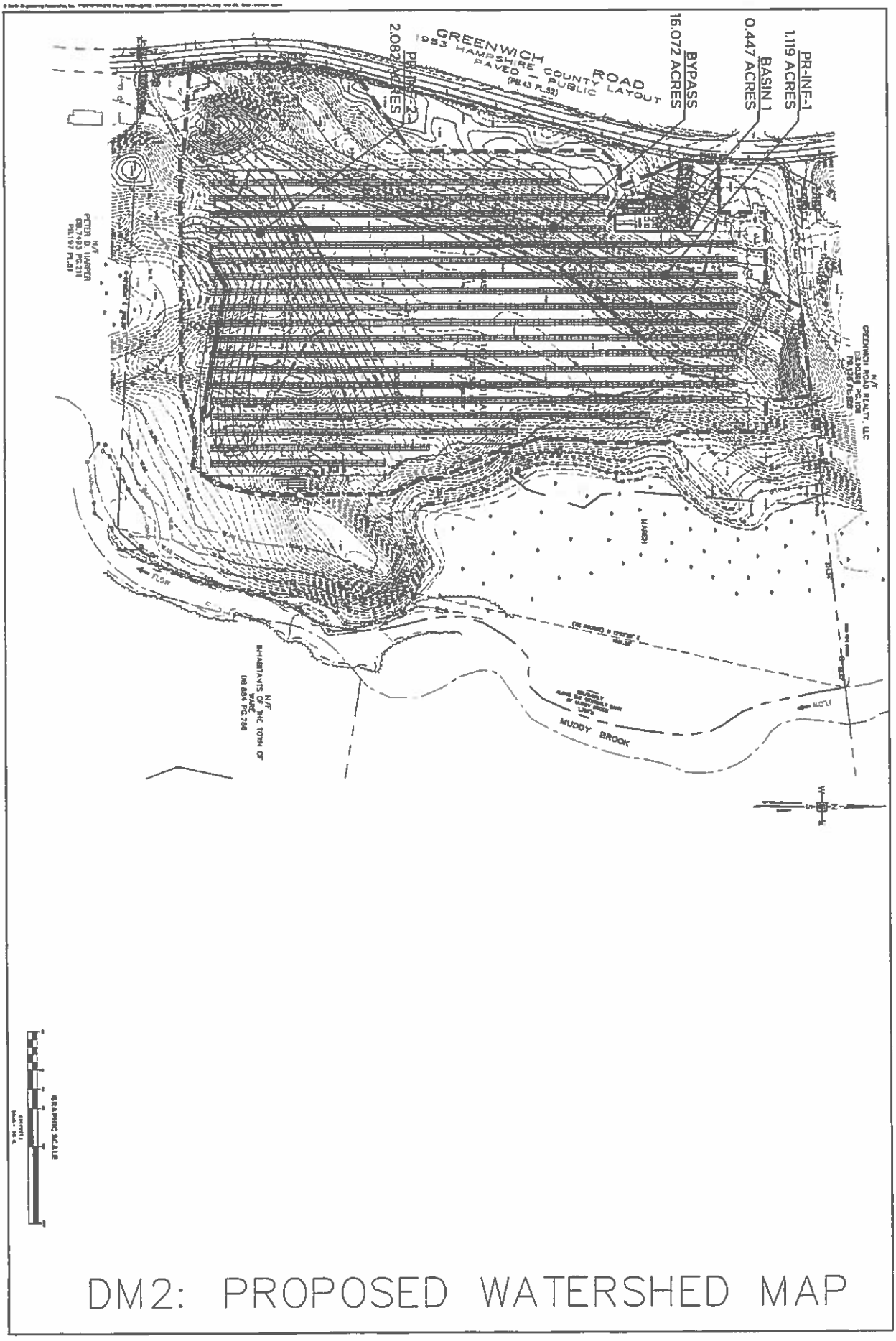


DM1: EXISTING WATERSHED MAP



DM2: PROPOSED WATERSHED MAP