BWC Wades Stream, LLC LSGMSPI

To: Worthington Town Planning Board

From: WSP USA Inc.

Cc: BWC Wades Stream, LLC

Ref: US-EI-3652230438

Date: 2025-09-17

Subject: Site Plan Review Application for BWC Wades Stream, LLC LSGMSPI

Introduction

On behalf of BWC Wades Stream, LLC, (Applicant), WSP USA Inc. is pleased to submit this Site Plan Review Application to the Worthington Town Planning Board for a proposed Large-Scale Ground Mounted Solar Photovoltaic Installation (LSGMSPI) (the Project) located at 190 Ridge Road, Worthington, Massachusetts in Hampshire County (the Site).

Contact Information for Applicant:

- Name: BWC Wades Stream, LLC
- Address: 116 Huntington Avenue Suite 601, Boston MA, 02116
- Telephone: (518) 530-0803
- Point of Contact: Aaron Simms

The required information for Site Plan Review is included in this letter and its appendices including the Site Plan Review Application Form in Appendix A. The Site Plan Review fees will accompany this application from the Applicant under separate cover.

Based on preliminary discussions with Worthington Town Planning Board representatives, it is anticipated that the Project will be allowable in accordance with the Town of Worthington Protective Zoning By-laws (the By-laws).

Existing Use of the Site

The Project Limit of Work covers approximately 29.95 acres of a 71.5-acre parcel owned by Timothy J. Sena and Catherine Rude-Sena (the Owners), PIN: 407-0-28. The Applicant will be leasing the Site from the Owners. The executed Notice of Lease and Easement Agreement can be found in Appendix A. The Site is located within the Residential Agriculture Zoning District (see Appendix C for the Zoning Map). All adjacent parcels are also zoned for Residential Agriculture. The Project location consists primarily of

open agricultural land, predominantly grass-covered fields. The area to the north and east is bordered by a tree line and local roads. The surrounding area to the west, and south, is forested. The forested area to the west, approximately 500 feet from the proposed northern array, consists of permanently protected conservation land. Most of these lands are owned by the Commonwealth of Massachusetts, while some are owned by towns, nonprofit organizations, or are protected under Agricultural Preservation Restriction (APR) or Conservation Restriction (CR) programs.

Proposed Use of the Site

The Project includes the installation of approximately 7,462 ground-mounted PV modules and will generate approximately 3.95-megawatts (MW) direct current (DC) and 2.00 MW alternating current (AC). The Project is considered a Large-Scale Ground Mounted Solar Photovoltaic Installation (LSGMSPI) per the Town of Worthington Protective Zoning By-laws (the By-laws). The maximum height of the array panels will be approximately 10 feet above the existing ground surface. The array will be surrounded by an 8-foot-high woven-wire agricultural fence equipped with a self-locking gate for security and electrical code purposes. The fenced area includes approximately 27.45 acres. Access to the site will be provided via an existing gravel driveway off Ridge Road. This driveway shall be improved and widened as necessary to provide a road width between 16 and 20 feet. A four-leg intersection shall be added to the existing driveway to provide short access drives and parking areas for maintenance vehicles. The IFP Plan Set showing the existing and proposed conditions of the Site is included in Appendix D.

The array will be connected through a series of inverters, switchboards, and transformers mounted on two concrete pads located near the middle of the array on either side of the access road. The array will be accompanied by Battery Energy Storage System (BESS) equipment, also located on the concrete pads. The purpose of the transformers is to step up the voltage to match and allow for interconnection with the existing Eversource Energy utility grid. Medium voltage power from the transformers will run in an underground distribution line under the perimeter fence and transition to overhead distribution on a series of seven proposed utility poles to be constructed along the access drive. The new poles will provide the overhead interconnection to an existing utility pole identified as Utility Pole (UP) #27-20-11 near the Site entrance on the west side of Ridge Road.

To treat and infiltrate new runoff from the increase in impervious area and achieve a post-development peak runoff rate equal to or below the pre-development conditions, three infiltration trenches shall be installed. Each infiltration trench has a corresponding pre-treatment vegetated filter strip to settle out sediment and debris. The Stormwater Management Report detailing the drainage patterns and calculations in designing these best management practices (BMPs) is included in Appendix M.

Impact Statement

The Applicant is committed to comply with Local, State and Federal regulations through all phases of the Project. The Project will not have negative economic effects on adjoining properties, nor will it result in disruptive noise, odor, fumes, or vibration on adjoining properties. The Project is generally compatible with adjacent and other properties in the district. The Project will not impact any municipal or educational services for the community. The effects to traffic by the Project will be minimal. During construction of the Project, the area will experience a slight increase in traffic during typical work hours. Following construction, traffic impact will be limited to the occasional maintenance vehicle for servicing of the array.

The Town of Worthington has demonstrated a strong commitment to renewable energy through its participation in the Solarize Mass program and designation as a Green Community by the Massachusetts Department of Energy Resources (DOER). These initiatives reflect the Town of Worthington's dedication to reducing greenhouse gas emissions, lowering energy costs, and supporting Massachusetts clean energy goals. The Project directly aligns with Worthington's priorities by expanding access to clean energy, further diversifying the local energy mix, and reinforcing the community's leadership in sustainable energy practices.

Additional Permitting

In addition to the Site Plan Review, additional permits and approvals will be pursued to comply with all relevant laws and appropriate agencies as detailed below.

Wetlands

Field investigation for wetland resource areas was conducted on the Site by Fleetwood Environmental Solutions, LLC in Q2-3 of 2023. The delineation was performed in accordance with the Massachusetts Wetlands Protection Act (M.G.L. c. 131, § 40) and associated regulations. The investigation identified two Bordering Vegetated Wetland (BVW) within or adjacent to the Project area. The Project has been designed to avoid direct wetland impacts to the maximum extent practicable. The Project does not involve the discharge of fill or dredged material into wetlands or Waters of the United States (WOTUS), and a Section 404 permit from the U.S. Army Corps of Engineers is likely not required. Proposed work within the buffer consists exclusively of the installation of the woven wire perimeter fence, which qualifies as an agricultural improvement, and therefore should be exempt under the agricultural provisions of the Wetlands Protection Act. The Applicant will file a Request for Determination of Applicability (RDA) with the Town of Worthington Conservation Commission to confirm the jurisdictional authority and the applicability of exemptions. All work will be performed in accordance with the Massachusetts Wetlands Protection Act and applicable local by-laws. Erosion and sedimentation controls will be installed and implemented to protect adjacent resource areas during construction. The delineated wetlands and buffer zones are shown the IFP Plan Set included in Appendix D. The wetland delineation is included in the Natural Resources Assessment prepared by Fleetwood Environmental Solutions, LLC in Appendix E.

Worthington Driveway, Building and Electrical Permits

Based on the By-laws, it is assumed that building and electrical permits will be required for the Project. The Applicant will pursue the building and electrical permit approvals prior to construction. Since the Project will utilize an existing access point off Ridge Rd, it is assumed a driveway permit will not be necessary at this time.

Construction General Permit (CGP)

Under the Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES), projects that involve one or more acres of earth-disturbing activities require submittal of an electronic Notice of Intent (NOI) to obtain coverage under the CGP. This permit will include the submittal of a Stormwater Pollution Prevention Plan (SWPPP) detailing BMPs including soil erosion and sedimentation controls, pollution prevention standards, inspection and corrective action requirements,

and specifications for temporary and permanent stabilization. The CGP will be acquired prior to construction.

Cultural Resources

The Applicant will concurrently engage with the Massachusetts Historical Commission (MHC) for formal review. The Project is not currently anticipated to impact any potential cultural resources in the vicinity.

Rare, Threatened, and Endangered Species

WSP conducted a desktop review of potential rare, threatened, and endangered (RTE) species and priority habitats coinciding with the Project. The Massachusetts Natural Heritage and Endangered Species Program (NHESP) Priority and Estimated Habitat mapping under the Massachusetts Endangered Species Act (MESA) (M.G.L. c. 131A) was reviewed in August 2025. The Site does not fall within Priority Habitat of Rare Species or Estimated Habitat of Rare Wildlife as defined by NHESP. Therefore, a MESA filing is not anticipated. Additionally, the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) database was consulted to identify potential RTE species and habitats. IPaC results indicate the potential presence of three species within the broader region that could be affected by development activities:

- Northern Long-eared Bat (Myotis septentrionalis), listed as endangered under the Endangered Species Act (ESA);
- Tricolored Bat (Perimyotis subflavus), listed as proposed endangered under the Endangered Species Act (ESA); and
- Monarch Butterfly (Danaus plexippus), a candidate species for federal protection.

No tree clearing is proposed, and no critical habitats have been identified on-site. Therefore, formal consultation under Section 7 of the ESA is not anticipated. Should the Project scope change to include activities that may affect federally listed species or designated critical habitat, the Applicant will coordinate with the USFWS accordingly. IPaC results are included in Appendix F.

Compliance with By-laws

This application, the site plans, and supporting documentation were prepared in accordance with the Town of Worthington Protective Zoning By-laws: Section 8.5: Large-Scale Ground Mounted Solar Photovoltaic Installations and Section 2.6.9: Site Plan Review Criteria. Information required in the By-laws is included in the attached site plans, supporting documentation and narrative below (WSP's comments provided in ***bold italics***).

Section 2.6.9 Site Plan Review Criteria

A. The Site Plan Reviewing Authority shall use the following criteria in evaluating site plans applications:

   1. Whether the architectural design, scale, layout, and landscaping of the proposed development is in harmony with the historic and rural character of the neighborhood and the Town of Worthington;

The proposed design maintains the agricultural use of the Site by mitigating substantial impacts to the existing landscape. The 8-foot-high perimeter fence will be a woven wire fence consistent with the Town of Worthington's rural character. The maximum array panel height will be approximately 10 feet above ground, limiting visual impacts to the surrounding community. Furthermore, the vegetated Site perimeter along Buffington Hill Road, Ridge Road, and the forested areas along the eastern and southern borders will remain undisturbed. The design maintains the 50' zoning offset along the roadways and Site access will be provided via improvements of the existing gravel driveway, limiting impacts to the surrounding roadways.

2. Whether the proposed project, to the extent feasible:

   a) Protects Town amenities and abutting properties by minimizing detrimental or offensive actions and site characteristics such as lighting glare and noise;

      The solar panels are manufactured with a specialized anti-reflective coating that prevents lighting glare impacts. The pad-mounted equipment is located as central within the Site as possible to minimize noise impacts. Based on previous project experience, noise from the facility is not anticipated to be audible at the surrounding property lines. Typical transformer and inverter installations produce a "low hum" of approximately 50 decibels, which can be compared to the noise emitted from a ceiling fan.

   b) Minimizes adverse environmental impacts on such features as wetlands, floodplains, steep slopes, and aquifer recharge areas;

      The Project has been designed to minimize the total increase in impervious area and disturbance to surrounding natural resources to the maximum extent practicable while accomplishing the Project design goals. The proposed design includes less than 10 square feet of permanent wetland impacts for the installation of a woven wire fence. These activities are anticipated to be exempt from the Wetlands Protection Act (WPA) through agricultural exemption, as they constitute normal improvement of agricultural use land. The Project does not include development in any delineated floodplain. A majority of the array and associated construction is proposed on terrain with slopes between 0-10% to minimize stormwater erosion. Earthwork has been minimized to extent practicable; however, it is required for construction of BMPs, widening the access drive, and flattening areas for the equipment pads. Through installation of the proposed BMPs, properly treated groundwater recharge volume on Site shall increase. A negligible amount of impervious area shall be introduced within the Interim Wellhead Protection Area (IWPA) at the northern edge of the Site. Recharge BMPs and earthwork in general shall not be within the IWPA. For more information on potential impacts to the Site's surrounding natural resources, see the Stormwater Management Report in Appendix M.

   c) Maximizes open space retention and minimizes fragmentation of contiguous undeveloped land;

      The Project is wholly situated within the cleared open space of the existing agricultural fields and maintains site access via the footprint of the existing gravel driveway. This

avoids disturbance of intact undeveloped land of the property. Furthermore, minimal grading is being proposed such that when the Project is decommissioned in the future, the land can be smoothly restored to the original use.

d) Minimizes obstruction of scenic views from publicly accessible locations;

With an 8-foot-high woven wire perimeter fence, array panels maximum height approximately 10 feet above ground, and no vegetation clearing being proposed, obstruction of scenic views from publicly accessible locations is not anticipated.

e) Preserves unique natural or historical features;

No vegetation clearing is proposed, and the Site will be reseeded with grass mixes designated by the Applicant and landowner to maintain vegetative cover and allow for continuation of hay production. The Applicant has engaged with the Massachusetts Historical Commission (MHC) to assess potential impacts to historic or archaeological resources. Based on this consultation, no further action is required, and the Project is not anticipated to impact any potential historical resources in the vicinity.

f) Minimizes tree, vegetation and soil removal and grade changes;

No vegetation clearing is proposed, and the Site will be reseeded with grass mixes designated by the Applicant and landowner to maintain vegetative cover and allow for continuation of hay production. Proposed grading includes minimal adjustments along the gravel access driveway and around the concrete equipment pads. The design aims to balance the volume of cut and fill such that all soil may remain on Site. The construction of the infiltration trenches will require soil removal which will be replaced with pervious crushed stone. See Plan Sheet C-102 for more information regarding grade changes.

g) Provides adequate landscaping to screen storage areas, loading docks, dumpsters, rooftop equipment, utility buildings and similar features from view from adjacent residences and public roadways;

The well-established vegetated Site perimeter along Buffington Hill Road and Ridge Road, and the forested areas along the eastern and southern borders will remain undisturbed. These vegetated areas act as a visual buffer to the adjacent residences and public roadways. Due to the existing vegetation, planting of a vegetative screening is not proposed as part of the Project at this time.

h) Provides adequate measures to prevent pollution of surface and groundwater, erosion and sedimentation, and assures no increase in run-off or potential for flooding;

Sediment barriers will be installed around the perimeter of the Site prior to any soil disturbance. The Erosion and Sedimentation Control Plan included on Plan Sheet G-001 in Appendix D will be adhered to for the duration of the Project to ensure proper functioning of the erosion and sedimentation controls. The Project has been designed in accordance with the Massachusetts Stormwater Management Standards. Flow paths are primarily maintained, the main areas of alteration corresponding with the concrete equipment pads and driveway widening. Hydrologic analysis confirmed the proposed conditions demonstrate a lower peak rate of runoff and lower total volume of runoff

leaving the Site when compared to existing conditions as described in the Stormwater Management Report in Appendix M. Long-term pollution prevention measures are also detailed in the Stormwater Management Report.

i) Places electric lines, telecommunications lines and other such utilities, to the extent feasible, underground;

Grid interconnection shall be accomplished through electric lines installed overhead from the existing Utility Pole #27-20-11 extending for approximately 230 feet via a series of seven proposed utility poles. The electric lines will then transition to underground wires to the equipment pads. All electric lines within the array area will be installed underground. No other utility lines are proposed.

j) Provides for the convenience and safety of vehicular and pedestrian movement both within the site and in relation to adjoining ways and properties; and

Improvements of the existing gravel driveway, which includes widening, will increase convenience and safety for Site access. The access point to Ridge Road will remain in the current location, reducing impacts to adjoining ways and properties.

k) Provides access to adjoining properties where needed.

Access to adjoining properties is not needed for the Project and therefore, not proposed.

Section 8.5 Large-Scale Ground Mounted Solar Photovoltaic Installations (LSGMSPI)

8.5.1 Purposes

A. The purposes of this section are to:

1. Promote the creation of large-scale ground-mounted solar photovoltaic installations with a minimum nameplate capacity of 250kW DC (hereinafter abbreviated as LSGMSPI)
2. Provide standards for the placement, design, construction, operation, monitoring, modification and removal of such installations
3. Address public safety, minimize impacts on scenic, natural and historic resources, and provide adequate financial assurance for the eventual decommissioning of such installations.
4. The provisions set forth in this section shall apply to the construction, operation, and/or repair of LSGMSPI.

The Applicant acknowledges the purpose of this section. The Project is defined as an LSGMSPI. Therefore, the Applicant understands that the Project is subject to the regulations provided in this section.

8.5.2 Applicability

A. This section applies to LSGMSPI proposed to be constructed after the effective date of this section. This section also pertains to physical modifications that materially alter the type, configuration, or size of these installations or related equipment.

B. LSGMSPIs will be permitted in Worthington, subject to the terms of this Section and subject to Site Plan Review, per Section 2.6 of this By-law.

The Applicant acknowledges the applicability of Section 2.6 in determining the permit requirements for the Project. See responses to Section 2.6.9: Site Plan Review Criteria of the By-laws in the above section.

8.5.3 General Requirements for all LSGMSPI

A. The following requirements are common to all LSGMSPI to be sited in Designated Locations:

1. Compliance with Laws and Regulations 35 of 63

    a) The construction and operation of all LSGMSPI shall be consistent with all applicable local, state and federal requirements, including but not limited to all applicable safety, construction, electrical, and communications requirements. All buildings and fixtures forming part of a LSGMSPI shall be constructed in accordance with the State Building Code.

    The Project will comply with all applicable local, state, and federal requirements.

2. Building Permit and Building Inspection

    a) No LSGMSPI shall be constructed, installed, or modified as provided in this section without first obtaining a building permit.

    Acknowledged. The building permit will be applied for and obtained prior to construction.

3. Fees

    a) The application for a Site Plan Review for a LSGMSPI must be accompanied by the fee as determined by the Planning Board.

    The Site Plan Review application fee will be provided by the Applicant under separate cover.

4. Site Plan Review

    a) LSGMSPIs shall undergo Site Plan Review (see Section 2.6) by the Planning Board prior to construction, installation or modification as provided in this section.

    Acknowledged.

5. General

    a) All plans and maps shall be prepared, stamped and signed by a Professional Engineer licensed to practice in Massachusetts.

    The stamped IFP Plan Set is included as Appendix D.

6. Required Documents

    a) Pursuant to the site plan review process, the project proponent shall provide the following documents:

        1) A site plan showing:

a. Property lines and physical features, including roads, lot areas, setbacks, open space, parking, and structure coverage for the project site;

Property lines and physical features are shown on Sheet V-101 of the IFP Plan Set (Appendix D).

b. Proposed changes to the landscape of the site, grading, drainage, vegetation clearing and planting, exterior lighting, screening vegetation or structures;

Proposed changes to the landscape of the Site are shown on Sheets C-101 through C-104 of the IFP Plan Set (Appendix D).

c. Blueprints or drawings of the LSGMSPI and appurtenant structures signed by a Professional Engineer licensed to practice in the Commonwealth of Massachusetts showing the proposed layout of the system, lighting, signage, utility connections, transformers, and any potential shading from nearby structures or natural features or vegetation;

The LSGMSPI and appurtenant structures are shown on Sheet C-101 of the IFP Plan Set (Appendix D). A shading analysis of the Site is shown on Sheet C-105 of the IFP Plan Set.

d. One or three line electrical diagram detailing the solar photovoltaic installation, associated components, and electrical interconnection methods, with all National Electrical Code compliant disconnects and overcurrent devices;

A one-line electrical diagram prepared by LIG Consultants, PC is included as Appendix G.

e. Documentation of the major system components to be used, including the photovoltaic panels, mounting system, and inverter;

Specification sheets for the major system component information is included as Appendix H. BESS component selections are currently preliminary and subject to change during final design.

f. Name, address, license verification, and contact information for proposed system installer;

The system installer has not yet been established. All requested information about the system installer will be provided when the Applicant pursues the building permit.

g. Name, address, phone number and signature of the project proponent, as well as all coproponents or property owners, if any;

Project proponent and property owner information and signatures are provided on the Site Plan Review Application Form included as Appendix A.

h. The name, contact information and signature of any agents representing the project proponent;

Agent information and signature are provided on the Site Plan Review Application Form included as Appendix A.

i. The delineation of any wetlands on or near the specific portion of the parcel proposed for the LSGMSPI.

The wetland delineations shown in relation to the LSGMSPI are included on Sheet C-101 of the IFP Plan Set in Appendix D. Full wetland delineation information is included in Appendix E.

2) Documentation of actual or prospective access and control of the project site; see also Section 8.5.3.A.6.a.11 of this By-law;

The executed Notice of Lease and Easements is included as Appendix B.

3) An operation and maintenance plan; see also Section 8.5.3.A.6.a.10 of this By-law;

The operation and maintenance plan is included as Appendix I.

4) Zoning district designation for the parcel(s) of land comprising the project site (submission of a copy of a zoning map with the parcel(s) identified is suitable for this purpose);

The Site is located within the Residential Agriculture Zoning District. The approximate boundary of the Site is shown on Worthington's zoning map included as Appendix C.

5) Natural Resources Conservation Service soil survey classification map(s) for the proposed site

The Natural Resources Conservation Service soil survey classification maps are contained within the Stormwater Management Report included as Appendix M.

6) Proof of liability insurance; and

Proof of liability insurance is included as Appendix J

7) Description of financial surety that satisfies Section 8.5.6.F of this By-law.

A Decommissioning Bond template is included in Appendix K.

8) The Planning Board may waive documentary requirements as it deems appropriate.

Acknowledged.

9) Site Control

a. The project proponent shall submit documentation of actual or prospective access and control of the project site sufficient to allow for construction and operation of the proposed LSGMSPI.

The executed Notice of Lease and Easements is included as Appendix B.

10) Operation and Maintenance Plan

a. The project proponent shall submit a plan for the operation and maintenance of the LSGMSPI, which shall include measures for maintaining safe access to the

installation, storm water controls, as well as general procedures for operational maintenance of the installation.

The operation and maintenance plan is included as Appendix I.

11) Utility Notification

a. No LSGMSPI shall be constructed until evidence has been given to the Planning Board that the utility company that operates the electrical grid where the installation is to be located has been informed of the solar photovoltaic installation owner or operator's intent to install an interconnected customer-owned generator.

The Applicant's Interconnection Service Agreement with Eversource is included as Appendix L.

8.5.4 Dimension and Density Requirements

A. Setbacks

1. For LSGMSPIs, front, side and rear setbacks shall be as follows:

a) Front yard: The front yard depth shall be at least 50 feet.

The array panels have a minimum 50-foot front setback.

b) Side yard: Each side yard shall have a depth at least 50 feet.

The array panels have a minimum 50-foot side setback.

c) Rear yard: The rear yard depth shall be at least 50 feet.

The array panels have a rear setback greater than 500 feet.

d) Access roads or driveways shall be set back at least 25 feet from side and rear lot lines.

The access roads have a side and rear setback greater than 400 feet.

B. Appurtenant Structures

1. All appurtenant structures to LSGMSPIs shall be subject to the Worthington Zoning By-laws. Whenever reasonable, structures should be shielded from view by vegetation and/or joined or clustered to avoid adverse visual impacts. Vegetation shall be of varieties native to New England. Said vegetative screening shall reach a mature form to effectively screen the installation within five years of installation. Planting of the vegetative screening shall be completed prior to final approval of the photovoltaic installation by the Building Inspector.

Acknowledged. The well-established vegetated Site perimeter along Buffington Hill Road, Ridge Road, and the forested areas along the eastern and southern borders will remain undisturbed. Due to the existing vegetation, planting of a vegetative screening is not proposed as part of the Project at this time.

8.5.5 Design Standards

A. Lighting

1. Lighting of other parts of the installation, such as appurtenant structures, shall be limited to that required for safety and operational purposes, and shall be shielded from abutting properties. Lighting of the solar photovoltaic installation shall be directed downward and shall incorporate full cut-off fixtures to reduce light pollution.

   Lighting is not being proposed as part of the Project.

B. Signage

1. Signs on LSGMSPIs shall comply with the Worthington sign by-law (Section 4.3.B.D). A sign consistent with the Worthington sign by-law shall be required to identify the owner and provide a 24-hour emergency contact phone number.

   Entrance signs in compliance with the Worthington sign by-law will be installed on Site fences. A typical entrance sign is shown on Sheet C-501 in Appendix D.

2. LSGMSPIs shall not be used for displaying any advertising except for reasonable identification of the manufacturer or operator of the solar photovoltaic installation.

   Acknowledged.

8.5.6 Safety and Environmental Standards

A. Emergency Services

1. The LSGMSPI owner or operator shall provide a copy of the project summary, electrical schematic, and site plan to the Town Fire Chief. Upon request the owner or operator shall cooperate with local emergency services in developing an emergency response plan. All means of shutting down the solar photovoltaic installation shall be clearly marked and approved by the Town fire chief. The owner or operator shall identify a responsible person for public inquiries throughout the life of the installation.

   A project summary, electrical schematic, and site plan were provided to the Town Fire Chief concurrently. The Applicant will cooperate with local emergency services in developing an emergency response plan upon request.

2. The LSGMSPI owner or operator shall provide a copy of the project summary, electrical schematic, and site plan to the Town Fire Chief. Upon request the owner or operator shall cooperate with local emergency services in developing an emergency response plan. All means of shutting down the solar photovoltaic installation shall be clearly marked and approved by the Town fire chief. The owner or operator shall identify a responsible person for public inquiries throughout the life of the installation.

   Duplicate standard of 8.5.6.A.1 above. See comment above.

B. Land Clearing, Soil Erosion, Drainage and Habitat Impacts

1. Clearing of natural vegetation shall be limited to what is necessary for the construction, operation and maintenance of the LSGMSPI or otherwise prescribed by applicable laws, regulations and bylaws. LSGMSPIs shall be installed on water permeable surfaces as approved by the Planning Board during site plan review

No tree clearing is being proposed. Disturbance of the existing hay fields is expected to occur during solar array installation. The array area will be reseeded in accordance with the landowner's hay production practices to maintain vegetative cover in the proposed condition.

C. Landscape Maintenance

1. When possible, a diversity of plant species shall be used, with a preference for species native to New England. Use of plants identified by the most recent copy of the "Massachusetts Prohibited Plant List" maintained by the Massachusetts Department of Agricultural Resources, is prohibited. Herbicides shall only be applied by properly licensed personnel, as enforced by the Massachusetts Department of Agricultural Resources.

   The Applicant and landowner will use plant species typical for hay production in New England and avoid species on the "Massachusetts Prohibited Plant List." Herbicides will not be applied during construction and if used post-construction, application shall be performed in accordance with product labels and applicable guidelines.

D. Sound Levels

1. The sound levels under normal operating conditions, measured at the boundary of the lot on which the installation is sited, shall not be more than 10 decibels greater than would otherwise exist in the absence of such a facility.

   Based on previous project experience, noise from the facility is not anticipated to be audible at the surrounding property lines. Typical transformer and inverter installations produce a "low hum" of approximately 50 decibels, which can be compared to the noise emitted from a ceiling fan. The intensity of the sound decreases with distance.

E. Monitoring and Maintenance

1. Solar Photovoltaic Installation Conditions

   a) The LSGMSPI owner or operator shall maintain the facility in good condition. Maintenance shall include, but not be limited to, structural repairs, and integrity of security measures. Site access shall be maintained to a level acceptable to the Town Fire Chief and Police Chief. The owner or operator shall be responsible for the cost of maintaining the LSGMSPI and any access road(s), unless accepted as a public way.

      The Applicant will adhere to the operation and maintenance plan included as Appendix I to ensure the facility is in good condition. The Site will be wholly surrounded by perimeter fencing and locked gates for security.

2. Modifications

   a) Any modifications to a LSGMSPI made after issuance of the required building permit shall require approval by the Planning Board.

      Any proposed modifications will be documented with updated site plans and relevant supporting documentation and submitted to the Planning Board for approval.

3. Abandonment or Decommissioning

    a) Abandonment

        1) Absent notice of a proposed date of decommissioning or written notice of extenuating circumstances, the LSGMSPI shall be considered abandoned when it fails to operate for more than one year without the written consent of the Planning Board. If the owner or operator of the LSGMSPI fails to remove the installation in accordance with the requirements of this section within 150 days of abandonment or the proposed date of decommissioning, the Town retains the right, after the receipt of an appropriate court order, to enter and remove an abandoned, hazardous or decommissioned LSGMSPI. As a condition of site plan approval, a property owner shall agree to allow the Town entry to remove an abandoned or decommissioned installation. The cost for the removal will be charged to the property owner in accordance with the provisions of M.G.L. 139, Section 3A as a tax lien on the property.

            Acknowledged. The Applicant and/or landowner will provide the Planning Board with written notice prior to anticipated decommission.

    b) Removal Requirements

        1) Any LSGMSPI which has reached the end of its useful life or has been discontinued or has been abandoned consistent with Section 8.5.6(E)(3)(a)(1) of this bylaw shall be removed. The owner or operator shall physically remove the installation no more than 150 days after the date of discontinued operations. The owner or operator shall notify the Planning Board by certified mail of the proposed date of discontinued operations and plans for removal. Decommissioning shall consist of:

            a. Physical removal of LSGMSPI structures, equipment, security barriers and transmission lines from the site

            b. Physical removal of LSGMSPI structures, equipment, security barriers and transmission lines from the site

            c. Disposal of all solid and hazardous waste in accordance with local, state, and federal waste disposal regulations

            d. Stabilization or re-vegetation of the site as necessary to minimize erosion. The Planning Board may allow the owner or operator to leave landscaping or designated below-grade foundations in order to minimize erosion and disruption to vegetation

            The Applicant Acknowledges the decommissioning requirements outlined above. A detailed decommissioning cost estimate, prepared to account for all required decommissioning activities, is included in Appendix K.

F. Financial Surety

1. Proponents of LSGMSPI projects shall provide a form of surety, either through escrow account, bond or otherwise, to cover the cost of removal in the event the Town must remove the installation and remediate the landscape, in an amount and form determined to be reasonable by the Planning Board, but in no event to exceed more than 125 percent of the cost of removal and

compliance with the additional requirements set forth herein, as determined by the project proponent. Such surety will not be required for municipally- or state-owned facilities. The project proponent shall submit a fully inclusive estimate of the costs associated with removal, prepared by a qualified engineer, during site plan review stage of application. The amount shall include a mechanism for calculating increased removal costs due to inflation.

The Decommissioning Cost Estimate and Financial Security Documentation, prepared by a qualified engineer is included in Appendix K.

G. Independent Engineer

1. The Planning Board may engage, at the applicant's expense, professional and technical consultants, including legal counsel, to assist the Planning Board with its review of the application in accordance with the requirements of Section 53G of Chapter 44 of the Massachusetts General Laws. The Planning Board may direct the applicant to deposit funds with the Planning Board at the time the application is accepted, and to add additional funds as needed upon notice. Failure to comply with this section shall be grounds for denying the application. Upon approval of the application, any excess amount in the account attributable to that project, including any accrued interest, shall be repaid to the applicant.

   Acknowledged. The Applicant will provide the requested funds for third-party engineering services upon notice from the Planning Board.

Appendix A Site Plan Approval Application Form

Town Clerk Timestamp / Date and Time Received:

Do not write in this area – official use only

Worthington PLANNING BOARD
SITE PLAN APPROVAL APPLICATION

1. Applicant Information Date: _____

Name: BWC Wades Stream, LLC

Address: 116 Hungtington Avenue, Boston, MA 02116

Phone: (617) 431-8758 Email: mzhe@bluewave.energy

Applicant is: ☐ Owner ☐ Owner's agent ☑ Tenant ☐ Prospective owner/tenant
☐ Other _____

2. Property Owner Information (if different from applicant)

Name: Timothy J. Sena & Catherine Rude-Sena

Address: PO Box 132 Worthington, MA 01098

Phone: _____ Email: _____

3. Property Information

Address: 190 Ridge Road, Worthington, MA 01098

Assessor Map & Lot: 407 - 28 Zoning District: Res-Ag Lot Size: 71.6

4. Explanation of Application (attached additional materials if necessary): _____

This application pertains to a proposed Large-Scale Ground Mounted Solar Photovoltaic Installation covering approximately 29.95 acres of the Property. The Project is an agrivoltaics system which allows dual use of the farmland for solar energy and hay production. More details are provided in the additional materials. The array will generate approximately 2.0 MW AC and will be surrounded by a woven wire agricultural fence. The existing gravel driveway off Ridge Road will be expanded to accommodate the array facility needs. Electrical equipment pads will be installed on-site and will connect to the existing electrical utility grid.

4. All Applicants: *I hereby request a meeting before the Planning Board and attest that all information provided as part of this application and presented at the meeting is accurate and true to the best of my knowledge. I understand that knowingly providing false information could result in the revocation of the permit.*

Signature of Applicant: Aaron Simms Date: 09/17/25

If the Applicant is not the Property Owner of Record, then the signature of the Owner is required below:

Signature of Owner: Timothy J Sena Catherine Rude-Sena
Timothy J Sena Catherine Rude-Sena (Sep 17, 2025 07:41:51 EDT) Date: 09/17/25

Note: *If the Applicant is unable to attend the hearing to explain the application to the board, or is authorizing a representative (legal or otherwise) to speak on their behalf, the* ***Authorization to Represent Applicant*** *form must be completed and presented to the Board prior to the start of the hearing and will become part of the public record.*

AUTHORIZATION TO REPRESENT APPLICANT

If you are unable to attend the hearing to explain your application to the board, or are authorizing a representative (legal or otherwise) to speak on your behalf, the following statement regarding representation must be given to the Board prior to the start of the hearing and will become a part of the official record:

Date: 09/17/25

I/we, BWC Wades Stream, LLC, authorize WSP USA Inc. to represent my/our interests in the application being heard by the Planning Board for the property located at 190 Ridge Road, Worthington, MA.

I/we hereby acknowledge that a decision rendered by the Planning Board based on information given by my/our representative will be considered final, unless appealed in Superior Court in accordance with MGL Chapter 40A, Section 17.

BWC Wades Stream, LLC c/o Aaron Simms

Printed name(s) of Applicant(s)

Aaron Simms

Signature(s) of Applicant(s) *Date*

Aaron Simms 09/17/25

Representative name: WSP USA Inc. c/o Olivia Crosby

Address: 100 Apollo Drive, Suite 302, Chelmsford, MA 01824

Phone: (978) 761-7934 Email: olivia.crosby@wsp.com

As designated representative, I acknowledge that the decision (and any conditions) made by the Planning Board based upon my presentation is binding upon the applicant.

Olivia Crosby 9/17/25

Signature of Representative *Date*

Worthington Ridge Rd Planning Board Application Form

Final Audit Report 2025-09-17

Created:	2025-09-16
By:	Brie Fortmuller (brie.fortmuller@bluewavesolar.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAA9iE-hQwSykOB5jyD4On_3ErrPKhkr0xs

"Worthington Ridge Rd Planning Board Application Form" History

Document created by Brie Fortmuller (brie.fortmuller@bluewavesolar.com)
2025-09-16 - 4:10:37 PM GMT

Document emailed to senatj4609@verizon.net for signature
2025-09-16 - 4:10:41 PM GMT

Email viewed by senatj4609@verizon.net
2025-09-17 - 11:39:16 AM GMT

Signer senatj4609@verizon.net entered name at signing as Timothy J Sena Catherine Rude-Sena
2025-09-17 - 11:41:49 AM GMT

Document e-signed by Timothy J Sena Catherine Rude-Sena (senatj4609@verizon.net)
Signature Date: 2025-09-17 - 11:41:51 AM GMT - Time Source: server

Agreement completed.
2025-09-17 - 11:41:51 AM GMT

25-0917 Worthington Ridge Rd SPA Signature Page - LO Signed

Final Audit Report 2025-09-17

Created:	2025-09-17
By:	Brie Fortmuller (brie.fortmuller@bluewavesolar.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAApqCy-9OabHtbuGJ41v4AX-6yZ4WSYiRr

"25-0917 Worthington Ridge Rd SPA Signature Page - LO Signed" History

Document created by Brie Fortmuller (brie.fortmuller@bluewavesolar.com)
2025-09-17 - 3:07:26 PM GMT

Document emailed to Aaron Simms (asimms@bluewavesolar.com) for signature
2025-09-17 - 3:07:31 PM GMT

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2025-09-17 - 3:16:27 PM GMT

Document e-signed by Aaron Simms (asimms@bluewavesolar.com)
Signature Date: 2025-09-17 - 3:17:41 PM GMT - Time Source: server

Agreement completed.
2025-09-17 - 3:17:41 PM GMT

Appendix B Notice of Lease and Easements

After recording return to:
BlueWave
116 Huntington Avenue, Suite 601
Boston, MA 02116
Attn: Legal Department

NOTICE OF LEASE AND EASEMENTS

Property Address: 190 Ridge Road, Worthington, MA

In accordance with the provisions of Massachusetts General Laws, Chapter 183, Section 4, as amended, notice is hereby given of the following described lease and easements:

Parties to the Land Lease and Easement Agreement (the "Lease"):

Landlord: Timothy J. Sena and Catherine Rude-Sena
P.O. Box 132
Worthington, MA01098
Attn: Timothy J. Sena

Tenant: BWC Wades Stream, LLC
c/o BlueWave
116 Huntington Avenue, Suite 601
Boston, MA 02116
(and its successors and/or assigns)

Property Description: The real property located at 190 Ridge Road, Worthington, MA 01098 and identified as Tax Parcel 407 0 28, described on the attached Exhibit A-1 (the "Property"). For Landlord's title see Deed recorded with the Hampshire County Registry of Deeds in Book 8119 at Page 223.

Description of Leased Premises: A portion of the Property as described on the attached Exhibit A-2 where a solar photovoltaic electric generating facility, converting solar radiation emitted from the sun into electrical energy, and collecting, storing, and transmitting the electrical energy so converted will be installed and accessed for the Term of the Lease (the "Leased Premises").

Date of Execution of the Lease: September 27, 2024 (the "Effective Date").

Term of Lease:

The Lease shall commence on the Effective Date and, unless terminated earlier pursuant to the provisions of the Lease, shall continue until 11:59 p.m. on the last day of the month in which the twentieth (20th) anniversary of the Operations Period Commencement Date occurs, as defined in the Lease, unless the Tenant exercises the options to renew.

Options to Renew:

Tenant shall have the right to extend the Term of the Lease for up to four (4) additional five (5) year terms.

Decommissioning Period:

The Lease also contains the Decommissioning Period, which shall commence upon expiration of the Term and any extensions thereto and shall continue for a period of 180 days, provided that if such 180 day term begins or ends within the months of December, January, February, March, or April, the Decommissioning Period shall be extended to the next occurring July 31.

Easements.

(a) Under the Lease, Landlord granted the easements (the "Easements") to Tenant described in Exhibit B across and burdening the Property.

(b) Landlord's grant of Easements in the Lease shall commence on the Effective Date and end upon termination of the Term.

Ownership of the Facility.

Landlord shall have no right, title or interest in the Facility (as defined in the Lease) or any component thereof and Tenant shall be the exclusive owner thereof.

Miscellaneous

1. This Notice of Lease may be executed in multiple counterparts, each of which shall be deemed an original and all of which, together, shall constitute one and the same instrument.

2. This Notice of Lease does not describe or refer to all of the terms or conditions contained in the actual Lease and nothing contained herein shall serve to modify or amend the terms of the actual Lease. In the event of any inconsistency between the provisions of the Lease and the provisions of this Notice, the provisions of the Lease shall control.

3. Any capitalized term not defined herein shall have the definition ascribed to it in the Lease.

EXECUTED as a sealed instrument on as of September 26, 2024.

LANDLORD:

Timothy J. Sena

Catherine Rude-Sena

STATE/COMMONWEALTH OF Massachusetts
Hampshire County, ss.

On this 26th day of September, 2024, before me, the undersigned Notary Public, personally appeared the above-named Timothy J. Sena and Catherine Rude-Sena proved to me by satisfactory evidence of identification, being (check whichever applies): ☑ driver's license or other state or federal governmental document bearing a photographic image, ☐ oath or affirmation of a credible witness known to me who knows the above signatory, or ☐ my own personal knowledge of the identity of the signatory, to be the person whose name is signed above, and acknowledged the foregoing to be signed by them voluntarily for its stated purpose as their free act and deed.

JOSEPH E. SZAWLOWSKI NOTARY PUBLIC COMMONWEALTH OF MASSACHUSETTS MY COMMISSION EXPIRES ON 07-31-2026

Notary Public
My Commission Expires:

TENANT:
BWC Wades Stream, LLC

By: _____
Printed Name: James Haley
Title: CFO Authorized Signatory

COMMONWEALTH OF MASSACHUSETTS

Suffolk, ss.

On this 17 day of October, 2024, before me, the undersigned Notary Public, personally appeared the above-named James Haley, Authorized Signatory of BWC Wades Stream, LLC proved to me by satisfactory evidence of identification, being (check whichever applies): ☐ driver's license or other state or federal governmental document bearing a photographic image, ☐ oath or affirmation of a credible witness known to me who knows the above signatory, or ☑ my own personal knowledge of the identity of the signatory, to be the person whose name is signed above, and acknowledged the foregoing to be signed by him/her voluntarily for its stated purpose as Authorized Signatory on behalf of BWC Wades Stream, LLC as its free act and deed.

Olivia Williams
Notary Public
My Commission Expires: 1.3.2031

Olivia Williams
My Commission Expires January 3, 2031
NOTARY PUBLIC
COMMONWEALTH OF MASSACHUSETTS

EXHIBIT A-1

Property

Property Address: 190 Ridge Road, Worthington, MA 01098

Legal Description of the Property

That certain tract or parcel of land situated on the Southerly side of Buffington Hill Road and the Westerly side of Ridge Road in said Worthington, more particularly bounded and described as follows:

Beginning at the northeasterly corner of the tract hereinafter described, said point being on the Westerly bound of said Ridge Road and at the Southeasterly corner of land now or formerly of one Taliaferro; thence Southerly along the Westerly bound of said Ridge Road to a discontinued town road at property now or formerly of one Hyde and Kirkam; thence Westerly along land of said Hyde, et al., to the center line of a brook; thence in a Northerly direction along the center line of said brook to the northerly bound of an old roadway; thence Easterly along the Northerly bound of said roadway to a point at which the woods end and the open field begins; thence in a Northerly direction along the edge of the woods to the Southerly bound of said Buffington Hill Road; thence Easterly along the Southerly bound of said Buffington Hill Road to property of said Taliaferro; thence Southerly along the Westerly bound of said Taliaferro to a point; thence Easterly along the Southerly bound of said Taliaferro to the place of beginning, the last two bounds running along a fence line. Containing approximately fifty (50) acres of land. The said Buffington Hill Road was formerly known as Lindsay Hill Road.

Being all and the same premises conveyed by deed of Timothy J. Sena and Catherine Rude-Sena, and Paul A. Sena, dated December 30, 2004 and recorded with the Hampshire County Registry of Deeds in Book 8119, Page 223.

END OF DESCRIPTION

EXHIBIT A-2

LEASE AND EASEMENT AREA DESCRIPTION

The Leased Premises and Easement Area shall mean the portion of the Property generally outlined as follows:

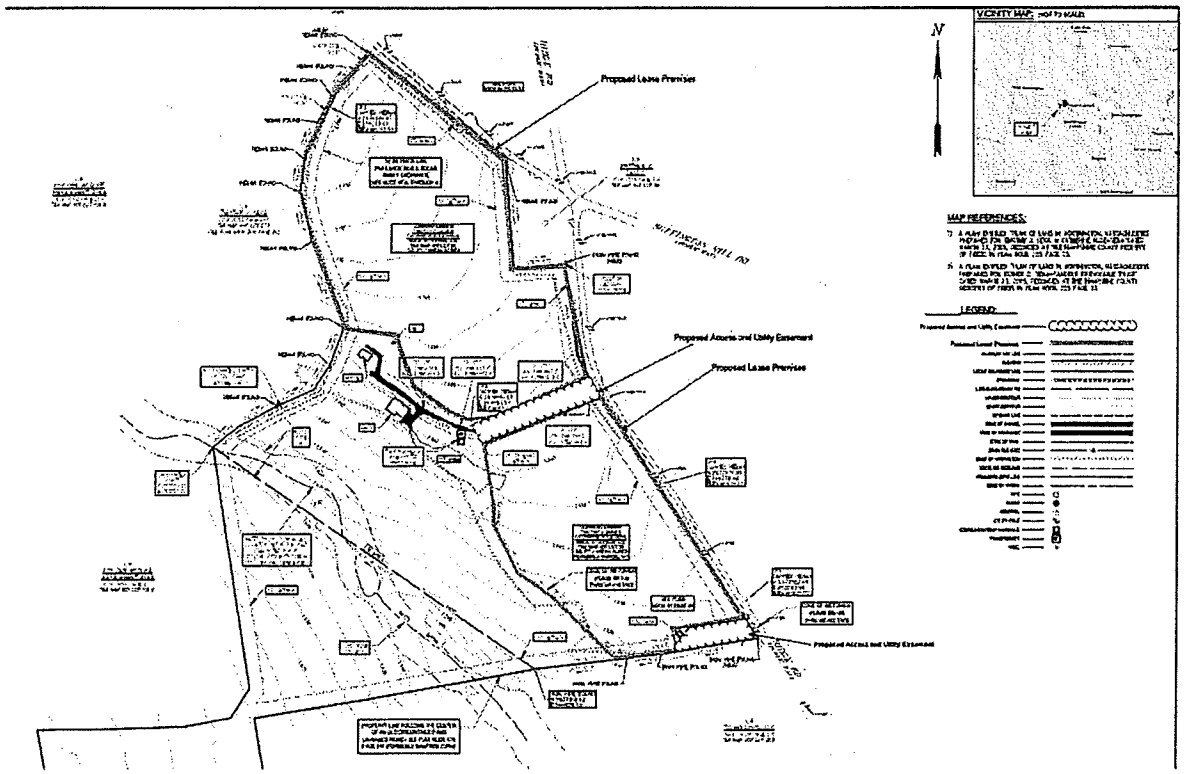


EXHIBIT B

3. GRANT OF EASEMENTS.

3.1 Landlord hereby grants, conveys and warrants to Tenant, and Tenant hereby accepts the following easements upon, over, across, under and burdening the Property and any Surrounding Property at all times during the Term:

(a) Solar Easement; Non-Obstruction. An exclusive easement pursuant to Applicable Law, on, over and across the Property and Surrounding Property for the purpose of ensuring access to direct sunlight to any solar panels on the Leased Premises and an exclusive easement prohibiting any obstruction of direct sunlight throughout the entire Property to and for the benefit of the area existing horizontally three hundred and sixty degrees (360°) from any point where any solar panel is or may be located at any time from time to time (each such point referred to as a "Site") and for a distance from each Site to the boundaries of the Property and any Surrounding Property, together vertically through all space located above the surface of the Property, that is, one hundred eighty degrees (180°) or such greater number or numbers of degrees as may be necessary to extend from each point on and along a line drawn along the surface from each point along the exterior boundary of the Property and Surrounding Property through each Site to each point and on and along such line to the opposite exterior boundary of the Property and any Surrounding Property (collectively, the "Solar Easement");

(b) Operating Easement. An exclusive easement over the Property and any Surrounding Property for all activities occurring on the Leased Premises, in the Solar Easement, Access Easement or the Utility Easement necessary to develop and operate the Facility, including but not limited to, electromagnetic, audio, visual, view, light, noise, vibration, electrical, radio interference, or other effects attributable to the Facility or any Site Activities;

(c) Access Easement. An exclusive easement to access the Facility and the Leased Premises for equipment access and for vehicular and pedestrian ingress to and egress, from the Facility (whether located on the Property, on adjacent property or elsewhere) over and across the Property and Surrounding Property by means of roads and lanes thereon if existing or later constructed by Landlord, or otherwise by such route or routes as Tenant may construct from time to time, and which roads and lanes must connect to a public way, including over any areas specifically identified on Exhibit A-2 hereto ("Access Easement");

(d) Utility Easement. An exclusive easement to construct, install, operate, maintain, relocate, remove, repair electric service infrastructure, poles, towers, foundations, switchgear, cabinets, transformers, and other equipment necessary and convenient to interconnect the Facility to the local electric distribution system and for transmitting electric current and communications and intelligence, which may be overhead or underground, including over any areas specifically identified on Exhibit A-2 hereto ("Utility Easement"); and

(e) Vegetation Maintenance Easement. (i) An easement to enter upon the Property and trim and cut vegetation and trees along the access and utility easements which may overhang or interfere with such access and utility easements, and (ii) an easement to trim existing trees and vegetation on the Property that interfere with the Solar Easement from any angle upon,

across and over the Leased Premises. The easement granted in this subsection (e) shall be exercised after providing Landlord with at least five (5) Business Days prior written notice of the Tenant's need to enter the Property.

(f) Temporary Construction Easement. A non-exclusive easement to be located at a mutually acceptable location on a portion of the Property and Surrounding Property to be used for temporary (i) storage and staging of tools, materials and equipment, (ii) construction laydown, (iii) parking of construction crew vehicles and temporary construction trailers, (iv) vehicular and pedestrian access and access for rigging and material handling, and (v) other facilities reasonably necessary to construct, erect, install, expand, modify or remove the Facility. In the event that Tenant disturbs the surface of the Property or Surrounding Property in connection with the exercise of its rights under this easement, Tenant will, at its sole expense, restore the surface of such areas so-disturbed to substantially the same or better condition as existed prior to such disturbance, provided, however, that Tenant shall not be required to restore any vegetation.

(g) To the extent that Landlord holds or has the right to use any access, utility, transmission, water, stormwater or other easements, rights of way or licenses over lands in the general vicinity of the Property or the Surrounding Property (the "Landlord Easements") on or after the date of this Agreement, and such Landlord Easements are or could be used for the benefit of the Property, then the same are hereby included in this Agreement, and Tenant shall be entitled to use such Landlord Easements, if such use is permitted under Landlord Easements and provided that such use does not interfere with use of the same by Landlord or other parties having rights therein, and; provided that such use does not cause any claims against Landlord relating to Tenant's use thereof. Upon the request of Tenant, Landlord shall grant (in recordable form and containing such terms and provisions as may reasonably be requested by Tenant and Landlord), for no additional consideration, one or more sub-easements of Landlord Easements to run concurrently with the Term (or for such shorter period as provided in Landlord Easement).

(h) Other Easements. All other easements reasonably necessary to accomplish the activities permitted by this Agreement, including but not limited to the Permitted Uses and those activities described in Section 2. During the Development Period, the boundaries of the easements granted in Sections 3.1(c) and 3.1(d) may be determined by means of a plan or survey prepared by Tenant, and such plan or survey shall then define the easement locations. Exhibit A-2 shall be amended with such plan or survey.

3.2 Landlord's grant of easements in Section 3.1(a) through (e) shall commence on the Effective Date and continue throughout the Term and any extensions of the Term, and for the time necessary and convenient to perform any decommissioning, if such obligations extend beyond the Term. Landlord's grant of easement in Section 3.1(f) shall commence on the Effective Date and shall continue through the Construction Phase.

3.3 If required by the local electric utility ("Utility"), Landlord shall grant to the Utility an easement and right to construct, operate, maintain, reconstruct, relocate, remove, and/or repair the electric utility service infrastructure and associated wires, lines and poles and other infrastructure necessary and convenient to interconnect the Facility to the Utility electrical distribution system, the location of which will be determined by the Utility prior to the Commercial Operation Date. If required by the Utility, Landlord shall enter into a recordable easement instrument on the Utility's form.

3.4 All easements shall burden the Property and shall run with the land for the benefit of Tenant, its successors and assigns (including any Financing Parties and any other permitted assignees of Tenant's rights under the Agreement), and their respective agents, contractors, subcontractors and licensees.

Select Definitions:

"Surrounding Property" means the Property and all adjacent real property owned or controlled by Landlord or any affiliates.

A copy of the Lease is on file with the Tenant, at its address set forth on the first page hereof.

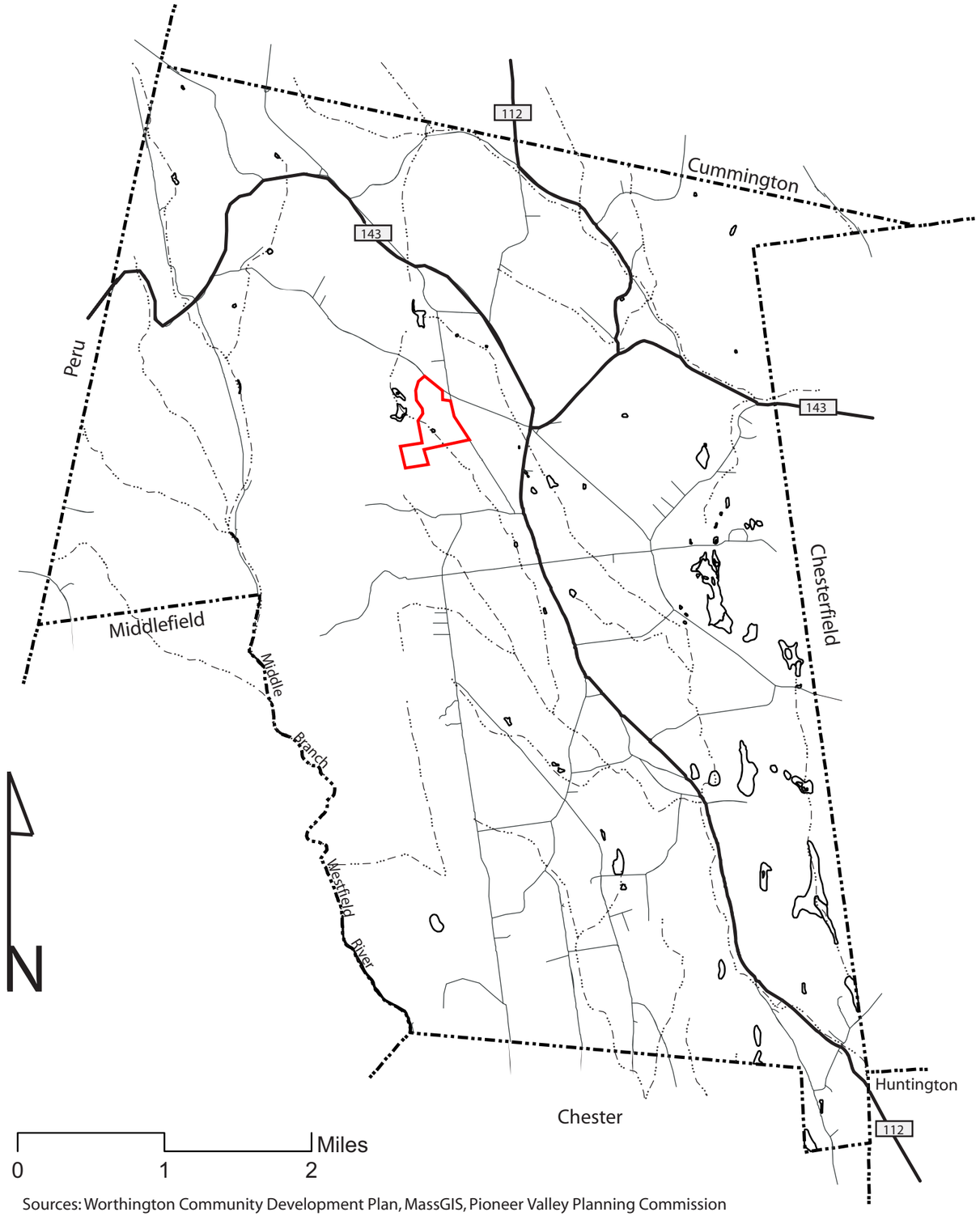
Appendix C Zoning Map

Zoning

All of Worthington is zoned Residential Agriculture.

The minimum lot size is two acres with a minimum 400-foot frontage requirement. This type of zoning promotes sprawl development and gives the town no ability to protect its scenic, cultural, historic, or natural resources.

The Executive Office of Environmental Affairs states that under these conditions Worthington could have a maximum build out of 6210 households. In 2004, there were 501 single-family homes in Worthington.



Sources: Worthington Community Development Plan, MassGIS, Pioneer Valley Planning Commission

Zoning Map

Approximate Site Parcel
Primary Roads
Secondary Roads
Town Boundary
Rivers
Ponds

Worthington, Massachusetts
2006 Open Space and Recreation Plan Update

Conway School of Landscape Design

John Bisbing - Janna Thompson - Ian Warner

March 2006

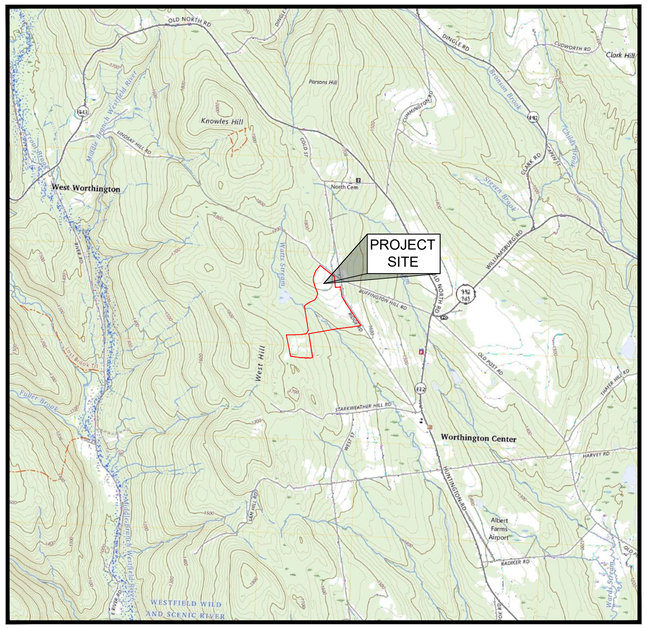
Note: This map is intended for planning purposes only.

Appendix D Issued for Permitting Plan Set

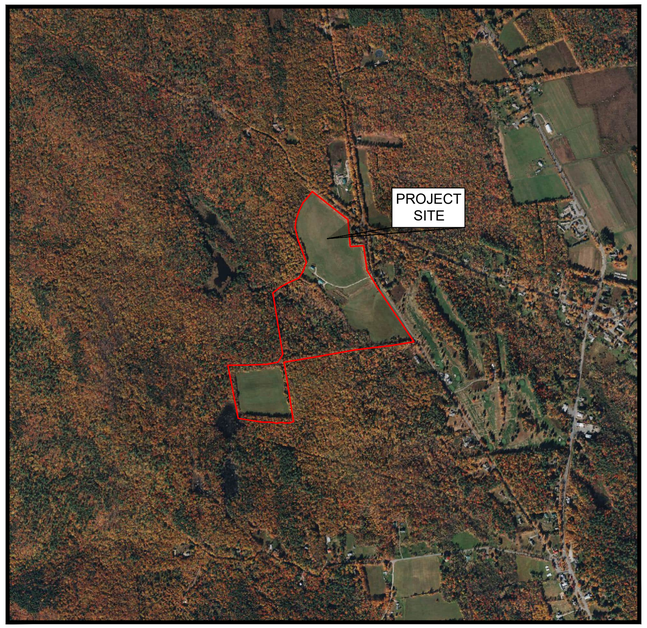
PROPRIETARY INFORMATION: THIS DRAWING IS THE PROPERTY OF WSP USA INC. AND IS NOT TO BE LOANED OR REPRODUCED IN ANY WAY WITHOUT THE PERMISSION OF WSP USA INC.

BWC WADES STREAM, LLC

2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098
SEPTEMBER 23, 2025
ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION



LOCUS MAP
1"=2500'



AERIAL IMAGE
1"=1000'

DRAWING INDEX

SHEET NUMBER	DRAWING TITLE	DRAWING NUMBER
	COVER SHEET	
1	CONSTRUCTION, EROSION AND SEDIMENTATION CONTROL NOTES	G-001
2	EXISTING CONDITIONS	V-101
3	PROPOSED CONDITIONS	C-101
4	GRADING/EARTHWORK PLAN	C-102
5	ACCESS ROAD TOPOGRAPHIC PROFILE ANALYSIS	C-104
6	SHADOW ANALYSIS OF PROPOSED CONDITIONS	C-105
7	DETAILS (SHEET 1 OF 2)	C-501
8	DETAILS (SHEET 2 OF 2)	C-502

PROPERTY OWNER

TIMOTHY J. SENA &
CATHERINE RUDE-SENA
PO BOX 132
WORTHINGTON, MA 01098

PREPARED BY

WSP USA INC.
100 APOLLO DRIVE SUITE 302
CHELMSFORD, MASSACHUSETTS 01824
T +1 978-692-9090
OLIVIA.CROSBY@WSP.COM

DEVELOPED BY

BWC WADES STREAM, LLC

116 HUNTINGTON AVE
BOSTON, MA 02116
T +1 617-209-3122
ASSETMGMT@BLUEWAVE.ENERGY

SITE PLAN REVIEW BY

TOWN OF WORTHINGTON
PLANNING BOARD
PO BOX 247; 160 HUNTINGTON ROAD
WORTHINGTON, MA 01098
T +1 413-238-5577
PLANNING@WORTHINGTONMA.US

D:\BlueWave\US-ED-0052230437 - Ridge Rd Worthington\4 Permitting\Sheets\0 - Ridge Rd - G-000.dwg - G-000 - Sep. 23, 2025 10:08am - wds_morgan.mcdonald

MATERIAL SPECIFICATIONS AND PLACEMENT REQUIREMENTS:

1.1 ANGULAR ROCK FILL

ANGULAR ROCK FILL SHALL BE USED FOR THE CONSTRUCTION ENTRANCE AS SHOWN ON THE DRAWINGS, AND SHALL MEET THE GRADATION REQUIREMENTS LISTED BELOW.

U.S. STANDARD SIEVE	PERCENT PASSING
3 INCH	100
2 INCH	80 - 100
1 INCH	50 - 80
NO. 200	0 - 10

PRIOR TO USE, THE ANGULAR ROCK FILL SHALL BE TESTED FOR APPROVAL AS DESCRIBED IN SECTION 2.0 AND SHALL BE PLACED AS DESCRIBED IN SECTION 3.0.

1.2 DENSE GRADED CRUSHED STONE

DENSE GRADED CRUSHED STONE SHALL BE USED TO CONSTRUCT THE CRUSHED STONE ACCESS ROAD, AND SHALL MEET THE REQUIREMENTS OF A MATERIAL SUCH AS MASSDOT SPECIFICATION M2.01.7 CRUSHED STONE, OR APPROVED EQUAL. THIS MATERIAL SHALL BE PLACED AT A MINIMUM THICKNESS OF 6-INCHES AND SHALL BE IN DIRECT CONTACT WITH THE BALLAST BLOCKS. THIS MATERIAL SHALL CONSIST OF CLEAN, HARD, DURABLE CRUSHED ROCK OR CRUSHED GRAVEL STONE, FREE FROM LOAM AND CLAY AND DELETERIOUS MATERIAL AND NO MORE THAN 10 PERCENT PASSING THE U.S. NO. 200 SIEVE. THIS MATERIAL SHALL MEET THE FOLLOWING GRADATION:

SIEVE DESIGNATION	PERCENT PASSING
2-INCH	100
1.5-INCH	70-100
¾-INCH	50-85
NO. 4	30-55
NO. 50	8-24
NO. 200	3-10

PRIOR TO USE, THE DENSE GRADED CRUSHED STONE SHALL BE TESTED FOR APPROVAL AS DESCRIBED BELOW IN SECTION 2.0 AND SHALL BE PLACED AS DESCRIBED BELOW IN SECTION 3.0.

1.3 GRANULAR FILL MATERIAL

CLEAN GRANULAR FILL MAY BE USED FOR FILL OR GRADING MATERIAL. GRANULAR FILL SHALL CONSIST OF MASSDOT MATERIAL M1.03.0, GRAVEL BORROW, TYPE C, OR APPROVED EQUAL, AND MEET THE FOLLOWING GRADATION:

SIEVE DESIGNATION	PERCENT PASSING
2-INCH	100
½-INCH	50-85
NO. 4	40-75
NO. 50	8-28
NO. 200	0-10

PRIOR TO USE, THE GRANULAR FILL SHALL BE TESTED FOR APPROVAL AS DESCRIBED IN SECTION 2.0 AND SHALL BE PLACED AS DESCRIBED IN SECTION 3.0.

1.4 LOAM BORROW MATERIAL

THE LOAM BORROW SHALL CONFORM TO MASSACHUSETTS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, DIVISION III - MATERIALS SPECIFICATIONS, SECTION M1.05.0 "LOAM BORROW". THE LOAM SHALL CONTAIN NOT LESS THAN 4% NOR MORE THAN 20% ORGANIC MATTER.

1.5 GEOTEXTILE FABRIC

FIBERS USED IN MANUFACTURING OF THE GEOTEXTILES SHALL CONSIST OF POLYPROPYLENE, POLYVINYL CHLORIDE, NYLON, POLYOLEFINS, POLYAMIDES, OR POLYESTER. THE FIBERS SHALL BE FORMED INTO A NETWORK SUCH THAT THE FILAMENTS OR YARNS RETAIN DIMENSIONAL STABILITY RELATIVE TO EACH OTHER, INCLUDING SELVAGES. THE GEOTEXTILE SHALL CONTAIN STABILIZERS AND/OR INHIBITORS TO MAKE THE FIBERS RESISTANT TO DETERIORATION RESULTING FROM EXPOSURE TO SUNLIGHT, WATER, OR HEAT. THE GEOTEXTILE SHALL BE FREE OF DEFECTS OR FLAWS WHICH WILL AFFECT ITS PHYSICAL PROPERTIES. PROVIDE A GEOTEXTILE MEETING THE PROPERTIES LISTED IN TABLE 1:

TABLE 1

REQUIRED PHYSICAL PROPERTIES OF GEOTEXTILE FABRIC

PROPERTY	TEST METHOD	NON-WOVEN	WOVEN
MASS PER UNIT AREA	D 5261	6	N/A
GRAB TENSILE STRENGTH (LBS)	D 4632	170	N/A
TENSILE STRENGTH (LBS/FT)	D 4595	N/A	7200
ELONGATION (%)	D 4632	50	N/A
PUNCTURE STRENGTH (LBS)	D 6241	435	N/A
TRAPEZOID TEAR (LBS)	D 4533	70	N/A
PERMITTIVITY (SEC^{-1})	D 4491	1.50	0.90
WATER FLOW RATE (GPM/FT^2)	D 4491	110	65
ULTRAVIOLET STABILITY (% FOR MIN 500 HRS)	D 4355	70	80
APPARENT OPENING SIZE (AOS) (STANDARD SIEVE)	D 4751	70	20

TABLE NOTES:

1. ALL NUMERICAL VALUES EXCEPT AOS AND ULTRAVIOLET STABILITY REPRESENT MINIMUM AVERAGE ROLL VALUES (MARV), IN THE WEAKER PRINCIPAL DIRECTION.
2. AOS VALUE IS A MAXIMUM AVERAGE ROLL VALUE OR MAXARV.
3. ULTRAVIOLET STABILITY IS MEASURED AS A MINIMUM AVERAGE PERCENTAGE.
4. SEE DETAILS ON DRAWING C-501 FOR LOCATIONS OF WOVEN AND NON-WOVEN GEOTEXTILES.

2.0 BORROW SOURCE TESTING REQUIREMENTS

PRIOR TO USE, BORROW SOURCE TESTING, INCLUDING GEOTECHNICAL CHARACTERIZATION REQUIREMENTS, SHALL BE CONDUCTED ON ALL SOIL MATERIALS PROPOSED FOR CONSTRUCTION AND SUBMITTED TO THE ENGINEER TO ASSESS CONFORMANCE TO MATERIAL SPECIFICATIONS.

3.0 MATERIAL PLACEMENT AND FIELD QUALITY CONTROL REQUIREMENTS

1. FILL MATERIAL SHALL NOT BE PLACED ON SURFACES THAT ARE MUDDY, FROZEN, OR CONTAIN FROST OR ICE.
2. SURFACES ON WHICH THE GEOTEXTILE WILL BE PLACED SHALL BE PREPARED TO A RELATIVELY SMOOTH SURFACE CONDITION. SURFACES SHALL BE FREE FROM OBSTRUCTION, DEBRIS, DEPRESSIONS, EROSION FEATURE, OR VEGETATION. ANY IRREGULARITIES SHALL BE REMOVED SO AS TO ENSURE CONTINUOUS, INTIMATE CONTACT OF THE GEOTEXTILE WITH THE SURFACE. ANY LOOSE MATERIAL, OR SOFT OR LOW DENSITY POCKETS OF MATERIAL, SHALL BE REMOVED, FILLED WITH SUITABLE SUBGRADE FILL, AND COMPACTED. EROSION FEATURES SUCH AS RILLS AND GULLIES MUST BE GRADED OUT OF THE SURFACE BEFORE GEOTEXTILE PLACEMENT.
3. AT THE TIME OF INSTALLATION, FABRIC SHALL BE REJECTED IF IT HAS DEFECTS, RIPS, HOLES, FLAWS, DETERIORATION OR DAMAGE INCURRED DURING MANUFACTURE, TRANSPORT OR STORAGE.
4. FABRIC SHALL LAY SMOOTH AND BE FREE OF TENSION, STRESS, FOLDS, WRINKLES, OR CREASES.
5. CRUSHED STONE FOR ACCESS ROADS SHALL BE PLACED IN MAXIMUM 6-INCH LOOSE LIFTS AND COMPACTED TO A MINIMUM OF 95% OF MAXIMUM DRY DENSITY (MODIFIED PROCTOR (ASTM D 1557)).
6. LOAM BORROW FOR STORMWATER INFILTRATION BEST MANAGEMENT PRACTICES (BMPS) SHALL BE PLACED IN MAXIMUM 6-INCH LOOSE LIFTS AND COMPACTED TO A MINIMUM OF 92% OF MAXIMUM DRY DENSITY (MODIFIED PROCTOR (ASTM D 1557)).

CONCEPTUAL CONSTRUCTION SEQUENCE:

1. ESTABLISHMENT OF LIMITS OF WORK;
2. PLACEMENT OF EROSION CONTROLS;
3. MINOR CLEARING AND GRUBBING AND SITE GRADING;
4. CONSTRUCTION OF ACCESS ROAD;
5. CONSTRUCTION OF THE SOLAR ARRAY AND APPURTENANT EQUIPMENT;
4. RESTORATION OF DISTURBED AREAS;
5. CONSTRUCTION OF STORMWATER INFILTRATION BMPS;
6. ERECTION OF THE PERIMETER FENCE; AND
7. FINAL STABILIZATION OF DISTURBED AREAS.

EROSION AND SEDIMENTATION CONTROL PLAN:

THIS PLAN HAS BEEN DEVELOPED TO PROVIDE A STRATEGY FOR CONTROLLING SOIL EROSION AND SEDIMENTATION DURING AND AFTER CONSTRUCTION OF THE PROPOSED PROJECT.

THIS PLAN IS BASED ON STANDARDS AND SPECIFICATIONS FOR EROSION PREVENTION IN DEVELOPING AREAS AS CONTAINED IN MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS, 2003.

GENERAL EROSION AND SEDIMENTATION CONSTRUCTION DETAIL NOTES:

DURING CONSTRUCTION, THE CONTRACTOR SHALL TAKE ALL REASONABLE MEASURES TO SCHEDULE EARTHWORK OPERATIONS SUCH THAT THE AREA OF EXPOSED AND DISTURBED SOIL IS MINIMIZED. CONSTRUCTION SHALL BE PHASED TO MINIMIZE THE AREA OF DISTURBED SOIL THAT IS EXPOSED AT ANY ONE TIME. UPGRADIENT STORM WATER DIVERSION AND DISPERSION MEASURES SHALL BE INSTALLED WHERE APPROPRIATE. ALL CUT AND FILL SLOPES SHALL BE STABILIZED UPON COMPLETION. THE FOLLOWING MEASURES WILL BE UNDERTAKEN TO PROVIDE MAXIMUM PROTECTION TO THE SOIL, WATER, AND ABUTTING LANDS:

PRIOR TO GRUBBING OR ANY EARTH MOVING OPERATION, SEDIMENT BARRIERS, OR OTHER APPROPRIATE PERIMETER CONTROL BMPS SHALL BE INSTALLED ACROSS THE SLOPE ON THE CONTOUR AT THE DOWNHILL LIMIT OF THE WORK AS PROTECTION AGAINST CONSTRUCTION RELATED EROSION. INSTALL ALL NECESSARY STORMWATER DIVERSIONS AND DISPERSION MEASURES.

1. PERMANENT SOIL STABILIZATION MEASURES FOR ALL SLOPES, OR ANY DISTURBED LAND AREA SHALL BE COMPLETED WITHIN FOURTEEN CALENDAR DAYS AFTER FINAL GRADING HAS BEEN COMPLETED. WHEN IT IS NOT POSSIBLE OR PRACTICAL TO PERMANENTLY STABILIZE DISTURBED LAND, TEMPORARY EROSION CONTROL MEASURES SHALL BE IMPLEMENTED ON DISTURBED AREAS (INCLUDING STOCKPILES) WITHIN FOURTEEN CALENDAR DAYS OF EXPOSURE OF SOIL OR FORMATION OF PILES, UNLESS THESE AREAS ARE TO BE SUBSEQUENTLY SURFACED WITH PERMANENT STRUCTURES. ALL DISTURBED AREAS SHALL BE MULCHED FOR EROSION CONTROL UPON COMPLETION OF ROUGH GRADING.
2. ANY EXPOSED SLOPES 3:1 OR GREATER SHALL BE STABILIZED WITH EROSION CONTROL BLANKETS (NORTH AMERICAN GREEN C125BN OR APPROVED EQUAL) TO PREVENT EROSION DURING CONSTRUCTION AND TO FACILITATE REVEGETATION AFTER TOPSOILING AND SEEDING.
3. EXISTING TOPSOIL SHALL BE SAVED, STOCKPILED, AND REUSED AS MUCH AS POSSIBLE ON SITE. SEDIMENT BARRIER SHALL BE INSTALLED AT THE BASE OF STOCKPILES AT THE DOWNHILL LIMIT TO PROTECT AGAINST EROSION. STOCKPILES ANTICIPATED TO REMAIN FOR MORE THAN 14 CALENDAR DAYS SHALL BE STABILIZED BY SEEDING AND MULCHING UPON FORMATION OF THE PILES. UPGRADIENT OF THE STOCKPILES, STABILIZED DITCHES AND/OR BERMS SHALL BE CONSTRUCTED TO DIVERT STORMWATER RUNOFF AWAY FROM THE PILES.
4. INTERCEPTED SEDIMENT SHALL BE REMOVED WHEN IT REACHES ONE-HALF THE HEIGHT OF THE SEDIMENT BARRIER, OR AS DIRECTED IN THE DRAWING DETAILS FOR OTHER BMPS, AND SHALL BE DEPOSITED IN AN AREA THAT SHALL NOT CONTRIBUTE TO SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED. ALL DAMAGED EROSION CONTROL DEVICES SHALL BE REPAIRED AND/OR REPLACED IMMEDIATELY. DEVICES NO LONGER SERVICEABLE DUE TO SEDIMENT ACCUMULATION SHALL ALSO BE REPAIRED AND/OR REPLACED AS REQUIRED.
5. ADDITIONAL EROSION CONTROL METHODS SHALL BE IMPLEMENTED IF CONSTRUCTION OCCURS BETWEEN NOVEMBER 1ST AND APRIL 15TH. ALL DISTURBED AREAS SHALL BE MINIMIZED TO THE EXTENT POSSIBLE. PRIOR TO FREEZING, ADDITIONAL EROSION CONTROL DEVICES SHALL BE INSTALLED AS APPROPRIATE. INSPECTION OF THESE EROSION CONTROL ITEMS SHALL BE FREQUENT, WITH PARTICULAR ATTENTION PAID TO WEATHER PREDICTIONS TO ENSURE THAT THESE MEASURES ARE PROPERLY IN PLACE TO HANDLE LARGE QUANTITIES OF RUNOFF RESULTING FROM HEAVY RAINS OR EXCESSIVE THAWS.
6. GENERAL EROSION AND SEDIMENTATION CONTROL ACTIONS SHALL BE EMPLOYED, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
   - MARK SOIL DISTURBANCE LIMITS
   - INSTALL SEDIMENT BARRIERS BEFORE DISTURBING ANY SOILS
   - DIVERT AND DISPERSE STORM WATER RUNOFF TO UNDISTURBED AREAS WHEREVER POSSIBLE
   - MULCH DISTURBED AREAS
   - PROTECT STEEP SLOPES
   - INSPECT AND REPAIR EROSION CONTROLS AND SEDIMENT BARRIERS

DUST CONTROL:

1. CONSTRUCTION ACTIVITIES SHALL BE SCHEDULED TO MINIMIZE THE AREA OF DISTURBED SOIL THAT IS EXPOSED AT ONE TIME.
2. DUST CONTROL SHALL BE USED ON CONSTRUCTION ROUTES AND OTHER DISTURBED AREAS SUBJECT TO SURFACE DUST MOVEMENT AND DUST BLOWING.
3. MAINTAIN DUST CONTROL MEASURES PROPERLY THROUGH DRY WEATHER PERIODS UNTIL ALL DISTURBED AREAS HAVE BEEN PERMANENTLY STABILIZED.
4. DUST CONTROL METHODS SHALL BE APPROVED BY THE ENGINEER AND MAY INCLUDE VEGETATIVE COVER, MULCH (INCLUDING GRAVEL MULCH), SPRINKLING, STONE, AND BARRIERS.
5. VEGETATIVE COVER - FOR DISTURBED AREAS NOT SUBJECT TO TRAFFIC, VEGETATION PROVIDES THE MOST PRACTICAL METHOD OF DUST CONTROL.
6. MULCH (INCLUDING GRAVEL MULCH) - WHEN PROPERLY APPLIED, MULCH OFFERS A FAST, EFFECTIVE MEANS OF CONTROLLING DUST. SEE MANUFACTURER'S RECOMMENDATIONS OR THE MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS, 2003 FOR APPLICATION RATES.
7. SPRINKLING - EXPOSED SOILS MAY BE SPRINKLED UNTIL THE SURFACE IS WET. SPRINKLING IS ESPECIALLY EFFECTIVE FOR DUST CONTROL ON HAUL ROADS AND OTHER TRAFFIC ROUTES.
8. STONE - USED TO STABILIZE CONSTRUCTION ROADS; CAN ALSO BE EFFECTIVE FOR DUST CONTROL.
9. BARRIERS - A BOARD FENCE, WIND FENCE, SEDIMENT FENCE, OR SIMILAR BARRIER CAN CONTROL AIR CURRENTS AND BLOWING SOIL. ALL OF THESE FENCES ARE NORMALLY CONSTRUCTED OF WOOD AND THEY PREVENT EROSION BY OBSTRUCTING THE WIND NEAR THE GROUND AND PREVENTING THE SOIL FROM BLOWING OFFSITE.

MONITORING PROGRAM:

1. EROSION AND SEDIMENTATION CONTROLS SHALL BE INSPECTED AT LEAST ONCE EVERY 7 CALENDAR DAYS AND WITHIN 24 HOURS OF THE END OF A STORM EVENT OF 0.25 INCHES OR GREATER. DAILY RAINFALL SHALL BE MONITORED AND RECORDED BY THE CONTRACTOR. ALL STRUCTURES DAMAGED BY CONSTRUCTION EQUIPMENT, VANDALS, OR THE ELEMENTS SHALL BE REPAIRED OR REPLACED IMMEDIATELY, PRIOR TO CONTINUING THE CONSTRUCTION.
2. FOLLOWING THE FINAL SEEDING, THE SITE SHALL BE INSPECTED IN ACCORDANCE WITH THE SCHEDULE OUTLINED IN #1 ABOVE, TO ENSURE THAT THE VEGETATION HAS BEEN ESTABLISHED (90% COVER ACHIEVED). IN THE EVENT OF ANY UNSATISFACTORY GROWTH, RESEEDING WILL BE CARRIED OUT, WITH FOLLOW-UP INSPECTION.
3. AFTER THE CONSTRUCTION INSPECTOR HAS DETERMINED THAT THE PROJECT AREA HAS BEEN PERMANENTLY STABILIZED (70% COVER HAS BEEN ACHIVED OR NON-VEGETATED MEASURES HAVE BEEN IMPLEMENTED), THE CONTRACTOR SHALL REMOVE ALL SEDIMENT BARRIERS, TEMPORARY SEDIMENTATION CONTROL RISERS AND ANY OTHER TEMPORARY EROSION CONTROL MEASURES.

SEEDING AND REVEGETATION PLAN:

IMMEDIATELY FOLLOWING THE COMPLETION OF TREE CLEARING, ALL DISTURBED AREAS SHALL BE TREATED AS STATED BELOW IN ORDER TO MINIMIZE CONSTRUCTION-PERIOD EROSION.

APPLY SEED/TACKIFIER MIX ACCORDING TO THE FOLLOWING SPECIFICATIONS:

1. SEED: ERNST SEEDS QUICK EROSION CONTROL COVER MIX CONSISTING OF (% BY WEIGHT):
   - 50% LOLIUM MULTIFLORUM (ANNUAL RYEGRASS)
   - 50% LOLIUM PERENNE, 'BIGLEAGUE' (PERENNIAL RYEGRASS, 'BIGLEAGUE')

   1.1. SEEDING RATE: 50 LBS PER ACRE
2. TACKIFIER: GEOPERM BONDED FIBER MATRIX (OR APPROVED EQUAL) APPLIED PER MANUFACTURER SPECIFICATIONS.

UPON COMPLETION OF SITE CONSTRUCTION, ALL AREAS PREVIOUSLY DISTURBED WITHIN THE FENCED AREA SHALL BE TREATED AS STATED BELOW. THESE AREAS WILL BE CLOSELY MONITORED BY THE CONTRACTOR UNTIL SUCH TIME AS A SATISFACTORY GROWTH OF VEGETATION IS ESTABLISHED. SATISFACTORY GROWTH SHALL MEAN A MINIMUM OF 90% OF THE AREA IS VEGETATED WITH VIGOROUS GROWTH.

1. TOPSOIL WILL BE SPREAD OVER ALL DISTURBED AREAS TO BE REVEGETATED AND SHALL BE GRADED TO A UNIFORM DEPTH OF FOUR (4) TO SIX (6) INCHES.
2. APPLY SEED AS DIRECTED BY THE OWNER AND FARMER OF THE LAND TO MAINTAIN HAY PRODUCTION AND RESTORE SITE TO PRE-EXISTING CONDITIONS TO THE MAXIMUM EXTENT PRACTICABLE.
3. SEEDING METHODS MAY BE DRILL SEEDINGS, BROADCASTS AND ROLLED, CULTIPACKED, OR TRACKED WITH A SMALL TRACK PIECE OF CONSTRUCTION EQUIPMENT, OR HYDRO-SEEDING, WITH SUBSEQUENT TRACKING.
4. WATERING MAY BE REQUIRED DURING DRY PERIODS, THE CONTRACTOR MUST CONSULT SEED MANUFACTURER'S INSTRUCTIONS.
5. INSPECT SEEDED AREAS FOR FAILURE AND MAKE NECESSARY REPAIRS AND RESEED IMMEDIATELY. CONDUCT A FOLLOW-UP SURVEY AFTER ONE YEAR AND RESEED WHERE NECESSARY.
6. ALL SEDIMENT CONTROL STRUCTURES LOCATED DOWN GRADIENT OF SOILS STABILIZED BY VEGETATIVE MEASURES SHALL REMAIN IN PLACE UNTIL VEGETATION IS ESTABLISHED. ESTABLISHED MEANS A MINIMUM OF 70% OF THE AREA IS VEGETATED WITH VIGOROUS GROWTH.

UPON COMPLETION OF SITE CONSTRUCTION, ALL AREAS PREVIOUSLY DISTURBED OUTSIDE THE FENCED AREA SHALL BE TREATED AS STATED BELOW. THESE AREAS WILL BE CLOSELY MONITORED BY THE CONTRACTOR UNTIL SUCH TIME AS A SATISFACTORY GROWTH OF VEGETATION IS ESTABLISHED. SATISFACTORY GROWTH SHALL MEAN A MINIMUM OF 90% OF THE AREA IS VEGETATED WITH VIGOROUS GROWTH.

1. APPLY SEED AS DIRECTED BELOW:

   (APRIL 1ST THROUGH OCTOBER 1ST)
   - SEED DISTURBED AREAS AT THE RATE OF 30 LBS PER ACRE OF ERNST SEEDS NORTHEAST SOLAR POLLINATOR 4' MIX CONSISTING OF (% BY WEIGHT):
     - 35% BOUTELOUA CURTIPENDULA, BUTTE (SIDEOATS GRAMA, BUTTE)
     - 35% SCHIZACHYRIUM SCOPARIUM, 'CAMPER' (LITTLE BLUESTEM, 'CAMPER')
     - 10% PANICUM SPHAERONCARPON (ROUNDSEED PANICGRASS)
     - 4% ASCLEPIAS TUBEROSA (BUTTERFLY MILKWEED)
     - 4% CHAMAECRISTA FASCICULATA, PA ECOTYPE (PARTRIDGE PEA, PA ECOTYPE)
     - 4% COREOPSIS LANCEOLATA (LANCELEAF COREOPSIS)
     - 4% RUDBECKIA HIRTA (BLACKEYED SUSAN)
     - 0.9% PYCNANTHEMUM TENUIFOLIUM (NARROWLEAF MOUNTAINMINT)
     - 0.7% ASTER OBLONGIFOLIUS, (AROMATIC ASTER, PA ECOTYPE)
     - 0.5% ASTER PRENANTHOIDES, PA ECOTYPE (ZIGZAG ASTER, PA ECOTYPE)
     - 0.5% PENSTEMON DIGITALIS (TALL WHITE BEARDTONGUE)
     - 0.5% TRADESCANTIA OHIENSIS (OHIO SPIDERWORT, PA ECOTYPE)
     - 0.5% ZIZIA AUREA (GOLDEN ALEXANDERS)
     - 0.3% OENOTHERA FRUTICOSA VAR. FRUTICOSA (SUNDROPS)
     - 0.1% SOLIDAGO NEMORALIS, PA ECOTYPE (GRAY GOLDENROD, PA ECOTYPE)
   - APPLY WOOD FIBER MULCH AT A RATE OF 2,000 LBS PER ACRE FOR MAXIMUM MOISTURE RETENTION.
   - SEEDING SHALL HAVE A MINIMUM GERMINATION PERCENTAGE OF 85%.

   (NOVEMBER 1ST THROUGH DECEMBER 15TH)
   - SEED DISTURBED AREAS AT THE RATE OF 3 LBS PER 1,000 SQ. FT. OF WINTER RYE
   - APPLY HAY MULCH AT THE RATE OF 100 LBS PER 1,000 SQ. FT.

   (AFTER DECEMBER 15TH)
   - DO NOT SEED.
   - APPLY HAY MULCH AT THE RATE OF 100 LBS PER 1,000 SQ. FT.
2. SEEDING METHODS MAY BE DRILL SEEDINGS, BROADCASTS AND ROLLED, CULTIPACKED, OR TRACKED WITH A SMALL TRACK PIECE OF CONSTRUCTION EQUIPMENT, OR HYDRO-SEEDING, WITH SUBSEQUENT TRACKING.
3. WATERING MAY BE REQUIRED DURING DRY PERIODS CONSULT SEED MANUFACTURER'S INSTRUCTIONS.
4. INSPECT SEEDED AREAS FOR FAILURE AND MAKE NECESSARY REPAIRS AND RESEED IMMEDIATELY. CONDUCT A FOLLOW-UP SURVEY AFTER ONE YEAR AND RESEED WHERE NECESSARY.
5. ALL SEDIMENT CONTROL STRUCTURES LOCATED DOWN GRADIENT OF SOILS STABILIZED BY VEGETATIVE MEASURES SHALL REMAIN IN PLACE UNTIL VEGETATION IS ESTABLISHED. ESTABLISHED MEANS A MINIMUM OF 70% OF THE AREA IS VEGETATED WITH VIGOROUS GROWTH.

ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION

WSP USA INC.
100 APOLLO DRIVE, SUITE 302
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REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED	APPROVED
0	08/20/2025	ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION	MRB	OAC

PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
CONSTRUCTION, EROSION, AND SEDIMENTATION CONTROL NOTES

CLIENT:
BWC WADES STREAM, LLC

SEAL:
COMMONWEALTH OF MASSACHUSETTS
ANDREW P VARDAKIS
CIVIL
No. 52524
REGISTERED PROFESSIONAL ENGINEER
08/20/2025

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN
PROJECT NUMBER: US-EI-365230438	
DRAWING NUMBER: **G-001**	
SHEET NUMBER: **1 OF 8**	

D:\Blue Vaves\US-EI-365230437 - Ridge Rd Worthington\Permitting\Sheets\1 - Ridge Rd - G-001.dwg - G-001 - Sep. 23, 2025 10:26am - wds_morgan.mcdonald

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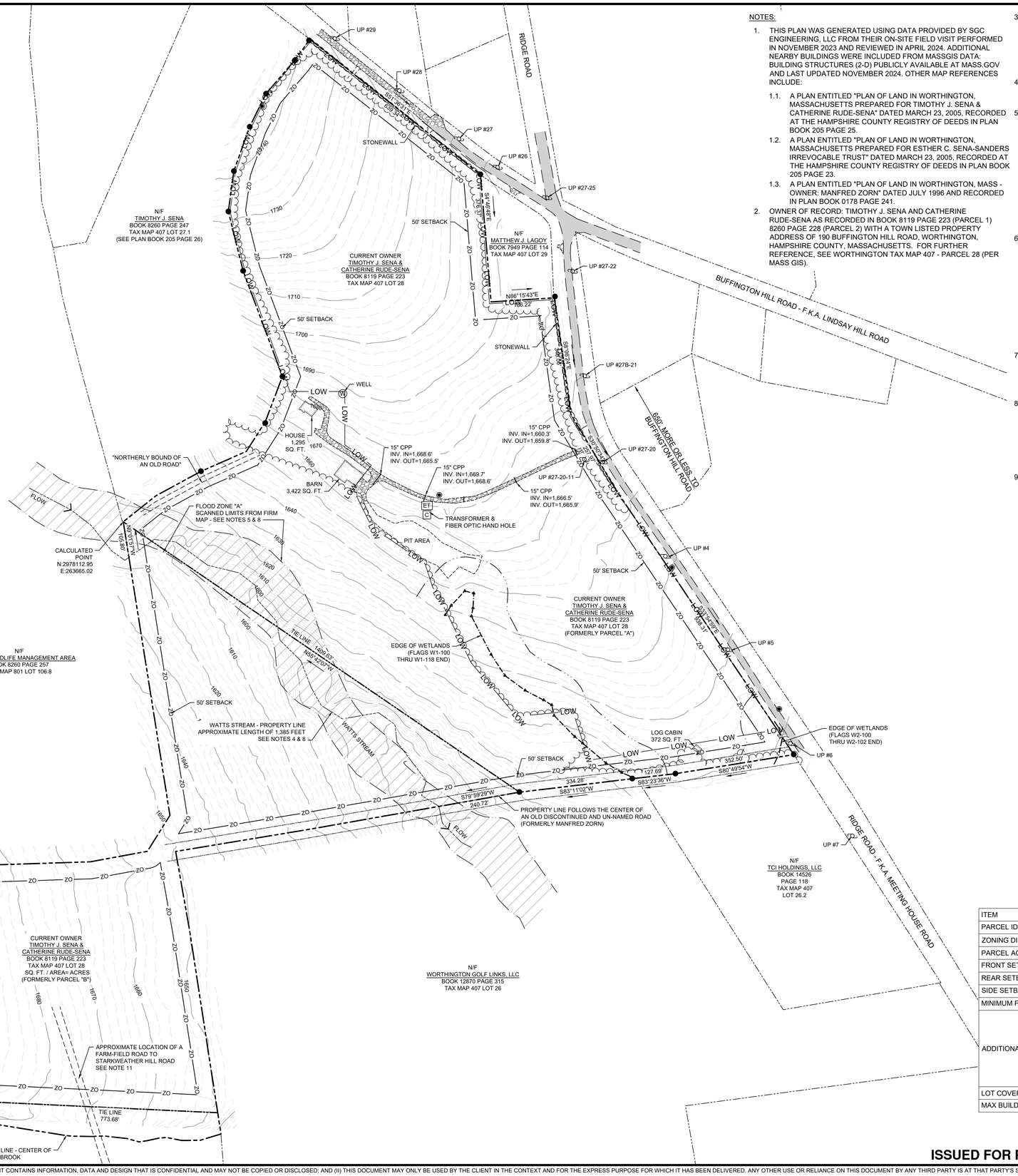

NOTES:

1. THIS PLAN WAS GENERATED USING DATA PROVIDED BY SGC ENGINEERING, LLC FROM THEIR ON-SITE FIELD VISIT PERFORMED IN NOVEMBER 2023 AND REVIEWED IN APRIL 2024. ADDITIONAL NEARBY BUILDINGS WERE INCLUDED FROM MASSGIS DATA: BUILDING STRUCTURES (2-D) PUBLICLY AVAILABLE AT MASS.GOV AND LAST UPDATED NOVEMBER 2024. OTHER MAP REFERENCES INCLUDE:
   - 1.1. A PLAN ENTITLED "PLAN OF LAND IN WORTHINGTON, MASSACHUSETTS PREPARED FOR TIMOTHY J. SENA & CATHERINE RUDE-SENA" DATED MARCH 23, 2005, RECORDED AT THE HAMPSHIRE COUNTY REGISTRY OF DEEDS IN PLAN BOOK 205 PAGE 25.
   - 1.2. A PLAN ENTITLED "PLAN OF LAND IN WORTHINGTON, MASSACHUSETTS PREPARED FOR ESTHER C. SENA-SANDERS IRREVOCABLE TRUST" DATED MARCH 23, 2005, RECORDED AT THE HAMPSHIRE COUNTY REGISTRY OF DEEDS IN PLAN BOOK 205 PAGE 23.
   - 1.3. A PLAN ENTITLED "PLAN OF LAND IN WORTHINGTON, MASS - OWNER: MANFRED ZORN" DATED JULY 1996 AND RECORDED IN PLAN BOOK 0178 PAGE 241.
2. OWNER OF RECORD: TIMOTHY J. SENA AND CATHERINE RUDE-SENA AS RECORDED IN BOOK 8119 PAGE 223 (PARCEL 1) 8260 PAGE 228 (PARCEL 2) WITH A TOWN LISTED PROPERTY ADDRESS OF 190 BUFFINGTON HILL ROAD, WORTHINGTON, HAMPSHIRE COUNTY, MASSACHUSETTS. FOR FURTHER REFERENCE, SEE WORTHINGTON TAX MAP 407 - PARCEL 28 (PER MASS GIS).
3. HORIZONTAL DATUM IS BASED ON MASSACHUSETTS STATE GRID COORDINATE SYSTEM NAD83 (2011 - MAINLAND). VERTICAL DATUM IS REFERENCED TO NAVD 88. TOPOGRAPHY SHOWN WAS DEVELOPED UTILIZING THE MOST UP TO DATE ONLINE ELECTRONIC LIDAR FILES FROM NGS. IN COMBINATION WITH ON THE GROUND DATA COLLECTION WITH SURVEY GRADE GPS AND OR ROBOTIC TOTAL STATION. CONTOUR INTERVAL SHOWN ON PLAN IS 2 FOOT.
4. THE WETLANDS SHOWN ON THIS PLAN WERE REVIEWED, DEFINED, AND FLAGGED BY OTHERS AND FIELD LOCATED BY SGC ENGINEERING DATED NOVEMBER 22, 2023.
5. A PREDOMINATE PORTION OF THE PROPERTY LIES WITHIN ZONE "X" AND THE PROPOSED SOLAR DEVELOPMENT IS NOT AFFECTED (SEE PLAN). A SMALL CENTRAL PORTION OF THE LOCUS PARCEL IS AFFECTED BY ZONE "A" AND IS CATEGORIZED AS A SPECIFIED FLOOD HAZARD ZONE. FOR FURTHER REFERENCE SEE F.I.R.M. - FLOOD INSURANCE RATE MAP - COMMUNITY PANEL NUMBER 250175 0008 SUFFIX B / MAP NUMBER 8 OF 25 FOR THE TOWN OF WORTHINGTON, HAMPSHIRE COUNTY (ALL JURISDICTIONS), MASSACHUSETTS. WITH AN EFFECTIVE DATE OF JUNE 19, 1989. ZONE "A" (WATTS STREAM SO-CALLED) IS DESCRIBED AS AN AREA THAT NO BASE FLOOD ELEVATION HAS BEEN DETERMINED. THE BASE FLOOD ELEVATION IS THE WATER SURFACE ELEVATION OF THE 1% ANNUAL CHANCE FLOOD. ZONE "X" IS DETERMINED AS AREAS OUTSIDE 500 - YEAR FLOOD PLAIN.
6. NEITHER SGC ENGINEERING, LLC NOR WSP HAVE INDEPENDENTLY VERIFIED THE LOCATION, EXISTENCE, AND SERVICEABILITY OF ANY UTILITIES AND MAKE NO GUARANTEE TO THE COMPLETENESS OR THE ACCURACY OF ANY UTILITIES SHOWN ON THIS PLAN. UTILITIES SHOWN WERE FIELD LOCATED ABOVEGROUND AND VISUAL, AND OR REFERENCED FROM PLANS AND MAP REFERENCES. ADDITIONAL UTILITIES MAY EXIST IN THE FIELD, WHICH ARE NOT SHOWN ON THIS PLAN. ACTUAL LOCATIONS MUST BE DETERMINED IN THE FIELD PRIOR TO EXCAVATION OR OTHER CONSTRUCTION ACTIVITIES. CALL "DIG SAFE" AT 1-888-344-7233 OR DIAL 811. SGC ENGINEERING, LLC AND WSP USA INC. ASSUME NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN ON THIS PLAN.
7. THIS SURVEY WAS PREPARED FOR THE EXCLUSIVE USE OF THE PERSON, PERSONS, OR ENTITY NAMED IN THE CERTIFICATION AND TITLE BLOCK OF THIS PLAN. THIS SURVEY DOES NOT EXTEND TO ANY UNNAMED PERSON, PERSONS, OR ENTITY WITHOUT HAVING SGC ENGINEERING'S CONSENT IN WRITING.
8. THE LOCATIONS OF THE WATTS STREAM, WITHIN PARCEL "A" (SO CALLED), AND AN UN-NAMED BROOK, THAT DEMARCATES A WESTERLY BOUNDARY LINE OF PARCEL "B", ARE BOTH BASED ON PHYSICAL FIELD EVIDENCE, DEED CALLS, AND OR PLANS OF RECORD AT TIME OF SURVEY. BOTH WATTS STREAM AND THE UN-NAMED BROOK MAY OR MAY NOT AFFECT THE PRESENT - FUTURE PROPERTY DUE TO AVULSION, ACCRETION, AND/OR RELICTION.
9. OBSERVATIONS OF THE PREMISES BY SGC IN NOVEMBER 2023:
   - 9.a. LOCUS PARCEL HAS FREE AND CLEAR ACCESS, IN AND TO BUFFINGTON HILL ROAD AND RIDGE ROAD AS SHOWN ON PLAN. BOTH ROADS ARE DEDICATED AND PUBLIC WAYS OF VARIABLE WIDTHS.
   - 9.b. THE LOCUS PARCEL IS THE SAME LAND AS DESCRIBED IN THE TITLE COMMITMENT AS EXHIBIT "A".
   - 9.c. NO EVIDENCE OF EARTH MOVING WORK, BUILDING CONSTRUCTION, AND BUILDING ADDITIONS WERE OBSERVED ON SURVEYED PREMISES.
   - 9.d. THE PROPERTY COMPRISES A SINGLE TAX LOT - TOWN OF WORTHINGTON TAX MAP NUMBER 407 PARCEL 28.
   - 9.e. NO EVIDENCE WAS NOTICED OF THE SITE BEING USED AS A SOLID WASTE DUMP.

LEGEND:

EXISTING:
- 710 MAJOR CONTOUR
- MINOR CONTOUR
- PROPERTY LINE
- INTERNAL PROPERTY LINE
- ABUTTER'S PROPERTY LINE
- RIGHT OF WAY
- ZO PROPERTY LINE SETBACK
- BUILDING
- ASPHALT
- GRAVEL
- STONE WALL
- EDGE OF VEGETATION
- EDGE OF GRASS
- TRAIL
- EDGE OF WETLAND
- WETLAND FLAG
- WATERBODY
- BUFFER
- FEMA FLOOD ZONE "A"
- OHE OVERHEAD WIRE
- CULVERT
- UTILITY POLE
- BOUNDARY EVIDENCE
- CONTROL POINT

PROPOSED:
- LOW LIMIT OF WORK

ITEM	REQUIRED		PROPOSED
PARCEL ID NUMBER(S)	TAX MAP 407 0 28		
ZONING DISTRICT	RESIDENTIAL - AGRICULTURAL DISTRICT		
PARCEL ACREAGE	2.0		71.6
FRONT SETBACK (FT)	50		50
REAR SETBACK (FT)	50		>500
SIDE SETBACK (FT)	50		50
MINIMUM FRONTAGE (FT)	400		1542
ADDITIONAL SETBACKS	ACCESS TO SIDE-REAR (FT)	25	>400
	ACCESS EASEMENT (FT)	15	-
	UTILITY EASEMENT (FT)	20	-
	LEASE TO FENCE (FT)	25	-
	LEASE TO BASINS (FT)	15	-
	WETLANDS (FT)	100	-
LOT COVERAGE	<50%		8.6%
MAX BUILDING HEIGHT (FT)	35		10

0' 75' 150' 225'
1" = 150' WHEN PLOTTED 24" X 36"

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190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
EXISTING CONDITIONS

CLIENT:
BWC WADES STREAM, LLC

SEAL:
COMMONWEALTH OF MASSACHUSETTS
ANDREW P VARDAKIS
CIVIL
No. 52524
REGISTERED PROFESSIONAL ENGINEER
08/23/2025

DESIGNED BY:	DRAWN BY:
OAC	MRB
CHECKED BY:	SCALE:
APV	AS SHOWN

PROJECT NUMBER: US-EI-365230438

DRAWING NUMBER: **V-101**

SHEET NUMBER: **2 OF 8**

D:\Blue\Vaveli\US-EI-365230437 - Ridge Rd Worthington\Permitting\Sheets\2 - Ridge Rd - V-101.dwg - V-101 - Sep 23, 2025 10:28am - wds_morgan.mcdonald

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NOTES:

1. ELECTRICAL DESIGN, INCLUDING UTILITY POLES, PERFORMED BY OTHERS. ELECTRICAL EQUIPMENT AND COMPONENTS SHOWN TO ILLUSTRATE LOCATIONS ONLY. REFER TO ELECTRICAL DRAWINGS FOR DETAILED ELECTRICAL SYSTEM.
2. ALL AREAS WITHIN LIMIT OF DISTURBANCE TO BE SEEDED AS SPECIFIED IN THE SEEDING & REVEGETATION PLAN ON SHEET G-001.

LEGEND:

EXISTING:
- PROPERTY LINE
- INTERNAL PROPERTY LINE
- ABUTTER'S PROPERTY LINE
- RIGHT OF WAY
- ZO — PROPERTY LINE SETBACK
- BUILDING
- ASPHALT
- GRAVEL
- STONE WALL
- EDGE OF VEGETATION
- EDGE OF GRASS
- TRAIL
- EDGE OF WETLAND
- WETLAND FLAG
- WATERBODY
- BUFFER
- FEMA FLOOD ZONE "A"
- OHE — OVERHEAD WIRE
- CULVERT
- UTILITY POLE
- BOUNDARY EVIDENCE
- CONTROL POINT

PROPOSED:
- LOW — LIMIT OF WORK
- 1670 — MAJOR CONTOUR
- MINOR CONTOUR
- FIXED KNOT GAME FENCE (10 C-501, 17 C-502)
- DOUBLE SWING GATE (7,11 C-501)
- SLIDING GATE (9 C-501)
- OHE — OVERHEAD ELECTRIC
- SB — SEDIMENT BARRIER (4 C-501)
- EC — ELECTRICAL CONDUIT (2 C-501)
- ACCESS ROAD (1 C-501)
- CONCRETE PAD (6 C-501)
- SOLAR PV ARRAY (8 C-501)
- UTILITY POLE
- CULVERT (3 C-501)
- INFILTRATION TRENCH (12 C-502)
- PERVIOUS BERM (12,16 C-502)
- VEGETATED FILTER STRIP (12 C-502)
- CONVEYANCE CHANNEL (15 C-502)
- RIPRAP APRON (13,14 C-502)

SYSTEM SIZE (MWDC; MWAC)	3.93 MWDC; 2.00 MWAC
PANEL COUNT (# OF PANELS)	7,423
PANEL SELECTION	HELIENE 530 W
GROUND COVERAGE RATIO	17.1%
INTER-ROW SPACING (FT)	18.07
PITCH (FT)	21.5
PROPOSED PANEL HEIGHT (FT)	10.0
LIMIT OF WORK AREA (ACRES)	31.89
VEGETATION CLEARING AREA (ACRES)	0.00
FENCED AREA (ACRES)	27.87
TOTAL EXISTING IMPERVIOUS AREA (SQFT)	42,040
TOTAL PROPOSED IMPERVIOUS AREA (SQFT)	58,527
TOTAL PROPOSED GRAVEL ROAD AREA (SQFT)	25,187
TOTAL ACCESS ROAD LENGTH (FT)	159.74
UTILITY MV RUN LENGTH (FT)	696
EQUIPMENT PAD AREA (SQFT)	4,000
WETLAND IMPACTS (SQFT)	<10
EXISTING LAND USE	AGRICULTURAL
PROPOSED DUAL USE	AGRICULTURAL / INDUSTRIAL

ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION

0' 50' 100' 150'
1" = 100' WHEN PLOTTED 24" X 36"

WSP USA INC.
100 APOLLO DRIVE, SUITE 302
CHELMSFORD MASSACHUSETTS 01824
TELEPHONE: (978) 692-9090
FAX: (978) 692-6633
WEB: WWW.WSP.COM

REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED	APPROVED
0	09/23/2025	ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION	MRB	OAC

PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
PROPOSED CONDITIONS

CLIENT:
BWC WADES STREAM, LLC

SEAL:
COMMONWEALTH OF MASSACHUSETTS
ANDREW P VARDAKIS
CIVIL
No. 52524
REGISTERED PROFESSIONAL ENGINEER
09/23/2025

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN
PROJECT NUMBER: US-EI-365230438	
DRAWING NUMBER: C-101	
SHEET NUMBER: 3 OF 8	

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NOTES:

1. ALL AREAS WITHIN LIMIT OF DISTURBANCE TO BE SEEDED AS SPECIFIED IN THE SEEDING & REVEGETATION PLAN ON SHEET G-001.
2. PROPOSED EQUIPMENT PAD LOCATION TO BE GRADED TO A MAXIMUM 2% SLOPE.

LEGEND:

EXISTING:
- 710 MAJOR CONTOUR
- MINOR CONTOUR
- PROPERTY LINE
- INTERNAL PROPERTY LINE
- ABUTTER'S PROPERTY LINE
- RIGHT OF WAY
- ZO PROPERTY LINE SETBACK
- BUILDING
- ASPHALT
- GRAVEL
- STONE WALL
- EDGE OF VEGETATION
- EDGE OF GRASS
- TRAIL
- EDGE OF WETLAND
- WETLAND FLAG
- WATERBODY
- BUFFER
- FEMA FLOOD ZONE "A"
- OHE OVERHEAD WIRE
- CULVERT
- UTILITY POLE
- BOUNDARY EVIDENCE
- CONTROL POINT

PROPOSED:
- LOW LIMIT OF WORK
- 1670 MAJOR CONTOUR
- MINOR CONTOUR
- SB SEDIMENT BARRIER (4 / C-501)
- EC ELECTRICAL CONDUIT (2 / C-501)
- ACCESS ROAD (1 / C-501)
- CONCRETE PAD (6 / C-501)
- CULVERT (3 / C-501)
- INFILTRATION TRENCH (12 / C-502)
- PERVIOUS BERM (12,16 / C-502)
- VEGETATED FILTER STRIP (12 / C-502)
- CONVEYANCE CHANNEL (15 / C-502)
- RIPRAP APRON (13,14 / C-502)

N/F
TIMOTHY J. SENA
BOOK 8260 PAGE 247
TAX MAP 407 LOT 27.1
(SEE PLAN BOOK 205 PAGE 26)

CURRENT OWNER
TIMOTHY J. SENA &
CATHERINE RUDE-SENA
BOOK 8119 PAGE 223
TAX MAP 407 LOT 28

N/F
MATTHEW J. LAGOY
BOOK 7949 PAGE 114
TAX MAP 407 LOT 29

50' SETBACK

UP #27
UP #26
UP #27-25
UP #27B-21
UP #27-20
UP #27-11
UP #4

STONEWALL

N86°18'43"E

WELL

HOUSE
1,295
SQ. FT.

BARN
3,422 SQ. FT.

TRANSFORMER &
FIBER OPTIC HAND HOLE

PIT AREA

~0.5 ACRE
LAYDOWN
AREA

15" CPP TO BE
REMOVED AND
REPLACED

6" GRASSED
CONVEYANCE
CHANNEL

3" GRASSED
CONVEYANCE
CHANNEL

RIPRAP
APRON

RIPRAP
APRON
(TYP.)

INFILTRATION
TRENCH (IT1)

INFILTRATION
TRENCH (IT2)

INFILTRATION
TRENCH (IT3)

ACCESS
ROAD

VEGETATED FILTER
STRIP (TYP.)

12" CPP

15" CPP
INV. IN=1,669.7'
INV. OUT=1,668.6'

15" CPP
INV. IN=1,668.6'
INV. OUT=1,665.5'

15" CPP
INV. IN=1,660.3'
INV. OUT=1,659.2'

15" CPP
INV. IN=1,666.9'
INV. OUT=1,665.9'

SOLAR & BESS
EQUIPMENT PAD (TYP.)

660' MORE OR LESS TO
BUTTINGTON HILL ROAD

WB-40 VEHICLE ROUTING

WB-67 VEHICLE ROUTING

0' 30' 60' 90'
1" = 60' WHEN PLOTTED 24" X 36"

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WSP USA INC.
100 APOLLO DRIVE, SUITE 302
CHELMSFORD MASSACHUSETTS 01824
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WEB: WWW.WSP.COM

REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED	APPROVED
0	09/23/2025	ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION	MRB	OAC

PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
GRADING/EARTHWORK PLAN

CLIENT:
BWC WADES STREAM, LLC

SEAL:
COMMONWEALTH OF MASSACHUSETTS
ANDREW P VARDAKIS
CIVIL
No. 52524
REGISTERED PROFESSIONAL ENGINEER
09/23/2025

DESIGNED BY:	DRAWN BY:
OAC	MRB
CHECKED BY:	SCALE:
APV	AS SHOWN

PROJECT NUMBER: US-EI-365230438

DRAWING NUMBER: **C-102**

SHEET NUMBER: **4 OF 8**

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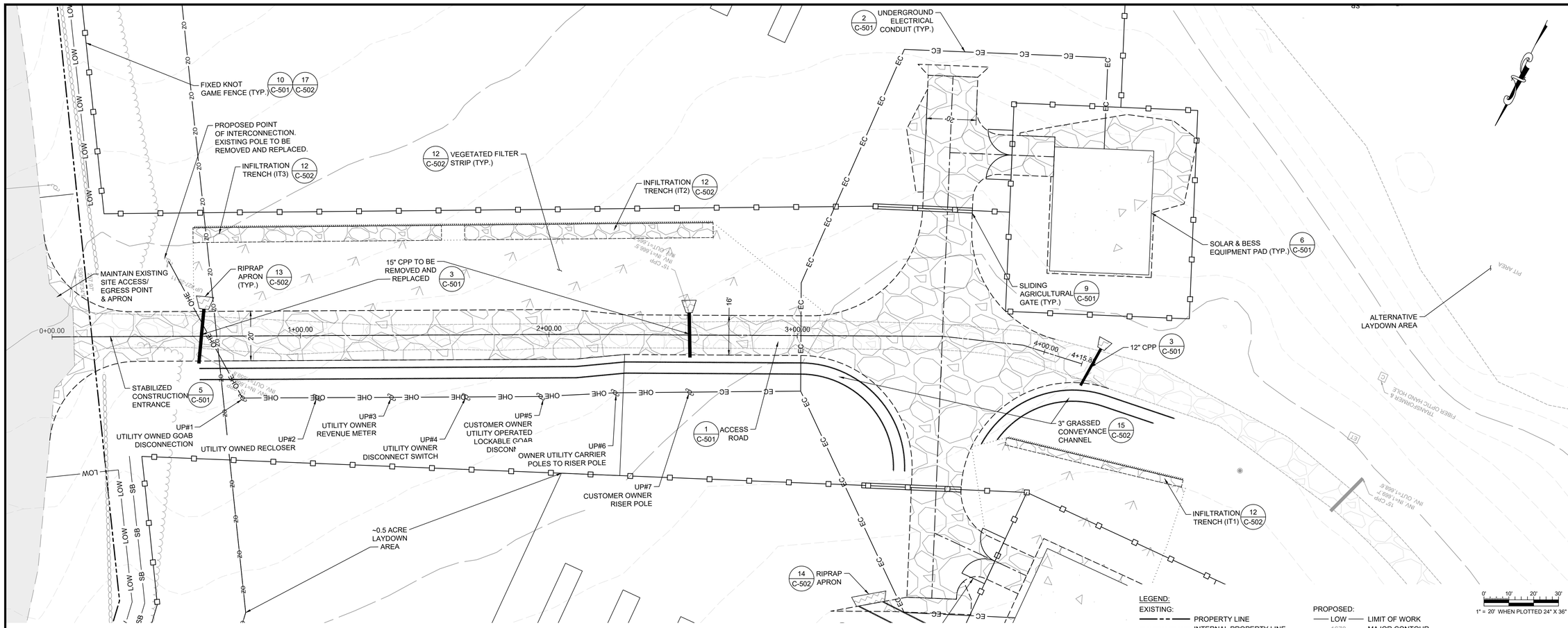

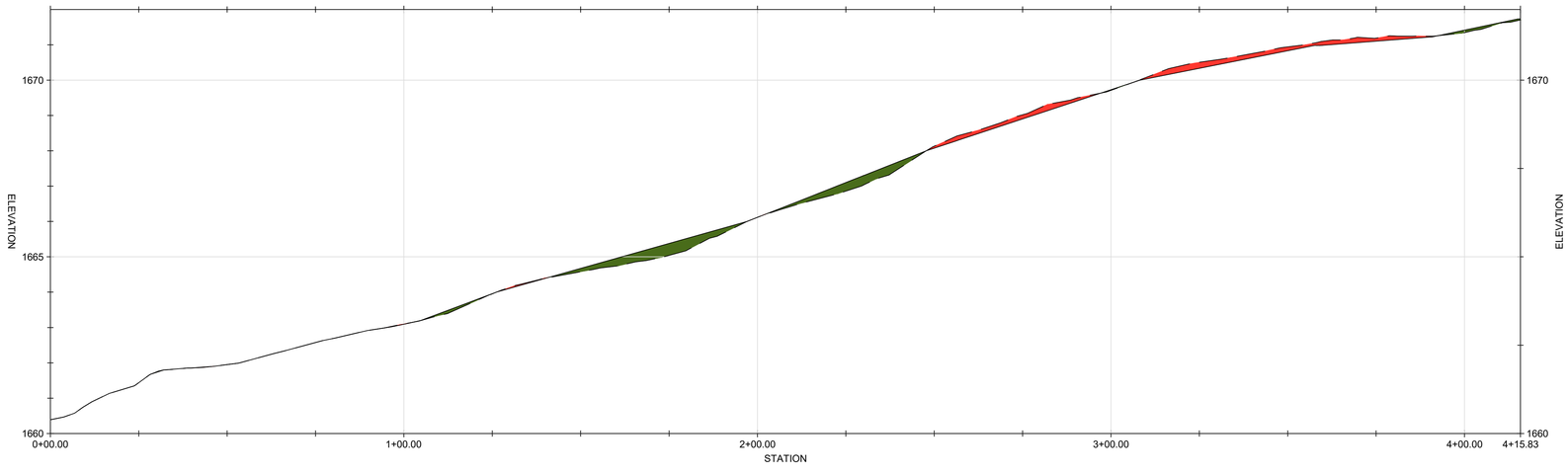

PROFILE LEGEND:
- EXISTING ELEVATION
- PROPOSED ELEVATION
- CUT AREA
- FILL AREA

LEGEND:

EXISTING:
- PROPERTY LINE
- INTERNAL PROPERTY LINE
- ABUTTER'S PROPERTY LINE
- RIGHT OF WAY
- PROPERTY LINE SETBACK
- BUILDING
- ASPHALT
- GRAVEL
- STONE WALL
- EDGE OF VEGETATION
- EDGE OF GRASS
- TRAIL
- EDGE OF WETLAND
- WETLAND FLAG
- WATERBODY
- BUFFER
- FEMA FLOOD ZONE "A"
- OVERHEAD WIRE
- CULVERT
- UTILITY POLE
- BOUNDARY EVIDENCE
- CONTROL POINT

PROPOSED:
- LIMIT OF WORK
- MAJOR CONTOUR
- MINOR CONTOUR
- FIXED KNOT GAME FENCE 10 C-501 17 C-502
- DOUBLE SWING GATE 7,11 C-501
- SLIDING GATE 9 C-501
- OVERHEAD ELECTRIC
- SEDIMENT BARRIER 4 C-501
- ELECTRICAL CONDUIT 2 C-501
- ACCESS ROAD 1 C-501
- CONCRETE PAD 6 C-501
- SOLAR PV ARRAY 8 C-501
- UTILITY POLE
- CULVERT 3 C-501
- INFILTRATION TRENCH 12 C-502
- PERVIOUS BERM 12,16 C-502
- VEGETATED FILTER STRIP 12 C-502
- CONVEYANCE CHANNEL 15 C-502
- RIPRAP APRON 13,14 C-502

NOTES:
1. ELECTRICAL DESIGN, INCLUDING UTILITY POLES, PERFORMED BY OTHERS. ELECTRICAL EQUIPMENT AND COMPONENTS SHOWN TO ILLUSTRATE LOCATIONS ONLY. REFER TO ELECTRICAL DRAWINGS FOR DETAILED ELECTRICAL SYSTEM.
2. ALL AREAS WITHIN LIMIT OF DISTURBANCE TO BE SEEDED AS SPECIFIED IN THE SEEDING & REVEGETATION PLAN ON SHEET G-001.
3. THE TOTAL GRADING CUT VOLUME IS 841.92 CUBIC YARDS. THE TOTAL GRADING FILL VOLUME IS 584.76 CUBIC YARDS. THE GRADING OF THE ACCESS ROAD AND EQUIPMENT PAD AREA WILL RESULT IN A NET CUT VOLUME OF 257.16 CUBIC YARDS.

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WSP USA INC.
100 APOLLO DRIVE, SUITE 302
CHELMSFORD MASSACHUSETTS 01824
TELEPHONE: (978) 692-9090
FAX: (978) 692-6633
WEB: WWW.WSP.COM

REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED	APPROVED
0	09/23/2025	ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION	MRB	OAC

PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
ACCESS ROAD TOPOGRAPHIC PROFILE ANALYSIS

CLIENT:
BWC WADES STREAM, LLC

SEAL:
COMMONWEALTH OF MASSACHUSETTS
ANDREW P VARDAKIS
CIVIL
No. 52524
REGISTERED PROFESSIONAL ENGINEER
09/23/2025

DESIGNED BY:	DRAWN BY:
OAC	MRB
CHECKED BY:	SCALE:
APV	AS SHOWN

PROJECT NUMBER: US-EI-365230438

DRAWING NUMBER: **C-103**

SHEET NUMBER: **5 OF 8**

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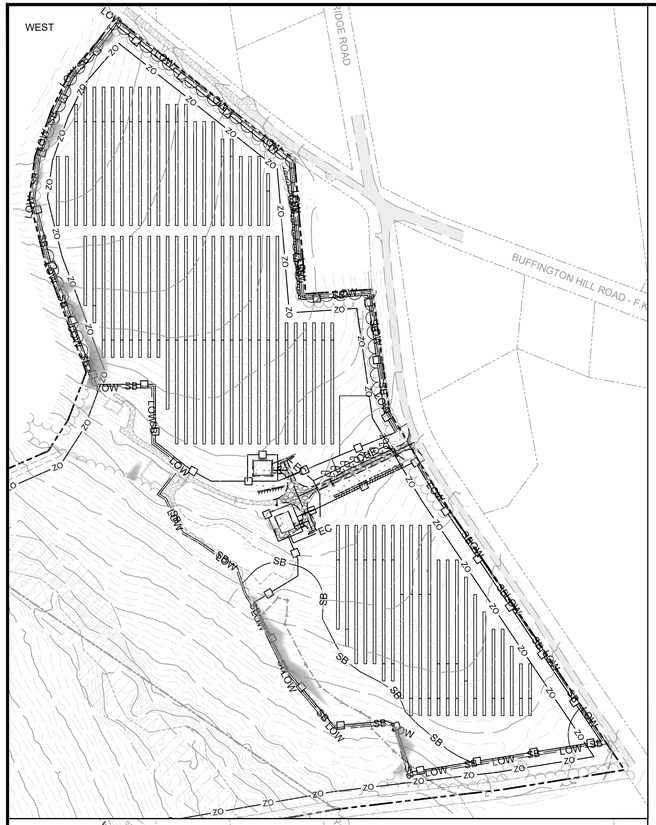
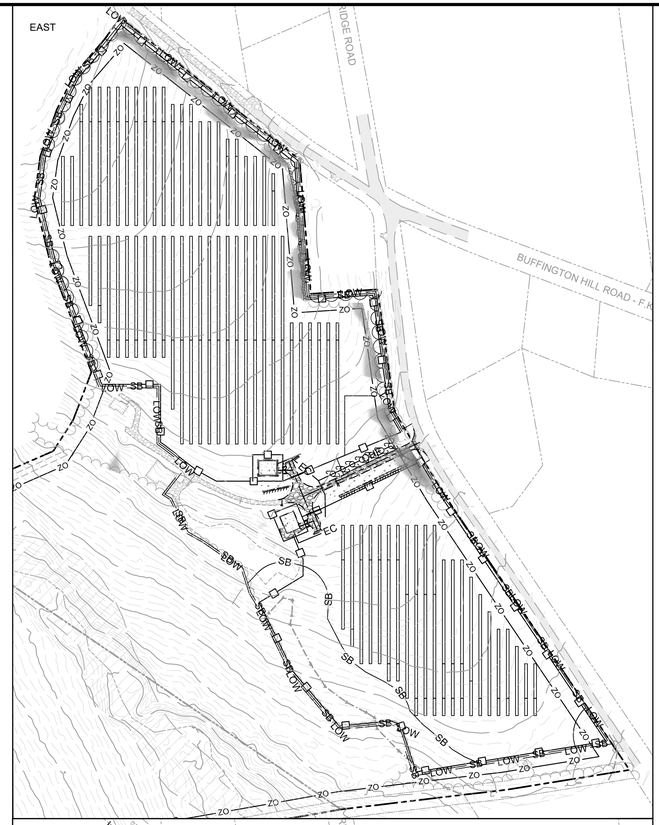
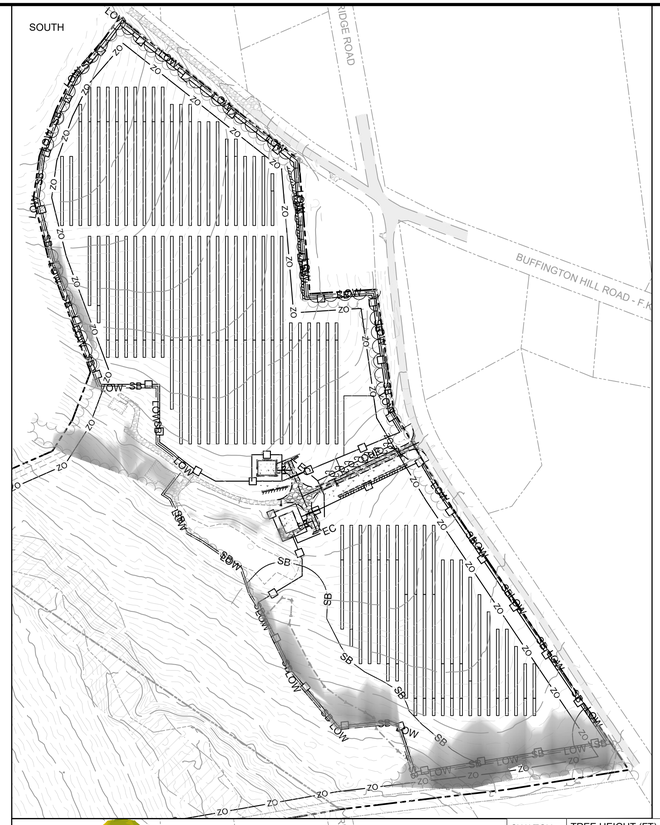
WEST



EAST



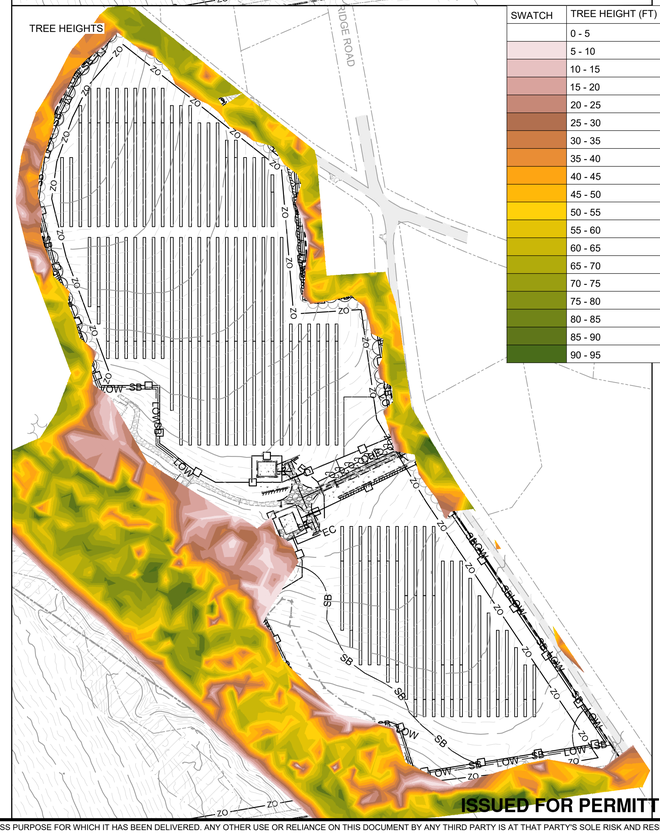
SOUTH



SOUTHWEST & NORTHWEST

SOUTHEAST & NORTHEAST

TREE HEIGHTS



SWATCH	TREE HEIGHT (FT)
	0 - 5
	5 - 10
	10 - 15
	15 - 20
	20 - 25
	25 - 30
	30 - 35
	35 - 40
	40 - 45
	45 - 50
	50 - 55
	55 - 60
	60 - 65
	65 - 70
	70 - 75
	75 - 80
	80 - 85
	85 - 90
	90 - 95

NOTES:

1. IDEAL SHADING SETBACKS:
   - 1.1. SOUTHERN TREES: 3X TREE HEIGHT
   - 1.2. EAST& WEST TREES: 2.5X TREE HEIGHT
   - 1.3. SOUTHWEST & SOUTHEAST TREES: 3X TREE HEIGHT
   - 1.4. NORTHWEST AND NORTHEAST TREES: 0.85X TREE HEIGHT

LEGEND:

EXISTING:
- PROPERTY LINE
- INTERNAL PROPERTY LINE
- ABUTTER'S PROPERTY LINE
- RIGHT OF WAY
- ZO — PROPERTY LINE SETBACK
- BUILDING
- ASPHALT
- GRAVEL
- STONE WALL
- EDGE OF VEGETATION
- EDGE OF GRASS
- TRAIL
- EDGE OF WETLAND
- WETLAND FLAG
- WATERBODY
- BUFFER
- FEMA FLOOD ZONE "A"
- OHE — OVERHEAD WIRE
- CULVERT
- UTILITY POLE
- BOUNDARY EVIDENCE
- CONTROL POINT

PROPOSED:
- LOW — LIMIT OF WORK
- 1670 — MAJOR CONTOUR
- MINOR CONTOUR
- FIXED KNOT GAME FENCE (10, C-501) (17, C-502)
- DOUBLE SWING GATE (7,11, C-501)
- SLIDING GATE (9, C-501)
- OHE — OVERHEAD ELECTRIC
- SB — SEDIMENT BARRIER (4, C-501)
- EC — ELECTRICAL CONDUIT (2, C-501)
- ACCESS ROAD (1, C-501)
- CONCRETE PAD (6, C-501)
- SOLAR PV ARRAY (8, C-501)
- UTILITY POLE
- CULVERT (3, C-501)
- INFILTRATION TRENCH (12, C-502)
- PERVIOUS BERM (12,16, C-502)
- VEGETATED FILTER STRIP (12, C-502)
- CONVEYANCE CHANNEL (15, C-502)
- RIPRAP APRON (13,14, C-502)

0' 100' 200' 300'
1" = 200' WHEN PLOTTED 24" X 36"

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PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
SHADOW ANALYSIS OF PROPOSED CONDITIONS

CLIENT:
BWC WADES STREAM, LLC

SEAL:
COMMONWEALTH OF MASSACHUSETTS
ANDREW P VARDAKIS
CIVIL
No. 52524
REGISTERED PROFESSIONAL ENGINEER
9/23/2025

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN
PROJECT NUMBER:	US-EI-365230438
DRAWING NUMBER:	C-104
SHEET NUMBER:	6 OF 8

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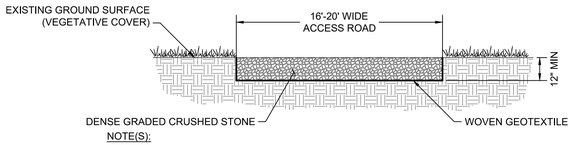
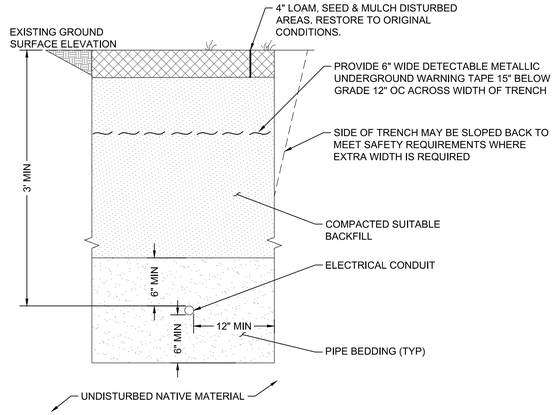


NOTE(S):

1. ACCESS ROAD TO BE CONSTRUCTED OF A MINIMUM 6" OF DENSE GRADED CRUSHED STONE.
2. WOVEN GEOTEXTILE TO BE PLACED BETWEEN THE GROUND SURFACE AND THE CRUSHED STONE.
3. CRUSHED STONE SHALL BE COMPACTED TO A FIRM AND NON-YIELDING CONDITION.

FLUSH CRUSHED STONE ACCESS ROAD 1

NOT TO SCALE

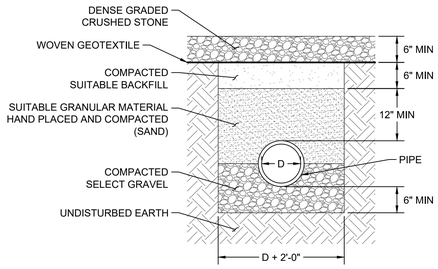


NOTE(S):

1. DETAIL SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. ELECTRICAL ENGINEER TO CONFIRM REGULATORY AND CODE COMPLIANCE.

TYPICAL ELECTRICAL CONDUIT UTILITY TRENCH 2

NOT TO SCALE

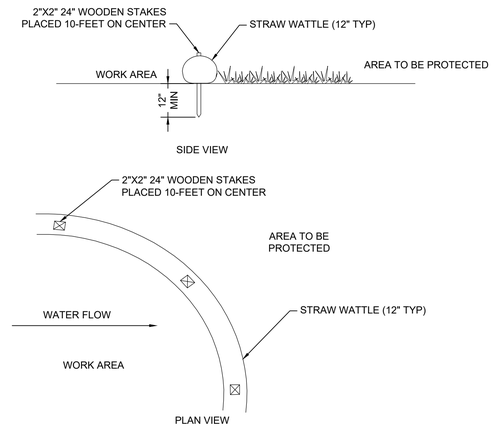


NOTE(S):

1. ALIGN CENTER OF PIPE WITH CENTERLINE OF DITCH AND BOTTOM OF PIPE WITH DITCH LINE.
2. PIPE EXTENDS A MINIMUM OF 3" BEYOND DENSE GRADED CRUSHED STONE AT INLET AND OUTLET.
3. PIPE SLOPE SHALL FOLLOW EXISTING DITCH LINE BUT BE NO LESS THAN 1.5% AND NO MORE THAN 10%.

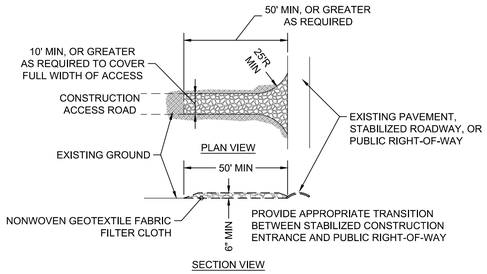
TYPICAL CULVERT TRENCH 3

NOT TO SCALE



SEDIMENT BARRIER - STRAW WATTLE 4

NOT TO SCALE

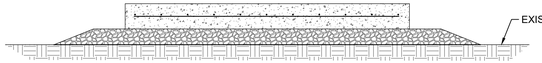


NOTE(S):

1. STONE TO BE 1"-3" STONE, RECLAIMED STONE, OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - AS REQUIRED, BUT NOT LESS THAN 50 FT.
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - TEN (10) FT. MIN, BUT NOT LESS THAN THE FULL TRAVELED WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
5. FILTER CLOTH - SHALL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCE SHALL BE PIPED ACROSS OR BENEATH THE ENTRANCE.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WASHING - WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHTS-OF-WAY. IF WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

STABILIZED CONSTRUCTION ENTRANCE 5

NOT TO SCALE

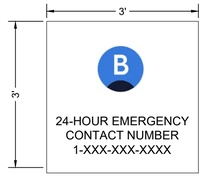


NOTE(S):

1. CONCRETE PAD SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. DESIGN TO BE FINALIZED AT LATER DATE.

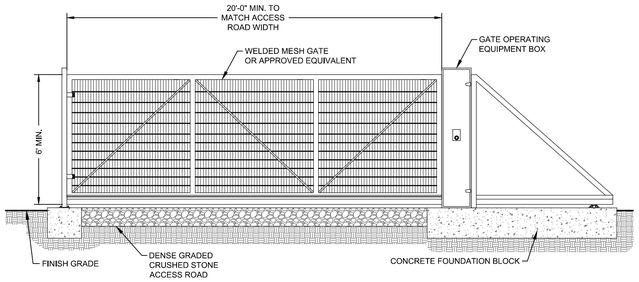
TYPICAL CONCRETE EQUIPMENT PAD SECTION 6

NOT TO SCALE



TYPICAL ENTRANCE SIGN 7

NOT TO SCALE

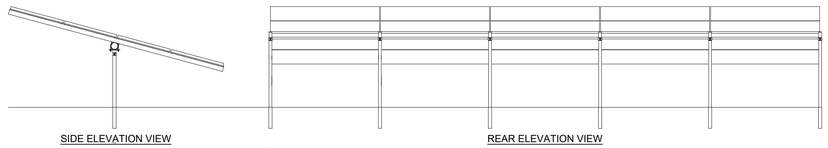


NOTE:

1. TYPICAL GATE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. DESIGN TO BE FINALIZED AT LATER DATE.

WELDED MESH ELECTRIC SLIDING GATE 9

NOT TO SCALE

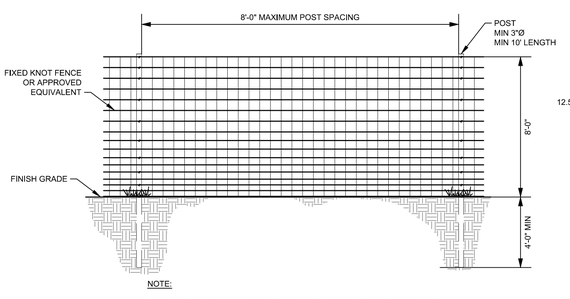


NOTE(S):

1. DESIGN FOR FOUNDATIONS, RACKING, AND MODULES BY OTHERS. DETAILS SHOWN FOR ILLUSTRATION PURPOSES ONLY.

TRACKER SOLAR PV ARRAY 8

NOT TO SCALE

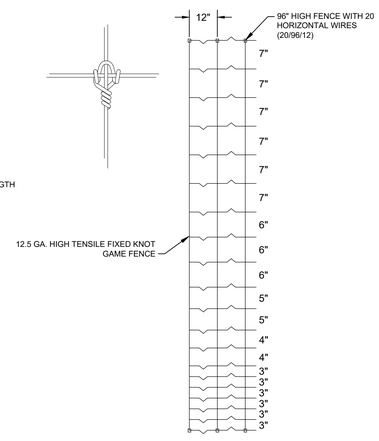


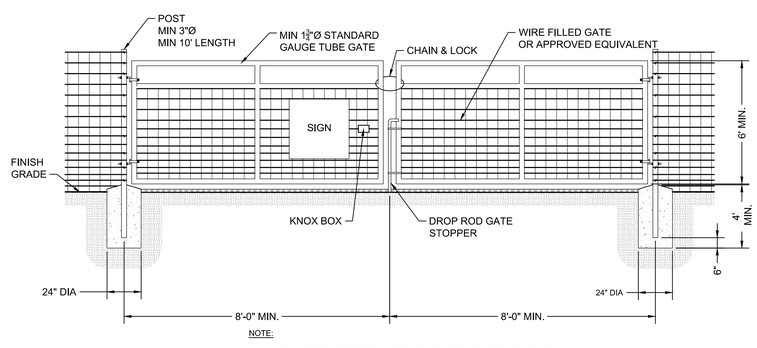
NOTE:

1. TYPICAL FENCE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. DESIGN TO BE FINALIZED AT LATER DATE.

WOVEN WIRE FENCE 10

NOT TO SCALE





NOTE:

1. TYPICAL GATE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. DESIGN TO BE FINALIZED AT LATER DATE.

WOVEN WIRE DOUBLE SWING GATE 11

NOT TO SCALE

ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION

WSP USA INC.
100 APOLLO DRIVE, SUITE 302
CHELMSFORD MASSACHUSETTS 01824
TELEPHONE: (978) 692-9090
FAX: (978) 692-6633
WEB: WWW.WSP.COM

REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED	APPROVED
0	09/23/2025	ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION	MRB	OAC

PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
DETAILS (SHEET 1 OF 2)

CLIENT:
BWC WADES STREAM, LLC

SEAL:
COMMONWEALTH OF MASSACHUSETTS
ANDREW P VARDAKIS
CIVIL
No. 52524
REGISTERED PROFESSIONAL ENGINEER
09/23/2025

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN
PROJECT NUMBER: US-EI-365230438	
DRAWING NUMBER: **C-501**	
SHEET NUMBER: **7 OF 8**	

D:\Box\Vaults\US-EI-365230437 - Ridge Rd Worthington\4 Permitting\Sheets\7-8 - Ridge Rd - C-501-2.dwg - C-501 - Sep 23, 2025 10:25am - wels_morgan.mcdonald

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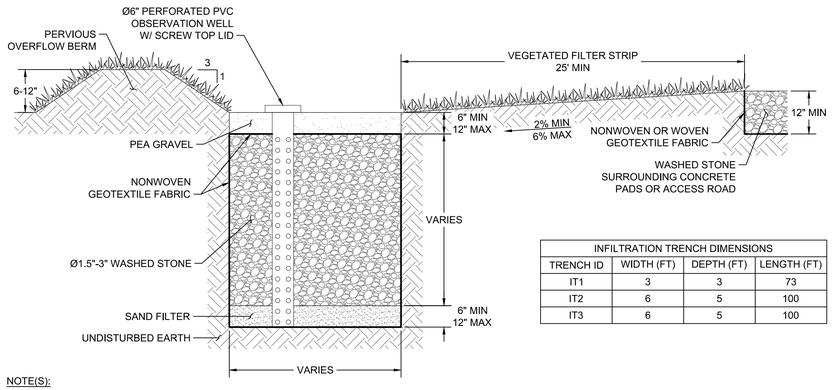
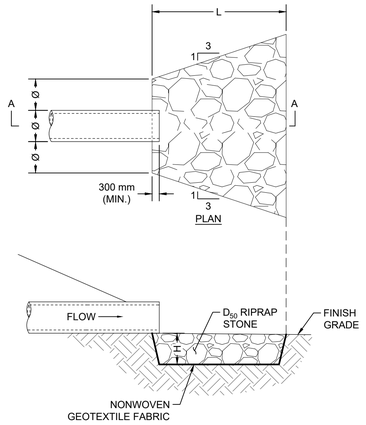


INFILTRATION TRENCH DIMENSIONS			
TRENCH ID	WIDTH (FT)	DEPTH (FT)	LENGTH (FT)
IT1	3	3	73
IT2	6	5	100
IT3	6	5	100

NOTE(S):

1. PERVIOUS BERM MAY VARY IN HEIGHT BETWEEN 6 TO 12 INCHES IN ORDER TO ACHEIVE A LEVEL ELEVATION ALONG THE TOP OF THE BERM TO THE MAXIMUM EXTENT POSSIBLE.
2. ONE SCREW TOP OBSERVATION WELL TO BE INSTALLED CENTRAL TO THE TRENCH LENGTH.

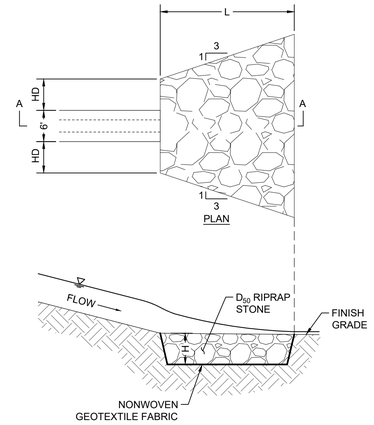
INFILTRATION TRENCH (12)
NOT TO SCALE



SECTION A-A

RIPRAP APRON DIMENSIONS				
PIPE Ø	CLASS	D_{50} (IN)	LENGTH L (FT)	HEIGHT H (IN)
12"	1	5	4	18
15"	1	5	5	18

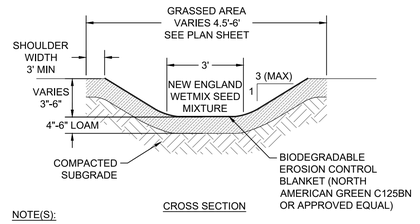
RIPRAP APRON (PIPE) (13)
NOT TO SCALE



SECTION A-A

RIPRAP APRON DIMENSIONS				
HYDRAULIC DIAMETER (HD)	CLASS	D_{50} (IN)	LENGTH L (FT)	HEIGHT H (IN)
0.75'	3	10	4	24

RIPRAP APRON (CHANNEL) (14)
NOT TO SCALE

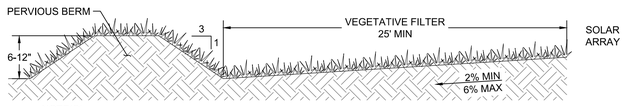


CROSS SECTION

NOTE(S):

1. THE LONGITUDINAL SLOPE OF THE CHANNEL BOTTOM SHOULD BE AS FLAT AS POSSIBLE AND NO GREATER THAN 5%.

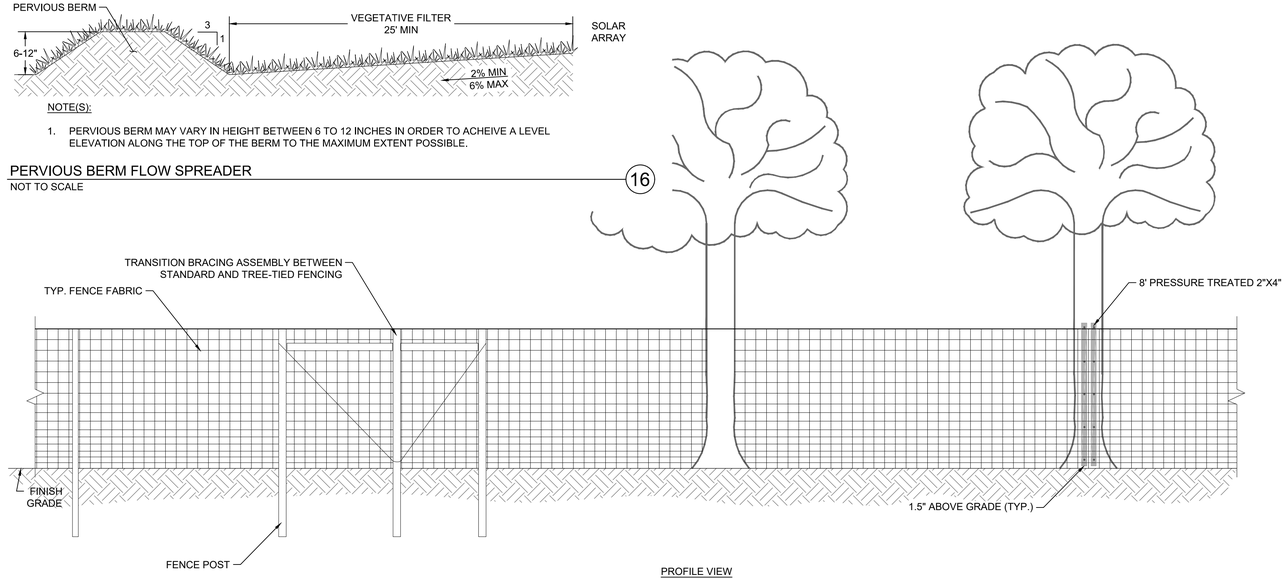
GRASSED CONVEYANCE CHANNEL (15)
NOT TO SCALE



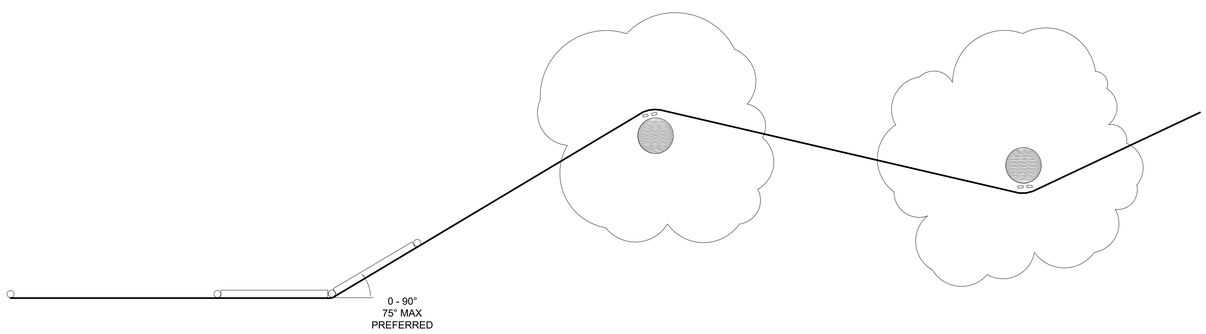
NOTE(S):

1. PERVIOUS BERM MAY VARY IN HEIGHT BETWEEN 6 TO 12 INCHES IN ORDER TO ACHEIVE A LEVEL ELEVATION ALONG THE TOP OF THE BERM TO THE MAXIMUM EXTENT POSSIBLE.

PERVIOUS BERM FLOW SPREADER (16)
NOT TO SCALE

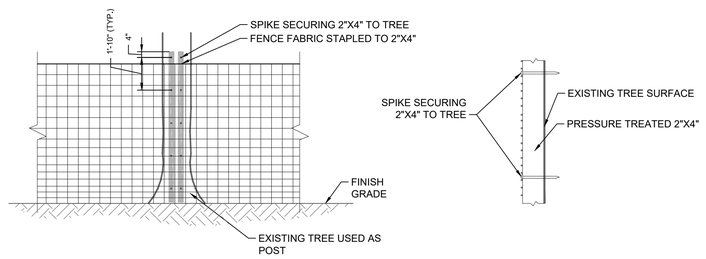


PROFILE VIEW

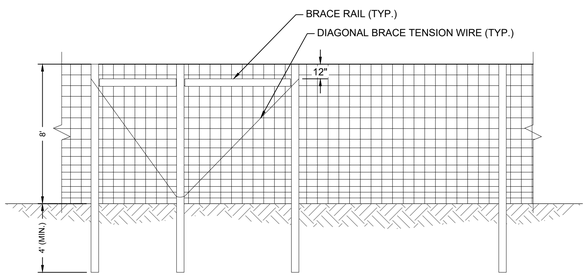


PLAN VIEW

TREE-TIED WOVEN WIRE FENCE (17)
NOT TO SCALE



MOUNTING DETAIL



BRACING DETAIL

NOTE(S):

1. ALL FENCING AND HARDWARE SHALL BE GALVANIZED.
2. FIXED KNOT WIRE MESH TO BE BEKAERT SOLIDLOCK (R) PRO 30 (2096-3), 12.5AWG-16 HIGH TENSILE FIXED KNOT GAME FENCE OR APPROVED EQUIVALENT, INSTALLED AND BRACED PER MANUFACTURERS RECOMMENDATIONS. NOT TO EXCEED 2" GAP ABOVE GRADE.
3. ONLY SOUND, HEALTHY TREES GREATER THAN 6" DBH SPACED 10' - 40' APART SHALL BE USED.
4. ROUTE FENCE TO AVOID IMPINGING ON GROWTH OF ADJACENT TREES.
5. ADD 2"X4" SPACERS AS NEEDED BASED ON ANGLE AND DBH TO ENSURE FENCING DOES NOT CONTACT TREE.
6. OBSTRUCTIVE LIMBS TO BE CLIPPED FROM TRUNK OF TREE.

ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION

WSP USA INC.
100 APOLLO DRIVE, SUITE 302
CHELMSFORD MASSACHUSETTS 01824
TELEPHONE: (978) 692-9090
FAX: (978) 692-6633
WEB: WWW.WSP.COM

REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED	APPROVED
0	09/23/2025	ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION	MRB	OAC

PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
DETAILS (SHEET 2 OF 2)

CLIENT:
BWC WADES STREAM, LLC

SEAL:
COMMONWEALTH OF MASSACHUSETTS
ANDREW P VARDAKIS
CIVIL
No. 52524
REGISTERED PROFESSIONAL ENGINEER
09/23/2025

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN
PROJECT NUMBER: US-EI-365230438	
DRAWING NUMBER: **C-502**	
SHEET NUMBER: **8 OF 8**	

D:\BlueWave\US-EI-365220437 - Ridge Rd Worthington\4 Permitting\Sheets\7-8 - Ridge Rd - C-501-2.dwg - C-502 - Sep. 23, 2025 10:28am - wds_morgan.mcdonald

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Appendix E Natural Resources Assessment

Fleetwood Environmental Solutions, LLC
84 Russell Street
Hadley, MA 01035
413.325.7372
www.fleetwoodenv.com

MEMORANDUM

Date: **August 2, 2023**

To: **Sam Kitfield, BlueWave Solar**

Copy: **Aaron Simms & Kat Himmelberger, BlueWave Solar**

From: **David Cameron, PWS, Fleetwood Environmental Solutions, LLC**

Subject: **Natural Resources Assessment for 190 Ridge Road, Worthington, MA**

1.0 INTRODUCTION AND BACKGROUND

Per your request, Fleetwood Environmental Solutions, LLC ("Fleetwood") conducted a natural resources-based evaluation for a property at 190 Ridge Road, Worthington, identified by MassGIS as Map 407, Parcel 28. BlueWave Solar ("BlueWave") is assessing the feasibility of a dual-use commercial solar development for this agricultural property. This current assessment is intended to provide detail regarding wetland assessments conducted by Fleetwood and the wetlands and rare species permitting implications for development at this site, in order assist BlueWave in making a more informed decision as to whether to continue to pursue the project.

Note: this memorandum is very site-specific and is intended strictly for the planning purposes of BlueWave, for this property; it is not meant for public distribution or as generic regulatory guidance.

2.0 REVIEW METHODS

2.1 *Desktop Analysis*

Fleetwood initially conducted a desktop investigation for the subject parcel. The following project files were provided by BlueWave for Fleetwood's use:

- "21-0329 Wetland Preliminary Site Sketch_Lucas" prepared by Lucas Environmental, LLC; and
- "21-0404 Site Walk Memo_Worthington, 190 Ridge Road" prepared by Lucas Environmental, LLC, which includes a July 16, 2020 Preliminary Site Plan, prepared by BlueWave Solar

Fleetwood additionally consulted historic and contemporary aerial imagery, and resource maps depicting topography, elevation, land use, wetlands, floodplain, hydrologic connections, soils, Estimated Habitats of Rare Wildlife ("EH"), Priority Habitats of Rare Species ("PH"), Certified Vernal Pools ("CVPs"), Potential Vernal Pools ("PVP"), Areas of Critical Environmental Concern ("ACECs"), Outstanding Resource Waters ("ORWs"), Coldwater Fisheries Resources ("CFRs"), and the U.S. Geological Survey's StreamStats Program as part of the desktop exercise.

2.2 Field-Based Analysis

Field assessments were conducted on May 3rd, June 9th, July 12th, and August 1, 2023 by Fleetwood. These evaluations entailed a reconnaissance-level assessment of the parcel ("Site" or "parcel") and meander surveys during various periods of the growing season, including immediately after significant rainfall events. These assessments were conducted to search for Resource Areas regulated under the Massachusetts Wetlands Protection Act ("WPA"). Approximately 48 acres were visually inspected during the field survey, including the footprint of the solar project depicted on the Preliminary Site plan and all other portions of the parcel except for acreage west of Watts Stream. The presence or absence of Resource Areas was determined using both state and federal guidelines.

3.0 FINDINGS

3.1 *General*

According to MassGIS data the Site is comprised of 72 acres and is owned by Timothy J. Sena. The project footprint occurs on approximately 15.5 acres spread over two hayfields (i.e., "Northern Field" and "Southern Field"). A barn and single-family home occupy a small area in the center of the property, near the Northern Field's western edge, and a gravel driveway to the house and barn separates the two fields. A prominent earthen berm exists in the southern field, south of and roughly parallel to the driveway. According to Mr. Sena, this berm was built largely to manage rapid snowmelt during late winters exhibiting significant snowpack. Mr. Sena also indicated that an historic tile drain system underlies both fields, though no surface outlet pipes beyond the fields occur, to his knowledge, and none were observed by Fleetwood.

3.2 *Historic and Contemporary Aerial Imagery, Topography, Elevation, and Land Use*

Elevation at the project site ranges from roughly 1510 feet to roughly 1570 feet, with most of the elevation gain occurring from west to east. The southwestern corner of the property is its low spot. The entire project footprint is currently in agricultural use. Current U.S Geological Survey ("USGS") topographic maps depict Watts Stream roughly 300 feet west of the conceptual array at its closest point. Said map depicts Watts Stream as perennial. Historic aerial imagery and topographic maps depict the current agricultural fields being present back to at least 1946, and in substantially the same configuration and size. For a number of years prior to roughly 2016, a portion of the Southern Field south of the earthen berm was used as a driving range (the Worthington Golf course is immediately east and south of the property), and a putting green is evident during certain years as a small, circular feature just north of the central portion of the berm.

3.3 *Wetlands and Hydrologic Connections*

According to MassGIS the Site contains one watercourse – Watts Stream – with associated forested and shallow marsh/fen wetlands – approximately 300 feet west of the conceptual array footprint at its closest point. No additional "Linear Features" or "Hydrologic Connections" are depicted on the property by MassGIS.

MassGIS does not indicate any polygons of "Wetlands Change" that have been detected on the parcel, meaning no illicit alterations of wetlands have been detected via remote sensing.

Based on Fleetwood's on-site investigations, the following additional information was obtained:

- The streams and wetlands identified by USGS and MassGIS mapping exist and are located consistent with said mapping;

- Two additional Bordering Vegetated Wetlands ("BVWs") were identified within or in close proximity to the conceptual solar array, and the boundaries of each were flagged as follows:

    - "Wetland 1" (flags W1-100 through W1-118) occurs starting along the western edge of the Southern Field, and is connected to Watts Stream via a number of ephemeral streams and associated wetlands. This wetland is partially overlain by the conceptual solar array. Mr. Sena indicates it is sporadically mowed/hayed, except during wetter years. This is evidenced by a number of woody saplings that have started to grow in this part of the Southern Field and;
    - "Wetland 2" (Flags W2-100 through W2-102) is roughly 50 linear feet prior to discharging off the property and appears to be a man-made drainage swale downstream of a damaged culvert and driveway at the southeastern corner of the property. Said driveway leads to an outbuilding that was historically used for the driving range operation in the Southern field. The swale downstream of the culvert exhibits a wetland plant community, while upstream of the culvert it does not. Wetland 2 appears to be located more than 100 feet away from the conceptual array footprint, meaning it is unlikely the Buffer Zone of Wetland 2 will encroach into the project footprint.

3.4 *Floodplain*

MassGIS does not depict any portion of the project footprint as encompassed by a 100-year floodplain. This is corroborated by the corresponding Federal Emergency Management Agency ("FEMA") Flood Insurance Rate Map ("FIRM"), Panel (Appendix A), which only depicts a 100-year floodplain associated with Watts Stream (i.e., "Zone A", with base flood elevations undetermined), approximately 300 feet west of the conceptual array footprint. This means that none of the conceptual array would fall within Bordering Land Subject to Flooding ("BLSF") -- a Resource Area regulated under the WPA.

3.5 *Soils*

Three different soil types are mapped on the portion of the Site which encompasses the solar project footprint depicted on the Preliminary Site Plan, per the Natural Resources Conservation Service's Hampden and Hampshire Counties, Western Part and MassGIS, as summarized in Table 3-1, below.

Table 3-1. Soil Types Mapped within the Vicinity of the Proposed Solar Project Footprint

Map Symbol and Unit Name	Portion of Site	Slopes	Hydric?	Prime Farmland?	Drainage Class
355C/ Marlow fine sandy loam	western part, and near house, barn, and driveway	8-15%	No	*	well drained
360B/Peru fine sandy loam	majority of array footprint	3-8%	No	Yes	moderately well drained
905C/Peru-Marlow Association, extremely stony	southwestern corner	3-15%	No	No	moderately well drained

*Farmland of statewide significance

There are no hydric soils mapped by MassGIS within the project footprint.

3.6 *Estimated Habitats of Rare Wildlife*

According to MassGIS there is no EH on the property.

3.7 *Priority Habitats of Rare Species*

According to MassGIS there is no PH on the property.

3.8 *Certified Vernal Pools*

According to MassGIS there are no CVPs on the parcel.

3.9 *Potential Vernal Pools*

According to MassGIS there are no PVPs on the parcel.

3.10 *Areas of Critical Environmental Concern*

According to MassGIS the parcel is not within or encompassed by any ACECs.

3.11 *Outstanding Resource Waters*

According to MassGIS, none of the parcel is mapped as an ORW, although an ORW boundary does occur west of the property by approximately 1,200 feet, evidently associated with Littleville Lake in Huntington and the City of Springfield's Cobble Mountain Reservoir system.

3.12 *Coldwater Fisheries Resources (CFRs)*

According to MassGIS, there is one CFR on the property: Watts Stream (SARIS ID 3211150).

3.13 *U.S. Geological Survey's StreamStats Program*

StreamStats was consulted to assess whether Watts Stream has a contributing drainage area large enough (i.e., at least 0.5 square mile with requisite 75% of underlying stratified drift soils) to typically constitute a "River" per 310 CMR 10.04 in the absence of a perennial designation on the most current U.S.G.S. topographic map. Table 3-2 provides a summary of this analysis, and the StreamStats report for this stream is provided as Appendix B.

Table 3-2. USGS StreamStats Assessment Results for Watts Stream

Stream Name	Contributing Drainage Area	% of Drainage Area Underlain by Stratified Drift	Perennial Per StreamStats?
Watts Stream	0.73 sq. mile	0%	No

While this analysis implies that Watts Stream does not meet the requisite criteria to be considered a River, this finding is regulatorily superseded by the stream's depiction as perennial on the most current map. This presumption could be overcome, if needed, by documenting the stream as dry during at least four days within any non-drought, consecutive 12-month period.

Representative site photographs are provided at Appendix C and a MassGIS-based wetlands and soils map is provided at Appendix D. A wetland delineation sketch with other prominent site features is provided as Appendix E.

4.0 DISCUSSION AND RECOMMENDATIONS

From a natural resources perspective, the subject parcel appears to be a reasonable candidate for a commercial dual-use solar array. The entire footprint of the conceptual project is already within active agricultural fields, and limited alterations to Resource Areas will occur based on the conceptual array footprint, and contingent upon adjacent tree removal conducted in accordance with agricultural exemptions that allow for management of field edges (i.e., Fleetwood notes that the preliminary site plan includes a note that reads: "SHADE SPRAYS ASSUMING 60' TREES SELECTIVELY CLEARED TO REDUCE SHADING." It is difficult to discern

precisely what this note means in practical terms regarding the project. Presumably, no trees beyond the agriculturally exempt "field edge" would be removed. This should be confirmed).

Given the factors described above, Fleetwood suggests that BlueWave consider the following sequence of steps to advance the planning stages of the proposed project should it decide to pursue this Site:

1. Notify Fleetwood should BlueWave decide to pursue the project at this site. If so, Fleetwood will collect the requisite field botanical, soils, and hydrology data in which to prepare formal data forms to be submitted with a Notice of Intent.

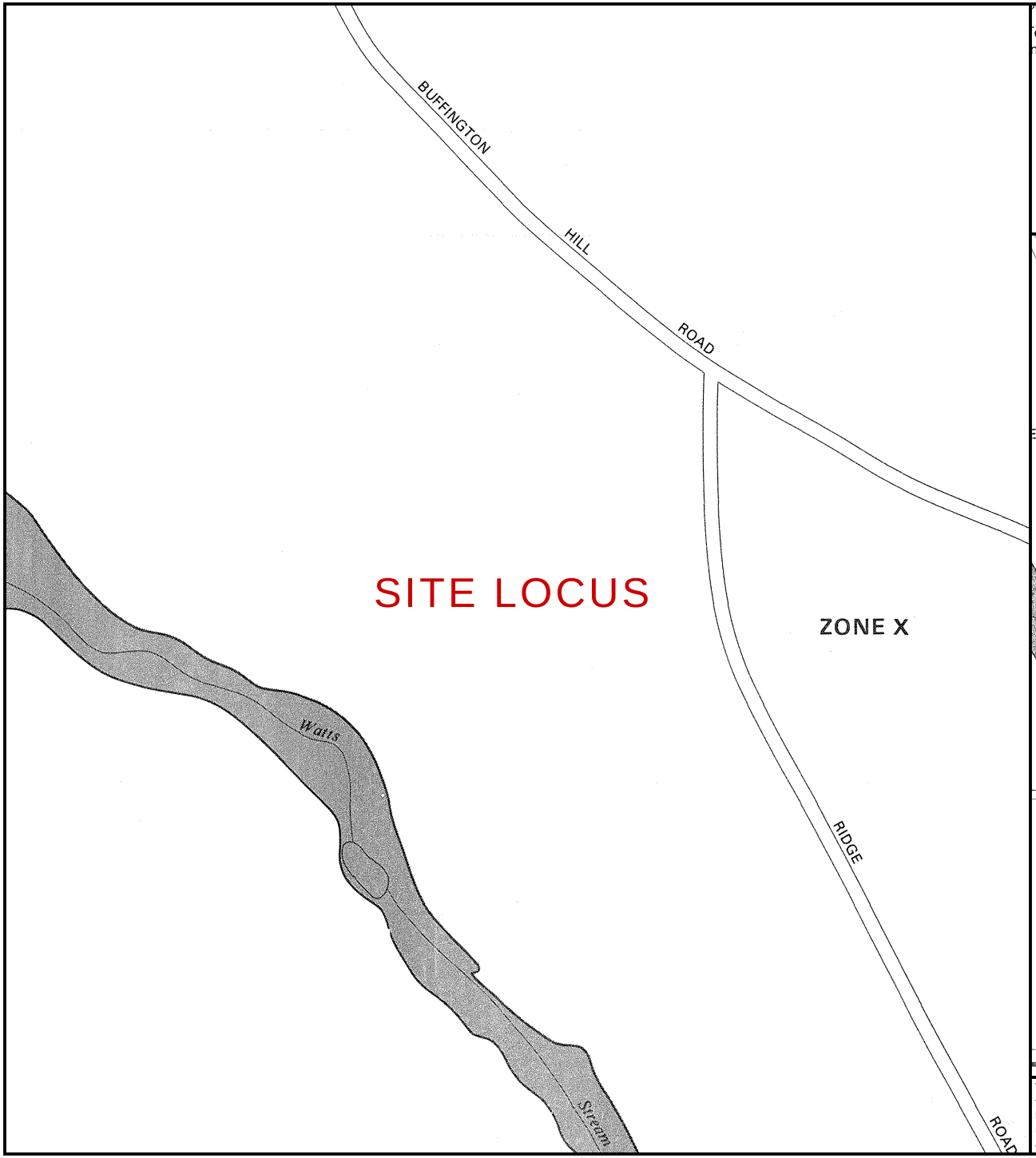
2. Have Fleetwood's wetland flags surveyed prior to the end of October 2023, as climatic conditions beyond that timeframe are apt to damage many of the flags. Said flag locations should be placed on formal site plans being prepared for the project.

3. Identify and quantify where tree removal is needed within Resource Areas or Buffer Zone to avoid shading impacts beyond the footprint of the project.

4. Identify what project activities that need to occur may incidentally overlap with exempt agricultural activities (e.g., "management of existing field edges"), and coordinate with the property owner to discuss and effectuate said activities. Fleetwood urges that such exempt activities be confirmed from the Worthington Conservation Commission ("Commission") via submittal of a Request for Determination of Applicability seeking a Negative Determination.

5. Submit of a Notice of Intent to the Commission seeking an Order of Conditions approving the proposed project.

Thank you for your attention to this memorandum. Please contact me should you wish to discuss this investigation and its findings in detail.



depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE

400 0 400 FEET

E A

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

TOWN OF
WORTHINGTON,
MASSACHUSETTS
HAMPSHIRE COUNTY

PANEL 8 OF 25
(SEE MAP INDEX FOR PANELS NOT PRINTED)

PANEL LOCATION

COMMUNITY-PANEL NUMBER
250175 0008 B

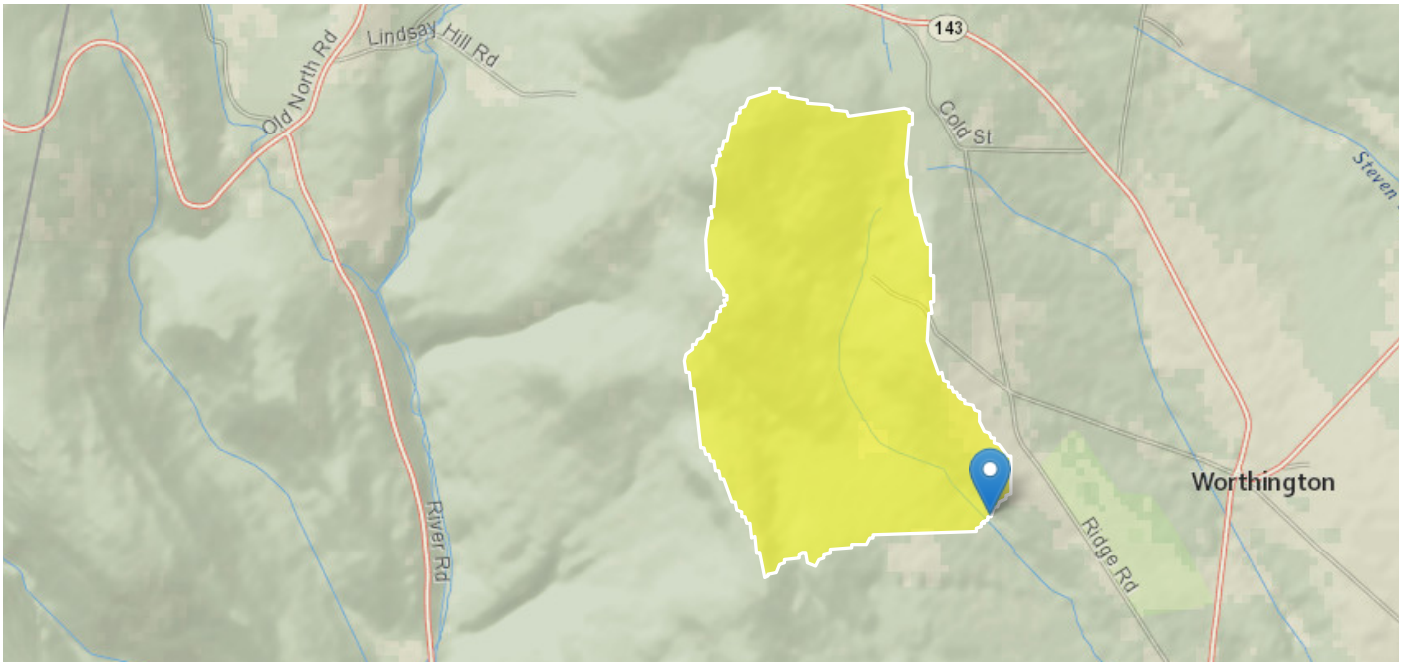
EFFECTIVE DATE:
JUNE 19, 1989

Federal Emergency Management Agency

This is an official FIRMette showing a portion of the above-referenced flood map created from the MSC FIRMette Web tool. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For additional information about how to make sure the map is current, please see the Flood Hazard Mapping Updates Overview Fact Sheet available on the FEMA Flood Map Service Center home page at https://msc.fema.gov.

StreamStats Report

Region ID: MA
Workspace ID: MA20230729223106779000
Clicked Point (Latitude, Longitude): 42.40866, -72.94982
Time: 2023-07-29 18:31:27 -0400



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
ACRSDFT	Area underlain by stratified drift	0	square miles
DRNAREA	Area that drains to a point on a stream	0.73	square miles

USGS Data Disclaimer: Unless otherwise stated, all data, metadata and related materials are considered to satisfy the quality standards relative to the purpose for which the data were collected. Although these data and associated metadata have been reviewed for accuracy and completeness and approved for release by the U.S. Geological Survey (USGS), no warranty expressed or implied is made regarding the display or utility of the data for other purposes, nor on all computer systems, nor shall the act of distribution constitute any such warranty.

USGS Software Disclaimer: This software has been approved for release by the U.S. Geological Survey (USGS). Although the software has been subjected to rigorous review, the USGS reserves the right to update the software as needed pursuant to further analysis and review. No warranty, expressed or implied, is made by the USGS or the U.S. Government as to the functionality of the software and related material nor shall the fact of release constitute any such warranty. Furthermore, the software is released on condition that neither the USGS nor the U.S. Government shall be held liable for any damages resulting from its authorized or unauthorized use.

USGS Product Names Disclaimer: Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Application Version: 4.16.1
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1

APPENDIX C

Site Photographs from June 9 and August 1, 2023
190 Ridge Road, Worthington, MA

View of Northern Field (facing southeast) from northern edge of property

View of Southern Field (facing north) from its southwestern portion

Watts Stream and remnants of beaver dam (facing south) roughly 450 feet west of Southern Field

Bordering Vegetated Wetland ("BVW") in former beaver impoundment of Watts Stream; view west

Watts Stream downstream of beaver dam; view northwest

Wetland 1 at western edge of Southern Field; view west

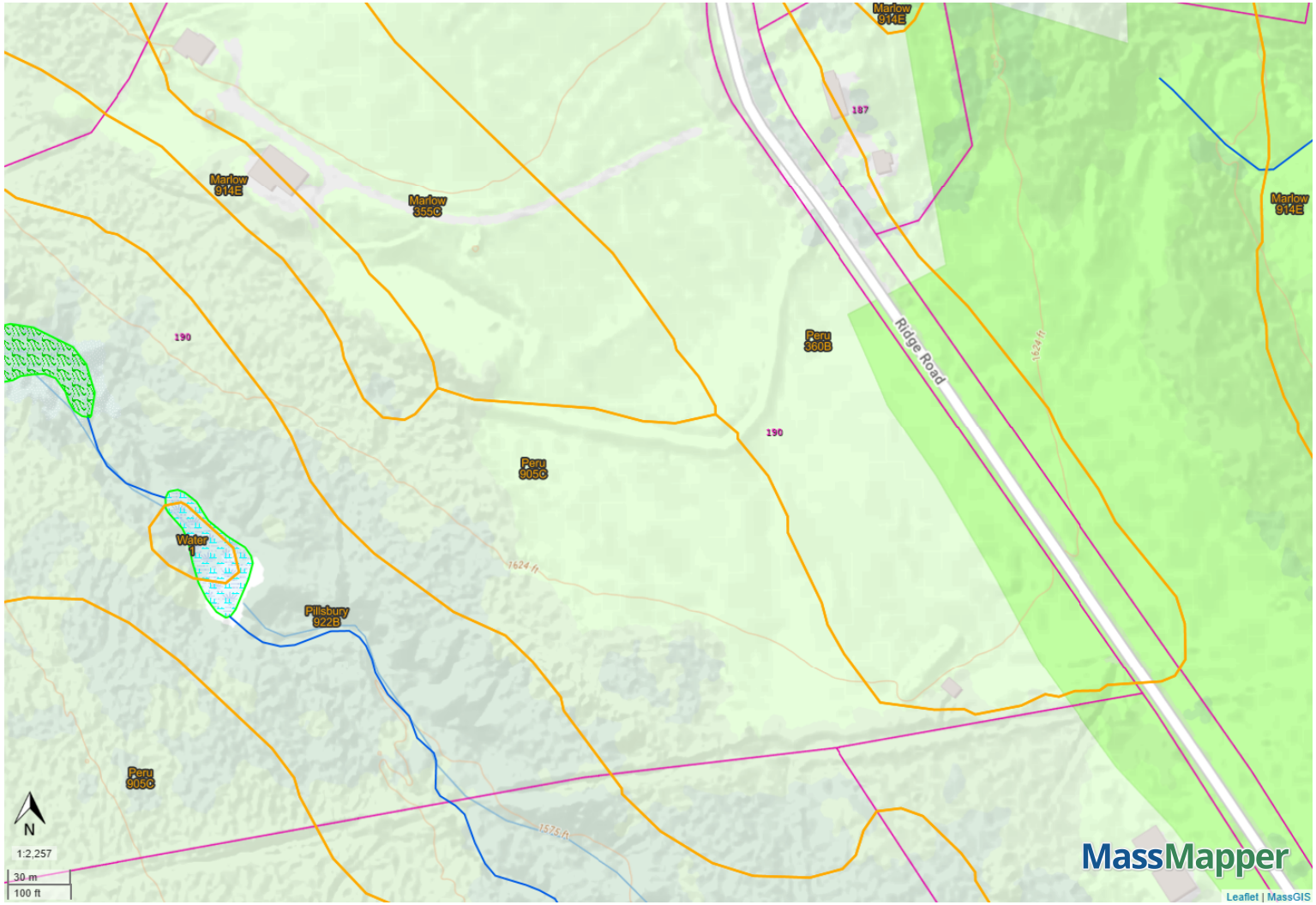
One of the streams connecting Wetland 1 in Southern Field to Watts Stream; view east

Representative view of staking/flagging of Wetland 1 boundary in Southern Field; view east

Damaged culvert at the head of Wetland 2 near southeastern corner of Southern Field

View of Southern Field's eastern edge just north of Wetland 2 and damaged culvert (i.e., no wetlands)

190 Ridge Road, Worthington



Soils Outlines

DEP Wetlands Linear Features

- SHORELINE
- HYDROLOGIC CONNECTION
- MEAN WATER LINE
- APPARENT WETLAND LIMIT
- CLOSURE LINE
- EDGE OF INTERPRETED AREA

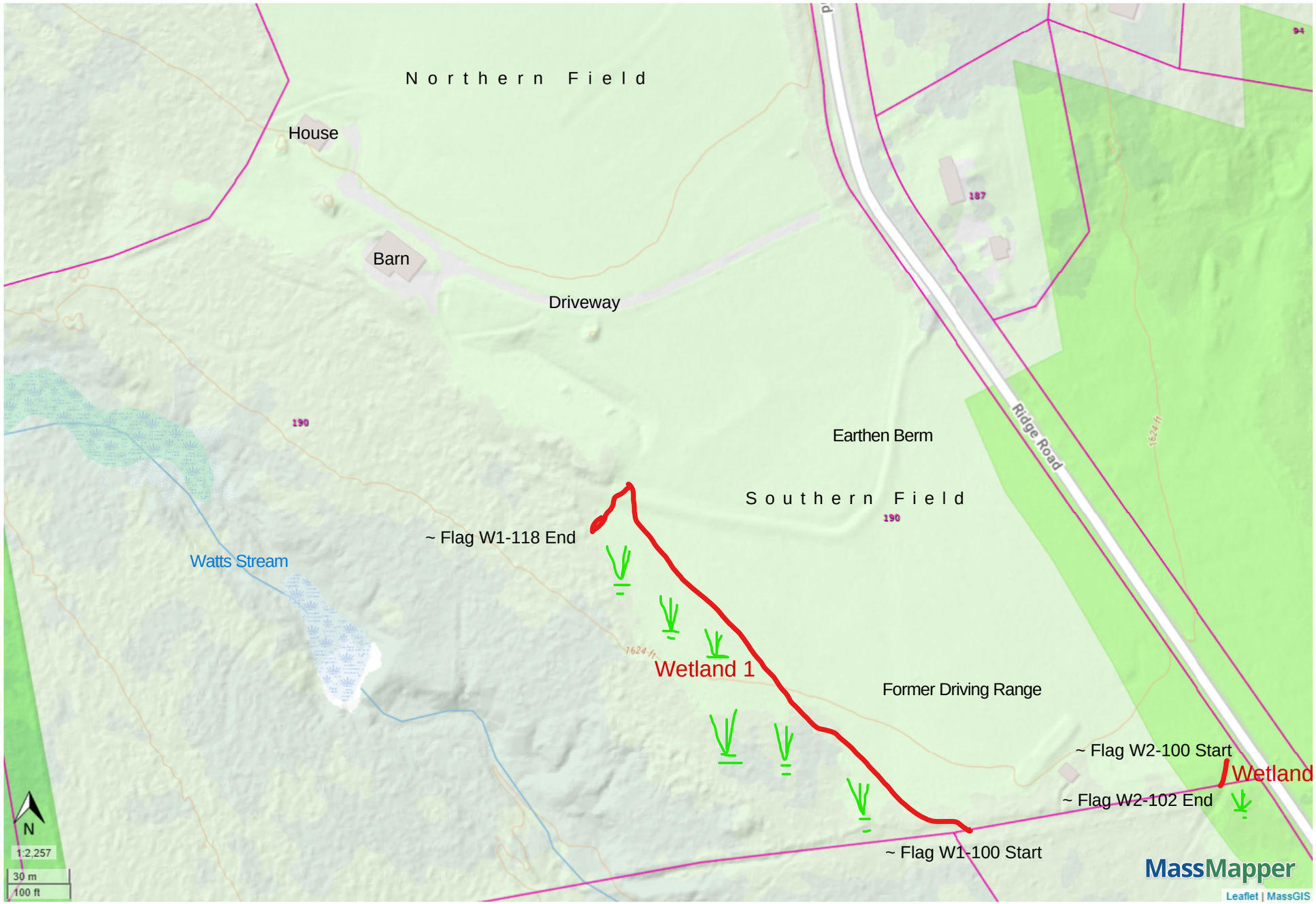
DEP Wetlands Detailed With Outlines

- Barrier Beach System
- Barrier Beach-Deep Marsh
- Barrier Beach-Wooded Swamp Mixed Trees
- Barrier Beach-Coastal Beach
- Barrier Beach-Coastal Dune
- Barrier Beach-Marsh
- Barrier Beach-Salt Marsh
- Barrier Beach-Shrub Swamp
- Barrier Beach-Wooded Swamp Coniferous
- Barrier Beach-Wooded Swamp Deciduous
- Bog
- Coastal Bank Bluff or Sea Cliff
- Coastal Beach
- Coastal Dune
- Cranberry Bog
- Deep Marsh
- Barrier Beach-Open Water
- Open Water
- Rocky Intertidal Shore
- Salt Marsh
- Shallow Marsh Meadow or Fen
- Shrub Swamp
- Tidal Flat
- Wooded Swamp Coniferous
- Wooded Swamp Deciduous
- Wooded Swamp Mixed Trees

Property Tax Parcels

MassGIS Wetlands & Soils

Wetlands Delineation Map



Property Tax Parcels

Appendix F IPaC Results

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

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Location

Hampshire County, Massachusetts

Local office

New England Ecological Services Field Office

(603) 223-2541
(603) 223-0104

70 Commercial Street, Suite 300

Concord, NH 3301-5094

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Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

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The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat Perimyotis subflavus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/9743	Proposed Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act [2] and the Migratory Bird Treaty Act (MBTA) [1]. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their nests, should follow appropriate

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regulations and implement required avoidance and minimization measures, as described in the various links on this page.

The data in this location indicates that no eagles have been observed in this area. This does not mean eagles are not present in your project area, especially if the area is difficult to survey. Please review the 'Steps to Take When No Results Are Returned' section of the Supplemental Information on Migratory Birds and Eagles document to determine if your project is in a poorly surveyed area. If it is, you may need to rely on other resources to determine if eagles may be present (e.g. your local FWS field office, state surveys, your own surveys).

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

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Bald & Golden Eagles FAQs

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are an eagle (Bald and Golden Eagle Protection Act requirements may apply).

Proper interpretation and use of your eagle report
On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort line or no data line (red horizontal) means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list and associated information help you know what to look for to confirm presence and helps guide you in knowing when to implement avoidance and minimization measures to eliminate or reduce potential impacts from your project activities or get the appropriate permits should presence be confirmed.

How do I know if eagles are breeding, wintering, or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the RAIL Tool and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If an eagle on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your “IPaC PROBABILITY OF PRESENCE SUMMARY” at the top of your results list), there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

Interpreting the Probability of Presence Graphs

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:
The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

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Migratory birds

The Migratory Bird Treaty Act (MBTA) [1] prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service).

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

Measures for Proactively Minimizing Migratory Bird Impacts

Your IPaC Migratory Bird list showcases birds of concern, including Birds of Conservation Concern (BCC), in your project location. This is not a comprehensive list of all birds found in your project area. However, you can help proactively minimize significant impacts to all birds at your project location by implementing the measures in the Nationwide avoidance and minimization measures for birds document, and any other project-specific avoidance and minimization measures suggested at the link Measures for avoiding and minimizing impacts to birds for the birds of concern on your list below.

Ensure Your Migratory Bird List is Accurate and Complete

If your project area is in a poorly surveyed area, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the Supplemental Information on Migratory Birds and Eagles document, to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the "Probability of Presence Summary" below to see when these birds are most likely to be present and breeding in your project area.

Review the FAQs

The FAQs below provide important additional information and resources.

NAME	BREEDING SEASON
Black-billed Cuckoo Coccyzus erythropthalmus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10

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Bobolink Dolichonyx oryzivorus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Canada Warbler Cardellina canadensis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10
Chimney Swift Chaetura pelagica This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Evening Grosbeak Coccothraustes vespertinus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 15 to Aug 10
Rose-breasted Grosbeak Pheucticus ludovicianus This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 15 to Jul 31
Veery Catharus fuscescens fuscescens This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 15 to Jul 15
Wood Thrush Hylocichla mustelina This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

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Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see

below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

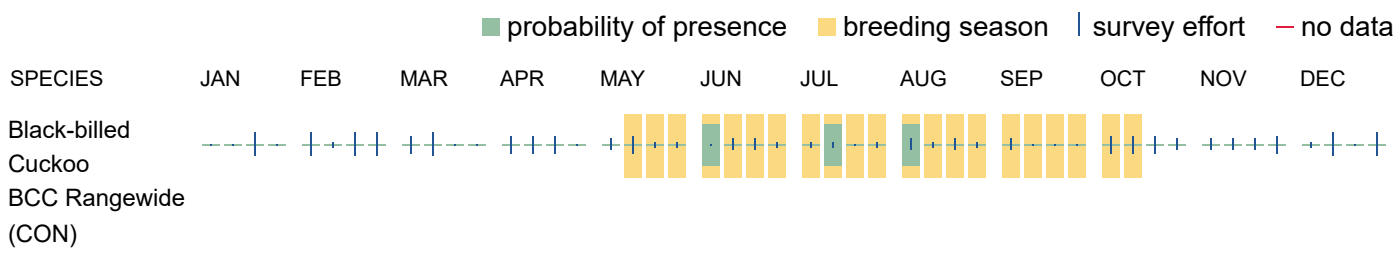
Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



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Migratory Bird FAQs

Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Avoidance & Minimization Measures for Birds describes measures that can help avoid and minimize impacts to all birds at any location year-round. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is one of the most effective ways to minimize impacts. To see when birds are most likely to occur and breed in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location, such as those listed under the Endangered Species Act or the Bald and Golden Eagle Protection Act and those species marked as “Vulnerable”. See the FAQ “What are the levels of concern for migratory birds?” for more information on the levels of concern covered in the IPaC migratory bird species list.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) with which your project intersects. These species have been identified as warranting special attention because they are BCC species in that area, an eagle (Bald and Golden Eagle Protection Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, and to verify survey effort when no results present, please visit the Rapid Avian Information Locator (RAIL) Tool.

Why are subspecies showing up on my list?

Subspecies profiles are included on the list of species present in your project area because observations in the AKN for **the species** are being detected. If the species are present, that means that the subspecies may also be present. If a subspecies shows up on your list, you may need to rely on other resources to determine if that subspecies may be present (e.g. your local FWS field office, state surveys, your own surveys).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go to the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the RAIL Tool and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your “IPaC PROBABILITY OF PRESENCE SUMMARY” at the top of your results list), there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Bald and Golden Eagle Protection Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially BCC species. For more information on avoidance and minimization measures you can implement to help avoid and minimize migratory bird impacts, please see the FAQ “Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds”.

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Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Proper interpretation and use of your migratory bird report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list does not represent all birds present in your project area. It is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list and associated information help you know what to look for to confirm presence and helps guide implementation of avoidance and minimization measures to eliminate or reduce potential impacts from your project activities, should presence be confirmed. To learn more about avoidance and minimization measures, visit the FAQ "Tell me about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds".

Interpreting the Probability of Presence Graphs
Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:
The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

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Survey Effort ()
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

NOT FOR CONSULTATION

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND
- PEM1E

FRESHWATER FORESTED/SHRUB WETLAND
- PFO1C
- PSS1/UBF

RIVERINE
- R5UBH

A full description for each wetland code can be found at the National Wetlands Inventory website

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

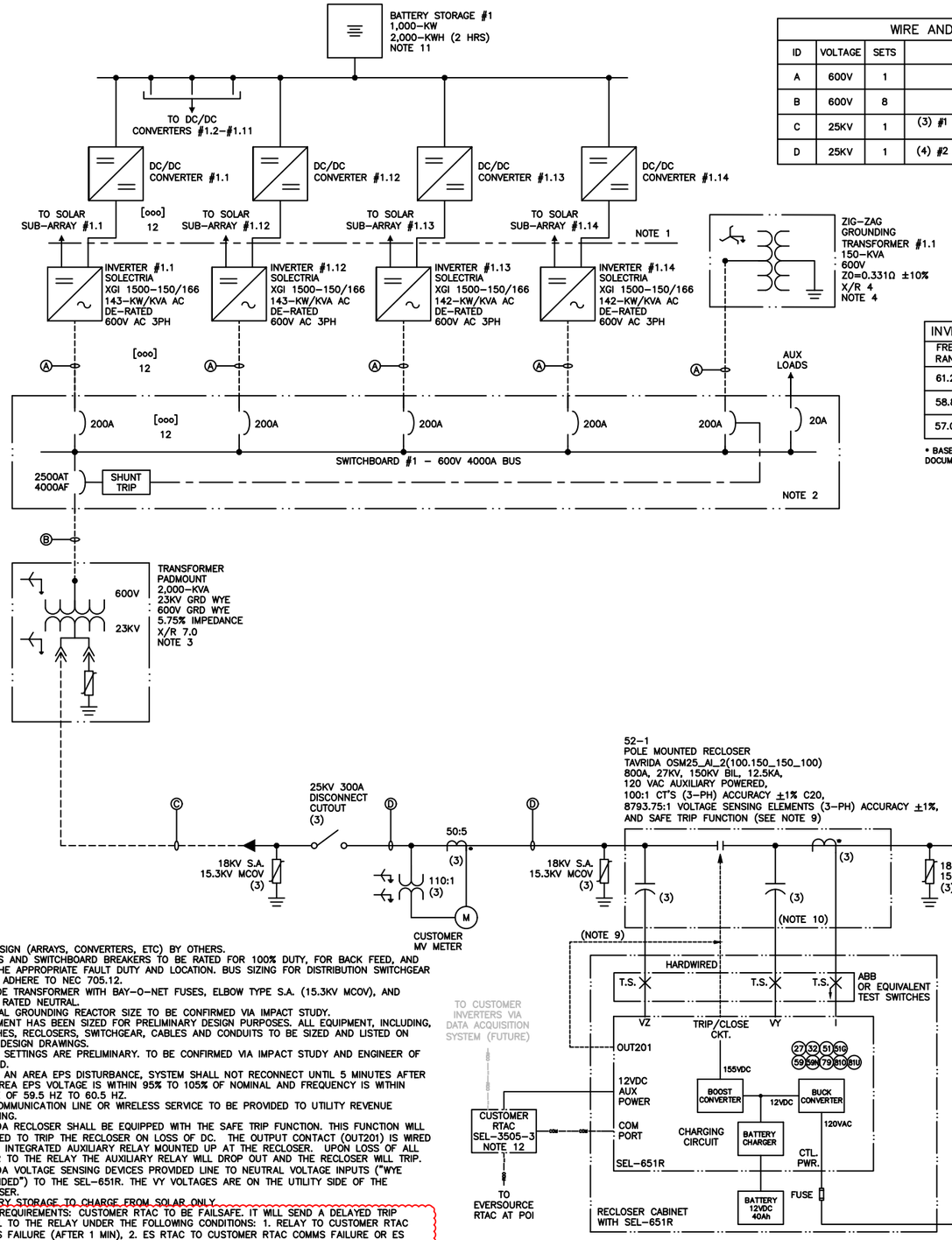
Data precautions

NOT FOR CONSULTATION

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

Appendix G Electrical Diagram



WIRE AND CONDUIT SCHEDULE				
ID	VOLTAGE	SETS	WIRE	CONDUIT
A	600V	1	(3) 250 KCMIL AL	(1) 3"
B	600V	8	(4) 600 KCMIL AL	(8) 4"
C	25KV	1	(3) #1 AWG AL, FULL NEUTRAL, XLPE-133%, MV-105	(1) 4"
D	25KV	1	(4) #2 AWG ACSR COVERED OVERHEAD WIRE	N/A

INVERTER PROTECTIVE SETTINGS			
INVERTER PROTECTIVE FUNCTIONS	PICKUP SETTING		TOTAL CLEARING TIME (SEC)
	PERCENT	VALUE	
27P1 - UNDERVOLTAGE	50%	300.0V	1.10
27P2 - UNDERVOLTAGE	88%	528.0V	3.00
59P1 - OVERVOLTAGE	110%	660.0V	2.00
59P2 - OVERVOLTAGE	120%	720.0V	0.16
81U1 - UNDERFREQUENCY	-	56.5 Hz	0.16
81U2 - UNDERFREQUENCY	-	58.5 Hz	300
81O1 - OVERFREQUENCY	-	61.2 Hz	300
81O2 - OVERFREQUENCY	-	62.0 Hz	0.16

* BASED ON ISO-NE DEFAULT IEEE 1547-2018 SETTING REQUIREMENTS DOCUMENT (12/13/2022).
* VOLTAGE SETTINGS ARE BASED ON LINE TO LINE VOLTAGES.
* LROV: INVERTERS WILL TRIP WITHIN 1 MS WHEN AC VOLTAGE EXCEEDS 1.4 PU.

INVERTER FREQUENCY RIDE-THROUGH CAPABILITY		
FREQUENCY RANGE (HZ)	OPERATING MODE	RIDE-THROUGH TIME (SEC)
61.2<F≤61.8	MANDATORY OPERATION	300
58.8≤F≤61.2	CONTINUOUS OPERATION	INFINITE
57.0≤F<58.8	MANDATORY OPERATION	300

* BASED ON ISO-NE DEFAULT IEEE 1547-2018 SETTING REQUIREMENTS DOCUMENT (12/13/2022).

INVERTER VOLTAGE RIDE-THROUGH CAPABILITY			
VOLTAGE RANGE (P.U.)	OPERATING MODE/RESPONSE	RIDE-THROUGH TIME (SEC)	MAXIMUM RESPONSE TIME (SEC)
V>1.20	CEASE TO ENERGIZE	N/A	0.16
1.10<V≤1.20	MOMENTARY CESSATION	2.00	N/A
0.88≤V≤1.10	CONTINUOUS OPERATION	INFINITE	N/A
0.50≤V<0.88	MANDATORY OPERATION	3.00	N/A
V<0.50	MOMENTARY CESSATION	1.10	N/A

* BASED ON ISO-NE DEFAULT IEEE 1547-2018 SETTING REQUIREMENTS DOCUMENT (12/13/2022).

PROTECTIVE RELAY SETTINGS 52-1			
SEL-651R PROTECTIVE FUNCTIONS	PICKUP SETTING		OPERATING TIME (SECONDS)
	PERCENT	VALUE	
27P1 - UNDERVOLTAGE	50%	0.76V (6,640V)	TOTAL: 1.10 RELAY: 1.05
27P2 - UNDERVOLTAGE	88%	1.33V (11,686V)	TOTAL: 3.00 RELAY: 2.95
59P1 - OVERVOLTAGE	110%	1.66V (14,607V)	TOTAL: 2.00 RELAY: 1.95
59P2 - OVERVOLTAGE	120%	1.81V (15,935V)	TOTAL: 0.16 RELAY: 0.11
81UP1 - UNDERFREQUENCY	-	56.5 Hz	TOTAL: 0.16 RELAY: 0.11
81UP2 - UNDERFREQUENCY	-	58.5 Hz	TOTAL: 300.00 RELAY: 299.95
81OP1 - OVERFREQUENCY	-	61.2 Hz	TOTAL: 300.00 RELAY: 299.95
81OP2 - OVERFREQUENCY	-	62.0 Hz	TOTAL: 0.16 RELAY: 0.11
32 - DIRECTIONAL POWER	2,001 KW		TOTAL: 0.16 RELAY: 0.11
51 - PHASE TIME OVERCURRENT	0.66A (66A PRI.)		CURVE: U4 T.D.: 2.0
51G - GROUND TIME OVERCURRENT	0.24A (24A PRI.)		CURVE: U4 T.D.: 2.0
59N - NEUTRAL OVERVOLTAGE	50%	0.76V (6,640V)	TOTAL: 1.00 RELAY: 0.95
79 - AUTO RESTORE VOLT. RANGE	2.48 (21,850)≤V≤2.75 (24,150)		300
79 - AUTO RESTORE FREQ. RANGE	59.5≤f≤60.5		300
ALARM - HARDWARE AND LOSS OF POWER (AC AND DC)	-	-	< 2.0

* 79 FUNCTION IS ONLY ENABLED ON VOLTAGE AND FREQUENCY DISTURBANCES. A 5 MINUTE DELAY FOR THE 79 FUNCTION IS ENABLED ON VOLTAGE AND FREQUENCY DISTURBANCES ONLY. A 5 MINUTE DELAY WILL BE SET FOR RECLOSING UPON GOOD QUALITY VOLTAGE. THE FIVE MINUTE TIME INTERVAL WILL RESTART IF THE UTILITY VOLTAGE OR FREQUENCY FALLS OUTSIDE OF THE WINDOW IDENTIFIED IN THE ABOVE CHART. RECLOSER WILL LOCKOUT ON OVERCURRENT OPERATION.

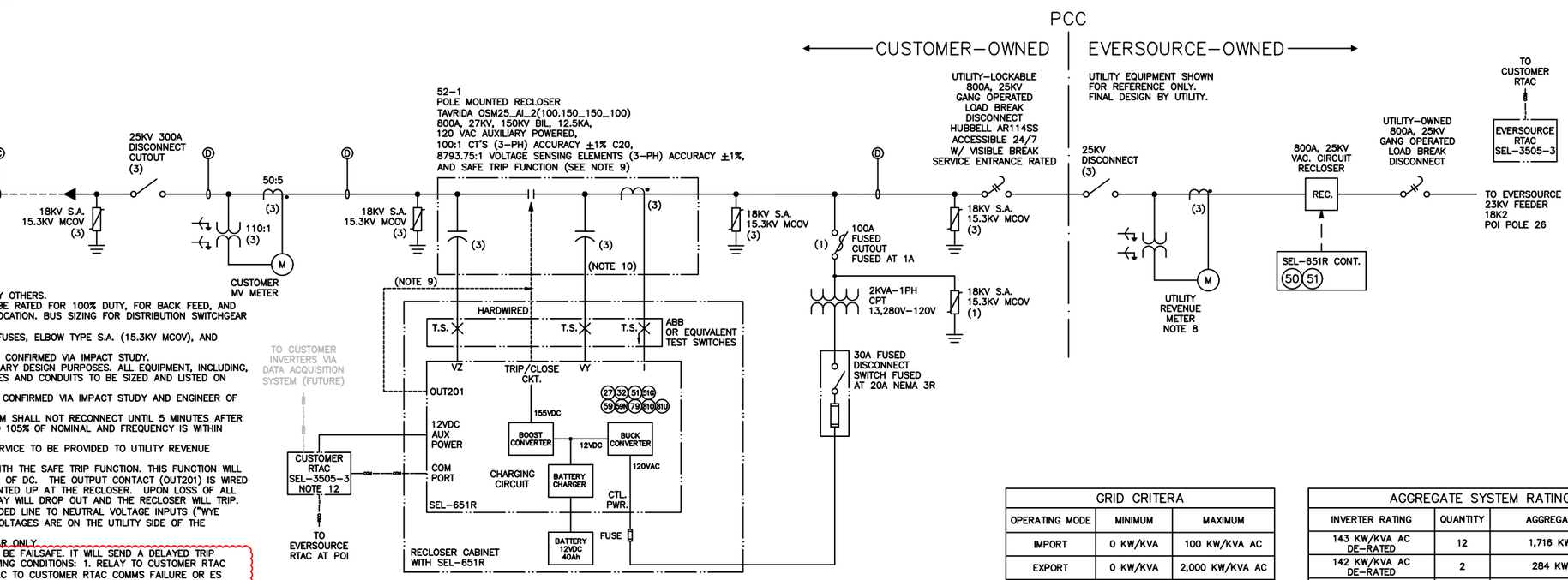
* RECLOSER WILL ONLY BE ALLOWED TO CLOSE WHEN THE VOLTAGE AND FREQUENCY ARE IN COMPLIANCE WITH THE FOLLOWING: VOLTAGE RANGE 95% TO 105% OF NOMINAL. VOLTAGE IS BASED ON LINE TO LINE VOLTAGE. FREQUENCY BETWEEN 59.5HZ TO 60.5HZ.

* BASED ON ISO-NE DEFAULT IEEE 1547-2018 SETTING REQUIREMENTS DOCUMENT (12/13/2022).

* RELAY WILL AUTOMATICALLY TRIP AND BLOCK CLOSE IF THERE IS A HARDWARE FAILURE OR POWER SUPPLY FAILURE AND ON ANY OVERCURRENT OPERATION (51 & 51G). THIS WILL BE DONE VIA LOGIC IN THE SEL-651R RELAY.

* TOTAL CLEARING TIME INCLUDES RELAY OPERATING TIME AND RECLOSER OPERATING TIME. RECLOSER OPERATING TIME IS 3.0 CYCLES.

* VOLTAGE SETTINGS BASED ON LINE TO NEUTRAL VOLTAGE.



NOTES:
1. DC DESIGN (ARRAYS, CONVERTERS, ETC) BY OTHERS.
2. PANELS AND SWITCHBOARD BREAKERS TO BE RATED FOR 100% DUTY, FOR BACK FEED, AND FOR THE APPROPRIATE FAULT DUTY AND LOCATION. BUS SIZING FOR DISTRIBUTION SWITCHGEAR SHALL ADHERE TO NEC 705.12.
3. PROVIDE TRANSFORMER WITH BAY-O-NET FUSES, ELBOW TYPE S.A. (15.3KV MCOV), AND FULLY RATED NEUTRAL.
4. NEUTRAL GROUNDING REACTOR SIZE TO BE CONFIRMED VIA IMPACT STUDY.
5. EQUIPMENT HAS BEEN SIZED FOR PRELIMINARY DESIGN PURPOSES. ALL EQUIPMENT, INCLUDING, SWITCHES, RECLOSERS, SWITCHGEAR, CABLES AND CONDUITS TO BE SIZED AND LISTED ON FINAL DESIGN DRAWINGS.
6. RELAY SETTINGS ARE PRELIMINARY. TO BE CONFIRMED VIA IMPACT STUDY AND ENGINEER OF RECORD.
7. AFTER AN AREA EPS DISTURBANCE, SYSTEM SHALL NOT RECONNECT UNTIL 5 MINUTES AFTER THE AREA EPS VOLTAGE IS WITHIN 95% TO 105% OF NOMINAL AND FREQUENCY IS WITHIN RANGE OF 59.5 HZ TO 60.5 HZ.
8. TELECOMMUNICATION LINE OR WIRELESS SERVICE TO BE PROVIDED TO UTILITY REVENUE METERING.
9. TAVRIDA RECLOSER SHALL BE EQUIPPED WITH THE SAFE TRIP FUNCTION. THIS FUNCTION WILL BE USED TO TRIP THE RECLOSER ON LOSS OF DC. THE OUTPUT CONTACT (OUT201) IS WIRED TO AN INTEGRATED AUXILIARY RELAY MOUNTED UP AT THE RECLOSER. UPON LOSS OF ALL POWER TO THE RELAY THE AUXILIARY RELAY WILL DROP OUT AND THE RECLOSER WILL TRIP.
10. TAVRIDA VOLTAGE SENSING DEVICES PROVIDED LINE TO NEUTRAL VOLTAGE INPUTS ("WYE GROUNDED") TO THE SEL-651R. THE VY VOLTAGES ARE ON THE UTILITY SIDE OF THE RECLOSER.
11. BATTERY STORAGE TO CHARGE FROM SOLAR ONLY.
12. RTAC REQUIREMENTS: CUSTOMER RTAC TO BE FAILSAFE. IT WILL SEND A DELAYED TRIP SIGNAL TO THE RELAY UNDER THE FOLLOWING CONDITIONS: 1. RELAY TO CUSTOMER RTAC COMMS FAILURE (AFTER 1 MIN), 2. ES RTAC TO CUSTOMER RTAC COMMS FAILURE OR ES RTAC OFFLINE (AFTER 5 MINS), 3. ES RTAC TO DSCADA COMMS FAILURE (AFTER 10 MINS). IF THE CUSTOMER RTAC RECEIVES A HARDWIRED TRIP OR SOFTWARE TRIP ALARM, A PULSE WILL STAY ON THE RISING EDGE FOR 2 SECONDS AND AGAIN SEND A TRIP SIGNAL TO THE RELAY. ENTIRE LOGIC SHALL BE IMPLEMENTED INSIDE THE RTAC. RELAY SETTINGS SHALL INCORPORATE REMOTE COMMAND FROM RTAC INTO TRIP AND BLOCK CLOSE EQUATIONS. RTAC TO SEND TRIP COMMAND TO RELAY (NOT RECLOSER). RELAY TO TRIP RECLOSER THROUGH HARDWIRED CONNECTION. CONNECTION MEDIUM FROM RELAY TO RTAC SHALL BE SERIAL OR ETHERNET. RTAC-RTAC AND RELAY-RTAC COMMUNICATION PROTOCOL TO BE DNP3. CUSTOMER RTAC TO SEND AUTOMATED EMAIL TO EVERSOURCE ONCE RECLOSER IS TRIPPED.

GRID CRITERA		
OPERATING MODE	MINIMUM	MAXIMUM
IMPORT	0 KW/KVA	100 KW/KVA AC
EXPORT	0 KW/KVA	2,000 KW/KVA AC

*ALL INTERCONNECTION REQUIREMENTS SUCH AS MAXIMUM AND MINIMUM IMPORT/EXPORT LIMITS SHALL BE PROGRAMMED INSIDE THE CUSTOMER RTAC.

AGGREGATE SYSTEM RATING		
INVERTER RATING	QUANTITY	AGGREGATE RATING
143 KW/KVA AC DE-RATED	12	1,716 KW/KVA AC
142 KW/KVA AC DE-RATED	2	284 KW/KVA AC
TOTAL CAPACITY	14	2,000 KW/KVA AC

NOT FOR CONSTRUCTION

COMMONWEALTH OF MASSACHUSETTS
ANTHONY M. MORREALE ELECTRICAL No. 50860
PROFESSIONAL ENGINEER

FIRM NAME: LIG CONSULTANTS, PC
FIRM REG #: N/A
PROF. ENGINEER: ANTHONY M. MORREALE, P.E.
ENGINEER LICENSE #: 50860

REV	DATE	DESCRIPTION	DRW	APR'D
D	8/10/23	REVISED PER EVERSOURCE COMMENT (ADDED 59N)	AMM	AMM
C	6/29/23	UPDATED PROTECTION SETTINGS AND RIDE-THROUGH CAPABILITY	AMM	AMM
B	5/8/23	UPDATED INVERTER TYPE AND DESIGN	KRC	AMM
A	1/15/21	ADDED BATTERY STORAGE	NPC	AMM
G	8/28/24	UPDATED RTAC INFORMATION	KRC	AMM
F	2/15/24	UPDATED RTAC INFORMATION	AMM	AMM
E	1/22/24	ADDED RTAC PER UTILITY REQUEST	KRC	AMM

DES NPC
DRW NPC
CHK AMM

LIG Consultants, PC

BWC WADES STREAM, LLC
190 RIDGE RD C, WORTHINGTON, MA
2.0 MW-AC SOLAR PV & STORAGE SYSTEM - INTERCONNECTION ONE-LINE

SIZE B
SHEET 1of1
DATE: 12/15/2020
SCALE: NTS
DWG NO: E-001
FILE NO: xxxxxxxxxx

Appendix H Electrical Equipment Specification Sheets

HELIENE

144HC M10 Bifacial Module

144 Half-Cut Monocrystalline 520W – 540W

21%

Utilizes the latest M10 size super high efficiency Monocrystalline PERC cells. Half cut design further reduces cell to module (CTM) losses.

Stability & Looks

Rugged, double webbed frame design withstands wind, snow, and other mechanical stresses. Framed Glass–Backsheet aesthetic is ideal for high visibility installation.

Anti-Reflective

Premium solar glass with anti reflective coating delivers more energy throughout the day

High Reliability

Proven resistance to PID and reliable in high temperature and humidity environments.

Manufactured Using International Quality System Standards: ISO9001

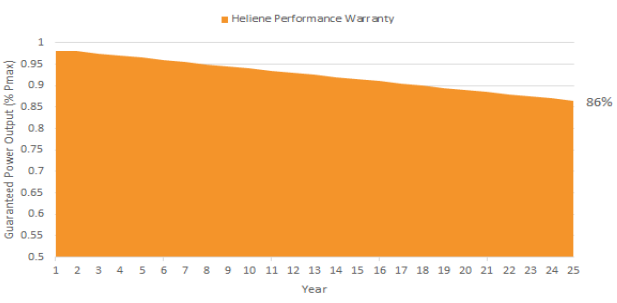
Half-Cut Design with Split Junction Box Technology

Bifacial Technology Enabling Additional Energy Harvest from Rear Side

1500V System Voltage Rating

No Compromise Guarantee

15 Year Workmanship Warranty
25 Year Linear Performance Guarantee



World-class Quality

- Heliene's fully automated manufacturing facilities with state-of-the-art robotics and computer aided inspection systems ensure the highest level of product quality and consistency
- All manufacturing locations are compliant with international quality standards and are ISO 9001 certified
- Heliene modules have received Top Performer rankings in several categories from PV Evolution Labs (PV EL) independent quality evaluations

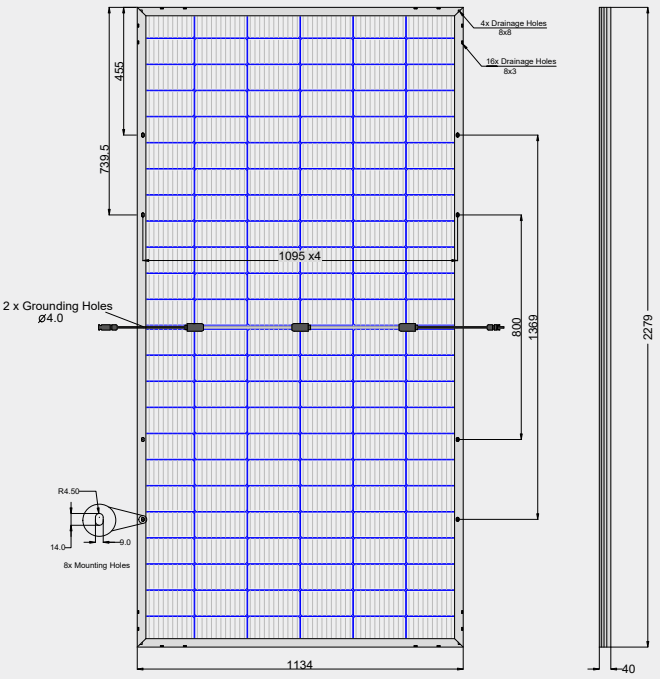
Bankable Reputation

- Established in 2010, Heliene is recognized as highly bankable Tier 1 manufacturer of solar modules and has been approved for use by the U.S. Department of Defense, U.S. Army Corps of Engineers and from numerous top tier utility scale project debt providers
- By investing heavily in research and development, Heliene has been able to stay on the cutting edge of advances in module technology and manufacturing efficiency

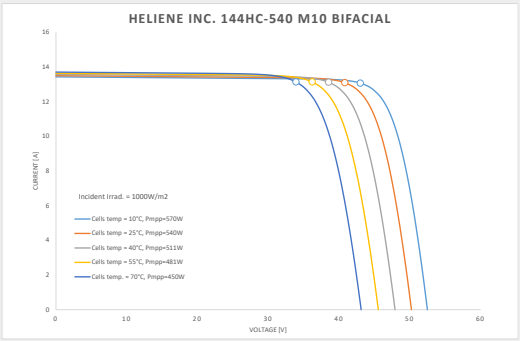
Local Sales, Service, and Support

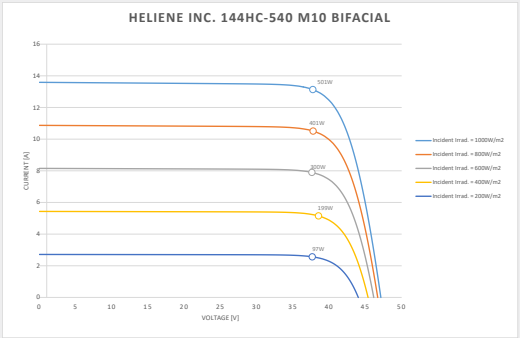
- With sales offices across the U.S. and Canada, Heliene prides itself on unsurpassed customer support for our clients. Heliene has become the brand of choice for many of the leading residential installers, developers and Independent Power Producers due to our innovative technology, product customization capability and just in time last-mile logistics support
- Local sales and customer support means answered phone calls and immediate answers to your technical and logistics questions. We understand your project schedules often change with little warning and endeavor to work with you to solve your project management challenges

Dimensions for 144HC M10 Bifacial Series Modules



I-V Curves for 144HC M10 Bifacial Series Modules





Certifications & Listing

Electrical Data (STC)

Peak Rated Power	P_{mpp} (W)	540	535	530	525	520
Maximum Power Voltage	V_{mpp} (V)	42.32	42.13	41.94	41.75	41.56
Maximum Power Current	I_{mpp} (A)	12.77	12.70	12.64	12.58	12.52
Open Circuit Voltage	V_{oc} (V)	50.22	49.97	49.72	49.23	48.73
Short Circuit Current	Isc (A)	13.50	13.44	13.37	13.32	13.28
Module Efficiency *	Eff (%)	20.9	20.7	20.5	20.3	20.1
Maximum Series Fuse Rating	MF (A)	30	30	30	30	30
Power Output Tolerance			[- 0/+3%]			
Bifaciality Factor			70%			

STC - Standard Test Conditions: Irradiation 1000 W/m2 - Air mass AM 1.5 - Cell temperature 25 °C

Electrical Data (NMOT)

Maximum Power	P_{mpp} (W)	400	395	390	385	380
Maximum Power Voltage	V_{mpp} (V)	39.19	38.58	38.58	37.97	37.96
Maximum Power Current	I_{mpp} (A)	10.21	10.24	10.11	10.14	10.01
Open Circuit Voltage	V_{oc} (V)	47.13	46.89	46.66	46.20	45.73
Short Circuit Current	Isc (A)	10.87	10.82	10.77	10.72	10.70

NMOT - Nominal Module Operating Temperature:
Irradiance at 800W/m2, Ambient Temperature 20ºC, Wind speed 1m/s

Mechanical Data

Solar Cells	144 Half Cut, M10, 182mm, PERC Cells
Module Construction	Framed Glass–Backsheet
Dimensions (L x W x D)	2279 x 1134 x 40 mm (89.72 x 44.65 x 1.6 inch)
Weight	29.2 kg (64.3 lbs)
Frame	Double Webbed 15-Micron Anodized Aluminum Alloy
Glass	3.2mm Low-Iron Content, High-Transmission, PV Solar Glass with Anti Reflective Coating
Junction Box	IP-68 rated with 3 bypass diodes
Output Cables	0.3-meter Symmetrical Cables
Connectors	Multi-Contact/ Stäubli MC4

Certifications

UL Certification	UL61215, UL61730

Temperature Ratings

Nominal Operating Cell Temperature (NOCT)	+45°C (±2°C)
Temperature Coefficient of P_{max}	-0.36%/°C
Temperature Coefficient of V_{oc}	-0.28%/°C
Temperature Coefficient of I_{sc}	0.034%/°C

Maximum Ratings

Operational Temperature	-40°C to +85°C
Max System Voltage	1500V
Mech. Load Test (Front)	113 psf / 5400Pa
Mech. Load Test (Back)	50 psf / 2400 Pa
Fire Type	Type 1

Warranty

15 Year Manufacturer's Workmanship Warranty
25 Year Linear Power Guarantee

Packaging Configuration

Modules per box:	27 pieces
Modules per 53' trailer:	702 pieces

The specifications and key features contained in this datasheet may deviate slightly from our actual products due to the ongoing innovation and product enhancements. Heliene Inc. reserves the right to make necessary adjustment to the information described herein at any time without prior notice. PV modules should be handled and installed only by qualified people. Please carefully read safety and installation instructions available for download from Heliene website before using Heliene PV modules. For warranty details, please refer to Product Warranty Document, also available for download from Heliene website.

EDGE760 Liquid-Cooled BESS Product Specification

For GOTION Battery Energy Storage System

Product Model	***ESD1267-05P760-G***		
Document Version	*Version 1.0*	***Date***	*11/5/2024*
Note	*Document confidential to NDA customers. Distribution to third-party not allowed.*		

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Abbreviation

BMS	Battery Management System
BMU	Battery Management Unit
BCMU	Battery Cluster Management Unit
DOD	Depth of Discharge
CAN	Controller Area Network
EOL	End of Life
SOC	State of Charge
SOE	State of Energy
SOH	State of Health
SOP	State of Power

1. Introduction to Energy Storage Systems

1.1. System Application Scope

Classification	Energy storage system function
Power generation side	Power generation capacity/peak shifting/Interconnection Output Stabilization
Grid side	Transmission system support/delay of transmission system expansion/relief of transmission system congestion/load tracking/reserve capacity/frequency regulation/voltage support
User side	Power supply reliability/time-of-use electricity price management/power quality/capacity cost management

1.2. System Performance Characteristics

- The ESD1267-05P760-G Energy Storage System is a highly integrated industrial and commercial liquid-cooled battery cabinet. The system includes battery racks (also referred to as battery clusters), a high-voltage box, a liquid-cooled temperature control system, and a fire suppression system.
- Utilizing Gotion's independently developed battery management system (BMS), this system enables real-time detection of individual cell voltage and temperature within the battery pack, as well as total pack current, total voltage, ambient temperature, and other parameters. It offers multiple protection functions to prevent overcharging and over-discharging. The system is flexible, reliable, and supports expansion and upgrades.
- CAN, RS485, and Ethernet interface design reduce the difficulty of advanced application development of energy storage systems.
- Adopt a comprehensive and multi-level battery protection strategy to ensure the safe operation of the energy storage system.
- The cabinet is equipped with a PACK-level submerged fire extinguishing system, aerosol fire suppression systems, and a water sprinkler system. Additionally, it includes heat detectors, smoke detectors, and an explosion relief panel, providing comprehensive monitoring and multi-layer protection for the battery cabinet.
- Equipped with an intelligent liquid cooling temperature control system, the power consumption utilization rate is increased by about 30% compared with traditional air-cooling system. The maximum temperature difference of the megawatt-level battery system is ≤41°F(5°C).
- The industrial and commercial liquid-cooled energy storage products are housed in outdoor cabinets, creating a distinct fire protection zone achieved through the deployment of two racks and a singular cabinet design. Key advantages of this cabinet include its compact design, robust safety features, ease of installation, and scalability for future expansion.

1.3. ESS Cabinet Liquid Cooling Overall Strategy

The ESD1267-05P760-G Energy Storage System is composed of the cabinet body, battery system, temperature control system, fire suppression system, etc.

Below is a diagram providing an overview of the key components.

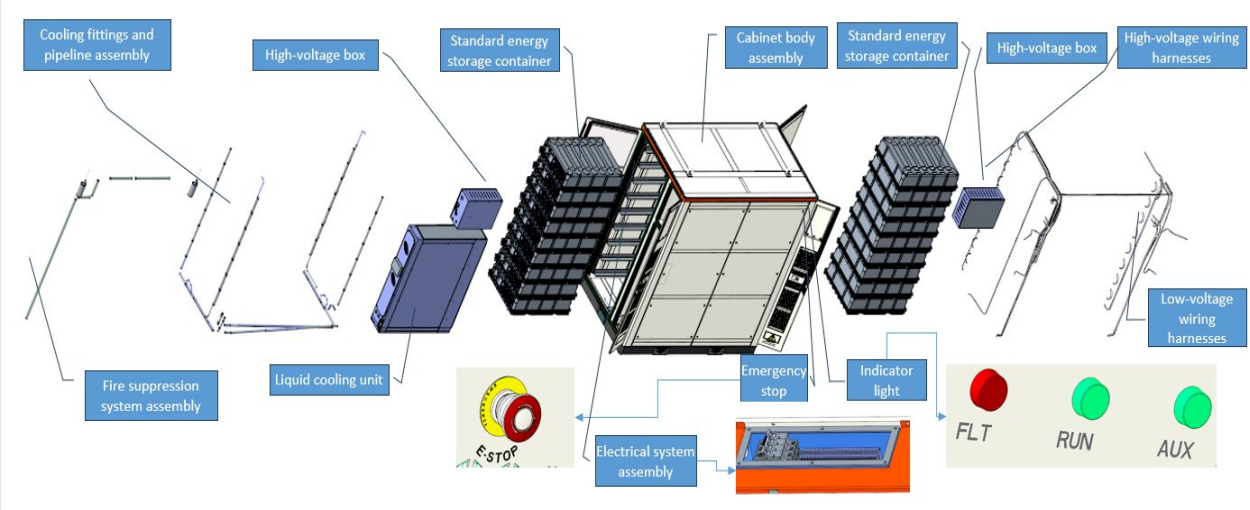

Figure 1-1 Battery cabinet overview

The detailed configuration is shown in the table below:

No.	Name	Quantity	Specification
1	Battery Cabinet Body	1	55.1in x 94.5in x 98.4in (1400mm x 2400mm x 2500mm) Non-walk-in design; Protection level: IP55
2	Battery System	1 Set	Using 300Ah lithium iron phosphate battery The battery container consists of 2 battery racks, each battery rack contains 9 (1P44S) battery packs and one high-voltage box Battery management system included
3	Temperature Control System	1 Set	12kW (cooling capacity) liquid cooling unit, liquid cooling pipeline, coolant;
4	Fire Suppression System	1 Set	• Heat/smoke detection • Explosion relief panel • PACK-level submerged fire extinguishing system • Aerosol fire extinguishing system • Prefabricated water sprinkler system (optional)

Table 1-1 Cabinet configuration overview

2. System Equipment Parameters

2.1. System Specifications

Figure 2-1 Battery cabinet appearance

Item	Specification	Note
Battery Cabinet Model	ESD1267-05P760-G	
Nominal Energy	760kWh	0.5P, 100%DoD, 77 ±3.6°F (25 ±2℃)
Nominal Voltage	1267.2V	
Nominal Capacity	300Ah	0.5P, 100%DoD, 77 ±3.6°F (25 ±2℃)
Operating Voltage Range	1069.2V ~ 1425.6V	2.7-3.6V, 95%DoD
Operating Temperature	59°F ~ 104°F (15℃ ~ 40℃)	
Maximum Charging/Discharging Power	380kW	0.5P, 77 ±3.6°F (25 ±2℃)
Maximum Charging/Discharging Ratio	0.5P	@77°F (25℃)
Cycle Life	8000 cycles	77 ±3.6°F (25 ±2℃), 0.5P/0.5P 95%DoD, 70%EOL
Calendar Life	15 years	77 ±3.6°F (25 ±2℃), 50%SoC, 70%EOL
Operating Ambient Temperature	-4°F ~ 113°F (-20 ~ 45℃)	
Operating Humidity	0% ~ 95%	
Protection Class	IP55	
Cooling Method	Intelligent liquid cooling	
Fire Suppression System	Aerosol + dry pipe sprinkler system + PACK immersion	Adjustable based on AHJ requirements
Altitude	≤6561.7ft (2000m)	
Communication Protocol	CAN, RS485, Ethernet	
Dimension (W x D x H)	55.1in x 94.5in x 98.4in (1400mm x 2400mm x 2500mm)	
Weight	≈8t	

Table 2-1 Battery Cabinet Product Specifications

2.2. Battery System

2.2.1. Cell

Item	Specification	Note
Cell Type	Prismatic	
Cell Chemistry	LiFePO4	
Cell Model Name	IFP81175200-300Ah	
Dimension (W x D x H)	6.9in x 3.2in x 8in (175.4mm x 81.2mm x 202.6mm)	±0.02in (0.5mm), including the cell pole
Weight	13.2lb ±0.7lb (5998g ±300g)	
Cell Capacity	300Ah	77 ±3.6°F (25 ±2℃), 100% DoD
Nominal Voltage	3.2V	
Operating Voltage Range	2.5V ~ 3.65V	T > 32°F (0℃), 100% DoD
Nominal Energy	960Wh	77 ±3.6°F (25 ±2℃), 100% DoD
Maximum Continuous Discharge Rate	0.48kW	0.5P
Operating Temperature	59°F ~ 113°F (15℃ ~ 45℃)	Charging Power ≤0.5P
Storage Temperature	-22°F ~ 140°F (-30℃ ~ 60℃)	Optimum storage temperature 59°F ~ 95°F (15℃ ~ 35℃)
DC Internal Resistance	≤0.5mΩ	50%SoC@3c30s, 77 ±3.6°F (25 ±2℃)
Cycle Life	8000 cycles	77 ±3.6°F (25 ±2℃), 0.5P/0.5P, 90% DoD, 70%EOL
Calendar Life	15 years	77 ±3.6°F (25 ±2℃), 50% SoC, 70% EOL

Table 2-2 Cell Parameters

2.2.2. Battery Pack

The battery pack consists of four 1P26S sub-modules connected in series to form 1P104S, with a rated specification of 332.8V/314Ah.

Item	Specification	Note
Battery Pack Model	EPD140-05P42	
Dimension (W x D x H)	31in x 42.8in x 9.3in (787mm x 1088mm x 235mm)	±0.1in (3mm), including the cooling pipe connector
Weight	691.8lb ±11lb (313.8kg ±5kg)	
Nominal Voltage	140.8V	
Operating Voltage Range	118.8V ~ 158.4V	
Pack Grouping (Parallel and Serial)	1P44S	Cell: IFP81175200-300Ah
Cell Capacity	300Ah	
Nominal Energy	42.24kWh	0.5P, 100% DoD, 77 ±3.6°F (25 ±2℃)
Maximum Charge/Discharge Power	21.1kW	0.5P, 77 ±3.6°F (25 ±2℃)
Operating Temperature	59°F ~ 104°F (15℃ ~ 40℃)	Charging power ≤0.5P
Operating Humidity	5% ~ 95%	
Protection Class	IP67	

Table 2-3 Battery Pack Parameters

2.2.3. Battery Rack

Item	Specification	Note
Battery Rack Model	ED1267-05P380	
Number of Packs per Rack	9	Pack: EPD140-05P42
Dimension (W x D x H)	35.3in x 41.9in x 93.9in (896mm x 1065mm x 2385mm)	±0.16in (4mm)
Cell Capacity	300 Ah	0.5P, 100%DOD, 77 ±3.6°F (25 ±2℃)
Nominal Capacity	380.16 kWh	0.5P, 100%DOD, 77 ±3.6°F (25 ±2℃)
Nominal Voltage	1267.2 V	
Voltage Range	1069.2 V ~ 1425.6 V	
Maximum Charging/Discharging Power	190.08 kW	0.5P, 77 ±3.6°F (25 ±2℃)
Working Temperature	59°F ~ 113°F (15℃ ~ 45℃)	Charging power ≤0.5P
Working Humidity	5% ~ 95%	
Weight	6834.3lb (3100 kg)	±176.4lb (80kg)

Table 2-4 Rack parameters

2.2.4. High Voltage Box

I. Technical Parameters

The high-voltage box is a rack-level control unit specifically designed and manufactured by Gotion for the liquid-cooled energy storage battery system. The high-voltage box houses isolation switches, relays, fuses, a secondary BMS, and switching power supplies.

The design of the high-voltage box fully considers electrical characteristics, heat dissipation, waterproofing, safety, operability, and maintainability. The space layout is rational, offering a compact structure, flexible configuration, and reliable safety.

The high-voltage box includes a DC24V power supply interface and a CAN communication interface to facilitate data communication, control, and protection of the battery management system.

Figure 2-2 Appearance of high voltage box

The technical parameters of the high-voltage box are shown below:

Item	Specification
Dimension (W x D x H)	9in x 24.2in x 17.7in (230mm × 615mm × 450mm)
Weight	≈66.1lb (30kg)
Voltage Range	≤ 1500V
Current Range	≤250A
Operating Temperature Range	-4°F～122°F (-20℃ ~ 50℃)
Operating Humidity Range	0~95%
Altitude	≤ 6561.7ft (2000m)

Communication Protocol	CAN, RS485, Ethernet
Cooling Method	Natural cooling

Table 2-5 High voltage box parameters

II. Function highlights:

Function highlights:

- Supports AC 220V power supply
- Supports CAN communication protocol
- Enables electric opening control and condition monitoring of circuit breakers for reliable breakpoint maintenance
- Equipped with power, operation, and fault indicators for visual status monitoring
- Features high-voltage fast plug-in for quick, safe, and reliable connections

Key Components Parameters

Item	Description	Parameter	Qty.	Unit	Note
1	Isolating Switch	NDG3VH-250，1500V	1	pc	
2	DC Contactor	DC1500V(max)/350A, No polarity	2	pc	
3	Fuse	DC 1500V/350A	2	pc	
4	Current Sensor	Range±300A	1	pc	
5	Positive Pole Socket	DC1500V/250A，Orange Color DC1500V/250A，	2	pc	
6	Negative Pole Socket	Black Color	2	pc	
7	Level-2 BMS Unit	Developed by Gotion	1	pc	

Table 2-6 High voltage box function parameters

III. External Interface Definition:

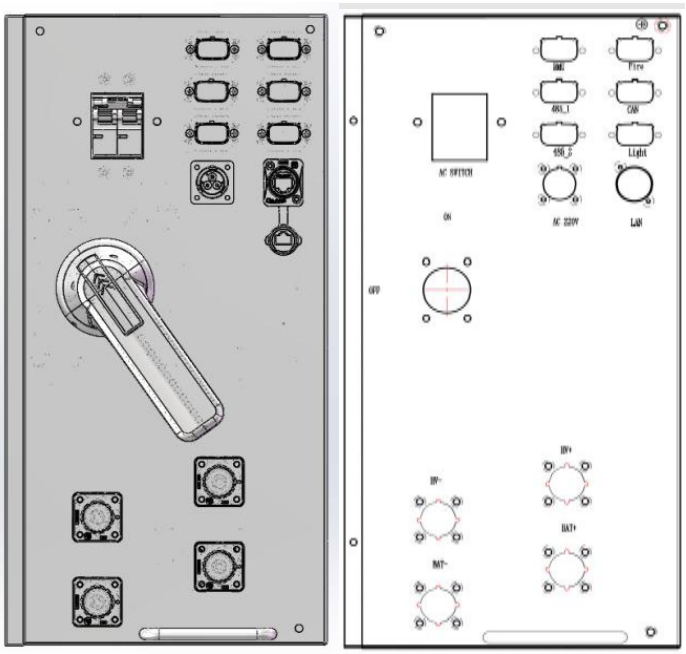

Figure 2-3 Appearance of the high-voltage box external front panel

The high-voltage box external front panel is shown in the figure above, and the interface information is as follows:

Serial Number	Item	Definition	Interface Information	Note
1	AC 220V	AC power supply	L, N	
2	BAT+	PACK positive pole connector	Positive	
3	BAT-	PACK negative pole connector	Negative	
4	BMU	Power and communication control part	24V+, 24V-, CANH-0, CANL-0	Slave power supply
5	CAN	CAN communication protocol	CANH-0, CANL-0, CANH-1, CANL-1, E-CAN_H, E-CAN_L	Debug
6	EIECMAGCTR	Solenoid control valve	ELEC1_DRV+	Solenoid valve connected to the battery pack
7	Fire	Fire power supply and feedback	24V+, 24V-, L_DETECT	
8	HV+	External output positive connector	Positive	
9	HV-	External output negative connector	Negative	
10	LAN	LAN based data communication in modern energy management systems (EMS)	Net interface	
11	Light	Pilot lamp	AUX, FLT, RUN, ESTOP	
12	485	Liquid cooler, PCS communication module	485A-1, 485B-1, 485A-2, 485B-2	

Table 2-7 High voltage box panel description overview

2.3. Battery Management System

2.3.1. Introduction to Battery Management System

The ESS employs a two-level or three-level hierarchical architecture for its BMS, providing for the following functions:

- Real-time monitoring of battery parameters such as voltage, temperature, total battery cluster voltage, current, and insulation.
- Detection of insulation resistance.
- Fault diagnosis, alarm triggering, fault protection, and recording of battery system faults.
- Self-testing functionality.
- Protection against overcharge, over-discharge, over-current, and other battery system abnormalities.
- Control of anti-circulation between Battery Racks.
- Estimation of SoC and State of Health (SoH).
- Passive and active equalization.
- Timing synchronization.
- Configuration of battery operating parameters, alarms, and protection thresholds locally or remotely.
- Event logging, data storage, and display.
- Communication with PCS, EMS, and monitoring devices.

I. Battery Management System Framework:

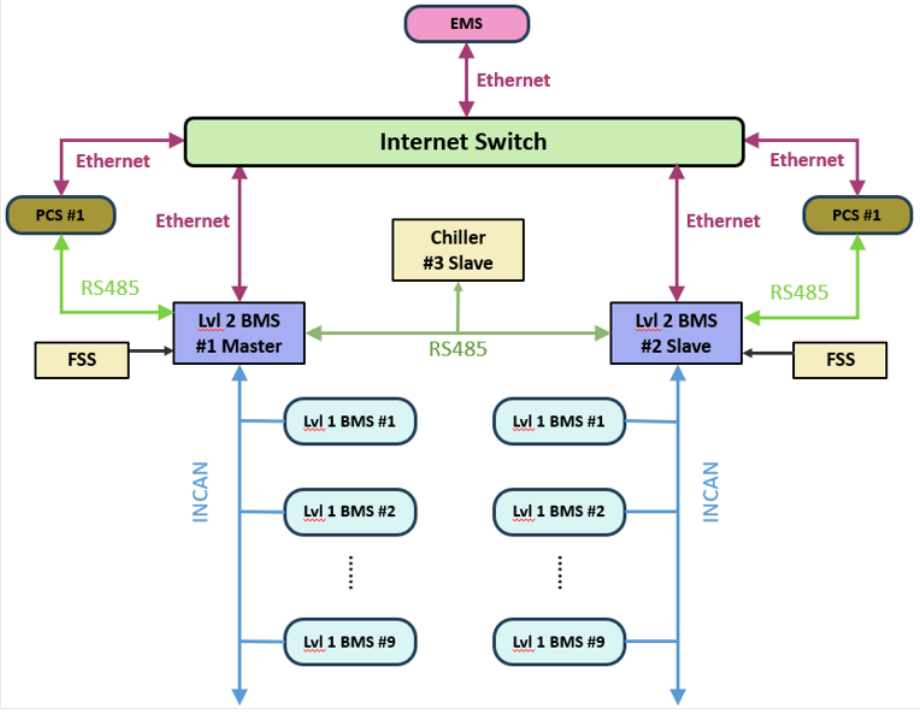

Figure 2-4 Overview of the two-level BMS system

II. Battery Management Function:

The protection and monitoring functions of the battery system are implemented by the BMS battery management system. The BMS system of the 760kWh system is managed at two levels, namely BMU and BCMU. The main functions of each level of BMS are as follows:

BMU (pack level, built in each battery pack): Monitors the voltage and temperature of individual cells and the total voltage of a single battery pack and transmits the information to the upper-level BMS in real-time through the CAN protocol to control the voltage balance of individual cells.

BCMU (rack level, built in the high-voltage box): Detects the total voltage and total current of the entire battery rack, and transmits the information to the upper-level BMS in real time through the CAN protocol. It can calculate the capacity and health status of the battery rack during charging and discharging (SOC and SOH), predict the power, and calculate the insulation resistance. It also controls the balance of relay switch and PACK level unit voltage.

III. Key Parameters:

The first-level BMS specifications are shown in the following table:

Item	Description		Parameter				Note
			Minimum	Typical	Maximum	Unit	
1	Working Power	Nominal Voltage	9	-	32	Vdc	
		Nominal Power Consumption	-	-	1	W	DI/DO not connected
2	Data Acquisition – Single Cell Voltage Data	Channels	3	-	48		Voltage for battery modules should be above (>) 6V
		Range	1.5	-	4.5		
		Accuracy	≤±0.1%FS, Voltage≤5mV				
3	Data Acquisition - Temperature	Channels	-	-	48	Channel	
		Range	-40 (-40)	-	257 (125)	°F (℃)	
		Accuracy	-	±1.8 (1)	-	°F (℃)	±1.8°F@-13°F ~ 149°F (±1°C@-25°C ~ 65°C), ±3.6°F@-40°F ~ -13°F, or 149°F ~ 257°F (±2°C@-40°C ~ -25°C, or 65°C ~ 125°C)

Table 2-8 First-level BMS parameters

The second-level BMS specifications are shown in the following table:

Item	Description	Specification
1	Dimension	7.7in x 4.7in x 0.8in (195mm x 120mm x 20.8mm)
2	Weight	1.8lb (800g)
3	Material	Sheet metal with ordinary spray paint
4	Insulation Resistance	>10MΩ 1000VDC
5	Withstand Voltage	3100V AC @ 50Hz
6	Power Supply Voltage	24V DC
7	Power Consumption	<3W
8	Slave BMS can be connected	Max. 64 Slave BMS
9	Communication Protocol	3 x Insulated CAN
10	Baud Rate	250kbps / CAN
11	Total Voltage Acquisition Accuracy (Rack Level)	≤±0.5%FS, maximum error≤5V
12	Current Acquisition Accuracy (Rack Level)	≤±0.5%FS, maximum error≤3A
13	Insulation Resistance Acquisition Accuracy (Rack Level)	Relative error ≤ 20% when nominal total voltage ≥ 400V; Relative error≤30% when nominal total voltage<400V;
14	Operating Environment	Temperature: 14°F ~ 131°F (-10°C ~ 55℃) Humidity: <95% (RH, no condensing) Magnetic Field: <400A/m Corrosive, flammable, and explosive gases are not allowed around

Table 2-9 Second-level BMS parameters

2.4. Liquid Cooling Unit

Industrial and commercial energy storage solutions implement an advanced liquid cooling temperature control system at the ESS cabinet level. This system ensures precise temperature regulation of the entire system, maintaining a consistent battery system temperature difference of 5±2℃.

I. Key Parameters

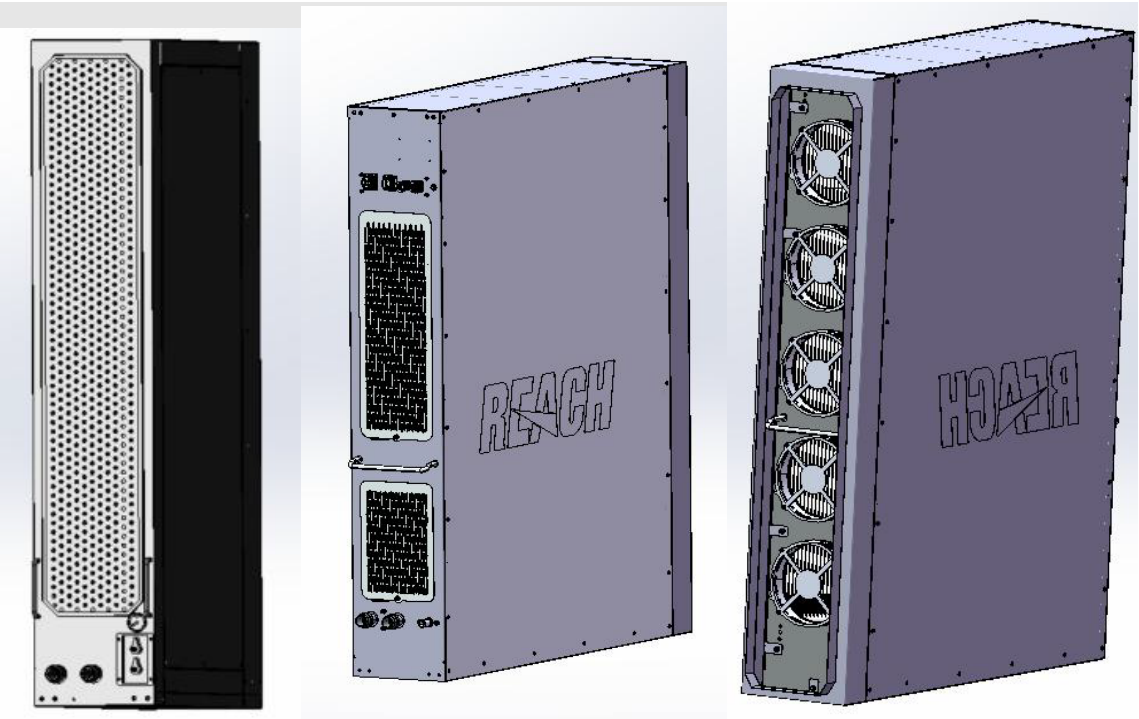

Figure 2-5 Liquid cooling unit

The system parameter specifications of the liquid cooling unit are shown in the following table:

Item	Parameter Value
Name and Model	12kW liquid cooling unit, BTMS-12B
Dimensions (W x D x H)	52.9in x 58.7in x 11in (1344mm x 1490mm x 280mm)
Operating Voltage	AC480V
Number of Wires	4
Communication Protocol	RS485
Quick Connector	NW26+ Nylon tube
Adaptive Medium	50% glycol solution
Water Discharge	≥ 19.8gal (75L)/min
Frequency	50Hz/60Hz
Noise	≤ 75dB

Table 2-10 Liquid cooling machine product parameters

II. System Schematic

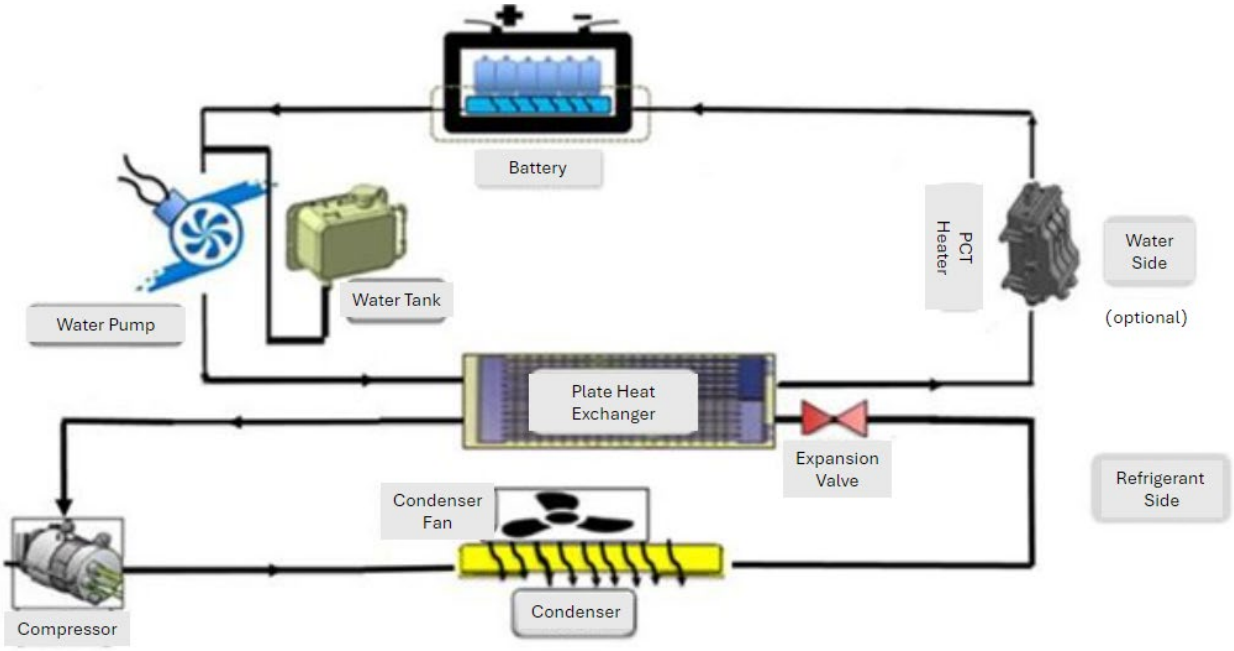

Figure 2-6 Temperature system schematic

III. Pipeline Interface

Both the inlet and outlet pipes use VDA quick-connect fittings with a nominal width (NW) of 26.

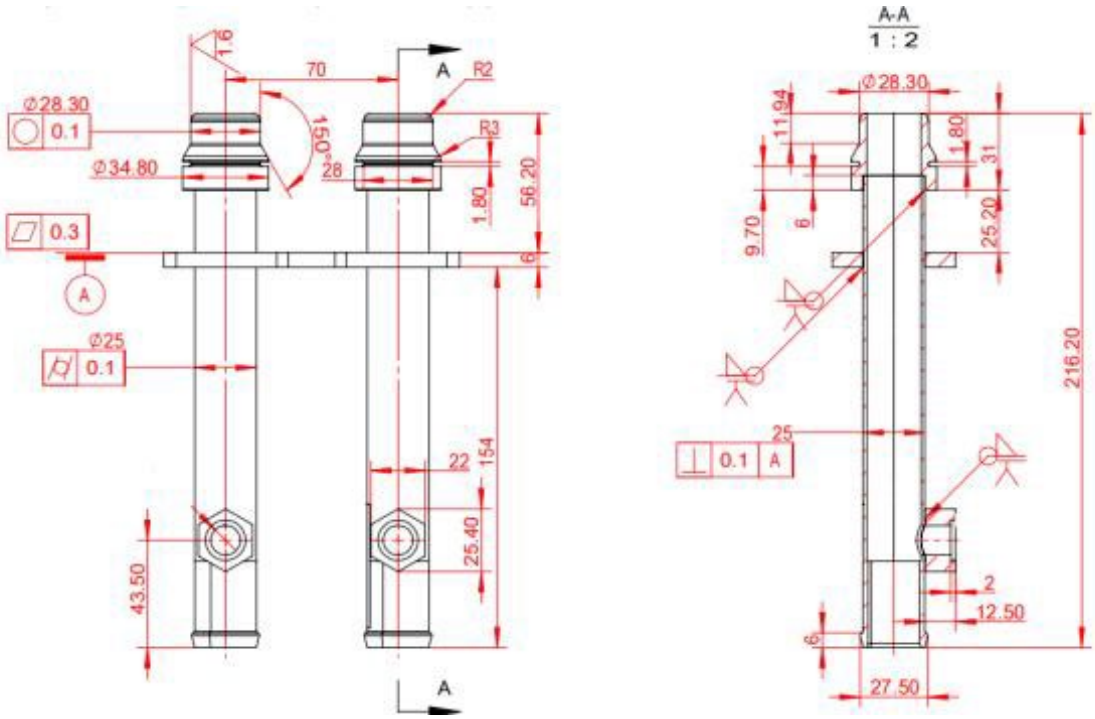

Figure 2-7 Schematic diagram of pipeline interface

2.5. Fire Suppression System

2.5.1. Introduction to Fire Suppression System

The fire extinguishing system operates at three levels: pack immersion at the pack level, clean agent dispersion (aerosol) at the cabinet level, and a dry pipe sprinkler system at the cabinet level.

I. PACK Level Immersion Protection:

Pack immersion is managed by the BMS. When the temperature of the battery pack surpasses the threshold, along with the temperature of two or more cells, and the overall pack temperature increases beyond the threshold, all three criteria met simultaneously trigger the opening of the respective battery valve. This action effectively extinguishes any thermal runaway within the battery pack.

II. Cabinet-Level Aerosol Fire Suppression System:

The cabinet-level Stat-X aerosol fire suppression system operates automatically, featuring two independent detection circuits for each designated area. It comprises smoke and heat detectors with dry contact output capabilities. These detectors can autonomously transmit signals to the main control system housed in the high-voltage box. In the event of concurrent smoke and temperature alarms, a fire alarm is triggered, and charging and discharging operations are halted. Additionally, dry contacts are activated, the PCS is shut down, and the contactor of each rack is disconnected with a 1-second delay. Once the temperature in the protected area reaches the activation threshold of the aerosol fire extinguishing device, the device releases the extinguishing agent and signals the BMS accordingly.

III. Dry Pipe Sprinkler System

The dry pipe sprinkler system for the entire cabinet is facilitated through the fire protection interface located on the cabinet. DN25 externally threaded pipes are reserved at the lower section of the cabinet's outer wall, sealed with pipe caps. These caps can be removed to extend the pipes to the fire valve, which connects to the external water source. Upon opening the valve, water flows through the pipeline and out of the spray ports to extinguish the fire in the cabinet. Equipped with closed sprinkler heads, these devices activate when heat-sensitive elements detect flames or high-temperature airflow, causing them to release water and extinguish the fire.

2.5.2. FSS Key Components

FSS configurations are shown in the following table:

FSS Components	Parameter	Quantity of Device
Heat detector	Point detector, NB758H-4	2
Smoke detector	Point detector, NB758S-4	2
STAT-X Aerosol fire extinguishing system	Stat-X 250MT	2
Sprinkler	VK345	3
Dry pipe system	DN25 pipe	1

Table 2-11 FSS components

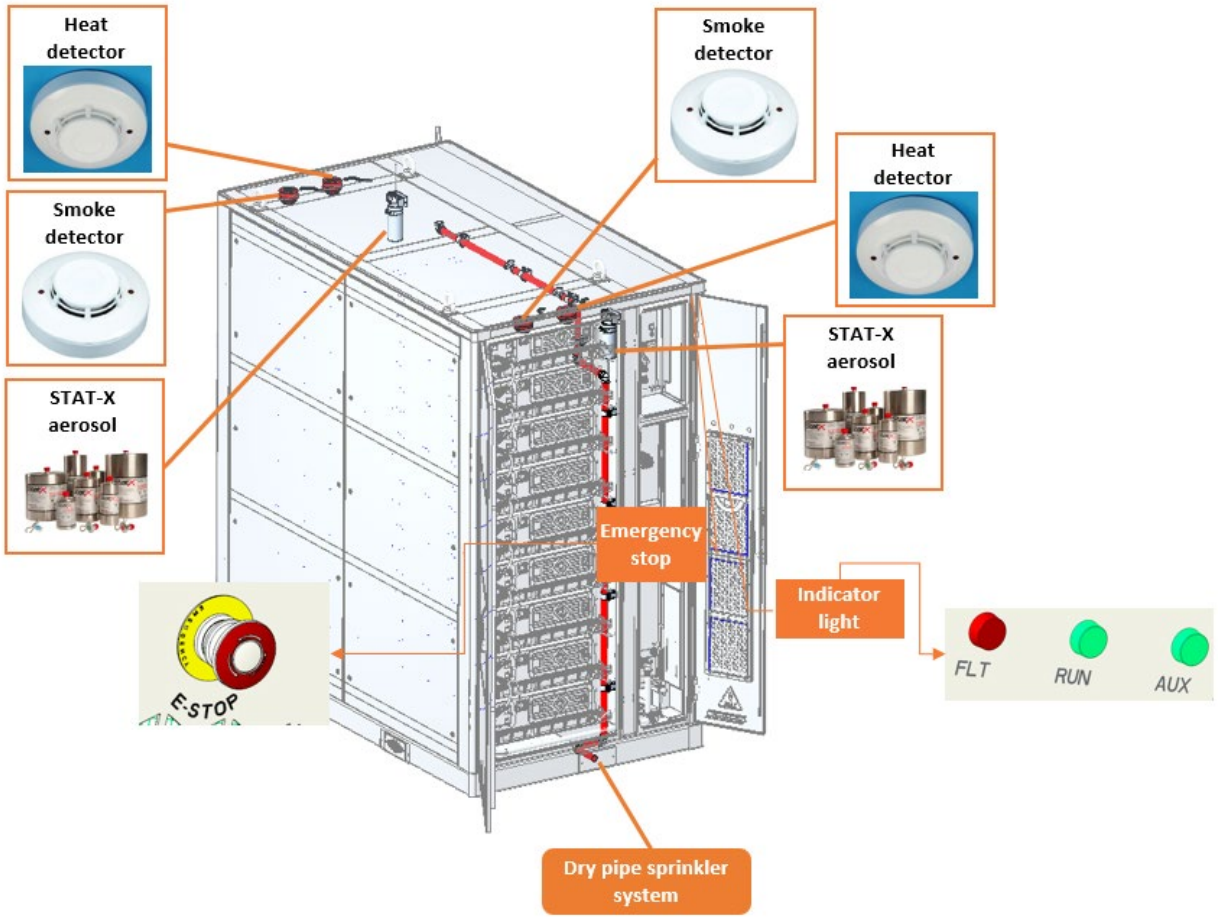

Figure 2-8 FSS components

2.5.3. Fire Extinguishing Flow Chart

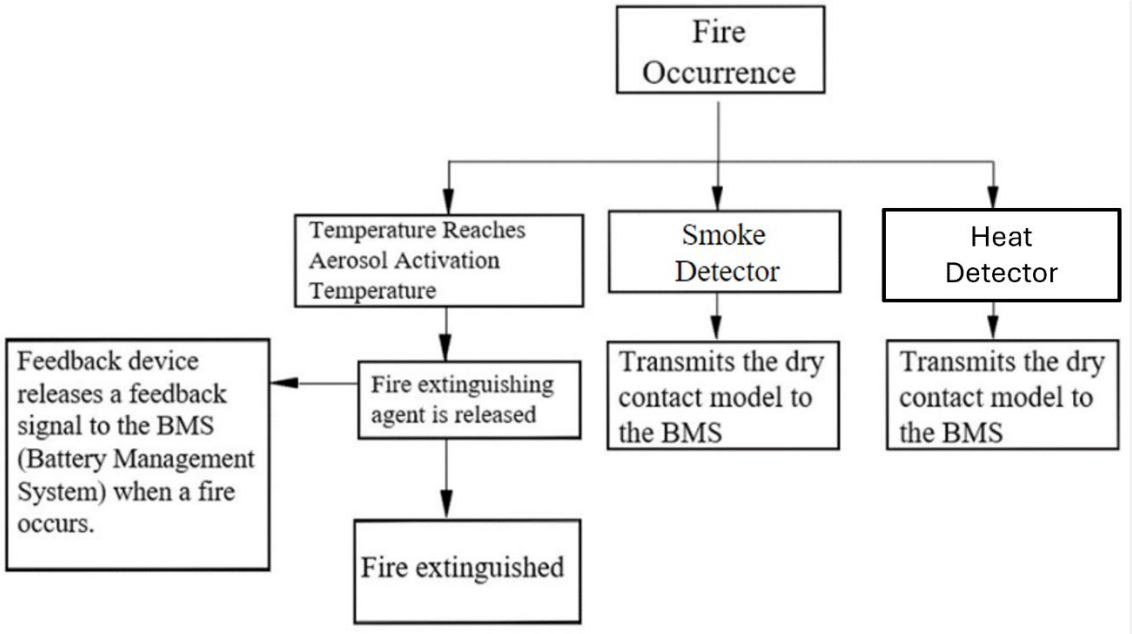

Figure 2-9 Fire control logic diagram

3. Battery ESS Working Principle

3.1. Schematic Layout of ESS System

Figure 3-1 is an electrical schematic layout of the system with high voltage and communication interfaces.

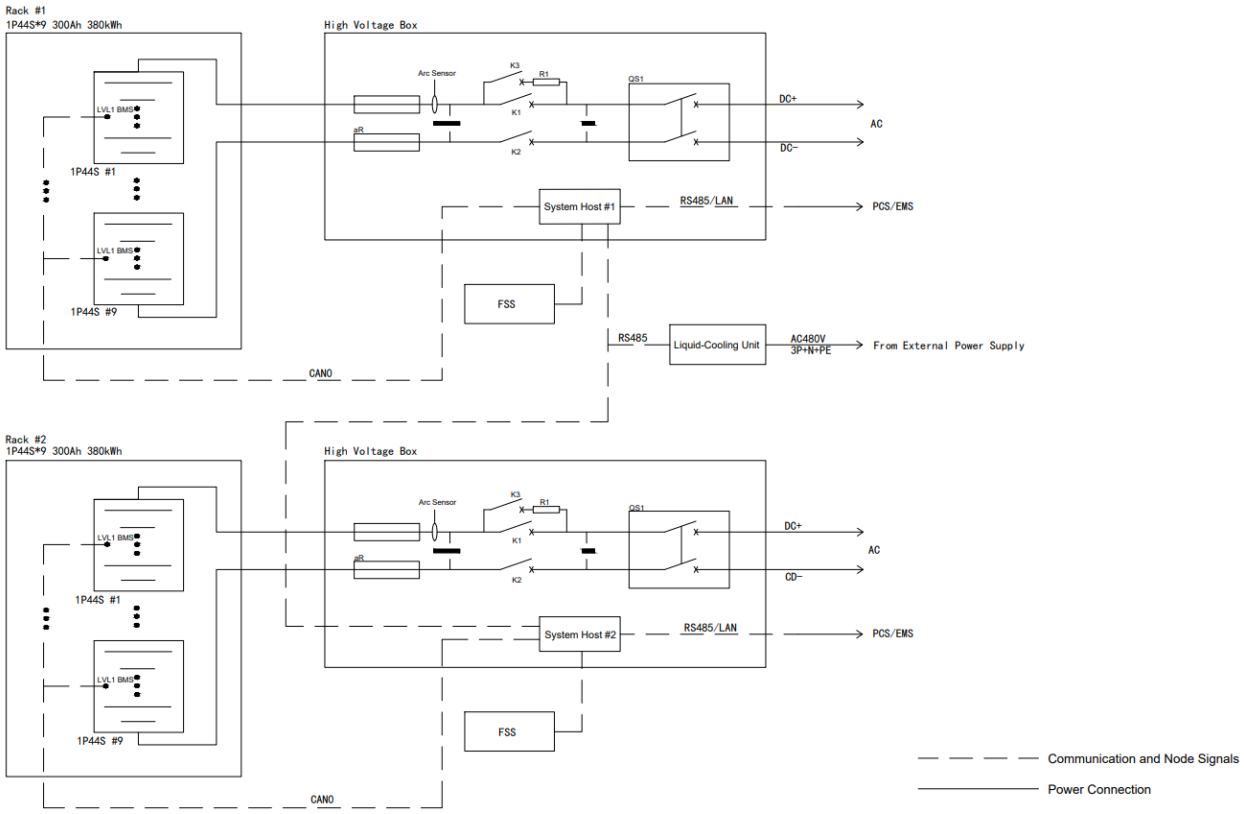

Figure 3-1 ESS system electrical schematic layout diagram

Appendix I Operation and Maintenance Plan

BLUEWAVE

PRELIMINARY GROUND MOUNTED SOLAR SYSTEM & BATTERY ENERGY STORAGE SYSTEM OPERATION & MAINTENANCE PLAN

1. GENERAL PROTOCOL

1.1 Contact Information

The primary points of contact for operations & maintenance related issues are as follows:

Property Owner

Timothy J. Sena & Catherine Rude-Sena with an address of PO Box 132, Worthington, MA 01098

Project Owner

BWC Wades Stream, LLC with a facility address of 190 Ridge Road, Worthington, MA 01098
BlueWave
Phone: 617-209-3122 (General phone number listed here to be updated with project specific number between Mechanical Completion and Substantial Completion)
Email: assetmgmt@bluewave.energy

Operator

BlueWave Asset Management
Phone: 617-209-3122 (General phone number listed here to be updated with project specific number between Mechanical Completion and Substantial Completion)
Email: assetmgmt@bluewave.energy

Battery Energy Storage System (BESS) Manufacturer

XXXXXX (To be finalized prior to construction)
(XXX) XXX-XXXX (To be finalized prior to construction)
XXXX@XXXX.com (To be finalized prior to construction)

1.2 Safety Guidelines

In the event of an emergency, immediately call 911 to alert local first responders. Emergency signage will be posted on-site for both the Local Fire Department and the contact of the Owner/Operator.

Owner/Operator will dispatch designated operational staff within 2 hours in the event of an

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emergency, and approximately 12 hours in the event of a non-emergency. In the event of an emergency, the Emergency Response Plan (ERP) on file with the Municipality and Local Fire Department should be referenced and appropriate procedures followed.

The Battery Energy Storage System (BESS) contains a number of high voltage AC and DC components and equipment. Only certified and [Manufacturer] approved technicians are authorized to conduct maintenance work on the system. Before performing work on the system, necessary Lockout-Tagout (LOTO) procedures should be followed to de-energize the system and fully disconnect the system from AC power. Proper procedures for de-energization should be referenced in the comprehensive Maintenance Manual provided by the system manufacturer prior to performing any maintenance tasks.

1.3 Equipment Requirements

All technicians and personnel performing work on the system are required to wear personal protective equipment (PPE) including but not limited to:

- Long pants and shirt (FR rated)
- Insulated gloves (See Arc Flash Study for required Protective Category)
- High visibility safety vest (FR Rate)
- Hardhat
- Eye protection
- Safety toe boots
- Arc Flash Personal Protective Equipment as needed or required by manufacturer

The following equipment and hand tools are required when performing work on the system, including but not limited to:

- 1,000V Multimeter
- 1,5000 Vdc Multimeter
- Proving Unit
- Test Leads
- Data Cable Test Unit
- Infrared Camera
- Electrostatic Discharge (ESD) Ground Wristband
- Insulated wrenches, ratches, and screwdrivers and other tools meeting IEC 60900

Additional equipment and safety procedures may be required and implemented during the

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operation of the system. All equipment must have valid calibration certifications if applicable.

2. OPERATION & MAINTENANCE ANNUAL SCHEDULE

O&M ANNUAL SCHEDULE		
Component Category	Service Descriptions	Frequency
Ground Mounted Solar System	Full Site Visual Inspection & Report	Annually
	Production Performance Report	Annually
	Inverter Preventative Maintenance	Annually
	Medium Voltage Gear Maintenance	Annually
	String Voc/Imp	As needed
	IV Curve Tracing	As needed
	Thermal Imaging Combiners, Inverters, Disconnects	100%, Annually
	Warranty Enforcement	As needed
	Issue Tracking of Unscheduled Service Dispatches	As needed
	24/7 Monitoring	24/7
	Dispatch Commitment	48 hrs.
	Vegetation Management	As needed
Thermal Management System	Thermal management system inspection	Semi-Annual
	Thermal management system maintenance	Semi-Annual
	Motor Lubrication	Semi-Annual
	Clean Filters by rinsing with Water	Semi-Annual
	Electric Heater - Dust accumulation on the coil, signs of overheating on the heater frame, traces of water or rust on the electric heater control box.	Semi-Annual
	Coolant tester Visual inspection	Annual
Fire Safety System	Fire alarm and detection system inspection	Annual
	Fire alarm and detection system	Annual

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	maintenance	
	Fire suppression System Inspection	Annual
Battery	Set battery maintenance (system check, cell balancing)	Annual
	Battery cable, appearance, grounding, dust removal	Annual
	Inspect battery management system alarms	Annual
	Visual inspection of all electrical terminations using thermal imager	Semi-Annual
Enclosure	Dust removal	Annual
	Inspect cable entry, grounding, sealing, dust removal	Annual
Reporting and Diagnostics	Inspection, maintenance reports and recommendations	Monthly
	Technical support and fault diagnosis	As required
	Data server connectivity check	Monthly
	Inspect battery running status, provide operating recommendations and maintain battery	Monthly
	System configuration check	Annual
General/ Miscellaneous	Auxiliary equipment maintenance and inspection	Annual
	Critical sensor calibration check	Annual
	Maintenance report	Annual
BESS 24/7 Monitoring	System is remote monitored 24/7 at the cell and enclosure level for voltage, temperature, and atmospheric conditions.	N/A
BESS Dispatch Commitment	12 hrs. In emergency, first responders will dispatch to site once fire alarm signal received, owner dispatch to follow as soon as possible.	
Three (3) Corrective Maintenance Troubleshooting Dispatches (total of 24 hrs.)	Baseline assumptions of 3 corrective maintenance visits per year	Annually

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3. SYSTEM SERVICES

3.1 Lifetime System Services

3.1.1 PREVENTIVE MAINTENANCE SITE VISITS – PV SOLAR & BESS

One time, annually, additional at request and expense of Project Owner for:

- System testing (voltage/amperage)
- System visual inspection and necessary corrections, excluding cost of replacement components.
- Inspect for stolen, broken or damaged PV modules, record damage and location. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect wiring for loose connections and wire condition. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Verify proper system grounding is in place from panels and BESS enclosures to the inverter. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Check conduits and raceways for proper anchorage to structures. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect all metallic parts for corrosion. Inspect ESS labels and ensure they match subpanel interior break. Verify that all enclosure doors, hinges and seals are in proper working order. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect all wiring connections for signs of poor contact at terminals (burning, discoloration, etc.). Verify all conductor connections and network cables are tight and solidly connected. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect disconnection for proper operation. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.

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- Survey entire jobsite for debris or obstructions. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect fasteners for proper torque and corrosion. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect inverter pads for cracking or settling. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect electrical hardware for proper warning and rating labeling. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Review as-built documentation as needed and update as-built documentation as changes are required.
- Check proper operation and reporting of monitoring hardware. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect sealed electrical components for condensation buildup. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect wiring and hardware for signs of damage from vandalism or animal damage. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Routine system maintenance to include correction of loose electrical connections, ground connections, replacement of defective modules found during testing, other minor maintenance repair work. Tree trimming and plant trimming work are not included.
- Routine DAS maintenance to include sensor calibration and data integrity check.

3.1.2 PREVENTIVE MAINTENANCE SITE VISITS – PV SOLAR SPECIFIC

One time, annually, additional at request and expense of Project Owner for:

- Inspect for wires in contact with the structure or hanging loose from racking. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project

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Owner, present proposal and wait for authorization on a course of action from the Project Owner.

- Check mechanical attachment of the PV modules to the racking. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Check attachment of racking components to each other and the structure. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Check combiner boxes for proper fuse size and continuity. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect alignment of arrays and racking to identify settling foundation or loose attachments. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect operation of tracking hinges, pivots, motors and actuators if present. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.

3.1.3 PREVENTIVE MAINTENANCE SITE VISITS – BESS SPECIFIC

One time, annually, additional at request and expense of Project Owner for:

- Inspect string controllers for damage and general condition. Inspect AC and DC fuses for replacement if needed. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal, and wait for authorization on a course of action from the Project Owner.
- Inspect HVAC unit components for rust, damage, and general condition. Check condensate drain lines and refrigerant levels as required. Inspect exhaust outlets and bottom of unit for pooling, inspect and replace all filters as needed. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Visually inspect all interior components of the ESS enclosures for signs of damage, discoloration, water ingress, or deterioration. Inspect all batteries and battery management systems for signs of damage, discoloration, water ingress, or deterioration. Operator to

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resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.

- Inspect enclosure footings, anchor bolts, and alignment to identify settling foundation or loose attachments. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.

3.1.4 TROUBLESHOOTING, INSPECTION AND ADDITIONAL REPAIRS

- Dispatch of field services resources within two business days for repairs of PV Solar components and 12 hours for BESS components up to three times per year or as deemed necessary by Operator.
- Major system repairs, not to include mid-voltage switchgear or transformers.
- The Project Owner agrees to permit Town staff to enter the property at reasonable times and in a reasonable manner for the purpose of inspection.

3.1.5 REPORTING

- Monthly Production report will be available online to the Project Owner personnel.
- Annual Performance report will be sent electronically to the Project Owner personnel.
- O&M Manual updates. Complete versions of new editions to be delivered electronically to the Project Owner staff as they become available.
- As Built drawing updates, as necessary.

3.1.6 OTHER SYSTEM SERVICES

Facility staff training, one time per site, will include the following basic training items:

- General Inspection: A full visual and physical inspection of all systems components and their immediate surroundings carried out in accordance with system services lists provided in this and future versions of the O&M Plan.
- Safety: Operator will train Project Owner staff on how to safely shut down the system.
- Tree Trimming/Plant Trimming: Operator will train Project Owner staff on what vegetation near structures that need to be trimmed as required by local site conditions.
- Structure Maintenance: Necessary preventive maintenance may be performed on system structural components to ensure continued safe and effective operation.
- The basics of performing a visual inspection: Checklist review with Operator.
- Performance characterization, as determined by Operator.
- O&M Manuals – additional copies, as needed. Updated editions of O&M manuals will be sent electronically to the Project Owner as they become available.
- Management of long-term service and warranty agreements, ongoing. Operator shall provide Project Owner local DFD/AFSD with updates as required.
- Stormwater and Drainage Structure Maintenance: See Stormwater Report and associated

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BMP O&M and Long-Term Maintenance Plan on file with the Municipality for proper stormwater BMP maintenance schedule and procedures.

3.1.7 INVERTER REPAIR

Component replacement and refurbishment as required, in the event of a failure.

INVERTER INSPECTION AND REGULAR SERVICING

As required under inverter manufacturer's warranty specifications. Include but are not limited to the following, one time annually:

- Check appearance/cleanliness of the cabinet, ventilation system and all exposed surfaces.
- Inspect, clean/replace air filter elements.
- Check for corrosion on all terminals, cables and enclosure.
- Check all fuses.
- Perform a complete visual inspection of all internally mounted equipment including subassemblies, wiring harness, contractors, power supplies and all major components.
- Check condition of all the AC and DC surge suppressors.
- Torque terminals and all fasteners in electrical power connections.
- Check the operation of all safety devices (E-stop, door switches)
- Record all operating voltages and current readings via the front display panel.
- Record all inspections completed.
- Inform Manufacturer of all deficiencies identified.
- Manufacturer will be responsible for the In-Warranty replacement of failed inverter components, parts and labor.

3.1.8 SERVICES UNDER THE FOLLOWING WARRANTIES

- 20-year warranty for inverters & batteries.
- 25-year warranty for PV Modules.

3.2 Notice of Transfer

Should the property or any portion of the property be transferred to another owner, the relevant Authorized Administrative Agency will be notified. The new owner will be notified of the presence of this Operation and Maintenance Plan and be held responsible for the implementation of this plan and financing as it pertains to their property.

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Final O&M plans are subject to revision based on O&M provider or Original Equipment Manufacturer recommendations without notice

Appendix J Proof of Liability Insurance

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 12/14/2025 | 9/4/2025

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Lockton Insurance Brokers, LLC CA license #0F15767 777 S. Figueroa St., 52nd Floor Los Angeles CA 90017 (213) 689-0065	**CONTACT NAME:** **PHONE (A/C, No, Ext):** **FAX (A/C, No):** **E-MAIL ADDRESS:**
INSURED 1518913 Bluewave Public Benefit Corp 116 Huntington Avenue, Ste. 601 Boston MA 02116-5749	**INSURER(S) AFFORDING COVERAGE** — **NAIC #** **INSURER A :** Travelers Property Casualty Company of America — 25674 **INSURER B :** Twin City Fire Insurance Company — 29459 **INSURER C :** The Travelers Indemnity Company — 25658 **INSURER D :** **INSURER E :** **INSURER F :**

COVERAGES **CERTIFICATE NUMBER:** 22361795 **REVISION NUMBER:** XXXXXXX

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X **COMMERCIAL GENERAL LIABILITY** [ ] CLAIMS-MADE [X] OCCUR X Ded. $5,000 GEN'L AGGREGATE LIMIT APPLIES PER: [ ] POLICY [X] PRO-JECT [ ] LOC [ ] OTHER:	N	N	DT-CO-B0001860-TIL-25	4/12/2025	4/12/2026	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG $	$ 1,000,000 $ 300,000 $ 5,000 $ 1,000,000 $ 2,000,000 $ 2,000,000 $
C	**AUTOMOBILE LIABILITY** [ ] ANY AUTO [ ] OWNED AUTOS ONLY [ ] SCHEDULED AUTOS [X] HIRED AUTOS ONLY [X] NON-OWNED AUTOS ONLY	N	N	BA-B0006702-25-26-G	4/12/2025	4/12/2026	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident) $	$ 1,000,000 $ XXXXXXX $ XXXXXXX $ XXXXXXX $ XXXXXXX
A	X **UMBRELLA LIAB** [ ] OCCUR **EXCESS LIAB** [ ] CLAIMS-MADE [ ] DED [X] RETENTION $ 10,000	N	N	CUP-B0008013-25-26	4/12/2025	4/12/2026	EACH OCCURRENCE AGGREGATE $	$ 10,000,000 $ 10,000,000 $ XXXXXXX
B	**WORKERS COMPENSATION AND EMPLOYERS' LIABILITY** Y / N ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y **(Mandatory in NH)** If yes, describe under DESCRIPTION OF OPERATIONS below	N / A	N	72 WE AU7ZHS	12/14/2024	12/14/2025	X PER STATUTE [ ] OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ 1,000,000 $ 1,000,000 $ 1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
Re: Worthington Ridge Rd C; 190 Ridge Rd, Worthington MA.

CERTIFICATE HOLDER

22361795
Town of Worthington
160 Huntington Rd,
Worthington MA 01098

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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Appendix K Decommissioning Cost Estimate and Financial Security Documentation

DECOMMISSIONING PLAN AND COST ESTIMATE
BWC WADES STREAM, LLC
3.95 MW DC GROUND-MOUNT SOLAR AND BESS
RIDGE ROAD, WORTHINGTON, MA

Timeline:

Decommissioning of the system will occur within 150 days following the end of the lease term.

Assumptions:

Key assumptions include the following:
1) Fencing, electrical cabinetry, solar racks, solar panels, wiring and all other equipment are 100% recyclable.
2) The primary cost of decommissioning is the labor to dismantle and load the equipment plus trucking.
3) Concrete pads will be demolished on-site and transported to an ABC recycling facility where it will be accepted at no charge.
4) All other recyclables will be transported to the nearest Transfer Station that accepts the material.
5) Costs are based on the 2023 NYSERDA Solar guidebook for Local Governments on MA Solar Projects. The prices have been adjusted to estimate 2025 costs based on the average inflation rate of 2024 (2.9%) and the current average inflation rate of 2025 (2.7%).

Decommissioning Tasks:

Task		Cost
1)	**Remove Panels** The panels are bolted in. A laborer needs to unbolt the panel and remove the panel off the rack.	**$5,114**
2)	**Remove Rack Wiring** The panels are plugged together in the same manner as an electrical cord from a light is plugged into a wall socket. A laborer needs only to reach over and pull the plug. The string wires lie in a tray. A laborer needs only to reach into the tray and remove the strands of wire.	**$5,132**
3)	**Dismantle Racks** Racks will be dismantled.	**$27,065**
4)	**Remove Electrical Equipment (Inverters, Transformers, Switchgear, Storage Containers)** Equipment will be removed from the equipment pads.	**$4,054**
5)	**Break Up Concrete Pads** Concrete will be broken up using an excavator and jackhammer.	**$3,287**
6)	**Remove Racks** Racks will be removed and stockpiled.	**$17,094**
7)	**Remove Cable** Cables will be removed and stockpiled.	**$14,245**
8)	**Remove Foundation Posts and Utility Poles** Posts and poles will be removed from the ground using appropriate equipment.	**$30,351**
9)	**Remove Fence** Fence fabric and posts will be removed.	**$10,848**
10)	**Grading** Graded areas (e.g., stormwater basins) will be returned to pre-construction conditions.	**$8,766**
11)	**Seed Disturbed Areas** Any graded areas will be seeded to promote revegetation.	**$548**
12)	**Trucking Costs** All stockpiled equipment and materials will be removed from the site and be recycled or disposed of.	**$4,931**
Total Decommissioning Cost Estimate (2025)		**$131,435**
Inflation for next 20 years based on average over last 20 years (2.5%)		$83,936
Total Decommissioning Cost Estimate (2045)		**$215,371**

DECOMMISSIONING BOND

Bond #

KNOW ALL BY THESE PRESENTS, that we**, BWC Wades Stream, LLC** as principal, and _____, a _____ corporation, authorized to do business in the State of **Massachusetts**, as Surety, are held and firmly bound unto **The Town of Worthington**, as Obligee, in the penal sum of _____ **($_____)**, lawful money of the United States of America, for the payment of which well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal is responsible for decommissioning the solar electric generating facility located at **190 Ridge Rd, Worthington, MA 01098**

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall decommission the solar electric generating facility as required, and shall save the Obligee harmless from any loss, cost or damage by reason of its failure to complete said decommissioning, then this obligation shall be null and void; otherwise to remain in full force and effect.

The bond is subject, however, to the following express conditions:

FIRST: That in the event of a default on the part of the Principal, its successors or assigns, to decommission the solar electric generating facility in accordance with its written legal obligations a written statement of such default with full details thereof shall be given to Surety promptly, and in any event, within thirty (30) days after the Obligee shall learn of such default, such notice to be delivered to Surety at its Home Office in _____ by registered or certified mail, with a copy to **BWC Wades Stream, LLC, 116 Huntington Ave Suite 601, Boston, MA 02116.**

SECOND: That no claim, suit or action under this bond by reason of any such default shall be brought against Surety unless asserted or commenced within twelve (12) months after the effective date of any termination or cancellation of this bond.

THIRD: This bond shall automatically renew for successive one-year terms unless, at least forty-five (45) days prior to the next annual renewal date, the Surety delivers written notice to Principal and to Obligee, or Principal delivers written notice to Surety and Obligee, that the notice-sender seeks to modify the terms of, or cancel, this bond. Written notice is effective if delivered to, or sent by certified mail, postage prepaid, and deposited in the U.S. Mail, at least forty-five (45) days prior to the next annual renewal date addressed to the Principal or Surety, as the case may be, and to the Obligee requiring bond, as outlined in the notice section of this Bond, and is actually received by the Principal or Surety, as the case may be, and the Obligee at least thirty (30) days prior to the renewal date. However, neither: (a) the Surety's decision to cancel, nor (b) the failure or inability of the Principal to file a replacement bond or other security in the event the Surety exercises its right to cancel this Bond, shall itself constitute a loss to the Obligee recoverable under this Bond or any extension thereof.

FOURTH: That no right of action shall accrue under this bond to or for the use of any person other than the Obligee, and its successors and assigns.

Signed, sealed and dated this day of .

_____
Principal

By: _____
Authorized Signatory

_____

By: _____
, Attorney-In-Fact

Appendix L Interconnection Service Agreement

EVERSOURCE

Exhibit G - Interconnection Service Agreement

1. Parties. This Interconnection Service Agreement ("Agreement"), dated as of is entered into, by and between **NSTAR Electric d/b/a Eversource Energy**, a Massachusetts corporation with a principal place of business at **247 Station Drive, Westwood, MA 02090** (hereinafter referred to as the Company"), and **BWC Wades Stream, LLC** a corporation with a principal place of business at **116 Huntington Ave, Boston MA 02116** ("Interconnecting Customer"). (The Company and Interconnecting Customer are collectively referred to as the "Parties"). Terms used herein without definition shall have the meanings set forth in Section 1.2 of the Interconnection Tariff which is hereby incorporated by reference.

Project Number #	ESMAEX-02438
Maximo WO #	13237745
Project Size	2000 **kW AC**
Has Storage	Yes
Storage Type	DC-Coupled
Storage Size (AC)	0 **kW**
Storage Size (DC)	1000 **kW**
Existing Facility Capacity	
Limited Export Max Size	2,000
Total Facility Capacity	2000 **kW**

2. Basic Understandings. This Agreement provides for parallel operation of an Interconnecting Customer's Facility with the Company EPS to be installed and operated by the Interconnecting Customer at **190 Ridge Rd, Worthington MA 01098 Acct# .** A description of the Facility is located in Attachment 1. If the Interconnecting Customer is not the Customer, an Agreement between the Company and the Company's Retail Customer, attached as Exhibit H to the Interconnection Tariff, must be signed and included as an Attachment to this Agreement. If neither the Interconnecting Customer nor the Customer is the Landowner of the property where the Facility is sited, a Landowner Consent Agreement, attached as Exhibit I to the Interconnection Tariff, must be signed and included as an Attachment to this Agreement, unless the Company, in its sole discretion, waives this requirement. The Interconnecting Customer has the right to operate its Facility in parallel with the Company EPS immediately upon successful completion of the protective relays testing as witnessed by the Company and receipt of written notice from the Company that interconnection with the Company EPS is authorized ("Authorization Date").

3. Term. This Agreement shall become effective as of the Effective Date. The Agreement shall continue in full force and effect until terminated pursuant to Section 4 of this Agreement.

4. Termination.

4.1. This Agreement may be terminated under the following conditions.

4.1 a) The Parties agree in writing to terminate the Agreement.

4.1 b) The Interconnecting Customer may terminate this agreement at any time by providing sixty (60) days written notice to Company.

4.1 c) The Company may terminate this Agreement upon the occurrence of an Event of Default by the Interconnecting Customer as provided in Section 18 of this Agreement.

4.1 d) The Company may terminate this Agreement if the Interconnecting Customer either:

(1) fails to energize the Facility within 12 months of the Authorization Date; or,

(2) permanently abandons the Facility. Failure to operate the Facility for any consecutive 12-month period after the Authorization Date shall constitute permanent abandonment unless otherwise agreed to in writing between the Parties.

4.1 e) The Company, upon 30 day's notice, may terminate this Agreement if there are any changes in Department regulations or state law that have a material adverse effect on the Company's ability to perform its obligations under the terms of this Agreement.

4.2. Survival of Obligations. The termination of this Agreement shall not relieve either Party of its liabilities and obligations owed or continuing at the time of termination. Sections 5, 10, 12, 13, and 25 as it relates to disputes pending or for wrongful termination of this Agreement shall survive the termination of this Agreement.

4.3. Related Agreements. Any agreement attached to and incorporated into this Agreement shall terminate concurrently with this Agreement unless the Parties have agreed otherwise in writing. If the Interconnection Service Agreement is signed prior to a Detailed Study (if applicable), the System Modifications construction schedule from the Detailed Study when finalized shall be deemed a part of the signed Interconnection Service Agreement.

5. General Payment Terms. The Interconnecting Customer shall be responsible for the System Modification costs and payment terms identified in Attachment 3 of this Agreement and any approved cost increases pursuant to the terms of the Interconnection Tariff. The Interconnecting Customer shall also be directly responsible to the Affected System Operator and/or Affected System Owner of any potentially Affected System for all costs of any additional studies required to evaluate the impact of the interconnection on the potentially Affected Systems and any resulting Affected System costs for its requirements, including, without limitation, modifications to the electric power system of the Affected System and operation and maintenance costs; provided, however, the Company may, in its sole discretion, elect to include the additional Affected System study and/or system modification costs known at the time of this Agreement in the Company's costs and payment terms identified in Attachment 3 of this Agreement, and the Interconnecting Customer will pay such costs to the Company (and will be responsible for any and all actual costs thereof). Where the Company includes the Affected System costs in this Agreement, the costs will be collected by the Company and passed-through to the Affected System Operator(s). Interconnecting Customer shall not be required to pay any costs related to Company infrastructure upgrades or System Modifications upon execution of the Interconnection Service Agreement (or once the Interconnecting Customer receives the construction schedule). Interconnecting Customers shall have 60 Business Days from the date of the Interconnecting Customer's execution of an Interconnection Service Agreement to pay 25 percent of those costs; if an Interconnecting Customer pays such cost within the 60 Business Day Time Frame, the Interconnecting Customer shall have an additional 120 Business Days from the earlier of the date of receipt of the first payment or 60 Business Days from the date of the Interconnecting Customer's execution of an Interconnection Service Agreement to pay the remainder of the costs. If the Company fails to sign this Interconnection Service Agreement within 15 Business Days after receipt of the first installment payment by the Interconnecting Customer, this Interconnection Service Agreement shall be deemed accepted by the Company on the 15th Business Day after receipt of the first installment payment. If the system modifications exceed $25,000, the Interconnecting Customer is eligible for a payment plan, including a payment and construction schedule with milestones for both parties, within the Time Frames for payment of such costs under the Interconnection Service Agreement in Section 3.6.2. Any such payment plan shall be set forth in Attachment 3. The payment plan may include a payment schedule different than the 60 Business Day payment schedule requirements set forth in this paragraph above, but shall not exceed 180 Business Days.

Construction estimates are valid for 60 Business Days from when they are delivered to the Interconnecting Customer. If an Interconnecting Customer payment is not received within 60 Business Days of receiving the Interconnection Service Agreement in the Expedited Process, or the Impact Study in the Standard Process, the Company has the right to reassess construction costs and Time Frames. In the event that the Interconnecting Customer fails to pay the Company within the Time Frame required by this provision, the Interconnecting Customer's interconnection application and this Interconnection Service Agreement will be cancelled, and its interconnection queue position will be lost. Further, any fees paid will not be refunded. The construction schedule will commence once the Interconnecting Customer's financial payment has been made in full or as otherwise provided in Attachment 3. The Company's obligation to the construction schedule (as it appears in either the

Interconnection Service Agreement or the Detailed Study, if the Interconnecting Customer has opted to sign the Interconnection Service Agreement without a Detailed Study) begins on the next Business Day after the Company receives full payment for such construction or as otherwise provided in Attachment 3.The Interconnecting Customer shall be responsible for the System Modification costs and payment terms identified in Attachment 3of this Agreement and any approved cost increases pursuant to the terms of the Interconnection Tariff. Interconnecting Customers shall not be required to pay any costs related to Company infrastructure upgrades or System Modifications upon execution of the Interconnection Service Agreement (or once the Interconnecting Customer receives the construction schedule). Interconnecting Customers shall have 60 Business Days from the date of execution of an Interconnection Service Agreement to pay 25 percent of those costs; if an Interconnecting Customer pays such cost within the 60 Business Day Time Frame, the Interconnecting Customer shall have an additional 120 Business Days from the date of first payment to pay the remainder of the costs. If the system modifications exceed $25,000, the Interconnecting Customer is eligible for a payment plan, including a payment and construction schedule with milestones for both parties, and any such payment plan shall be set forth in Attachment 3. The payment plan may include a payment schedule different than the 120 Business Day payment schedule requirements set forth in this paragraph above.

5.1. Cost or Fee Adjustment Procedures.

The Company will, in writing, advise the Interconnecting Customer in advance of any cost increase for work to be performed up to a total amount of increase of 10% only. Interconnecting Customers who elected to execute an Interconnection Services Agreement following the completion of the Impact Study but prior to the commencement of any required Detailed Study, pursuant to Section 3.4(g) of the Interconnection Tariff, shall be responsible for any System Modifications costs, ±25%, as identified by the Company in the Impact Study. All costs that exceed the above caps will be borne solely by the Company. Any such changes to the Company's costs for the work shall be subject to the Interconnecting Customer's consent. The Interconnecting Customer shall, within thirty (30) Business Days of the Company's notice of increase, authorize such increase and make payment in the amount up to the above caps, or the Company will suspend the work and the corresponding agreement will terminate.

5.2. Final Accounting.

An Interconnecting Customer may request a final accounting report of any difference between (a) Interconnecting Customer's cost responsibility under this Agreement for the actual cost of the System Modifications, and (b) Interconnecting Customer's previous aggregate payments to the Company under the Interconnection Service Agreement for such System Modifications within 120 Business days after completion of the construction and installation of the System Modifications described in an attached exhibit to the Interconnection Service Agreement. Upon receipt of such a request from an Interconnecting Customer, the Company shall have 120 Business days to provide the requested final accounting report to the Interconnecting Customer. To the extent that Interconnecting Customer's cost responsibility in the Interconnection Service Agreement exceeds Interconnecting Customer's previous aggregate payments, the Company shall invoice Interconnecting Customer and Interconnecting Customer shall make payment to the Company within 45 Business Days. To the extent that Interconnecting Customer's previous aggregate payments exceed Interconnecting Customer's cost responsibility under this agreement, the Company shall refund to Interconnecting Customer an amount equal to the difference within forty-five (45) Business Days of the provision of such final accounting report.

6. Operating Requirements.

6.1. General Operating Requirements.

Interconnecting Customer shall operate and maintain the Facility in accordance with the applicable manufacturer's recommended maintenance schedule, in compliance with all aspects of the Company's Interconnection Tariff. The Interconnecting Customer will continue to comply with all applicable laws and requirements after interconnection has occurred. In the event the Company has reason to believe that the Interconnecting Customer's installation may be the source of problems on the Company EPS, the Company has the right to install monitoring equipment at a mutually agreed upon location to determine the source of the problems. If the Facility is determined to be the source of the problems, the Company may require disconnection as outlined in Section 7.0 of this Interconnection Tariff. The cost of this testing will be borne

by the Company unless the Company demonstrates that the problem or problems are caused by the Facility or if the test was performed at the request of the Interconnecting Customer.

6.2. No Adverse Effects; Non-interference.

Company shall notify Interconnecting Customer if there is evidence that the operation of the Facility could cause disruption or deterioration of service to other Customers served from the same Company EPS or if operation of the Facility could cause damage to Company EPS or Affected Systems. The deterioration of service could be, but is not limited to, harmonic injection in excess of IEEE Standard 1547-2003, as well as voltage fluctuations caused by large step changes in loading at the Facility. Each Party will notify the other of any emergency or hazardous condition or occurrence with its equipment or facilities which could affect safe operation of the other Party's equipment or facilities. Each Party shall use reasonable efforts to provide the other Party with advance notice of such conditions.

The Company will operate the EPS in such a manner so as to not unreasonably interfere with the operation of the Facility. The Interconnecting Customer will protect itself from normal disturbances propagating through the Company EPS, and such normal disturbances shall not constitute unreasonable interference unless the Company has deviated from Good Utility Practice. Examples of such disturbances could be, but are not limited to, single-phasing events, voltage sags from remote faults on the Company EPS, and outages on the Company EPS. If the Interconnecting Customer demonstrates that the Company EPS is adversely affecting the operation of the Facility and if the adverse effect is a result of a Company deviation from Good Utility Practice, the Company shall take appropriate action to eliminate the adverse effect.

6.3. Safe Operations and Maintenance.

Each Party shall operate, maintain, repair, and inspect, and shall be fully responsible for, the facility or facilities that it now or hereafter may own unless otherwise specified in this Agreement. Each Party shall be responsible for the maintenance, repair and condition of its respective lines and appurtenances on their respective side of the PCC. The Company and the Interconnecting Customer shall each provide equipment on its respective side of the PCC that adequately protects the Company's EPS, personnel, and other persons from damage and injury.

6.4. Access.

The Company shall have access to the disconnect switch of the Facility at all times.

6.4 a) Company and Interconnecting Customer Representatives.

Each Party shall provide and update as necessary the telephone number that can be used at all times to allow either Party to report an emergency.

6.4 b) Company Right to Access Company-Owned Facilities and Equipment.

If necessary, for the purposes of the Interconnection Tariff and in the manner, it describes, the Interconnecting Customer shall allow the Company access to the Company's equipment and the Company's facilities located on the Interconnecting Customer's or Customer's premises. To the extent that the Interconnecting Customer does not own all or any part of the property on which the Company is required to locate its equipment or facilities to serve the Interconnecting Customer under the Interconnection Tariff, the Interconnecting Customer shall secure and provide in favor of the Company the necessary rights to obtain access to such equipment or facilities, including easements if the circumstances so require. In addition to any rights and easements required by the Company in accordance with the above provision, the Interconnecting Customer shall obtain an executed Landowner Consent Agreement (Exhibit I) from the Landowner, unless the Company, in its sole discretion, waives this requirement.

6.4 c) Right to Review Information.

The Company shall have the right to review and obtain copies of Interconnecting Customer's operations and maintenance records, logs, or other information such as, unit availability, maintenance outages, circuit breaker operation requiring manual reset, relay targets and unusual events pertaining to Interconnecting Customer's Facility or its interconnection with the Company EPS. This information will be treated as customer-confidential and only used for the purposes of meeting the requirements of Section 4.2.4 in the Interconnection Tariff.

7. Disconnection

7.1. Temporary Disconnection

7.1 a) **Emergency Conditions**. Company shall have the right to immediately and temporarily disconnect the Facility without prior notification in cases where, in the reasonable judgment of Company, continuance of such service to Interconnecting Customer is imminently likely to (i) endanger persons or damage property or (ii) cause a material adverse effect on the integrity or security of, or damage to, Company EPS or to the electric systems of others to which the Company EPS is directly connected. Company shall notify Interconnecting Customer promptly of the emergency condition. Interconnecting Customer shall notify Company promptly when it becomes aware of an emergency condition that affects the Facility that may reasonably be expected to affect the Company EPS. To the extent information is known, the notification shall describe the emergency condition, the extent of the damage or deficiency, or the expected effect on the operation of both Parties' facilities and operations, its anticipated duration and the necessary corrective action.

7.1 b) **Routine Maintenance, Construction and Repair**. Company shall have the right to disconnect the Facility from the Company EPS when necessary for routine maintenance, construction and repairs on the Company EPS. The Company shall provide the Interconnecting Customer with a minimum of seven calendar days planned outage notification consistent with the Company's planned outage notification protocols. If the Interconnecting Customer requests disconnection by the Company at the PCC, the Interconnecting Customer will provide a minimum of seven day's notice to the Company. Any additional notification requirements will be specified by mutual agreement in the Interconnection Service Agreement. Company shall make an effort to schedule such curtailment or temporary disconnection with Interconnecting Customer.

7.1 c) **Forced Outages**. During any forced outage, Company shall have the right to suspend interconnection service to effect immediate repairs on the Company EPS; provided, however, Company shall use reasonable efforts to provide the Interconnecting Customer with prior notice. Where circumstances do not permit such prior notice to Interconnecting Customer, Company may interrupt Interconnection Service and disconnect the Facility from the Company EPS without such notice.

7.1 d) **Non-Emergency Adverse Operating Effects**. The Company may disconnect the Facility if the Facility is having an adverse operating effect on the Company EPS or other Customers that is not an emergency, and the Interconnecting Customer fails to correct such adverse operating effect after written notice has been provided and a maximum of 45 days to correct such adverse operating effect has elapsed.

7.1 e) **Modification of the Facility**. Company shall notify Interconnecting Customer if there is evidence of a material modification to the Facility and shall have the right to immediately suspend interconnection service in cases where such material modification has been implemented without prior written authorization from the Company.

7.1 f) **Re-connection**. Any curtailment, reduction or disconnection shall continue only for so long as reasonably necessary. The Interconnecting Customer and the Company shall cooperate with each other to restore the Facility and the Company EPS, respectively, to their normal operating state as soon as

reasonably practicable following the cessation or remedy of the event that led to the temporary disconnection.

7.2. Permanent Disconnection.

The Interconnecting Customer has the right to permanently disconnect at any time with 30 days written notice to the Company.

7.2 a) The Company may permanently disconnect the Facility upon termination of the Interconnection Service Agreement in accordance with the terms thereof.

8. Metering. Metering of the output from the Facility shall be conducted pursuant to the terms of the Interconnection Tariff.

9. Assignment. Except as provided herein, Interconnecting Customer shall not voluntarily assign its rights or obligations, in whole or in part, under this Agreement without Company's written consent. Any assignment Interconnecting Customer purports to make without Company's written consent shall not be valid. Company shall not unreasonably withhold or delay its consent to Interconnecting Customer's assignment of this Agreement. Notwithstanding the above, Company's consent will not be required for any assignment made by Interconnecting Customer to an Affiliate or as collateral security in connection with a financing transaction. In all events, the Interconnecting Customer will not be relieved of its obligations under this Agreement unless, and until the assignee assumes in writing all obligations of this Agreement and notifies the Company of such assumption.

10. Confidentiality. Company shall maintain confidentiality of all Interconnecting Customer confidential and proprietary information except as otherwise required by applicable laws and regulations, the Interconnection Tariff, or as approved by the Interconnecting Customer in the Simplified or Expedited/Standard Application form or otherwise.

11. Insurance Requirements.

11.1. General Liability.

11.1 a) In connection with Interconnecting Customer's performance of its duties and obligations under the Interconnection Service Agreement, Interconnecting Customer shall maintain, during the term of the Agreement, general liability insurance with a combined single limit of not less than:

- Five million dollars ($5,000,000) for each occurrence and in the aggregate if the Gross Nameplate Rating of Interconnecting Customer's Facility is greater than five (5) MW.
- Two million dollars ($2,000,000) for each occurrence and five million dollars ($5,000,000) in the aggregate if the Gross Nameplate Rating of Interconnecting Customer's Facility is greater than one (1) MW and less than or equal to five (5) MW;
- One million dollars ($1,000,000) for each occurrence and in the aggregate if the Gross Nameplate Rating of Interconnecting Customer's Facility is greater than one hundred (100) kW and less than or equal to one (1) MW;
- Five hundred thousand dollars ($500,000) for each occurrence and in the aggregate if the Gross Nameplate Rating of Interconnecting Customer's Facility is greater than ten (10) kW and less than or equal to one hundred (100) kW, except for as provide below in subsection 11.1(b).

11.1 b) Pursuant to 220 CMR §18.03(2), no insurance is required for Interconnecting Customers with facilities eligible for Class 1 Net Metering (facilities less than or equal to sixty (60) kW. However, the Company recommends that the Interconnecting Customer obtain adequate insurance to cover potential liabilities.

11.1 c) Any combination of General Liability and Umbrella/Excess Liability policy limits can be used to satisfy the limit requirements stated above.

11.1 d) The general liability insurance required to be purchased in this Section 11 may be purchased for the direct benefit of the Company and shall respond to third party claims asserted against the Company (hereinafter known as "Owners Protective Liability"). Should this option be chosen, the requirement of Section 11.2(a) will not apply but the Owners Protective Liability policy will be purchased for the direct benefit of the Company and the Company will be designated as the primary and "Named Insured" under the policy.

11.1 e) The insurance hereunder is intended to provide coverage for the Company solely with respect to claims made by third parties against the Company.

11.1 f) In the event the Commonwealth of Massachusetts, or any other governmental subdivision thereof subject to the claims limits of the Massachusetts Tort Claims Act,G.L. c. 258 (hereinafter referred to as the "Governmental Entity") is the Interconnecting Customer, any insurance maintained by the Governmental Entity shall contain an endorsement that strictly prohibits the applicable insurance company from interposing the claims limits of G.L. c. 258 as a defense in either the adjustment of any claim, or in the defense of any lawsuit directly asserted against the insurer by the Company. Nothing herein is intended to constitute a waiver or indication of an intent to waive the protections of G.L. c. 258 by the Governmental Entity.

11.1 g) Notwithstanding the requirements of section 11.1(a) through (f), insurance for certain Governmental Entity facilities may be provided as set forth in section 11.1(g)(i) and (ii) below. Nothing herein changes the provision in subsection 11.1(a)(iv) that exempts Class I Net Metering facilities (less than or equal to 60 kW) from the requirement to obtain insurance. In addition, nothing shall prevent the Governmental Entity from obtaining insurance consistent with the provisions of subsection 11.1(a) through (f), if it is able and chooses to do so. i) For solar photovoltaic (PV) facilities with a Gross Nameplate Rating in excess of 60 kW up to 500 kW, the Governmental Entity is not required to obtain liability insurance. Any liability costs borne by the Company associated with a third-party claim for damages in excess of the claims limit of the Massachusetts Tort Claims Act, M.G.L. c. 258, and market-based premium related costs, if any, borne by the Company associated with insurance for such third-party claims shall be recovered annually on a reconciling basis in Company rates in a manner that shall be reviewed and approved by the Department. ii) For (a) PV facilities with a Gross Nameplate Rating in excess of 500 kW up to 5 MW, (b) wind facilities with a Gross Nameplate Rating in excess of 60 kW up to 5 MW, and (c) highly efficient combined heat and power facilities with a Gross Nameplate Rating of in excess of 60 kW up to 5 MW, the Governmental Entity is not required to obtain liability insurance, subject to the requirements of the following paragraph. The Company shall either self-insure for any risk associated with possible third- party claims for damages in excess of the Massachusetts Tort Claims Act limit, or obtain liability insurance for such third-party claims, and the Company is authorized to charge and collect from the Governmental Entity its pro-rata allocable share of the cost of so doing, plus all reasonable administrative costs. The coverage and cost may vary with the size and type of facility, and may change (increase or decrease) over time, based on insurance market conditions, and such cost shall be added to, and paid for as part of the Governmental Entity's electric bill.

11.2. Insurer Requirements and Endorsements.

All required insurance shall be carried by reputable insurers qualified to underwrite insurance in MA having a Best Rating of at least "A-". In addition, all insurance shall, (a) include Company as an additional insured; (b) contain a severability of interest clause or cross-liability clause; (c) provide that Company shall not incur liability to the insurance carrier for payment of premium for such insurance; and (d) provide for thirty (30) calendar days' written notice to Company prior to cancellation, termination, or material change of such –insurance; provided that to the extent the Interconnecting Customer is satisfying the requirements of subpart (d) of this paragraph by means of a presently existing insurance policy, the Interconnecting

Customer shall only be required to make good faith efforts to satisfy that requirement and will assume the responsibility for notifying the Company as required above.

If the requirement of clause (a) in the paragraph above prevents Interconnecting Customer from obtaining the insurance required without added cost or due to written refusal by the insurance carrier, then upon Interconnecting Customer's written Notice to Company, the requirements of clause (a) shall be waived.

11.3. Evidence of Insurance.

Evidence of the insurance required shall state that coverage provided is primary and is not in excess to or contributing with any insurance or self-insurance maintained by Interconnecting Customer.

The Interconnecting Customer is responsible for providing the Company with evidence of insurance in compliance with the Interconnection Tariff on an annual basis.

Prior to the Company commencing work on System Modifications, and annually thereafter, the Interconnecting Customer shall have its insurer furnish to the Company certificates of insurance evidencing the insurance coverage required above. The Interconnecting Customer shall notify and send to the Company a certificate of insurance for any policy written on a "claims-made" basis. The Interconnecting Customer will maintain extended reporting coverage for three years on all policies written on a "claims-made" basis.

In the event that an Owners Protective Liability policy is provided, the original policy shall be provided to the Company.

11.4. Self Insurance.

If Interconnecting Customer has a self-insurance program established in accordance with commercially acceptable risk management practices. Interconnecting Customer may comply with the following in lieu of the above requirements as reasonably approved by the Company:

- Interconnecting Customer shall provide to Company, at least thirty (30) calendar days prior to the Date of Initial Operation, evidence of such program to self-insure to a level of coverage equivalent to that required.
- If Interconnecting Customer ceases to self-insure to the standards required hereunder, or if Interconnecting Customer is unable to provide continuing evidence of Interconnecting Customer's financial ability to self-insure, Interconnecting Customer agrees to promptly obtain the coverage required under Section 11.1

This section shall not allow any Governmental Entity to self-insure where the existence of a limitation on damages payable by a Government Entity imposed by the Massachusetts Tort Claims Act, G.L. c. 258, or similar law, could effectively limit recovery (by virtue of a cap on recovery) to an amount lower than that required in Section 11.1(a).

11.5. All insurance certificates, statements of self-insurance, endorsements, cancellations, terminations, alterations, and material changes of such insurance shall be issued and submitted to the following:

Eversource
Attention: DG Group,
247 Station Dr, SW340
Westwood, MA 02090

12. Indemnification. Except as the Commonwealth is precluded from pledging credit by Section 1of Article 62 of the Amendments to the Constitution of the Commonwealth of Massachusetts, and except as the Commonwealth's cities and towns are precluded by Section 7 of Article 2 of the Amendments to the Massachusetts Constitution from pledging their credit without prior legislative authority, Interconnecting Customer and Company shall each indemnify, defend and hold the other, its directors, officers, employees and agents (including, but not limited to, Affiliates and contractors and their employees), harmless from and against all liabilities, damages, losses, penalties, claims, demands, suits and proceedings of any nature whatsoever for personal injury (including death) or property damages to unaffiliated third parties that arise out of or are in any manner connected with the performance of this

Agreement by that Party except to the extent that such injury or damages to unaffiliated third parties may be attributable to the negligence or willful misconduct of the Party seeking indemnification.

13. Limitation of Liability. Each Party's liability to the other Party for any loss, cost, claim, injury, liability, or expense, including court costs and reasonable attorney's fees, relating to or arising from any act or omission in its performance of this Agreement, shall be limited to the amount of direct damage or liability actually incurred. In no event shall either Party be liable to the other Party for any indirect, incidental, special, consequential, or punitive damages of any kind whatsoever.

14. Amendments and Modifications. No amendment or modification of this Agreement shall be binding unless in writing and duly executed by both Parties.

15. Permits and Approvals. Interconnecting Customer shall obtain all environmental and other permits lawfully required by governmental authorities for the construction and operation of the Facility. Prior to the construction of System Modifications, the Interconnecting Customer will notify the Company that it has initiated the permitting process. Prior to the commercial operation of the Facility the Interconnecting Customer will notify the Company that it has obtained all permits necessary. Upon request the Interconnecting Customer shall provide copies of one or more of the necessary permits to the Company.

16. Force Majeure. For purposes of this Agreement, "Force Majeure Event" means any event:

a) that is beyond the reasonable control of the affected Party; and

b) that the affected Party is unable to prevent or provide against by exercising commercially reasonable efforts, including the following events or circumstances, but only to the extent they satisfy the preceding requirements: acts of war or terrorism, public disorder, insurrection, or rebellion; floods, hurricanes, earthquakes, lightning, storms, and other natural calamities; explosions or fire; strikes, work stoppages, or labor disputes; embargoes; and sabotage. If a Force Majeure Event prevents a Party from fulfilling any obligations under this Agreement, such Party will promptly notify the other Party in writing, and will keep the other Party informed on a continuing basis of the scope and duration of the Force Majeure Event. The affected Party will specify in reasonable detail the circumstances of the Force Majeure Event, its expected duration, and the steps that the affected Party is taking to mitigate the effects of the event on its performance. The affected Party will be entitled to suspend or modify its performance of obligations under this Agreement, other than the obligation to make payments then due or becoming due under this Agreement, but only to the extent that the effect of the Force Majeure Event cannot be mitigated by the use of reasonable efforts. The affected Party will use reasonable efforts to resume its performance as soon as possible. In no event, will the unavailability or inability to obtain funds constitute a Force Majeure Event.

17. Notices.

17.1. Any written notice, demand, or request required or authorized in connection with this Agreement ("Notice") shall be deemed properly given on the date actually delivered in person or five (5) Business Days after being sent by certified mail, e-mail or fax with confirmation of receipt to the person specified below:

If to Company	
Name	**Eversource**
Attention	**247 Station Dr, SW340** **Westwood, MA 02090-9230**
Email	Brandon.Natale@eversource.com

If to Interconnecting Customer	
Name	BWC Wades Stream, LLC
Attention	Kojo Asenso
Address	116 Huntington Ave, Boston MA 02116
Phone	6172093122
Email	ixteam@bluewavesolar.com

17.2. A Party may change its address for Notices at any time by providing the other Party Notice of the change in accordance with Section 17.1.

17.3. The Parties may also designate operating representatives to conduct the daily communications, which may be necessary or convenient for the administration of this Agreement. Such designations, including names, addresses, email addresses, and phone numbers may be communicated or revised by one Party's Notice to the other.

18. Default and Remedies.

18.1. Defaults. Any one of the following shall constitute "An Event of Default."

i. One of the Parties shall fail to pay any undisputed bill for charges incurred under this Agreement or other amounts which one Party owes the other Party as and when due, and such failure shall continue for a period of thirty (30) days after written notice of nonpayment from the affected Party to the defaulting Party, or

ii. One of the Parties fails to comply with any other provision of this Agreement or breaches any representation or warranty in any material respect and fails to cure or remedy that default or breach within sixty (60) days after notice and written demand by the affected Party to cure the same or such longer period reasonably required to cure (not to exceed an additional 90 days unless otherwise mutually agreed upon), provided that the defaulting Party diligently continues to cure until such failure is fully cured.

18.2. Remedies. Upon the occurrence of an Event of Default, the affected Party may at its option, in addition to any remedies available under any other provision herein, do any, or any combination, as appropriate, of the following:

a) Continue to perform and enforce this Agreement;
b) Recover damages from the defaulting Party except as limited by this Agreement;
c) By written notice to the defaulting Party terminate this Agreement;
d) Pursue any other remedies it may have under this Agreement or under applicable law or in equity.

19. Entire Agreement. This Agreement, including any attachments or appendices, is entered into pursuant to the Interconnection Tariff. Together the Agreement and the Interconnection Tariff represent the entire understanding between the Parties, their agents, and employees as to the subject matter of this Agreement. Each Party also represents that in entering into this Agreement, it has not relied on any promise, inducement, representation, warranty, agreement or other statement not set forth in this Agreement or in the Company's Interconnection Tariff.

20. Supercedence. In the event of a conflict between this Agreement, the Interconnection Tariff, or the terms of any other tariff, Exhibit or Attachment incorporated by reference, the terms of the Interconnection Tariff, as the same may be amended from time to time, shall control. In the event
that the Company files a revised tariff related to interconnection for Department approval after the effective date of this Agreement, the Company shall, not later than the date of such filing, notify the signatories of this Agreement and provide them a copy of said filing.

21. Governing Law. This Agreement shall be interpreted, governed, and construed under the laws of
the Commonwealth of Massachusetts without giving effect to choice of law provisions that might apply to the law of a different jurisdiction.

22. Non-waiver. None of the provisions of this Agreement shall be considered waived by a Party unless such waiver is given in writing. The failure of a Party to insist in any one or more instances upon strict performance of any of the provisions of this Agreement or to take advantage of any of its rights hereunder shall not be construed as a waiver of any such provisions or the relinquishment of any such rights for the future, but the same shall continue and remain in full force and effect.

23. Counterparts. This Agreement may be signed in counterparts.

24. No Third Party Beneficiaries. This Agreement is made solely for the benefit of the Parties hereto. Nothing in the Agreement shall be construed to create any rights in or duty to, or standard of care with respect to, or any liability to, any person not a party to this Agreement.

25. Dispute Resolution. Unless otherwise agreed by the Parties, all disputes arising under this Agreement shall be resolved pursuant to the Dispute Resolution Process set forth in the Interconnection Tariff.

26. Severability. If any clause, provision, or section of this Agreement is ruled invalid by any court of competent jurisdiction, the invalidity of such clause, provision, or section, shall not affect any of the remaining provisions herein.

27. Signatures.

IN WITNESS WHEREOF, the Parties hereto have caused two (2) originals of this Agreement to be executed under seal by their duly authorized representatives.

Eversource Company	
Name	Natale, Brandon
Title:	Account Executive
Signature:	Brandon Natale
Date:	7/30/2025

Interconnecting Customer	
Customer Name	Kojo Asenso
Title	Authorized Signatory
Signature	Kojo Asenso Kojo Asenso (Aug 26, 2025 15:37:29 EDT)
Date	Aug 26, 2025

The following attachments will be included as appropriate for each specific Interconnection Service Agreement:

Attachment 1: Description of Facilities, including demarcation of Point of Common Coupling

Refer the **Design Document** & **One-Line Diagram** on the Power Clerk Portal under the attachment section.

Attachment 2: Description of System Modifications

The interconnection of this distributed generation application is queued behind other applicants which may require system upgrades to the Eversource system, and the cost for those upgrades has been included as a requirement in their respective Interconnection Services Agreement(s). If a prior applicant should dequeue or withdraw for any reason, the system conditions permitting the interconnection of succeeding applicant(s) may change. Upon the withdrawal of previously queued applicants, succeeding applicant(s) may become responsible some or all of the system upgrades that were required for the prior applicants, and Eversource may have to reassess system conditions to determine if the applicant currently under study would trigger the same upgrades

If you are planning to participate in the Net Metering Program three configurations pursuant to which paired systems are eligible to participate in the net metering program:

(1) the ESS charges only from the net metering facility and cannot export
(2) the ESS charges only from the net metering facility and can export
(3) the ESS charges either from the grid or the net metering facility and cannot export

The Department also sets forth certain other requirements related to the eligibility of paired systems to net meter and a process through which the host customer of a paired system must self-certify compliance with

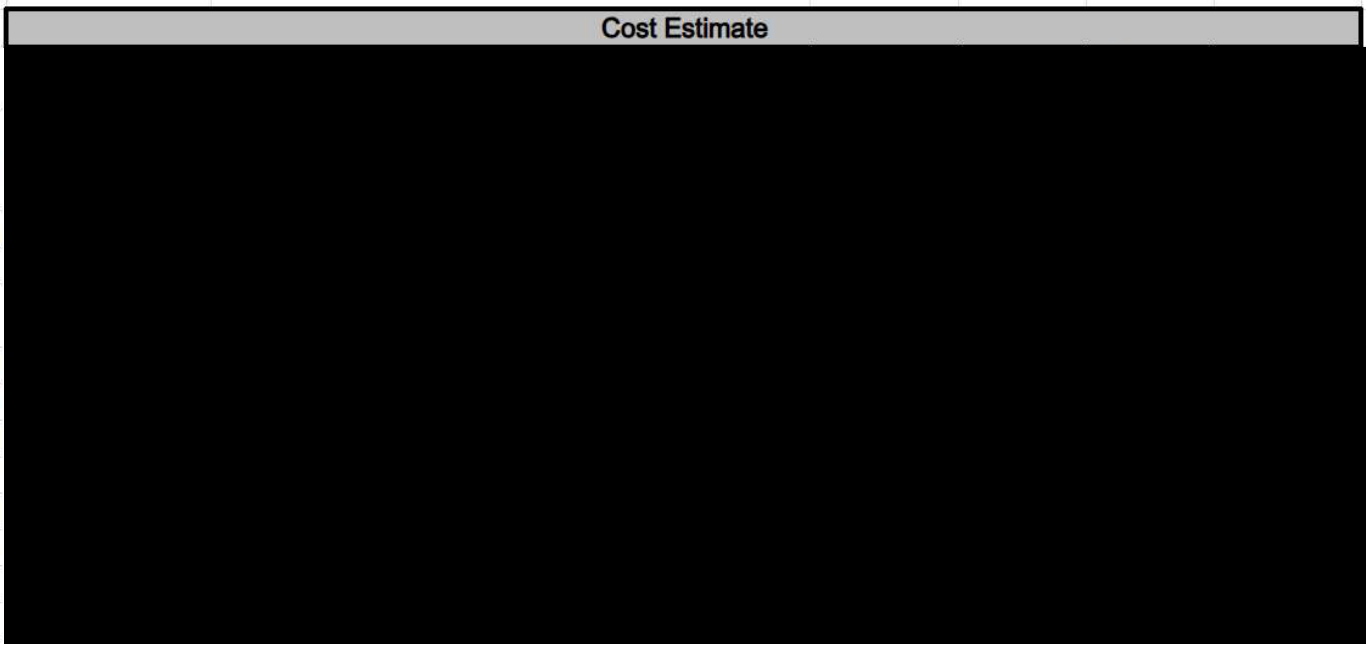
all net metering rules and regulations. Including inadvertent export which is defined as “the unscheduled and uncompensated export of real power from a generating facility for a limited duration, not to exceed 30 seconds.”

All metering must comply with Eversource Bluebook Standards, specifically regarding hot sequence and cold sequence.

For SMART Metering Work Orders:

SMART Metering and Wiring Installation Guidelines to be Adhered to: Click here

The following distribution upgrades are currently required for this DG Interconnection Application:



- 0.7 miles of overhead three-phase extension to POI.
- Upgrade existing Voltage Regulator on 18K5.
- 1.5 miles of reconductoring on 18C3 (cost split with ESMAEX-01622).
- Installation of voltage regulator on 18C3 (cost split with ESMAEX-01622).
- Local POI upgrades which include but are not limited to lateral tap, recloser, primary metering package, primary disconnect and RTAC/DER gateway to allow interconnection.

SPECIAL NOTE:

- **Substation & distribution level capital work is required to be completed prior to the interconnection of this project.**
- **Substation Capital Work: Upgrading the existing 25 MVA transformer to 62.5 MVA at Plainfield.**
- **Distribution Capital Work: Reconfiguring the existing feeders from 18K2/18K3 to 18K4/18K5.**
- **The interconnection of ESMAEX-02438 is contingent on the Dalton-Hinsdale group and cannot proceed until after the Dalton-Hinsdale group’s PTO date. In the event that the Dalton-Hinsdale group is dissolved, the Plainfield-Worthington participants interconnecting to the Berkshire 18C substation during an N-1 contingency will be responsible for all required upgrades.**
- **The project inverters are required to operate under volt-var mode with the default settings specified in Appendix A.1 of impact study report.**
- **It is required that the inverters must have the SPOV function enabled and set to trip at 1.3 p.u within 1 ms as listed in the manufacturer provided letter.**

Attachment 3: Costs of System Modifications and Payment Terms.

The **Eversource** cost summary is shown below:

The following check off items will be required, prior to commencement of final design for system modifications and construction:

- Payment in full prior to beginning of any construction work by **Eversource**
- Final site plan, alter survey and final ISD must be completed before final design
- Approved final electrical wiring inspection .
- Approved final customer relay/protection settings for Recloser, if applicable
- Signed easement and/or rights documents, if applicable
- This cost is handled between customer/developer and Verizon. This is a separate cost from the estimate included in the Eversource ISA and will be paid to Verizon directly by the customer/developer during the post-ISA construction process.
- Signed agreements to operate within **Eversource** Right-of-Ways, if applicable
- All Required Closeout Documents per Checklist

Your Witness Test for Final Commissioning can then take place once you have completed the check-off steps as part of the Interconnection Agreement and that the solar array is connected (energized) to Eversource's distribution system.

Please mail your payment, made payable to **Eversource** as shown below. Please reference the **Eversource** Electric Work Order **# 13237745** on the check. This cost is valid for Ninety (90) calendar days from the date of this letter. Note: the customer is responsible for all costs on private property.

Once final customer design, permits are secured and upon the 1st payment, Eversource will then schedule the final engineering and design to be completed.

This may take up to 2 – 3 months for review and approval based on the complexity of the Work Order. If a single customer has multiple projects Eversource may ask them to provide a priority.

Eversource
ATTN: DG Group, WO# 13237745
247 Station Dr, SW340
Westwood, MA 02090-9230

Attachment 4: Special Operating Requirements (Optional)

General Clause: The Customer acknowledges and agrees to certain operating constraints required by the Company so that its Facility does not adversely affect the Company's electric power system, or the quality of power delivered by it.

As indicated in the SIS report under Appendix A, all applicable system modifications and/or Capital upgrades must be completed before the Permission to Operate (PTO) letter is issued ensuring the safe and reliable operation of the System. Furthermore, please refer to this Section in understanding any field limitations related to the operation of Battery Energy Storage Systems (BESS) if applicable along with any other restrictive operation to the operating parameters and the activation of any Protective elements as identified throughout the review of the Oneline and the SIS report analysis must be programmed and witness tested before the official PTO is awarded. Any subsequent design changes upon the issuance of ISA that may require modification to any of the above mentioned clause would require an amended ISA reflecting those impactful changes in ensuring that we deliver the safe and reliable service to our Customers.

General Off-unity power factor operation (for facilities of 500kW or greater):

The Customer's Facility must be capable of operating at power factors within +/-0.95, and the Customer must adjust the Facility's control parameters to output at power factors within that range at the request of the Company in order to mitigate voltage deviations or other power quality phenomenon on the circuits that interconnect the Facility. Any such requests will be issued to the Customer in writing. The Company may consult with the Customer in order to determine a control methodology that will provide adequate mitigation that is consistent with the control capabilities of the Facility and are of least impact to the Customer; however, the requirements will ultimately be determined at the sole discretion of the Company. Should the Company determine that the Customer is operating its Facility contrary to this requirement; the Company will disconnect the Facility and will not allow re-connection until the Company is satisfied that the customer has implemented appropriate changes to its controls and/or settings to achieve the required performance. Inverters must have adjustable power factor. The Company has the right to go back and request off unity output from the DG interconnection.

This facility will be tripped offline via an Eversource recloser when the normal electrical Feed is not in operation. This includes when the area is fed from another feeder which is not the normal electrical feed. The facility will not be allowed on-line until the normal electrical feed is restored to service.

By signing this certification, Interconnecting Customer certifies that they will set and operate the Facility in accordance with the aggregate export/import limit on this Facility as stated herein. The installed Facility will have the limit install per the Interconnecting Customer's Installer Application or WEB Portal. Any future modifications to the aggregate power export/import limit stated herein must be reported to the Company prior to making any modifications to the Facility settings as stated herein. Future modifications cannot be implemented to the Facility until an updated permission to operate is issued by the Company. Notwithstanding the foregoing, the Company maintains the right to further curtail or disconnect the Facility consistent with Section 7 of the Interconnection Tariff, M.D.P.U. No. 55A, as amended from time to time. Any and all costs associated with the damage to the Company's EPS resulting from the failure of or unauthorized modification to the Facility's curtailment limit as stated herein will be the Interconnecting Customer's sole responsibility.

Attachment 5: Agreement between the Company and the Company's retail Customer (Exhibit H)

Agreement between the Company and the Company's retail Customer (to be signed by the Company's retail Customer where DG installation and interconnection will be placed, when retail Customer is not the owner and/or operator of the distributed generation facility.

3rd Party Agreement Required - No
Document References – Refer the **3rd Party Agreement (Unsigned)** on the Power Clerk Portal under the attachment section.

Attachment 6: Landowner Consent Agreement (Exhibit I)

Landowner Consent Agreement (to be signed by the Landowner where the Facility will be located when the Landowner is neither the Customer nor Interconnecting Customer --Exhibit I)

Landowner Agreement Required - Yes
Document References – Refer the **Landowner Agreement (Unsigned)** on the Power Clerk Portal under the attachment section.

Attachment 7: System Modifications construction schedule. If the Interconnection Service

Agreement is signed prior to a Detailed Study (if applicable), the System Modifications construction schedule from the Detailed Study when finalized shall be deemed a part of the signed Interconnection Service Agreement.

25-0826 MA Worthington Ridge Rd C ISA Agreement ESMAEX-02438

Final Audit Report 2025-08-26

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Appendix M Stormwater Management Report

Business Confidential

BWC Wades Stream, LLC
c/o BlueWave Solar
2.0 MW AC Ground-Mount Solar PV Development

Stormwater Management Report

2025-09-05

US-EI-3652230438

Document distribution

BWC Wades Stream, LLC

c/o BlueWave Solar

2.0 MW AC Ground-Mount Solar PV Development

Stormwater Management Report

2025-09-05

US-EI-3652230438

Prepared for

BWC Wades Stream, LLC

c/o BlueWave Solar

116 Huntington Avenue, Suite 601

Boston, MA 02116

Submitted to

Town of Worthington Planning Board
P.O. Box 247
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Worthington, MA

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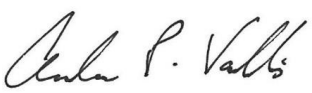
Approved by:	Andrew Vardakis, P.E.	09/23/2025	

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Abbreviations and glossary

Abbreviations

Abbreviation	Description
AC	Alternating Current
DC	Direct Current
DP	Design Point
HSG	Hydrologic Soil Group
IWPA	Interim Wellhead Protection Area
LOW	Limit of Work
LTPPP	Long-term Pollution Prevention Plan
LUHPPL	Land use with higher potential pollutant loads
MS4	Municipal Separate Storm Sewer System
MV	Medium Voltage
MW	Megawatt
O&M	Operation and maintenance
PV	Photovoltaic
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
UP	Utility pole

Glossary of terms

Term	Explanation
Ephemeral stream	A watercourse that only flows during and shortly after rainfall events
Forested wetland	Inland wetland where the dominant vegetation consists of woody trees over 20 feet tall
Project area	The all-encompassing area within the limit of work and disturbance
Shallow marsh/fen wetland	A.K.A. Emergent Wetland; wetland in which the tallest life form is emergent plants (erect & rooted hydrophytes) covering at least 30% of the area
Site	Parcel of land which the Project is located on: Tax Map 407 Lot 28

Executive summary

WSP USA Inc. (WSP) performed a stormwater evaluation to assess the impacts of the proposed 2.0-megawatt (MW) alternating current (AC) solar photovoltaic (PV) development (the Project) being installed at 190 Ridge Road, Worthington, MA (the Site). Stormwater drainage plans are attached to this report for reference (Appendix G – Drainage Figures). The 29.95-acre project area includes proposed ground-mounted PV modules on tracker systems. The array will be surrounded by a woven wire fence. Existing vegetative borders shall be maintained as screening. An existing gravel driveway connects the Site to Ridge Road and will be widened to 20 feet near the apron and 16 feet up to the intersection. A four-leg intersection shall be added to the existing driveway to provide short access drives and parking areas for maintenance vehicles. The array will be connected through a series of inverters, switchboards, and transformers mounted on two approximately 2,000 square feet concrete pads adjacent to the access drives. Power from the transformer will run in underground Medium Voltage (MV) lines to a series of seven proposed utility poles along the driveway. Overhead MV lines will connect the array to an interconnection point at an existing utility pole near the intersection of the existing driveway and Ridge Road (UP #27-20-11). Three infiltration trenches will be installed to treat and recharge groundwater and attenuate the peak runoff rate from the Project. WSP has performed the analysis described in detail below to compare the existing (pre-construction) stormwater runoff volumes and rates to the proposed (post-construction) stormwater runoff volumes and rates.

1. Stormwater Modelling

1.1 Existing Conditions

The 71.6-acre Site's primary use is agricultural hay production. A gravel driveway provides access to some structures on Site and a gravelly pit area used for storage. There are three structures present on-site: a house, barn, and log cabin. A presumably domestic use well was identified during a field survey by SGC Engineering, LLC (SGC) in November 2023 within the northern hay field near the house. While the primary use of the Site is agricultural, approximately a third of the Site is forested. Watts Stream flows directly through the Site within the forested portion. Adjacent to the western side of the Site, there is a swath of permanently protected forested open space. This land is either owned by the Commonwealth, the Town, nonprofits, or is conserved under an Agricultural Preservation Restriction (APR) or Conservation Restriction (CR).

1.1.1 Soils

The Site is made up of soils rated as Hydrologic Soil Group (HSG) C and D with a slow to very slow infiltration rate. Soils near the house, barn and pit area are HSG C. Majority of the hay fields are HSG D and classified as either farmland of statewide importance or prime farmland. Farmland classification and HSG was obtained from publicly available United States Department of Agriculture Natural Resources Conservation Service (USDA NRCS) soil surveys at the Site (Appendix B – Soils Information). Soils within the Project area are primarily classified as fine sandy loam with an assumed conductivity of 0.17 inches per hour according to the 1982 Rawl's Rates referenced in the Massachusetts Stormwater Handbook (the Handbook).

1.1.2 Waters

1.1.2.1 Wetlands

Fleetwood Environmental Solutions, LLC (Fleetwood) performed a wetland and waterbody delineation field survey of the Site in Q2-3 of 2023 and delineated two wetlands near the Project area. These wetland systems will be referred to according to their relative location on Site: west and southeast. Both wetlands are classified as bordering vegetated wetlands. The western wetland connects to Watts Stream through a series of ephemeral streams and their associated wetlands. Watts Stream flows through the Site and has corresponding forested and shallow marsh/fen wetlands. The southeastern wetland is downstream of a culvert under an overgrown driveway to the log cabin on the south side of the Site. An apparent man-made drainage swale provides a flow path for runoff from the culvert at the southern edge of the Site through the adjacent property to at least the edge of the forest surrounding Watts Stream.

1.1.2.2 Groundwater

The water table across the Project area is estimated 1.5 feet or more below the ground surface based on the USDA NRCS Web Soil Survey publicly available data (Appendix C – Groundwater Information). The water table is where the soil is considered saturated, soils with higher water tables will infiltrate less

water because they have less capacity for storage of water and, therefore, they also generate more runoff.

While publicly available data could not be found for the well on-site, multiple wells on adjacent properties have Well Driller Reports filed with the MA Executive Office of Energy & Environmental Affairs. These reports provide an estimated on-site depth to static water level of 20 feet and depth to bedrock approximately 15 feet below ground surface. Copies of the reports for three wells on properties adjacent to the Site are provided in Appendix C – Groundwater Information.

Approximately 22,560 square feet of an Interim Wellhead Protection Area (IWPA) falls within the Site and 20,304 square feet of that is within the Project limit of work. Approximately 350 feet from the Site is a transient non-community groundwater well which is considered a public water supply source. This well is identified as the Buffington Hill Partnership with ID 1349007-01G. Farther north along Ridge Road are ten wells which are community groundwater wells contributing to the public water supply of Worthington. These community groundwater wells are more than 1,000 feet from the Site.

During the field assessments performed by Fleetwood in 2023, one of the Site owners, Timothy Sena, reported a historic tile drain systems underlies both portions of the field divided by the driveway. To his knowledge, no surface outlet pipes beyond the fields exist and none were observed by Fleetwood.

1.1.2.3 Floodplain

Overlapping with Watts Stream is FEMA Flood Zone A, meaning it has a 1% annual chance of flooding (once every 100 years) and a base flood elevation has not been determined (Appendix D – FEMA Map). The Project has a significant buffer from the floodplain (> 300 feet).

1.1.3 Drainage Patterns

An on-the-ground existing conditions topographic survey was completed by SGC in November 2023. The field areas where trackers and modules will be installed have slopes primarily between 0% and 10%. Runoff from the fields runs primarily in two directions: west and east. Runoff flowing west takes a more direct route to Watts Stream and its corresponding bordering wetlands. Runoff flowing east combines into a roadside ditch along Ridge Road. This drainage channel has a high point parallel to the high point of Ridge Road, approximately 300 feet south of the Ridge Road and Buffington Hill Road Intersection. Runoff entering the drainage channel north of this highpoint will flow north to an existing culvert crossing under Ridge Road at the intersection mentioned above. This water continues in roadside channels for approximately 2,400 feet where it then flows into Wards Stream. Runoff entering the drainage channel south of the highpoint will flow south through culvert reaches under two driveways intersecting with Ridge Road. The southernmost culvert being the same one mentioned in Section 1.1.2.1 which flows into a man-made drainage swale leading to Watts Stream.

Watts Stream (sub-basin 4,075) and Wards Stream (sub-basin 4,072) combine south of Witt Hill Road into Little River. Little River drains into Westfield River which is controlled by Knightville Reservoir before continuing its flow southeast to the Connecticut River. Knightville Reservoir is a U.S. Army Corps of Engineers flood control facility consisting of a dam and large reservoir. It has a drainage area of approximately 162 square miles and a flood storage capacity of 49,000 acre-feet. Its primary function is to regulate the flows in the Westfield River to reduce flooding by gradually releasing stored water.

The Site is within the major watershed known as Westfield which is a sub-watershed of the Connecticut River Watershed. Both the Westfield (MA32-04) and Connecticut (MA34-05) basins have Massachusetts Statewide Total Maximum Daily Load (TMDL) for Pathogen-impaired Waterbodies (CN 515.1). Both are in reference to the pollutant E. Coli under pollutant group Pathogens. The Westfield River Basin TMDL is preventative while the Connecticut River Basin TMDL is restorative.

1.2 Proposed Conditions

The Project includes the installation of ground-mounted PV modules on tracker systems. The array will be surrounded by a woven wire fence. The total fenced area of the Project is approximately 27.45 acres. Much of the Site has an existing vegetative border which shall be maintained as screening. An existing gravel driveway connects the Site to Ridge Road. This driveway shall be improved and widened as necessary to provide a road width between 16 and 20 feet. A four-leg intersection shall be added to the existing driveway to provide short access drives and parking areas for maintenance vehicles. The array will be connected through a series of inverters, switchboards, and transformers mounted on concrete pads adjacent to the short access drives. Two equipment pads will be installed, each approximately 2,000 square feet of concrete. Power from the transformer will run in underground Medium Voltage (MV) lines to proposed utility poles along the existing driveway. A total of seven utility poles will be installed between the existing driveway and proposed fence. Overhead MV lines will connect the array to an interconnection point at an existing utility pole near the intersection of the existing driveway and Ridge Road (UP #27-20-11).

The Project is an agrivoltaics system which allows dual use of the farmland for solar energy and hay production. Throughout the design process, the owner and farmer of the land has been consulted to affirm the solar PV development does not remarkably decrease hay production nor impede the use of the property.

The Project has been designed to minimize the total increase in impervious area and disturbance to surrounding natural resources to the maximum extent practicable while accomplishing the Project design goals (Table 1.1). In totality, the project will disturb approximately 29.95 acres and introduce approximately 16,487 square feet of impervious area. Majority of the increase in impervious area accounts for the concrete equipment pads, driveway widening, and access drives off the existing driveway. The fence posts and utility poles introduce a negligible amount of impervious area comparatively.

Table 1.1 Land Disturbance Summary

Area Description	Area (square feet)
Limit of Work (LOW)	1,304,591
Existing Impervious Area	42,040
Proposed Impervious Area	58,527
Net Change in Impervious Area	16,487

1.2.1 Soils

Being an agrivoltaics system, nearly all the farmland will continue producing hay post-construction. Permanent impacts to the prime and important farmland have been minimized to the maximum extent practicable while achieving the Project design goals.

Earthwork has been minimized to extent practicable; however, it is required for construction of BMPs, widening the access drive, and flattening areas for the equipment pads. The design aims to balance the volume of cut and fill such that the transport of soil to and from the Site is minimized. The construction of the infiltration trenches and drives will require crushed stone deliveries to the Site. A designated laydown area shall be used to store the stockpiles. Fertile soils/loam may be brought to the Site to promote vegetative growth.

1.2.2 Waters

1.2.2.1 Wetlands

The Project has been designed with a significant buffer from Watts Stream (> 300 feet) and a 100-foot buffer the wetlands for work relevant to the solar installation. Farming improvements are exempt from Wetland Protection Act (WPA) regulations. The only work to be performed within the wetland and wetland buffer is the installation of approximately 1,234 feet of agricultural fencing bordering the hay pasture. The Applicant will be applying for a Request for Determination of Applicability (RDA) from the Conservation Commission to confirm there shall be no impacts to the wetlands on Site and the activities within the buffer are exempt from the WPA. Portions of the wetland and wetland buffer are currently farmed, and the farmer intends to continue utilizing this area for hay production post construction as well.

1.2.2.2 Groundwater

Through installation of the proposed BMPs, properly treated groundwater recharge volume on Site shall increase. A negligible amount of impervious area shall be introduced within the IWPA at the northern edge of the Site. Recharge BMPs and earthwork in general shall not be within the IWPA. The access road and equipment pads are placed central to the Site, significantly buffered from the IWPA. No wastewater nor hazardous materials will be discharged on Site. All proposed measures ensure that groundwater will not be contaminated, under-recharged, or otherwise adversely impacted.

1.2.2.3 Floodplain

The Project does not involve work within the floodplain and will not adversely impact the floodplain.

1.2.3 Drainage Patterns

Flow paths are primarily maintained, the main areas of alteration corresponding with the concrete equipment pads and driveway widening. The driveway shall be gently sloped to the south to promote runoff flow directly across the semi-pervious gravel. Existing culverts under the modified portion of the driveway will be removed and replaced during construction. Additionally, a new culvert shall be installed near the equipment pad north of the driveway, providing a flow path substitute to the south. At the outlets of these culverts, riprap aprons shall be installed in accordance with the U.S. Department of

Transportation Federal Highway Administration Hydraulic Design of Energy Dissipators for Culverts and Channels to dissipate energy and prevent erosion. A grassed channel shall be installed parallel to the northern equipment pad edge to divert runoff east towards the existing culvert which, under pre-development conditions, conveys the associated flow. Similar to the culverts, this channel shall end with a riprap apron to dissipate energy and prevent erosion. Otherwise, grading around the equipment pad areas shall gently divert flow around the pads to then continue along existing flow patterns.

To treat and infiltrate new runoff from the increase in impervious area and achieve a post-development peak runoff rate equal to or below the pre-development conditions, three infiltration trenches shall be installed. One trench shall be installed directly south of the northern equipment pad to specifically address runoff from the impervious concrete. The other two shall be installed south of the driveway expansion and shall treat and infiltrate runoff from the gravel and much of the northern array as conveyed by culverts. Each infiltration trench has a corresponding pre-treatment vegetated filter strip to settle out sediment and debris.

Water discharging from the most northern subcatchment (N) towards Wards Stream shall be filtered through a minimum of 25' of vegetation. A small pervious berm shall be installed downstream, parallel to the fence. The berm creates temporary ponding which reduces runoff velocity and hinders concentrated flow. Vegetative filtering aided by the downstream berm appropriately treats a significant amount of the runoff from this subcatchment before it flows off-site.

1.3 Hydrologic Analysis

A hydrologic analysis was performed using HydroCAD (Version 10.20-6a) for 24-hour, Type III, 2-, 10- and 100-year return frequency rainfall events for Worthington, MA. According to the National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 10, Version 3, the storm events generate 3.29, 5.14, and 8.09 inches of precipitation respectively (Appendix E – Rainfall Data). HydroCAD is an industry accepted modelling software that combines the capabilities of the TR-20 and TR-55 methodology. The calculations confirm the Project meets the Massachusetts Stormwater Standards, as described in further detail in Section 4. Each rainfall event was analysed under two scenarios: the Existing Condition (pre-construction) and the Proposed Condition (post-construction). The detailed stormwater models are included in Appendix I – HydroCAD Reports.

The Site was analysed as two design points (DPs), the first being Watts Stream which flows through the Site to the west of the Project (DP-W) and the other being Wades Stream east of the Site (DP-E). Hydrologic analysis results show proposed conditions demonstrate a lower peak rate of runoff and lower total volume of runoff leaving the Site when compared to existing conditions (Table 1.2).

Table 1.2 Hydrologic Analysis Results

Design point	Rainfall event	Peak flow (cfs)		Runoff volume (cf)	
		Existing	Proposed	Existing	Proposed
DP-W	2-year	36.12	33.68	194,762	191,833
	10-year	77.62	75.05	410,024	407,406
	100-year	149.42	144.07	791,167	788,882

Design point	Rainfall event	Peak flow (cfs)		Runoff volume (cf)	
		Existing	Proposed	Existing	Proposed
DP-E	2-year	9.56	9.56	39,235	39,235
	10-year	19.82	19.82	80,401	80,401
	100-year	37.02	37.02	152,236	152,236

2. Erosion and Sedimentation Control

2.1 During Construction

The Contractor shall be responsible for implementing and maintaining appropriate erosion and sedimentation controls to prevent sediment laden runoff from entering the existing stormwater management system. All controls shall be installed prior to beginning land disturbance and shall be maintained until the site is fully stabilized.

Sediment barriers (straw wattles, compost socks, or other appropriate best management practices (BMPs)) shall be placed around the perimeter of the proposed development area. Any disturbed area that are proposed to have vegetated ground cover will be restored to pre-construction conditions or seeded with similar vegetation to the maximum extent practicable. The area of disturbed soil exposed at any one time shall be minimized the extent practicable.

Temporary erosion control measures shall be implemented within 14 days of soil exposure or disturbance. Fast and effective measures include mulching and sprinkling for dust control. Reference manufacturer recommendations for mulching as well as the Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas, 2003. The implementation of a stabilized construction entrance/exit will prevent tracking of mud and sediment onto public roadways. Any material stockpiles shall be maintained in one or more designated, centralized locations away from drainage features. Perimeter erosion control shall surround all stockpiles and will consist of sediment barriers sized and maintained to effectively contain sediment.

The contractor shall inspect all erosion control devices a minimum of once weekly during construction and additionally following a major storm event. The contractor shall perform an inspection and any necessary repairs to achieve working order according to the original design. All temporary controls shall be maintained in working order until permanent stabilization is achieved.

The erosion prevention activities typically occur in the following sequence:

- Establish the Limits of Work (Surveying and staking the LOW boundary)
- Install Erosion and Sediment Controls
- Perform Clearing and Grubbing
- Conduct Necessary Site Grading
- Install Crushed Stone Access Road and BMPs
- Install Concrete Equipment Pad
- Install Perimeter Fence
- Perform Final Seeding and Landscaping (permanent stabilization of the site)
- Remove Temporary Erosion Controls Upon Close of Construction

2.2 Long-Term Pollution Prevention Plan

In accordance with EPA Standards, the development and implementation of suitable practices for source control and pollution prevention shall be incorporated in a Long-Term Pollution Prevention Plan (LTPPP). The primary focus of the LTPPP is to establish procedures and controls for limiting the potential sources of pollutants, including nutrients that may contribute to excessive contaminant levels in the site's stormwater runoff. To this end the following source controls and procedures will be in place at the site:

- Good housekeeping – The site shall be kept clean at all times. Refuse collection and disposal shall occur on a regular basis. All materials shall be disposed of in approved, designated locations in accordance with the relevant regulations.
- Storing material and waste products inside or under cover – No material storage shall take place outside at the Site on paved or lawn surfaces. All materials and waste products stored on-site shall be stored in compliance with all local, state, and federal requirements for spill prevention and containment.
- Vehicle washing controls – Vehicle washing shall not occur at the Site during construction. Any vehicle cleaning will be performed at an off-site facility with proper wastewater treatment. This prevents potentially harmful detergents, wash water or other associated pollutants from entering the stormwater BMPs. Standard farming equipment maintenance may require washing post-construction as may be typical pre-construction. The landowner/farmer shall be provided a copy of this report with the following recommendations for vehicle washing:
  - Use biodegradable, phosphate-free, water-based detergents.
  - Limit the amount of detergent used to only what is necessary.
  - Wash vehicles away from stormwater BMPs and wetlands.
  - Direct the wash water to pervious ground covers such as grassed areas.
- Requirement for routine inspections and maintenance of stormwater BMPs – All stormwater BMPs shall be inspected and maintained according to the Long-Term Operations and Maintenance (O&M) Plan (see Section 3).
- Spill prevention and response plans – A spill recovery kit shall always be readily accessible at the Site. Emergency contact information for a certified cleanup vendor shall be visible and apparent at the Site. All employees shall be briefed on clean-up response and procedures. All spills shall be documented and reported as required by law.
- Maintenance of lawns, gardens, and other landscaped areas – Landscaping activities shall be performed to avoid disturbing stabilized surfaces. Mowing shall be conducted in coordination with the farmer's hay production schedule and limited to only what is necessary to promote plant health.
- Requirements for storage and use of fertilizers, herbicides, and pesticides – Herbicide and pesticide use shall not take place during construction. If used post-construction, application shall be performed in accordance with product labels and applicable guidelines. Any fertilizer, herbicide, or pesticide application shall be coordinated with the farmer's hay production practices to avoid impacts on crop quality and yield.

- Pet waste management provisions – Pets shall not be present on-site during construction or operation. Waste from livestock present for vegetative management shall be managed through manual removal and specific grazing schedules to avoid accumulation of waste.
- Provisions for operation and management of septic systems – No septic systems are proposed for the Site. Temporary facilities present during construction shall be maintained according to the relevant regulations. It is unknown if the current residential building on Site has a correlated septic system. If one exists, it is the owner's responsibility to properly manage and maintain the septic system.
- Provisions for solid waste management – Solid waste generated during construction shall be stored in designated locations in covered containers. Containers will be removed by a licensed vendor, in compliance with the applicable regulations. Minimal waste generation is expected post-construction, and any found shall be removed promptly during routine maintenance visits.
- Snow disposal and plowing plans relative to Wetland Resources Act – Where snow plowing is appropriate, snow shall be compiled in upland areas, away from wetland resources and structural BMPs, to prevent direct discharge of meltwater. Snow shall not be piled within 100 feet of wetland resources and structural BMPs.
- Winter Road Salt and/or Sand Use and Storage restrictions – De-icing chemicals will be used strategically to minimize environmental impacts. Mechanical snow removal shall be prioritized over chemical treatment when possible. Snow piles shall be located away from storm drains and BMPs.
- Street sweeping schedules – During construction, street sweeping shall occur after all significant sediment disturbances. Driveways and adjacent roads shall be inspected for sediment tracking at the end of each workday and swept if deemed necessary. Post-construction, street sweeping shall occur twice annually during routine maintenance inspections.
- Provisions for prevention of illicit discharges to the stormwater management system – There are no illicit discharges (i.e., wastewater, discharges of substance, oil, or grease) associated with the Project. Illicit discharge detection and elimination measures shall be implemented including signage and regular inspections. Any evidence of illicit discharge shall be addressed immediately.

No new discharges shall occur near critical areas nor from any LUHPPLs. All personnel responsible for maintenance, repair of stormwater controls, and/or implementation of the LTPPP must receive adequate training related to the scope of their job duties. This includes training on the proper procedures to follow with respect to the LTPPP requirements and understand the principles and practices of erosion and sediment control. The following contact(s) can be reached in case of any questions or emergencies surrounding implementation of the LTPPP:

BlueWave Asset Management
T +1 617-209-3122
assetmgmt@bluewave.energy

2.2.1 Total Maximum Daily Loads

As described in Section 1.1.3, the Site is within two major watershed which both have Massachusetts Statewide Total Maximum Daily Load (TMDL) for Pathogen-impaired Waterbodies (CN 515.1) in reference to the pollutant E. Coli. In accordance with these TMDLs, the development and implementation

of suitable practices for source control and pollution prevention of pathogens shall be incorporated in this LTPPP. The Town of Worthington has no specific ordinances or bylaws pertaining to the TMDLs and is not within the regulated MS4 area.

For both the Westfield and Connecticut TMDLs, agricultural activities and wildlife waste have been identified as potential sources of pollution. These sources are applicable to the Site and its current and proposed use. Manure storage and spreading, if not well managed, can introduce pathogens to nearby waterbodies. It is recommended that any and all manure and fertilizer application is performed in accordance with applicable guidelines and in a conservative manner. Due to the large areas within the major watersheds dedicated to conservation and the wetlands throughout the watershed, wildlife waste can introduce pathogens pollution. Waterfowl are attracted to large open mowed areas near waterbodies, bringing with them a potential increase in bacteria levels. It is probable the solar PV development shall deter excessive waterfowl from the wetlands on Site. By practicing the measures outlined in this LTPPP, pathogen pollution will be mitigated throughout construction and the life of the Project.

3. Operation and Maintenance

3.1 Responsible Party & Notification of Future Owners

Property Owner: Timothy J. Sena & Catherine Rude-Sena
Site Adress: 190 Ridge Road, Worthington, MA 01098
Mailing Address: P.O. Box 132 Worthington, MA 01098

The property owner noted above is the stormwater management system owner. Upon transfer of property, and therefore stormwater system ownership, the seller shall notify the buyer of the presence and location of all stormwater BMPs and the ongoing responsibility to maintain them in accordance with this plan. O&M requirements and contract details shall be included in property transaction documents when possible.

It is the responsibility of the operator of the solar PV development to implement this O&M plan as outlined in their agreement with the owner.

Energy Storage Facility Operator: BlueWave Asset Manager
Mailing Address: 116 Huntington Avenue, Suite 601, Boston, MA 02116
Phone: +1 617-209-3122
Email: assetmgmt@bluewave.energy

3.2 General Site Maintenance

General site-wide conditions may be inspected simultaneous with stormwater inspections. The Site shall be checked for any eroded drainage paths and repaired, as necessary. Any loose debris on-site shall be removed and disposed of appropriately. If any significant sediment build-up occurs on the roadways or drives, it shall be removed by sweeping or other methods.

The array areas shall continue to be farmed post-construction as hay pastures by the landowner/farmer. Pesticides, fungicides and herbicides shall only be applied by the landowner/farmer in accordance with product labels and applicable guidelines. All landscaping and landscaping maintenance shall be performed by the landowner/farmer or a licensed subcontractor.

In general, maintenance of BMPs requiring earth disturbance should occur in late spring or summer, after spring rains have diminished, drier weather has set in, and when vegetation can re-establish itself through the growing season. Other times may be suitable if weather permits or if the potential for sediment transport is low. Any maintenance should occur with the intent to limit earth disturbance during times of high erosion potential. If earth disturbance occurs as part of maintenance activities, appropriate erosion and sediment controls shall be implemented.

The following maintenance procedures are necessary to ensure proper function of the stormwater management system and compliance with regulatory standards. The maintenance tasks are grouped by system component and summarized in the tables below. These actions, routine and corrective, shall be performed in a timely manner by the responsible party throughout the life of the system. At all times, across all activity relating to system O&M trash, sediment, and other debris that is removed from the

system shall be disposed of in accordance with applicable local, state and federal guidelines and regulations.

Based on the following O&M activities, the anticipated annual cost for full site-wide maintenance of the stormwater control system is estimated at $5,000.

3.2.1 Crushed Stone Access Road

The access road is a semi-permeable surface that can become unsafe if infiltration is not acceptable. Inspecting and repairing the access road in a timely manner is essential for overall system success. The surface of the crushed stone access road shall not be used to store soil or other materials that could clog the permeable stone surface.

Table 3.1 Routine O&M Activities – Crushed Stone Access Road

Activity	Details	Frequency
Inspect	Check for standing water, uneven surface, snowplow damage, and vegetation.	Twice a year or more often if needed, especially during winter.
Re-grade the stone	Redistribute and compact washed crushed stone to restore grades in original design.	As necessary
Remove vegetation	Manually remove vegetation that is growing within the road surface area.	Immediately when observed
Repair potholes and snowplow damage	Fill and compact potholes and other road damage with design specific material.	As necessary
Restore infiltration	If water remains on road surface >48 hours after storm, excavate, scarify the underlying topsoil, and replace the stone.	As necessary
Clean	Remove trash and debris from the road surface.	Immediately when observed

3.2.2 Drainage Channels

Vegetated drainage channels convey stormwater and allow for infiltration. Regular inspection and vegetation management are critical for channel flow.

Table 3.2 Routine O&M Activities – Drainage Channels

Activity	Details	Frequency
Inspect	Inspect channels to make sure vegetation is adequate and for signs of rilling and gullying. Repair rills and gullies. Replace dead vegetation.	Biannually
Mow	Grass height shall not exceed 6 inches.	As necessary
Remove sediment	Remove sediment and other debris manually.	At least once a year
Reseed	Reseed as necessary to ensure that vegetative cover is never below 80% across the channel.	As necessary

3.2.3 Vegetated Filter Strips

Efficiency of the vegetated filter strips shall benefit from the regular maintenance outlined below which shall ensure flow does not short-circuit the system and runoff is properly filtered.

Table 3.3 Routine O&M Activities – Vegetated Filter Strip

Activity	Details	Frequency
Inspect	Inspect for sediment buildup and signs of erosion. Check the vegetation for bare spots and overall health.	At least once a year
Mow	Grass height shall not exceed 6 inches.	As necessary
Remove sediment	Remove sediment and other debris manually.	At least once a year
Reseed	Reseed as necessary to ensure that vegetative cover is never below 80%.	As necessary

3.2.4 Infiltration Trenches

Strict maintenance of infiltration trenches is crucial in preventing their failure due to clogging. By routinely inspecting the trenches and performing preventative maintenance biannually, trenches can operate effectively for a decade or more before requiring rehabilitation.

Table 3.4 Routine O&M Activities – Infiltration Trenches

Activity	Details	Frequency
Inspect	Inspect for sediment buildup and ponding.	Twice a year or more often if needed
Remove sediment	Remove sediment and other debris manually.	Twice a year or more often if needed
Unclog	If there is ponded water at the surface of the trench, remove and replace the first layer of stone aggregate and the filter fabric. If water is ponded inside the trench, sediment must be removed from the trench before scarifying and tilling the bottom to induce infiltration. This unclogging process requires removal and replacement of the stone aggregate and filter fabric.	As necessary

3.2.5 Riprap Aprons

Riprap aprons shall be routinely inspected according to the outline below to ensure proper functionality and ability to dissipate energy.

Table 3.5 Routine O&M Activities – Riprap Aprons

Activity	Details	Frequency
Inspect	Check for damaged/misplaced stones, sediment accumulation, significant erosion, vegetation growth.	Twice a year
Clean	Remove trash, sediment, and other debris.	Twice a year or more often as necessary
Clear Vegetation	Manually remove vegetation from between or over the stones.	Immediately as observed
Replace Stone	Replace or reconfigure missing or dislodged stones to maintain original design functionality.	As necessary

3.3 Public Safety Features

The stormwater management system and energy storage facility shall have several features to ensure public safety, prevent unauthorized access to the Site, and ensure effective emergency response. A perimeter fence shall be installed with a lockable gate at the main entrance to the Site. The gate will include signage with operator identification and emergency contact information. A secure lockbox containing access key(s) shall be installed in case of emergency to provide full access to the Site for the local fire department. In accordance with the Worthington Protective Zoning Bylaws (the Bylaws) Section 8.5.6(A), “All means of shutting down the solar photovoltaic installation shall be clearly marked and approved by the Town fire chief.” In addition to gate and emergency shutoff signage, temporary and permanent signs may be installed near BMPs as is appropriate.

4. Massachusetts Stormwater Management Standards

The Project has been designed in accordance with the Massachusetts Stormwater Management Standards.

4.1 Standard 1: No New Untreated Discharges

No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

Impervious areas as a result of the development include the concrete equipment pads, widening of the existing driveway and additional access drives extending from the driveway. Runoff rates and volumes would increase without mitigation due to the ground cover change from hay pasture to concrete and gravel. With the BMPs implemented on the Site, the peak rate has been attenuated and the volume discharging to the wetlands and streams is reduced. Much of the runoff generated from impervious areas flows into the treatment vegetated filter strips and infiltration trenches which together provide 80% removal of Total Suspended Solids (TSS) as described in Volume 2 of the Handbook. New impervious areas which are not captured are treated through vegetative filtration through existing and natural stormwater conveyances strips which provide up to 45% TSS removal.

4.2 Standard 2: Peak Rate Attenuation

Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

The post-development peak discharge rates have been attenuated to be less than or equal to the pre-development rates through design of the BMPs (see Table 1.2). The infiltration trenches help to control runoff release from much of the introduced impervious area by collecting and infiltrating potential runoff and limiting release through its overflow berm which can induce sheet flow. Its capacity for storage during a rainfall event prevents the runoff which flows quicker over the new impervious surfaces from reaching the design points within a smaller period of time and increasing the peak discharge rate.

4.3 Standard 3: Recharge

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-

development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

The required recharge volume for the Site was calculated as follows:

$$
\begin{aligned}
&Recharge\ Volume \\
&\quad = 0.15\ in.runoff\ \times total\ impervious\ area\ within\ HSG\ C \\
&\quad + 0.10\ in.runoff\ \times total\ impervious\ area\ within\ HSG\ D \\
&= 0.15\ in.runoff \left({}^{1\ ft}/_{12\ in.}\right) \times 51{,}115\ sf + \ 0.10\ in.runoff \left({}^{1\ ft}/_{12\ in.}\right) \times 7{,}412\ sf \\
&= 639\ cf\ runoff + 62\ cf\ runoff \\
&= 701\ cf\ runoff
\end{aligned}
$$

The infiltration trenches provide a combined recharge capacity of 2,663 cubic feet assuming a 40% void ratio as recommended by the Volume 2 of the Handbook, meeting the standard. The infiltration trenches are built over soil classified as HSG C and C/D which has moderate drainage and an assumed conductivity of 0.17 inches per hour according to the 1982 Rawl's Rates referenced in the Handbook. The bottom of each trench is more than two feet from the seasonal high-water table and bedrock and below the frost line which is at most 48" below the ground surface.

4.4 Standard 4: Water Quality

Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:

a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;

b. Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and

c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook

Approximately 20,304 square feet of the Site is within an IWPA and requires a water quality volume equal to 1.0 inch of runoff times the total impervious area of the post-development Site. Within this area, an insignificant amount of impervious area (less than 3 square feet) shall be introduced through the installation of fence posts and the ground-mounted trackers. The remainder of the Site does not meet any of the criteria requiring 1.0 inch of runoff and therefore 0.5 inches of runoff may be used instead.

The required water quality volume for the Site was calculated as follows:

$$
\begin{aligned}
&Water\ Quality\ Volume \\
&\quad = 1.0\ in.runoff\ \times total\ impervious\ area\ within\ the\ IWPA \\
&\quad + 0.5\ in.runoff\ \times total\ impervious\ area\ of\ the\ post-development\ site \\
&= 1.0\ in.runoff\ \left({}^{1\ ft}/_{12\ in.}\right) \times 2\ sf + 0.5\ in.runoff \left({}^{1\ ft}/_{12\ in.}\right) \times 58{,}525\ sf \\
&= 2{,}438\ cf\ runoff
\end{aligned}
$$

The infiltration trenches have collectively been sized to capture 2,663 cubic feet assuming a 40% void ratio as recommended by the Volume 2 of the Handbook. The combined system of the vegetated filter strips and infiltration trenches provides 80% removal of TSS as described in Volume 2 of the Handbook.

The LTPPP is provided in Section 2.2.

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

For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

The solar PV development is not considered a land use with higher potential pollutant loads (LUHPPL).

4.6 Standard 6: Critical Areas

Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A “storm water discharge” as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

Critical areas protected under the Massachusetts stormwater handbook include the following areas:

- Outstanding Resource Waters (ORWs) as designated in 314 CMR 4.00
- Special Resource Waters (SRWs) as designated in 314 CMR 4.00
- Recharge areas for public water supplies as defined in 310 CMR 22.02 (Zone Is, Zone IIs and Interim Wellhead Protection Areas for groundwater sources and Zone As for surface water sources)

- Bathing beaches as defined in 105 CMR 445.000
- Cold-water fisheries as defined in 310 CMR 10.04 and 314 CMR 9.02
- Shellfish growing areas as defined in 310 CMR 10.04 and 314 CMR 9.02.

Based on a review of MassGIS and Massachusetts Department of Environmental Protection (MassDEP) data and mapping resources:

- There are no ORWs mapped within or near the Site.
- The Site is in the Connecticut River Basin, an area that currently does not have any SRWs.
- The Site may be within the Worthington Aquifer Protection Zone. A small sliver at the northern edge of the Site is within an Interim Wellhead Protection Zone. For more information on the groundwater resources near the Site, see Section 1.1.2.2. The Project is not anticipated to significantly impact these areas and has a low likelihood of doing so. The Project will not have any discharges within Zone I, Zone II, or Zone A areas.
- There are no bathing beaches within or near the Site
- Both receiving streams of the Site's subcatchments are cold-water fisheries: Watts Stream (ID 3211150) and Wards Stream (ID 3211175). The Project does not include any changes which are likely to reduce the ability of these waters to support cold-water fish reproduction. The Project has been specifically designed to not significantly impact these streams.
- There are no shellfish growing areas within or near the Site.

By proximity there are critical areas near the Site, but there are no discharges which have a strong likelihood of a significant impact to these areas. Therefore, by definition, there is no discharge near a critical area

4.7 Standard 7: Redevelopments

A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

The Project is new development; therefore, this standard does not apply.

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

A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

The erosion and sediment control plan narrative is provided in Section 2 and is included in the Issued for Permitting (IFP) plan set which shows the locations of measures to be implemented and visualizations of prevention measures (Appendix F – Issued for Permitting Plan Set).

4.9 Standard 9: Operation and Maintenance Plan

A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

The operation and maintenance (O&M) plan is provided in Section 3.

4.10 Standard 10: Prohibition of Illicit Discharges

All illicit discharges to the stormwater management system are prohibited.

There are no illicit discharges (i.e., wastewater, discharges of substance, oil, or grease) associated with the Project. See Section 2.2 for the long-term pollution prevention plan detailing measures to prevent illicit discharges. An Illicit Discharge Compliance Statement shall be submitted prior to the discharge of any stormwater to post-construction BMPs.

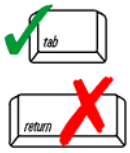
Appendix A – MA DEP Checklist for Stormwater Report

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

09/23/2025

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): Crushed stone access drive, vegated filter strips, infiltration trenches

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;

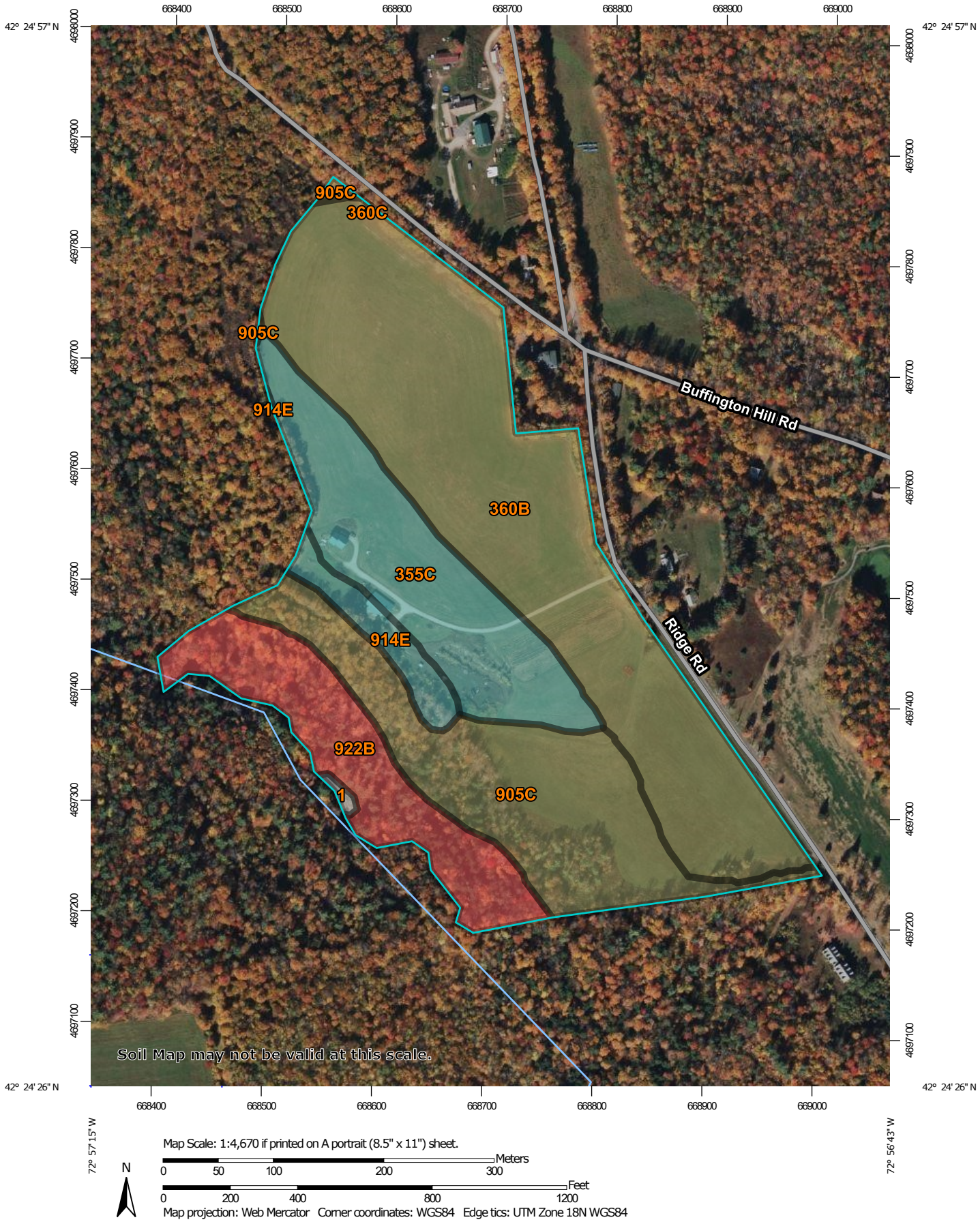
☐ An Illicit Discharge Compliance Statement is attached;

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

Appendix B – Soils Information

USDA NRCS HSG Soil Map

Hydrologic Soil Group—Hampden and Hampshire Counties, Massachusetts, Western Part
(Ridge Rd SW Analysis Area)



Map Scale: 1:4,670 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 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 1:25,000.

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, Western Part
Survey Area Data: Version 20, Aug 27, 2024

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

Date(s) aerial images were photographed: Oct 15, 2020—Oct 31, 2020

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		0.1	0.2%
355C	Marlow fine sandy loam, 8 to 15 percent slopes	C	8.2	17.4%
360B	Peru fine sandy loam, 3 to 8 percent slopes	C/D	21.1	45.0%
360C	Peru fine sandy loam, 8 to 15 percent slopes	C/D	0.0	0.0%
905C	Peru-Marlow association, 3 to 15 percent slopes, extremely stony	C/D	9.8	20.8%
914E	Marlow-Berkshire association, 35 to 60 percent slopes, extremely stony	C	1.5	3.3%
922B	Pillsbury-Peacham-Wonsqueak association, 0 to 8 percent slopes, extremely stony	D	6.3	13.3%
Totals for Area of Interest			**47.0**	**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

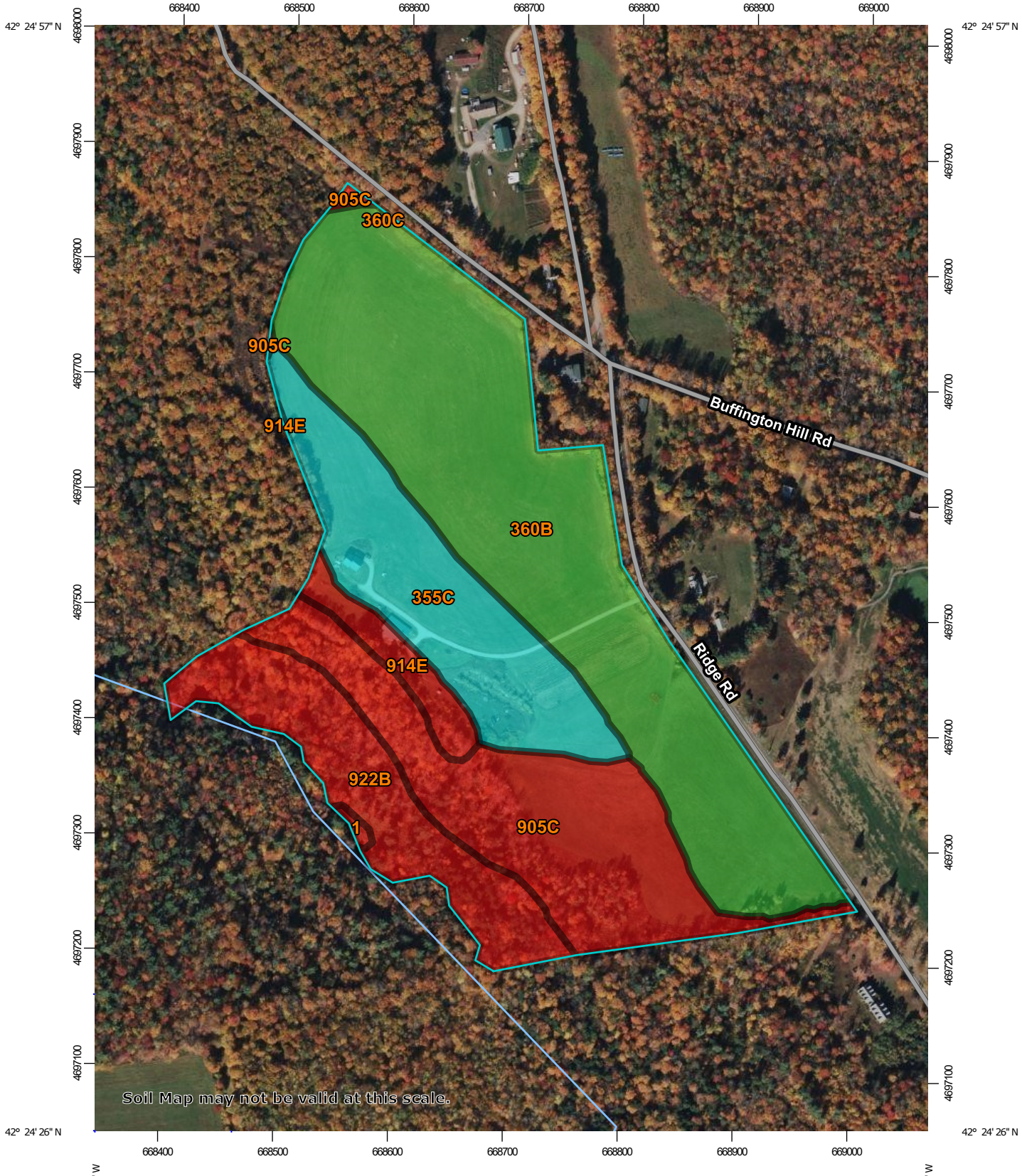
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

USDA NRCS Farmland Classification Map

Farmland Classification—Hampden and Hampshire Counties, Massachusetts, Western Part
(Ridge Rd SW Analysis Area)



Map Scale: 1:4,670 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)

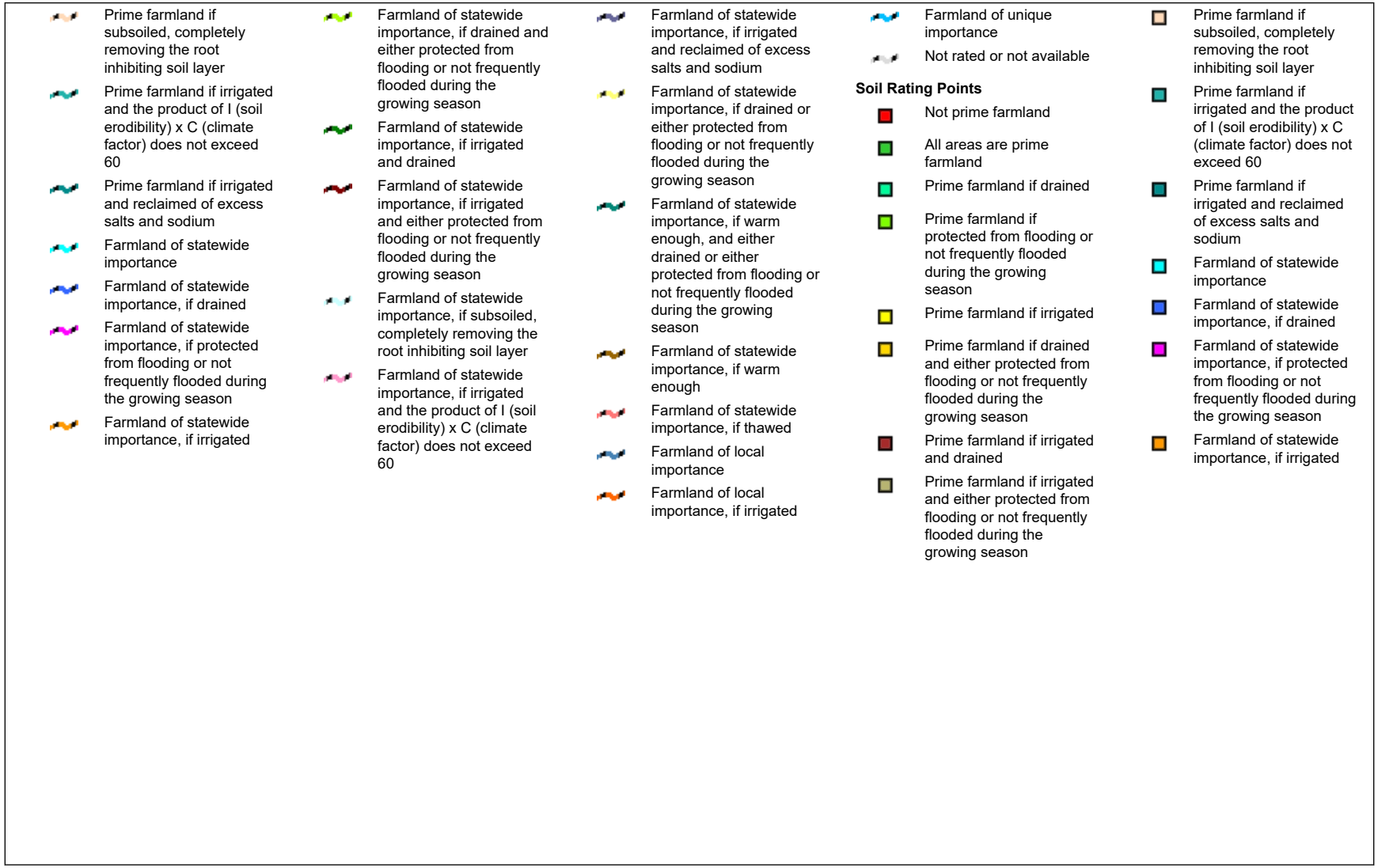
Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of statewide importance, if drained
- Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated
- Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated and drained
- Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough
- Farmland of statewide importance, if thawed
- Farmland of local importance
- Farmland of local importance, if irrigated
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season


Prime farmland if subsoiled, completely removing the root inhibiting soil layer
Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Prime farmland if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance
Farmland of statewide importance, if drained
Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated
Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated and drained
Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if warm enough
Farmland of statewide importance, if thawed
Farmland of local importance
Farmland of local importance, if irrigated
Farmland of unique importance
Not rated or not available
Soil Rating Points
Not prime farmland
All areas are prime farmland
Prime farmland if drained
Prime farmland if protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated and drained
Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
Prime farmland if subsoiled, completely removing the root inhibiting soil layer
Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Prime farmland if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance
Farmland of statewide importance, if drained
Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated

- Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated and drained
- Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough
- Farmland of statewide importance, if thawed
- Farmland of local importance
- Farmland of local importance, if irrigated
- Farmland of unique importance
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

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, Western Part
Survey Area Data: Version 20, Aug 27, 2024

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

Date(s) aerial images were photographed: Oct 15, 2020—Oct 31, 2020

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.

Farmland Classification

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water	Not prime farmland	0.1	0.2%
355C	Marlow fine sandy loam, 8 to 15 percent slopes	Farmland of statewide importance	8.2	17.4%
360B	Peru fine sandy loam, 3 to 8 percent slopes	All areas are prime farmland	21.1	45.0%
360C	Peru fine sandy loam, 8 to 15 percent slopes	Farmland of statewide importance	0.0	0.0%
905C	Peru-Marlow association, 3 to 15 percent slopes, extremely stony	Not prime farmland	9.8	20.8%
914E	Marlow-Berkshire association, 35 to 60 percent slopes, extremely stony	Not prime farmland	1.5	3.3%
922B	Pillsbury-Peacham-Wonsqueak association, 0 to 8 percent slopes, extremely stony	Not prime farmland	6.3	13.3%
Totals for Area of Interest			**47.0**	**100.0%**

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

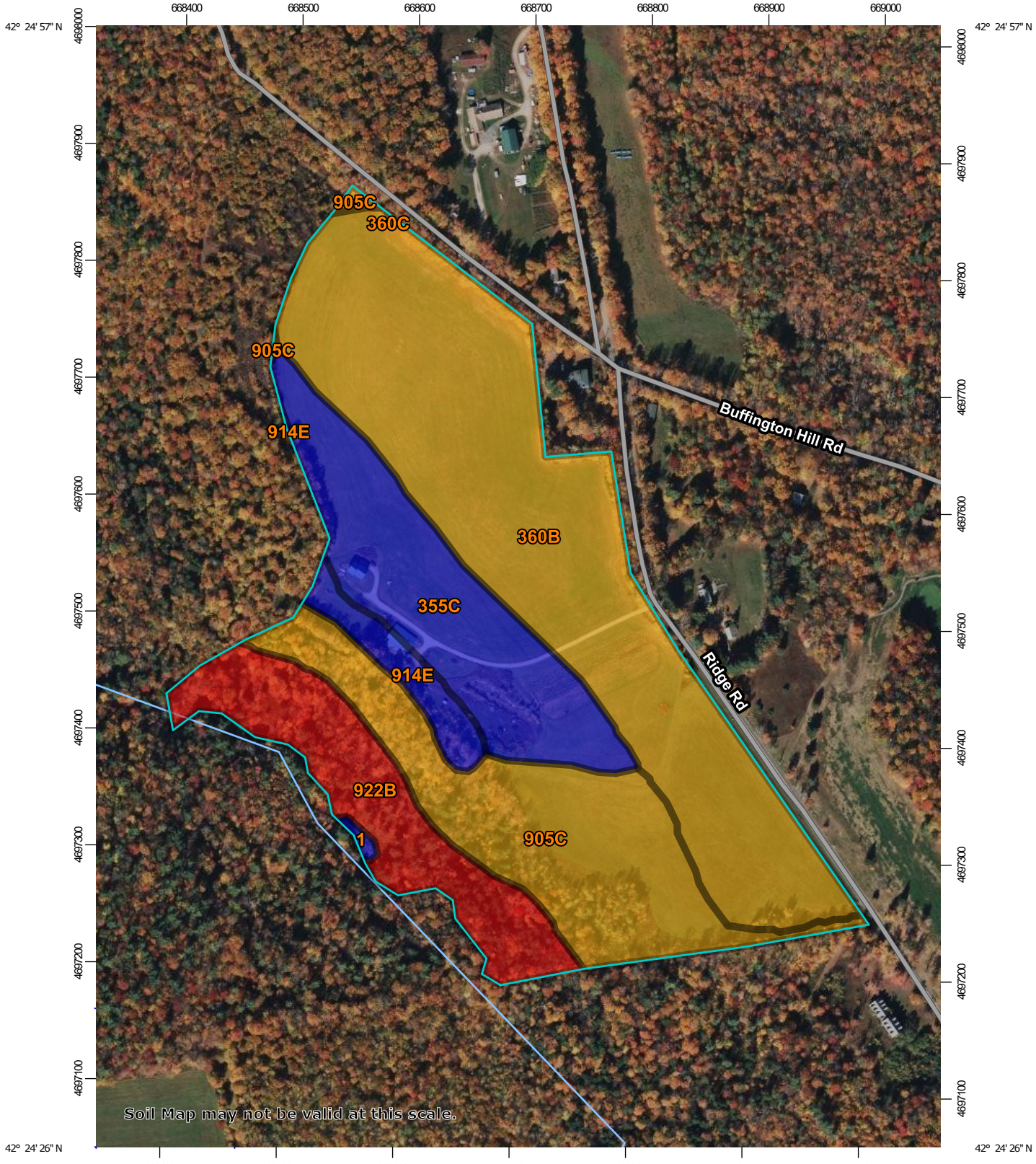
Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Appendix C – Groundwater Information

USGS NRCS Depth to Water Table Map

Depth to Water Table—Hampden and Hampshire Counties, Massachusetts, Western Part
(Ridge Rd SW Analysis Area)



Map Scale: 1:4,670 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 Rating Polygons
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Lines
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Points
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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, Western Part
Survey Area Data: Version 20, Aug 27, 2024

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

Date(s) aerial images were photographed: Oct 15, 2020—Oct 31, 2020

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.

Depth to Water Table

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
1	Water	>200	0.1	0.2%
355C	Marlow fine sandy loam, 8 to 15 percent slopes	>200	8.2	17.4%
360B	Peru fine sandy loam, 3 to 8 percent slopes	46	21.1	45.0%
360C	Peru fine sandy loam, 8 to 15 percent slopes	46	0.0	0.0%
905C	Peru-Marlow association, 3 to 15 percent slopes, extremely stony	46	9.8	20.8%
914E	Marlow-Berkshire association, 35 to 60 percent slopes, extremely stony	>200	1.5	3.3%
922B	Pillsbury-Peacham-Wonsqueak association, 0 to 8 percent slopes, extremely stony	15	6.3	13.3%
Totals for Area of Interest			**47.0**	**100.0%**

Description

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

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

Rating Options

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

Well Driller Reports for Adjacent Properties

MassDEP

Well Completion Report ID: 146467

eDEP Transmittal Number:

WELL LOCATION

GPS North: **GPS West:** **Assessors Map:**

Address: 141 Buffington Hill Road **Assessors Lot:**

Sub Division: **Permit Number:**

City/Town: WORTHINGTON **Date Issued:**

Board Of Health Permit Obtained: Y

Work Performed	Well Type	Drilling Method Overburden	Drilling Method Bedrock
New Well	Domestic	Air Rotary	Air Hammer

ADDITIONAL WELL INFORMATION

Developed: Yes

Disinfected: Yes

Total Well Depth: 140.00

Fracture Enhancement:

Well Seal Type:

Depth to Bedrock: 28.00

PERMANENT PUMP (IF AVAILABLE)

Pump Description:

Type:

Nominal Pump Capacity:

Intake Depth:

Horsepower:

Comments: Driveshoe well seal.

CASING

From(ft)	To(ft)	Type	Thickness	Diameter
0.00				
0.00	40.00	Steel	17#	6

SCREEN

From(ft)	To(ft)	Type	slotsize	Diameter

WELL SEAL / FILTER PACK / ABANDONMENT MATERIAL

From(ft)	To(ft)	Material Description	Purpose

STATIC WATER LEVEL(ALL WELLS)

Date Measured	Depth Below Ground Surface
08/01/2006	30.00

WELL TEST DATA (ALL SECTIONS MANDATORY FOR PRODUCTION WELLS)

Date	Method	Yield(GPM)	Time Pumped (hrs & min)	Pumping Level (Ft. BGS)	Time To Recoover (Hrs & min)	Recovery
08/01/2006	Air Lift	4.00	1:00	140	2:00	30

OVER BURDEN

From(ft)	To(ft)	Lithology	Color	Comment	Water Zone	Loss / Add of Fluid	Drill Stem Drop	Drill Rate
0.00	28.00	Till						

BEDROCK

From(ft)	To(ft)	Lithology	Comment	Water Zone	Drill Stem Drop	Extra Large	Drill Rate	Rust Stain	Loss / Add Of Fluid	# of Fract Per Ft
28	56	Gabbro								
56	60	Gneiss								
60	70	Gabbro		Yes						
70	140	Gneiss								

MassDEP

Well Completion Report ID: 649783

eDEP Transmittal Number:

WELL LOCATION

GPS North:

GPS West:

Assessors Map:

Address: Ridge Road

Assessors Lot:

Sub Division:

Permit Number:

City/Town: WORTHINGTON

Date Issued: 06/17/1996

Board Of Health Permit Obtained: Y

Work Performed	Well Type	Drilling Method Overburden	Drilling Method Bedrock
New Well	Domestic	Air Rotary	Air Rotary

ADDITIONAL WELL INFORMATION

Developed:

Disinfected:

Total Well Depth: 220.00

Fracture Enhancement:

Well Seal Type:

Depth to Bedrock: 18.00

PERMANENT PUMP (IF AVAILABLE)

Pump Description:

Type:

Nominal Pump Capacity:

Intake Depth:

Horsepower:

Comments: Geographic Description

Well is located 40ft SW of Ridge Road, .4 mi NW of intersection with Route 112

Water-bearing rock/unconsolidated material Description: Grey/Brown Rock

CASING

From(ft)	To(ft)	Type	Thickness	Diameter
0.00	60.00	Steel	17#	

SCREEN

From(ft)	To(ft)	Type	slotsize	Diameter

WELL SEAL / FILTER PACK / ABANDONMENT MATERIAL

From(ft)	To(ft)	Material Description	Purpose

STATIC WATER LEVEL(ALL WELLS)

Date Measured	Depth Below Ground Surface
06/20/1996	20.00

WELL TEST DATA (ALL SECTIONS MANDATORY FOR PRODUCTION WELLS)

Date	Method	Yield(GPM)	Time Pumped (hrs & min)	Pumping Level (Ft. BGS)	Time To Recoover (Hrs & min)	Recovery
06/20/1996	Air Blow with Drill Stem	20.00	00:30	220	00:30	60

OVER BURDEN

From(ft)	To(ft)	Lithology	Color	Comment	Water Zone	Loss / Add of Fluid	Drill Stem Drop	Drill Rate
0.00	18.00			Hard Pan				

BEDROCK

From(ft)	To(ft)	Lithology	Comment	Water Zone	Drill Stem Drop	Extra Large	Drill Rate	Rust Stain	Loss / Add Of Fluid	# of Fract Per Ft
18	48		Brown Soft Rock							
48	148		Grey Rock							
148	192		Grey Rock							
192	193		Grey/Brown Rock	Yes						
193	220		Grey Rock							

MassDEP

Well Completion Report ID: 649845

eDEP Transmittal Number:

WELL LOCATION

GPS North:

GPS West:

Assessors Map:

Address: Huntington Road

Assessors Lot:

Sub Division: Ives Lieou property

Permit Number:

City/Town: WORTHINGTON

Date Issued:

Board Of Health Permit Obtained: NR

Work Performed	Well Type	Drilling Method Overburden	Drilling Method Bedrock
New Well	Domestic	Air Rotary	Air Rotary

ADDITIONAL WELL INFORMATION

Developed:

Disinfected:

Total Well Depth: 419.00

Fracture Enhancement:

Well Seal Type: Cement/Bentonite

Depth to Bedrock: 8.00

PERMANENT PUMP (IF AVAILABLE)

Pump Description:

Type:

Nominal Pump Capacity:

Intake Depth:

Horsepower:

Comments: Geographic Description

Well is located 100ft E of Huntington Road, mi N of intersection with

Water-bearing rock/unconsolidated material Description: Black Granite

CASING

From(ft)	To(ft)	Type	Thickness	Diameter
0.00	61.00	Steel		

SCREEN

From(ft)	To(ft)	Type	slotsize	Diameter

WELL SEAL / FILTER PACK / ABANDONMENT MATERIAL

From(ft)	To(ft)	Material Description	Purpose

STATIC WATER LEVEL(ALL WELLS)

Date Measured	Depth Below Ground Surface
02/22/1991	20.00

WELL TEST DATA (ALL SECTIONS MANDATORY FOR PRODUCTION WELLS)

Date	Method	Yield(GPM)	Time Pumped (hrs & min)	Pumping Level (Ft. BGS)	Time To Recoover (Hrs & min)	Recovery
02/22/1991	Air Blow with Drill Stem	26.00	00:30	240	00:05	20

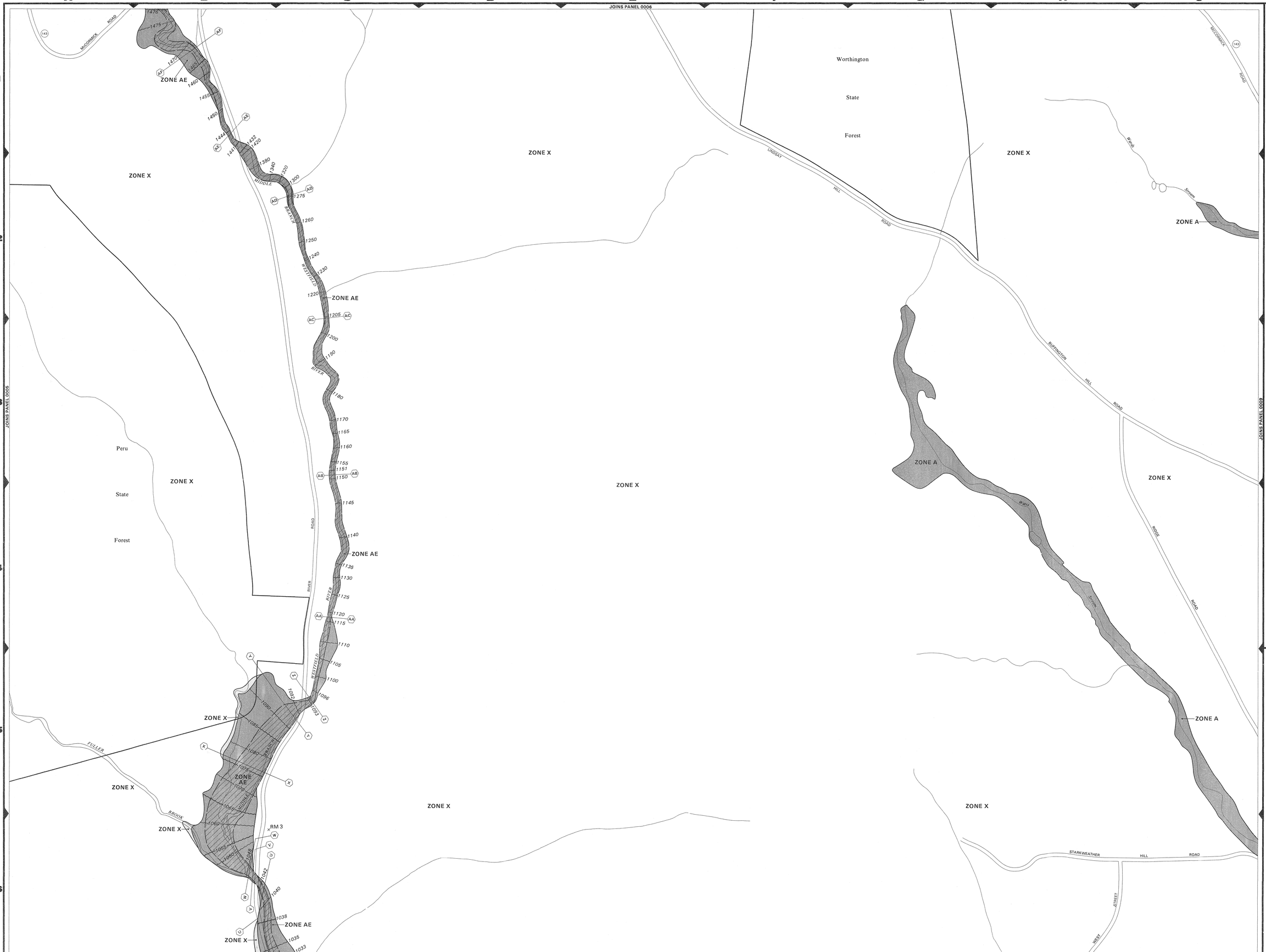
OVER BURDEN

From(ft)	To(ft)	Lithology	Color	Comment	Water Zone	Loss / Add of Fluid	Drill Stem Drop	Drill Rate
0.00	8.00			Top Soil				

BEDROCK

From(ft)	To(ft)	Lithology	Comment	Water Zone	Drill Stem Drop	Extra Large	Drill Rate	Rust Stain	Loss / Add Of Fluid	# of Fract Per Ft
8	108	Granite								
108	208	Granite								
208	308	Granite								
308	408	Granite								
408	419	Granite								

Appendix D – FEMA Map



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

- **ZONE A** — No base flood elevations determined.
- **ZONE AE** — Base flood elevations determined.
- **ZONE AH** — Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
- **ZONE AO** — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding; velocities also determined.
- **ZONE A99** — To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.
- **ZONE V** — Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- **ZONE VE** — Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

- **ZONE X** — Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

- **ZONE X** — Areas determined to be outside 500-year floodplain.
- **ZONE D** — Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

Floodplain Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 — Base Flood Elevation line; Elevation in Feet*

(D) — (D) Cross Section Line

(EL 987) — Base Flood Elevation in Feet Where Uniform Within Zone*

RM 7x — Elevation Reference Mark

•M1.5 — River Mile

*Referenced to the National Geodetic Vertical Datum of 1929

NOTES

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas. The community map repository should be consulted for possible updated flood hazard information prior to use of this map for property purchase or construction purposes.

Coastal base flood elevations apply only landward of 0.0 NGVD, and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of special flood hazard (100-year flood) include Zones A, AE, AH, AO, A99, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

Elevation reference marks are described in the Flood Insurance Study Report.

For adjoining map panels see separately printed Map Index.

MAP REPOSITORY

Town Clerk's Vault, Town Hall, Huntington Road, Worthington, Massachusetts 01098 (Maps available for reference only, not for distribution).

INITIAL IDENTIFICATION:
JUNE 28, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS:
APRIL 9, 1976

FLOOD INSURANCE RATE MAP EFFECTIVE:
JUNE 19, 1989

FLOOD INSURANCE RATE MAP REVISIONS:

Refer to the Flood Insurance Rate Map Effective date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE
400 0 400 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

TOWN OF
WORTHINGTON,
MASSACHUSETTS
HAMPSHIRE COUNTY

PANEL 8 OF 25
(SEE MAP INDEX FOR PANELS NOT PRINTED)

PANEL LOCATION

COMMUNITY-PANEL NUMBER
250175 0008 B

EFFECTIVE DATE:
JUNE 19, 1989

Federal Emergency Management Agency

Appendix E – Rainfall Data

NOAA Atlas 14, Volume 10, Version 3
Location name: Worthington, Massachusetts, USA*
Latitude: 42.4107°, Longitude: -72.9484°
Elevation: m/ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.323** (0.248-0.415)	**0.377** (0.289-0.484)	**0.465** (0.355-0.599)	**0.538** (0.409-0.697)	**0.639** (0.471-0.861)	**0.715** (0.518-0.984)	**0.794** (0.558-1.13)	**0.879** (0.590-1.28)	**0.998** (0.646-1.51)	**1.09** (0.691-1.68)
10-min	**0.458** (0.351-0.587)	**0.534** (0.409-0.686)	**0.659** (0.503-0.849)	**0.762** (0.579-0.988)	**0.905** (0.667-1.22)	**1.01** (0.732-1.39)	**1.12** (0.790-1.60)	**1.25** (0.836-1.82)	**1.41** (0.915-2.14)	**1.55** (0.979-2.39)
15-min	**0.538** (0.413-0.691)	**0.628** (0.481-0.807)	**0.775** (0.592-0.999)	**0.896** (0.682-1.16)	**1.06** (0.785-1.44)	**1.19** (0.861-1.64)	**1.32** (0.929-1.88)	**1.46** (0.983-2.14)	**1.66** (1.08-2.51)	**1.82** (1.15-2.81)
30-min	**0.767** (0.589-0.985)	**0.891** (0.683-1.14)	**1.09** (0.835-1.41)	**1.26** (0.958-1.63)	**1.49** (1.10-2.01)	**1.67** (1.20-2.29)	**1.85** (1.29-2.61)	**2.03** (1.36-2.97)	**2.29** (1.48-3.46)	**2.49** (1.57-3.83)
60-min	**0.996** (0.764-1.28)	**1.15** (0.884-1.48)	**1.41** (1.08-1.82)	**1.62** (1.23-2.10)	**1.92** (1.41-2.58)	**2.14** (1.54-2.94)	**2.37** (1.66-3.35)	**2.60** (1.75-3.80)	**2.91** (1.89-4.40)	**3.15** (2.00-4.86)
2-hr	**1.29** (0.992-1.64)	**1.49** (1.15-1.90)	**1.82** (1.40-2.33)	**2.09** (1.60-2.69)	**2.47** (1.83-3.30)	**2.76** (2.00-3.76)	**3.05** (2.15-4.30)	**3.36** (2.27-4.88)	**3.80** (2.47-5.71)	**4.14** (2.63-6.36)
3-hr	**1.48** (1.14-1.88)	**1.72** (1.33-2.18)	**2.11** (1.62-2.69)	**2.43** (1.87-3.12)	**2.88** (2.14-3.85)	**3.22** (2.35-4.39)	**3.57** (2.53-5.04)	**3.96** (2.67-5.73)	**4.51** (2.93-6.75)	**4.96** (3.15-7.57)
6-hr	**1.84** (1.43-2.32)	**2.17** (1.69-2.75)	**2.72** (2.11-3.45)	**3.17** (2.45-4.04)	**3.80** (2.84-5.06)	**4.26** (3.13-5.80)	**4.76** (3.41-6.72)	**5.33** (3.61-7.67)	**6.18** (4.03-9.20)	**6.89** (4.39-10.5)
12-hr	**2.25** (1.76-2.82)	**2.72** (2.13-3.41)	**3.49** (2.72-4.39)	**4.12** (3.20-5.22)	**5.00** (3.77-6.64)	**5.65** (4.18-7.67)	**6.35** (4.59-8.99)	**7.20** (4.89-10.3)	**8.48** (5.55-12.6)	**9.58** (6.13-14.5)
24-hr	**2.67** (2.10-3.32)	**3.29** (2.59-4.10)	**4.30** (3.37-5.38)	**5.14** (4.01-6.47)	**6.30** (4.78-8.34)	**7.15** (5.34-9.69)	**8.09** (5.90-11.4)	**9.24** (6.30-13.2)	**11.0** (7.24-16.2)	**12.6** (8.08-18.9)
2-day	**3.08** (2.45-3.82)	**3.85** (3.04-4.76)	**5.09** (4.02-6.32)	**6.12** (4.80-7.65)	**7.54** (5.76-9.93)	**8.58** (6.45-11.6)	**9.73** (7.16-13.7)	**11.2** (7.65-15.8)	**13.5** (8.89-19.8)	**15.5** (10.0-23.2)
3-day	**3.38** (2.69-4.17)	**4.22** (3.35-5.21)	**5.60** (4.43-6.92)	**6.73** (5.30-8.38)	**8.30** (6.37-10.9)	**9.45** (7.13-12.7)	**10.7** (7.93-15.1)	**12.4** (8.46-17.4)	**15.0** (9.88-21.9)	**17.3** (11.2-25.7)
4-day	**3.65** (2.91-4.48)	**4.54** (3.62-5.59)	**6.01** (4.77-7.42)	**7.22** (5.70-8.97)	**8.90** (6.84-11.7)	**10.1** (7.65-13.6)	**11.5** (8.51-16.2)	**13.2** (9.08-18.6)	**16.1** (10.6-23.4)	**18.5** (12.0-27.5)
7-day	**4.39** (3.52-5.37)	**5.39** (4.32-6.60)	**7.03** (5.61-8.63)	**8.39** (6.65-10.4)	**10.3** (7.92-13.3)	**11.6** (8.82-15.5)	**13.1** (9.75-18.3)	**15.1** (10.4-21.1)	**18.1** (12.0-26.2)	**20.8** (13.5-30.7)
10-day	**5.14** (4.13-6.26)	**6.19** (4.97-7.55)	**7.91** (6.33-9.68)	**9.34** (7.42-11.5)	**11.3** (8.73-14.6)	**12.7** (9.66-16.9)	**14.3** (10.6-19.8)	**16.3** (11.2-22.7)	**19.4** (12.8-27.9)	**22.0** (14.3-32.3)
20-day	**7.45** (6.03-9.02)	**8.55** (6.90-10.4)	**10.3** (8.32-12.6)	**11.8** (9.46-14.5)	**13.9** (10.7-17.7)	**15.4** (11.7-20.1)	**17.0** (12.5-23.1)	**18.9** (13.1-26.1)	**21.7** (14.5-31.0)	**24.0** (15.6-35.1)
30-day	**9.37** (7.60-11.3)	**10.5** (8.51-12.7)	**12.3** (9.96-14.9)	**13.9** (11.1-16.9)	**16.0** (12.4-20.2)	**17.6** (13.3-22.7)	**19.2** (14.1-25.7)	**21.0** (14.6-28.9)	**23.5** (15.7-33.5)	**25.6** (16.6-37.2)
45-day	**11.7** (9.53-14.0)	**12.9** (10.5-15.5)	**14.9** (12.0-17.9)	**16.5** (13.3-20.0)	**18.7** (14.5-23.5)	**20.5** (15.5-26.2)	**22.2** (16.2-29.3)	**23.9** (16.7-32.7)	**26.2** (17.6-37.1)	**27.8** (18.2-40.3)
60-day	**13.6** (11.1-16.3)	**14.9** (12.2-17.9)	**17.0** (13.8-20.4)	**18.8** (15.1-22.7)	**21.2** (16.5-26.4)	**23.0** (17.5-29.3)	**24.9** (18.1-32.5)	**26.6** (18.6-36.2)	**28.7** (19.3-40.5)	**30.1** (19.7-43.5)

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

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

Please refer to NOAA Atlas 14 document for more information.

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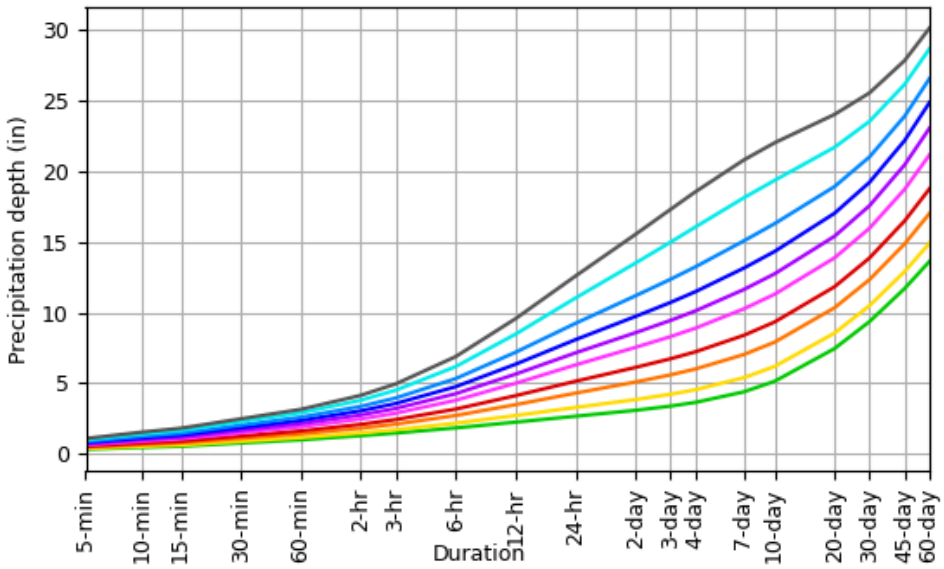
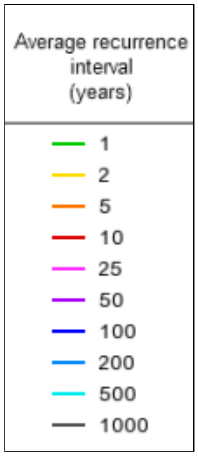
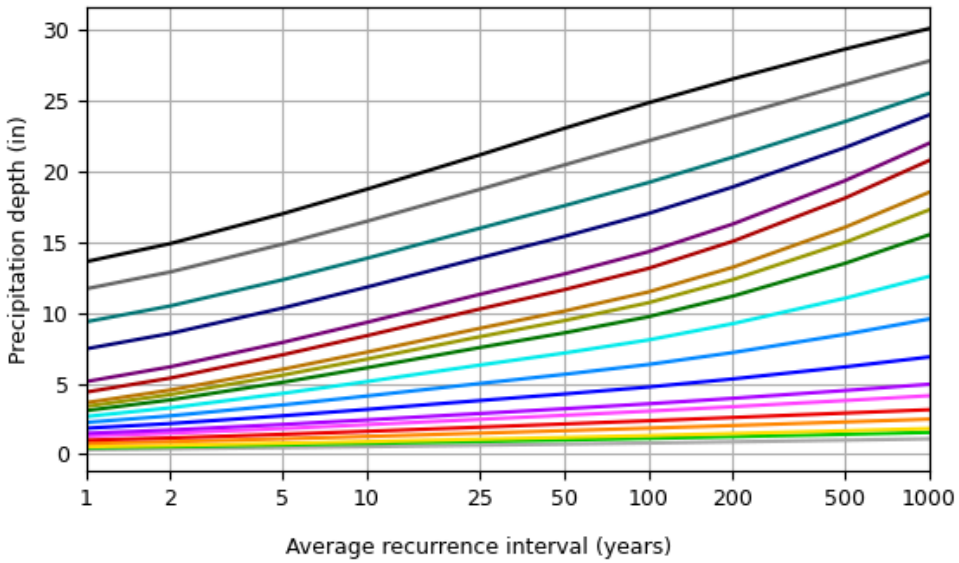
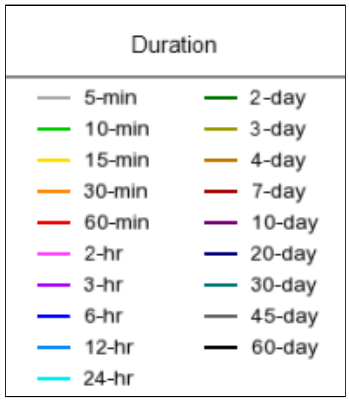
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 42.4107°, Longitude: -72.9484°









NOAA Atlas 14, Volume 10, Version 3 Created (GMT): Mon Aug 18 01:12:23 2025

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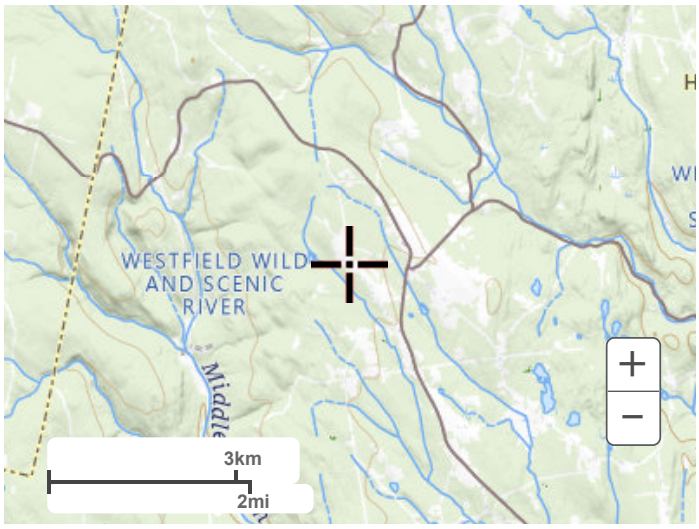
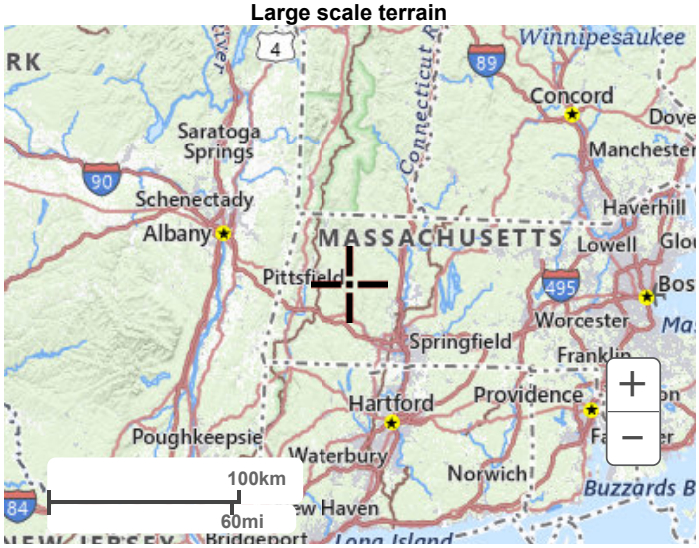
Maps & aerials

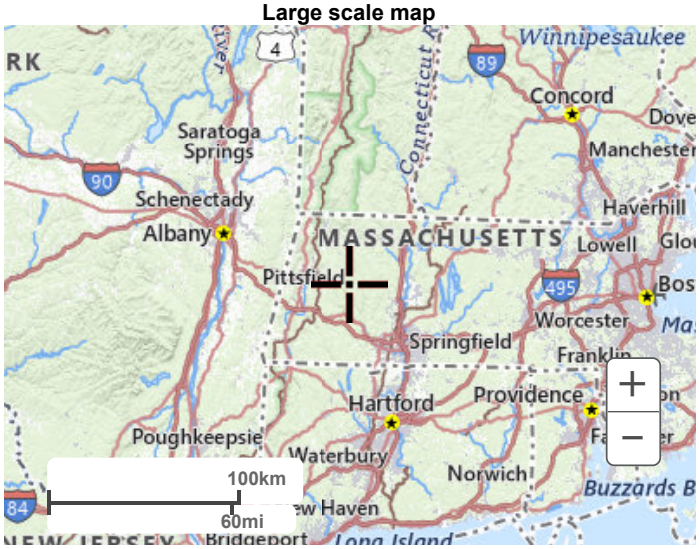
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

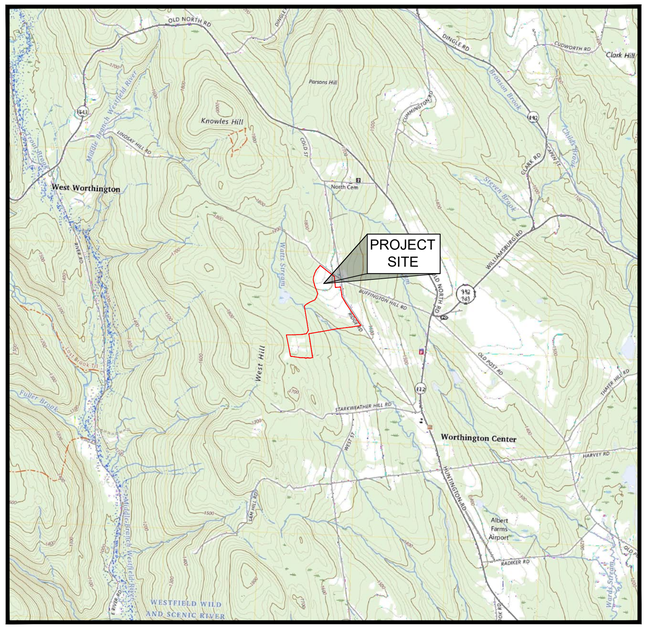
Disclaimer

Appendix F – Issued for Permitting Plan Set

PROPRIETARY INFORMATION: THIS DRAWING IS THE PROPERTY OF WSP USA INC. AND IS NOT TO BE LOANED OR REPRODUCED IN ANY WAY WITHOUT THE PERMISSION OF WSP USA INC.

BWC WADES STREAM, LLC

2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098
SEPTEMBER 23, 2025
ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION



LOCUS MAP
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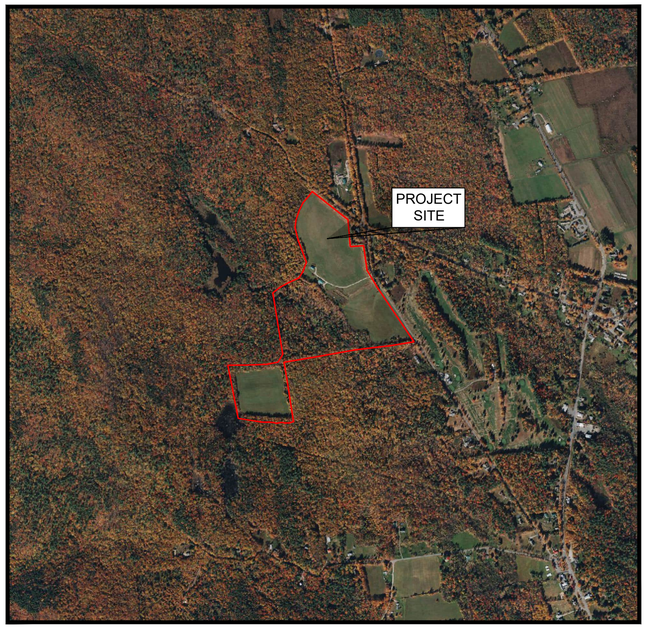

AERIAL IMAGE
1"=1000'

DRAWING INDEX

SHEET NUMBER	DRAWING TITLE	DRAWING NUMBER
	COVER SHEET	
1	CONSTRUCTION, EROSION AND SEDIMENTATION CONTROL NOTES	G-001
2	EXISTING CONDITIONS	V-101
3	PROPOSED CONDITIONS	C-101
4	GRADING/EARTHWORK PLAN	C-102
5	ACCESS ROAD TOPOGRAPHIC PROFILE ANALYSIS	C-104
6	SHADOW ANALYSIS OF PROPOSED CONDITIONS	C-105
7	DETAILS (SHEET 1 OF 2)	C-501
8	DETAILS (SHEET 2 OF 2)	C-502

PROPERTY OWNER

TIMOTHY J. SENA &
CATHERINE RUDE-SENA
PO BOX 132
WORTHINGTON, MA 01098

PREPARED BY

WSP USA INC.
100 APOLLO DRIVE SUITE 302
CHELMSFORD, MASSACHUSETTS 01824
T +1 978-692-9090
OLIVIA.CROSBY@WSP.COM

DEVELOPED BY

BWC WADES STREAM, LLC

116 HUNTINGTON AVE
BOSTON, MA 02116
T +1 617-209-3122
ASSETMGMT@BLUEWAVE.ENERGY

SITE PLAN REVIEW BY

TOWN OF WORTHINGTON
PLANNING BOARD
PO BOX 247; 160 HUNTINGTON ROAD
WORTHINGTON, MA 01098
T +1 413-238-5577
PLANNING@WORTHINGTONMA.US

D:\BlueWave\US-ED-0052230437 - Ridge Rd Worthington\4 Permitting\Sheets\0 - Ridge Rd - G-000.dwg - G-000 - Sep. 23, 2025 10:08am - wds_morgan.mcdonald

MATERIAL SPECIFICATIONS AND PLACEMENT REQUIREMENTS:

1.1 ANGULAR ROCK FILL

ANGULAR ROCK FILL SHALL BE USED FOR THE CONSTRUCTION ENTRANCE AS SHOWN ON THE DRAWINGS, AND SHALL MEET THE GRADATION REQUIREMENTS LISTED BELOW.

U.S. STANDARD SIEVE	PERCENT PASSING
3 INCH	100
2 INCH	80 - 100
1 INCH	50 - 80
NO. 200	0 - 10

PRIOR TO USE, THE ANGULAR ROCK FILL SHALL BE TESTED FOR APPROVAL AS DESCRIBED IN SECTION 2.0 AND SHALL BE PLACED AS DESCRIBED IN SECTION 3.0.

1.2 DENSE GRADED CRUSHED STONE

DENSE GRADED CRUSHED STONE SHALL BE USED TO CONSTRUCT THE CRUSHED STONE ACCESS ROAD, AND SHALL MEET THE REQUIREMENTS OF A MATERIAL SUCH AS MASSDOT SPECIFICATION M2.01.7 CRUSHED STONE, OR APPROVED EQUAL. THIS MATERIAL SHALL BE PLACED AT A MINIMUM THICKNESS OF 6-INCHES AND SHALL BE IN DIRECT CONTACT WITH THE BALLAST BLOCKS. THIS MATERIAL SHALL CONSIST OF CLEAN, HARD, DURABLE CRUSHED ROCK OR CRUSHED GRAVEL STONE, FREE FROM LOAM AND CLAY AND DELETERIOUS MATERIAL AND NO MORE THAN 10 PERCENT PASSING THE U.S. NO. 200 SIEVE. THIS MATERIAL SHALL MEET THE FOLLOWING GRADATION:

SIEVE DESIGNATION	PERCENT PASSING
2-INCH	100
1.5-INCH	70-100
¾-INCH	50-85
NO. 4	30-55
NO. 50	8-24
NO. 200	3-10

PRIOR TO USE, THE DENSE GRADED CRUSHED STONE SHALL BE TESTED FOR APPROVAL AS DESCRIBED BELOW IN SECTION 2.0 AND SHALL BE PLACED AS DESCRIBED BELOW IN SECTION 3.0.

1.3 GRANULAR FILL MATERIAL

CLEAN GRANULAR FILL MAY BE USED FOR FILL OR GRADING MATERIAL. GRANULAR FILL SHALL CONSIST OF MASSDOT MATERIAL M1.03.0, GRAVEL BORROW, TYPE C, OR APPROVED EQUAL, AND MEET THE FOLLOWING GRADATION:

SIEVE DESIGNATION	PERCENT PASSING
2-INCH	100
½-INCH	50-85
NO. 4	40-75
NO. 50	8-28
NO. 200	0-10

PRIOR TO USE, THE GRANULAR FILL SHALL BE TESTED FOR APPROVAL AS DESCRIBED IN SECTION 2.0 AND SHALL BE PLACED AS DESCRIBED IN SECTION 3.0.

1.4 LOAM BORROW MATERIAL

THE LOAM BORROW SHALL CONFORM TO MASSACHUSETTS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, DIVISION III - MATERIALS SPECIFICATIONS, SECTION M1.05.0 "LOAM BORROW". THE LOAM SHALL CONTAIN NOT LESS THAN 4% NOR MORE THAN 20% ORGANIC MATTER.

1.5 GEOTEXTILE FABRIC

FIBERS USED IN MANUFACTURING OF THE GEOTEXTILES SHALL CONSIST OF POLYPROPYLENE, POLYVINYL CHLORIDE, NYLON, POLYOLEFINS, POLYAMIDES, OR POLYESTER. THE FIBERS SHALL BE FORMED INTO A NETWORK SUCH THAT THE FILAMENTS OR YARNS RETAIN DIMENSIONAL STABILITY RELATIVE TO EACH OTHER, INCLUDING SELVAGES. THE GEOTEXTILE SHALL CONTAIN STABILIZERS AND/OR INHIBITORS TO MAKE THE FIBERS RESISTANT TO DETERIORATION RESULTING FROM EXPOSURE TO SUNLIGHT, WATER, OR HEAT. THE GEOTEXTILE SHALL BE FREE OF DEFECTS OR FLAWS WHICH WILL AFFECT ITS PHYSICAL PROPERTIES. PROVIDE A GEOTEXTILE MEETING THE PROPERTIES LISTED IN TABLE 1:

TABLE 1

REQUIRED PHYSICAL PROPERTIES OF GEOTEXTILE FABRIC

PROPERTY	TEST METHOD	NON-WOVEN	WOVEN
MASS PER UNIT AREA	D 5261	6	N/A
GRAB TENSILE STRENGTH (LBS)	D 4632	170	N/A
TENSILE STRENGTH (LBS/FT)	D 4595	N/A	7200
ELONGATION (%)	D 4632	50	N/A
PUNCTURE STRENGTH (LBS)	D 6241	435	N/A
TRAPEZOID TEAR (LBS)	D 4533	70	N/A
PERMITTIVITY (SEC^{-1})	D 4491	1.50	0.90
WATER FLOW RATE (GPM/FT^2)	D 4491	110	65
ULTRAVIOLET STABILITY (% FOR MIN 500 HRS)	D 4355	70	80
APPARENT OPENING SIZE (AOS) (STANDARD SIEVE)	D 4751	70	20

TABLE NOTES:

1. ALL NUMERICAL VALUES EXCEPT AOS AND ULTRAVIOLET STABILITY REPRESENT MINIMUM AVERAGE ROLL VALUES (MARV), IN THE WEAKER PRINCIPAL DIRECTION.
2. AOS VALUE IS A MAXIMUM AVERAGE ROLL VALUE OR MAXARV.
3. ULTRAVIOLET STABILITY IS MEASURED AS A MINIMUM AVERAGE PERCENTAGE.
4. SEE DETAILS ON DRAWING C-501 FOR LOCATIONS OF WOVEN AND NON-WOVEN GEOTEXTILES.

2.0 BORROW SOURCE TESTING REQUIREMENTS

PRIOR TO USE, BORROW SOURCE TESTING, INCLUDING GEOTECHNICAL CHARACTERIZATION REQUIREMENTS, SHALL BE CONDUCTED ON ALL SOIL MATERIALS PROPOSED FOR CONSTRUCTION AND SUBMITTED TO THE ENGINEER TO ASSESS CONFORMANCE TO MATERIAL SPECIFICATIONS.

3.0 MATERIAL PLACEMENT AND FIELD QUALITY CONTROL REQUIREMENTS

1. FILL MATERIAL SHALL NOT BE PLACED ON SURFACES THAT ARE MUDDY, FROZEN, OR CONTAIN FROST OR ICE.
2. SURFACES ON WHICH THE GEOTEXTILE WILL BE PLACED SHALL BE PREPARED TO A RELATIVELY SMOOTH SURFACE CONDITION. SURFACES SHALL BE FREE FROM OBSTRUCTION, DEBRIS, DEPRESSIONS, EROSION FEATURE, OR VEGETATION. ANY IRREGULARITIES SHALL BE REMOVED SO AS TO ENSURE CONTINUOUS, INTIMATE CONTACT OF THE GEOTEXTILE WITH THE SURFACE. ANY LOOSE MATERIAL, OR SOFT OR LOW DENSITY POCKETS OF MATERIAL, SHALL BE REMOVED, FILLED WITH SUITABLE SUBGRADE FILL, AND COMPACTED. EROSION FEATURES SUCH AS RILLS AND GULLIES MUST BE GRADED OUT OF THE SURFACE BEFORE GEOTEXTILE PLACEMENT.
3. AT THE TIME OF INSTALLATION, FABRIC SHALL BE REJECTED IF IT HAS DEFECTS, RIPS, HOLES, FLAWS, DETERIORATION OR DAMAGE INCURRED DURING MANUFACTURE, TRANSPORT OR STORAGE.
4. FABRIC SHALL LAY SMOOTH AND BE FREE OF TENSION, STRESS, FOLDS, WRINKLES, OR CREASES.
5. CRUSHED STONE FOR ACCESS ROADS SHALL BE PLACED IN MAXIMUM 6-INCH LOOSE LIFTS AND COMPACTED TO A MINIMUM OF 95% OF MAXIMUM DRY DENSITY (MODIFIED PROCTOR (ASTM D 1557)).
6. LOAM BORROW FOR STORMWATER INFILTRATION BEST MANAGEMENT PRACTICES (BMPS) SHALL BE PLACED IN MAXIMUM 6-INCH LOOSE LIFTS AND COMPACTED TO A MINIMUM OF 92% OF MAXIMUM DRY DENSITY (MODIFIED PROCTOR (ASTM D 1557)).

CONCEPTUAL CONSTRUCTION SEQUENCE:

1. ESTABLISHMENT OF LIMITS OF WORK;
2. PLACEMENT OF EROSION CONTROLS;
3. MINOR CLEARING AND GRUBBING AND SITE GRADING;
4. CONSTRUCTION OF ACCESS ROAD;
5. CONSTRUCTION OF THE SOLAR ARRAY AND APPURTENANT EQUIPMENT;
4. RESTORATION OF DISTURBED AREAS;
5. CONSTRUCTION OF STORMWATER INFILTRATION BMPS;
6. ERECTION OF THE PERIMETER FENCE; AND
7. FINAL STABILIZATION OF DISTURBED AREAS.

EROSION AND SEDIMENTATION CONTROL PLAN:

THIS PLAN HAS BEEN DEVELOPED TO PROVIDE A STRATEGY FOR CONTROLLING SOIL EROSION AND SEDIMENTATION DURING AND AFTER CONSTRUCTION OF THE PROPOSED PROJECT.

THIS PLAN IS BASED ON STANDARDS AND SPECIFICATIONS FOR EROSION PREVENTION IN DEVELOPING AREAS AS CONTAINED IN MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS, 2003.

GENERAL EROSION AND SEDIMENTATION CONSTRUCTION DETAIL NOTES:

DURING CONSTRUCTION, THE CONTRACTOR SHALL TAKE ALL REASONABLE MEASURES TO SCHEDULE EARTHWORK OPERATIONS SUCH THAT THE AREA OF EXPOSED AND DISTURBED SOIL IS MINIMIZED. CONSTRUCTION SHALL BE PHASED TO MINIMIZE THE AREA OF DISTURBED SOIL THAT IS EXPOSED AT ANY ONE TIME. UPGRADIENT STORM WATER DIVERSION AND DISPERSION MEASURES SHALL BE INSTALLED WHERE APPROPRIATE. ALL CUT AND FILL SLOPES SHALL BE STABILIZED UPON COMPLETION. THE FOLLOWING MEASURES WILL BE UNDERTAKEN TO PROVIDE MAXIMUM PROTECTION TO THE SOIL, WATER, AND ABUTTING LANDS:

PRIOR TO GRUBBING OR ANY EARTH MOVING OPERATION, SEDIMENT BARRIERS, OR OTHER APPROPRIATE PERIMETER CONTROL BMPS SHALL BE INSTALLED ACROSS THE SLOPE ON THE CONTOUR AT THE DOWNHILL LIMIT OF THE WORK AS PROTECTION AGAINST CONSTRUCTION RELATED EROSION. INSTALL ALL NECESSARY STORMWATER DIVERSIONS AND DISPERSION MEASURES.

1. PERMANENT SOIL STABILIZATION MEASURES FOR ALL SLOPES, OR ANY DISTURBED LAND AREA SHALL BE COMPLETED WITHIN FOURTEEN CALENDAR DAYS AFTER FINAL GRADING HAS BEEN COMPLETED. WHEN IT IS NOT POSSIBLE OR PRACTICAL TO PERMANENTLY STABILIZE DISTURBED LAND, TEMPORARY EROSION CONTROL MEASURES SHALL BE IMPLEMENTED ON DISTURBED AREAS (INCLUDING STOCKPILES) WITHIN FOURTEEN CALENDAR DAYS OF EXPOSURE OF SOIL OR FORMATION OF PILES, UNLESS THESE AREAS ARE TO BE SUBSEQUENTLY SURFACED WITH PERMANENT STRUCTURES. ALL DISTURBED AREAS SHALL BE MULCHED FOR EROSION CONTROL UPON COMPLETION OF ROUGH GRADING.
2. ANY EXPOSED SLOPES 3:1 OR GREATER SHALL BE STABILIZED WITH EROSION CONTROL BLANKETS (NORTH AMERICAN GREEN C125BN OR APPROVED EQUAL) TO PREVENT EROSION DURING CONSTRUCTION AND TO FACILITATE REVEGETATION AFTER TOPSOILING AND SEEDING.
3. EXISTING TOPSOIL SHALL BE SAVED, STOCKPILED, AND REUSED AS MUCH AS POSSIBLE ON SITE. SEDIMENT BARRIER SHALL BE INSTALLED AT THE BASE OF STOCKPILES AT THE DOWNHILL LIMIT TO PROTECT AGAINST EROSION. STOCKPILES ANTICIPATED TO REMAIN FOR MORE THAN 14 CALENDAR DAYS SHALL BE STABILIZED BY SEEDING AND MULCHING UPON FORMATION OF THE PILES. UPGRADIENT OF THE STOCKPILES, STABILIZED DITCHES AND/OR BERMS SHALL BE CONSTRUCTED TO DIVERT STORMWATER RUNOFF AWAY FROM THE PILES.
4. INTERCEPTED SEDIMENT SHALL BE REMOVED WHEN IT REACHES ONE-HALF THE HEIGHT OF THE SEDIMENT BARRIER, OR AS DIRECTED IN THE DRAWING DETAILS FOR OTHER BMPS, AND SHALL BE DEPOSITED IN AN AREA THAT SHALL NOT CONTRIBUTE TO SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED. ALL DAMAGED EROSION CONTROL DEVICES SHALL BE REPAIRED AND/OR REPLACED IMMEDIATELY. DEVICES NO LONGER SERVICEABLE DUE TO SEDIMENT ACCUMULATION SHALL ALSO BE REPAIRED AND/OR REPLACED AS REQUIRED.
5. ADDITIONAL EROSION CONTROL METHODS SHALL BE IMPLEMENTED IF CONSTRUCTION OCCURS BETWEEN NOVEMBER 1ST AND APRIL 15TH. ALL DISTURBED AREAS SHALL BE MINIMIZED TO THE EXTENT POSSIBLE. PRIOR TO FREEZING, ADDITIONAL EROSION CONTROL DEVICES SHALL BE INSTALLED AS APPROPRIATE. INSPECTION OF THESE EROSION CONTROL ITEMS SHALL BE FREQUENT, WITH PARTICULAR ATTENTION PAID TO WEATHER PREDICTIONS TO ENSURE THAT THESE MEASURES ARE PROPERLY IN PLACE TO HANDLE LARGE QUANTITIES OF RUNOFF RESULTING FROM HEAVY RAINS OR EXCESSIVE THAWS.
6. GENERAL EROSION AND SEDIMENTATION CONTROL ACTIONS SHALL BE EMPLOYED, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
   - MARK SOIL DISTURBANCE LIMITS
   - INSTALL SEDIMENT BARRIERS BEFORE DISTURBING ANY SOILS
   - DIVERT AND DISPERSE STORM WATER RUNOFF TO UNDISTURBED AREAS WHEREVER POSSIBLE
   - MULCH DISTURBED AREAS
   - PROTECT STEEP SLOPES
   - INSPECT AND REPAIR EROSION CONTROLS AND SEDIMENT BARRIERS

DUST CONTROL:

1. CONSTRUCTION ACTIVITIES SHALL BE SCHEDULED TO MINIMIZE THE AREA OF DISTURBED SOIL THAT IS EXPOSED AT ONE TIME.
2. DUST CONTROL SHALL BE USED ON CONSTRUCTION ROUTES AND OTHER DISTURBED AREAS SUBJECT TO SURFACE DUST MOVEMENT AND DUST BLOWING.
3. MAINTAIN DUST CONTROL MEASURES PROPERLY THROUGH DRY WEATHER PERIODS UNTIL ALL DISTURBED AREAS HAVE BEEN PERMANENTLY STABILIZED.
4. DUST CONTROL METHODS SHALL BE APPROVED BY THE ENGINEER AND MAY INCLUDE VEGETATIVE COVER, MULCH (INCLUDING GRAVEL MULCH), SPRINKLING, STONE, AND BARRIERS.
5. VEGETATIVE COVER - FOR DISTURBED AREAS NOT SUBJECT TO TRAFFIC, VEGETATION PROVIDES THE MOST PRACTICAL METHOD OF DUST CONTROL.
6. MULCH (INCLUDING GRAVEL MULCH) - WHEN PROPERLY APPLIED, MULCH OFFERS A FAST, EFFECTIVE MEANS OF CONTROLLING DUST. SEE MANUFACTURER'S RECOMMENDATIONS OR THE MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS, 2003 FOR APPLICATION RATES.
7. SPRINKLING - EXPOSED SOILS MAY BE SPRINKLED UNTIL THE SURFACE IS WET. SPRINKLING IS ESPECIALLY EFFECTIVE FOR DUST CONTROL ON HAUL ROADS AND OTHER TRAFFIC ROUTES.
8. STONE - USED TO STABILIZE CONSTRUCTION ROADS; CAN ALSO BE EFFECTIVE FOR DUST CONTROL.
9. BARRIERS - A BOARD FENCE, WIND FENCE, SEDIMENT FENCE, OR SIMILAR BARRIER CAN CONTROL AIR CURRENTS AND BLOWING SOIL. ALL OF THESE FENCES ARE NORMALLY CONSTRUCTED OF WOOD AND THEY PREVENT EROSION BY OBSTRUCTING THE WIND NEAR THE GROUND AND PREVENTING THE SOIL FROM BLOWING OFFSITE.

MONITORING PROGRAM:

1. EROSION AND SEDIMENTATION CONTROLS SHALL BE INSPECTED AT LEAST ONCE EVERY 7 CALENDAR DAYS AND WITHIN 24 HOURS OF THE END OF A STORM EVENT OF 0.25 INCHES OR GREATER. DAILY RAINFALL SHALL BE MONITORED AND RECORDED BY THE CONTRACTOR. ALL STRUCTURES DAMAGED BY CONSTRUCTION EQUIPMENT, VANDALS, OR THE ELEMENTS SHALL BE REPAIRED OR REPLACED IMMEDIATELY, PRIOR TO CONTINUING THE CONSTRUCTION.
2. FOLLOWING THE FINAL SEEDING, THE SITE SHALL BE INSPECTED IN ACCORDANCE WITH THE SCHEDULE OUTLINED IN #1 ABOVE, TO ENSURE THAT THE VEGETATION HAS BEEN ESTABLISHED (90% COVER ACHIEVED). IN THE EVENT OF ANY UNSATISFACTORY GROWTH, RESEEDING WILL BE CARRIED OUT, WITH FOLLOW-UP INSPECTION.
3. AFTER THE CONSTRUCTION INSPECTOR HAS DETERMINED THAT THE PROJECT AREA HAS BEEN PERMANENTLY STABILIZED (70% COVER HAS BEEN ACHIVED OR NON-VEGETATED MEASURES HAVE BEEN IMPLEMENTED), THE CONTRACTOR SHALL REMOVE ALL SEDIMENT BARRIERS, TEMPORARY SEDIMENTATION CONTROL RISERS AND ANY OTHER TEMPORARY EROSION CONTROL MEASURES.

SEEDING AND REVEGETATION PLAN:

IMMEDIATELY FOLLOWING THE COMPLETION OF TREE CLEARING, ALL DISTURBED AREAS SHALL BE TREATED AS STATED BELOW IN ORDER TO MINIMIZE CONSTRUCTION-PERIOD EROSION.

APPLY SEED/TACKIFIER MIX ACCORDING TO THE FOLLOWING SPECIFICATIONS:

1. SEED: ERNST SEEDS QUICK EROSION CONTROL COVER MIX CONSISTING OF (% BY WEIGHT):
   - 50% LOLIUM MULTIFLORUM (ANNUAL RYEGRASS)
   - 50% LOLIUM PERENNE, 'BIGLEAGUE' (PERENNIAL RYEGRASS, 'BIGLEAGUE')

   1.1. SEEDING RATE: 50 LBS PER ACRE
2. TACKIFIER: GEOPERM BONDED FIBER MATRIX (OR APPROVED EQUAL) APPLIED PER MANUFACTURER SPECIFICATIONS.

UPON COMPLETION OF SITE CONSTRUCTION, ALL AREAS PREVIOUSLY DISTURBED WITHIN THE FENCED AREA SHALL BE TREATED AS STATED BELOW. THESE AREAS WILL BE CLOSELY MONITORED BY THE CONTRACTOR UNTIL SUCH TIME AS A SATISFACTORY GROWTH OF VEGETATION IS ESTABLISHED. SATISFACTORY GROWTH SHALL MEAN A MINIMUM OF 90% OF THE AREA IS VEGETATED WITH VIGOROUS GROWTH.

1. TOPSOIL WILL BE SPREAD OVER ALL DISTURBED AREAS TO BE REVEGETATED AND SHALL BE GRADED TO A UNIFORM DEPTH OF FOUR (4) TO SIX (6) INCHES.
2. APPLY SEED AS DIRECTED BY THE OWNER AND FARMER OF THE LAND TO MAINTAIN HAY PRODUCTION AND RESTORE SITE TO PRE-EXISTING CONDITIONS TO THE MAXIMUM EXTENT PRACTICABLE.
3. SEEDING METHODS MAY BE DRILL SEEDINGS, BROADCASTS AND ROLLED, CULTIPACKED, OR TRACKED WITH A SMALL TRACK PIECE OF CONSTRUCTION EQUIPMENT, OR HYDRO-SEEDING, WITH SUBSEQUENT TRACKING.
4. WATERING MAY BE REQUIRED DURING DRY PERIODS, THE CONTRACTOR MUST CONSULT SEED MANUFACTURER'S INSTRUCTIONS.
5. INSPECT SEEDED AREAS FOR FAILURE AND MAKE NECESSARY REPAIRS AND RESEED IMMEDIATELY. CONDUCT A FOLLOW-UP SURVEY AFTER ONE YEAR AND RESEED WHERE NECESSARY.
6. ALL SEDIMENT CONTROL STRUCTURES LOCATED DOWN GRADIENT OF SOILS STABILIZED BY VEGETATIVE MEASURES SHALL REMAIN IN PLACE UNTIL VEGETATION IS ESTABLISHED. ESTABLISHED MEANS A MINIMUM OF 70% OF THE AREA IS VEGETATED WITH VIGOROUS GROWTH.

UPON COMPLETION OF SITE CONSTRUCTION, ALL AREAS PREVIOUSLY DISTURBED OUTSIDE THE FENCED AREA SHALL BE TREATED AS STATED BELOW. THESE AREAS WILL BE CLOSELY MONITORED BY THE CONTRACTOR UNTIL SUCH TIME AS A SATISFACTORY GROWTH OF VEGETATION IS ESTABLISHED. SATISFACTORY GROWTH SHALL MEAN A MINIMUM OF 90% OF THE AREA IS VEGETATED WITH VIGOROUS GROWTH.

1. APPLY SEED AS DIRECTED BELOW:

   (APRIL 1ST THROUGH OCTOBER 1ST)
   - SEED DISTURBED AREAS AT THE RATE OF 30 LBS PER ACRE OF ERNST SEEDS NORTHEAST SOLAR POLLINATOR 4' MIX CONSISTING OF (% BY WEIGHT):
     - 35% BOUTELOUA CURTIPENDULA, BUTTE (SIDEOATS GRAMA, BUTTE)
     - 35% SCHIZACHYRIUM SCOPARIUM, 'CAMPER' (LITTLE BLUESTEM, 'CAMPER')
     - 10% PANICUM SPHAERONCARPON (ROUNDSEED PANICGRASS)
     - 4% ASCLEPIAS TUBEROSA (BUTTERFLY MILKWEED)
     - 4% CHAMAECRISTA FASCICULATA, PA ECOTYPE (PARTRIDGE PEA, PA ECOTYPE)
     - 4% COREOPSIS LANCEOLATA (LANCELEAF COREOPSIS)
     - 4% RUDBECKIA HIRTA (BLACKEYED SUSAN)
     - 0.9% PYCNANTHEMUM TENUIFOLIUM (NARROWLEAF MOUNTAINMINT)
     - 0.7% ASTER OBLONGIFOLIUS, (AROMATIC ASTER, PA ECOTYPE)
     - 0.5% ASTER PRENANTHOIDES, PA ECOTYPE (ZIGZAG ASTER, PA ECOTYPE)
     - 0.5% PENSTEMON DIGITALIS (TALL WHITE BEARDTONGUE)
     - 0.5% TRADESCANTIA OHIENSIS (OHIO SPIDERWORT, PA ECOTYPE)
     - 0.5% ZIZIA AUREA (GOLDEN ALEXANDERS)
     - 0.3% OENOTHERA FRUTICOSA VAR. FRUTICOSA (SUNDROPS)
     - 0.1% SOLIDAGO NEMORALIS, PA ECOTYPE (GRAY GOLDENROD, PA ECOTYPE)
   - APPLY WOOD FIBER MULCH AT A RATE OF 2,000 LBS PER ACRE FOR MAXIMUM MOISTURE RETENTION.
   - SEEDING SHALL HAVE A MINIMUM GERMINATION PERCENTAGE OF 85%.

   (NOVEMBER 1ST THROUGH DECEMBER 15TH)
   - SEED DISTURBED AREAS AT THE RATE OF 3 LBS PER 1,000 SQ. FT. OF WINTER RYE
   - APPLY HAY MULCH AT THE RATE OF 100 LBS PER 1,000 SQ. FT.

   (AFTER DECEMBER 15TH)
   - DO NOT SEED.
   - APPLY HAY MULCH AT THE RATE OF 100 LBS PER 1,000 SQ. FT.
2. SEEDING METHODS MAY BE DRILL SEEDINGS, BROADCASTS AND ROLLED, CULTIPACKED, OR TRACKED WITH A SMALL TRACK PIECE OF CONSTRUCTION EQUIPMENT, OR HYDRO-SEEDING, WITH SUBSEQUENT TRACKING.
3. WATERING MAY BE REQUIRED DURING DRY PERIODS CONSULT SEED MANUFACTURER'S INSTRUCTIONS.
4. INSPECT SEEDED AREAS FOR FAILURE AND MAKE NECESSARY REPAIRS AND RESEED IMMEDIATELY. CONDUCT A FOLLOW-UP SURVEY AFTER ONE YEAR AND RESEED WHERE NECESSARY.
5. ALL SEDIMENT CONTROL STRUCTURES LOCATED DOWN GRADIENT OF SOILS STABILIZED BY VEGETATIVE MEASURES SHALL REMAIN IN PLACE UNTIL VEGETATION IS ESTABLISHED. ESTABLISHED MEANS A MINIMUM OF 70% OF THE AREA IS VEGETATED WITH VIGOROUS GROWTH.

ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION

WSP USA INC.
100 APOLLO DRIVE, SUITE 302
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REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED	APPROVED
0	08/20/2025	ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION	MRB	OAC

PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
CONSTRUCTION, EROSION, AND SEDIMENTATION CONTROL NOTES

CLIENT:
BWC WADES STREAM, LLC

SEAL:
COMMONWEALTH OF MASSACHUSETTS
ANDREW P VARDAKIS
CIVIL
No. 52524
REGISTERED PROFESSIONAL ENGINEER
08/20/2025

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN
PROJECT NUMBER: US-EI-365230438	
DRAWING NUMBER: **G-001**	
SHEET NUMBER: **1 OF 8**	

D:\Blue Vaves\US-EI-365230437 - Ridge Rd Worthington\Permitting\Sheets\1 - Ridge Rd - G-001.dwg - G-001 - Sep. 23, 2025 10:26am - wds_morgan.mcdonald

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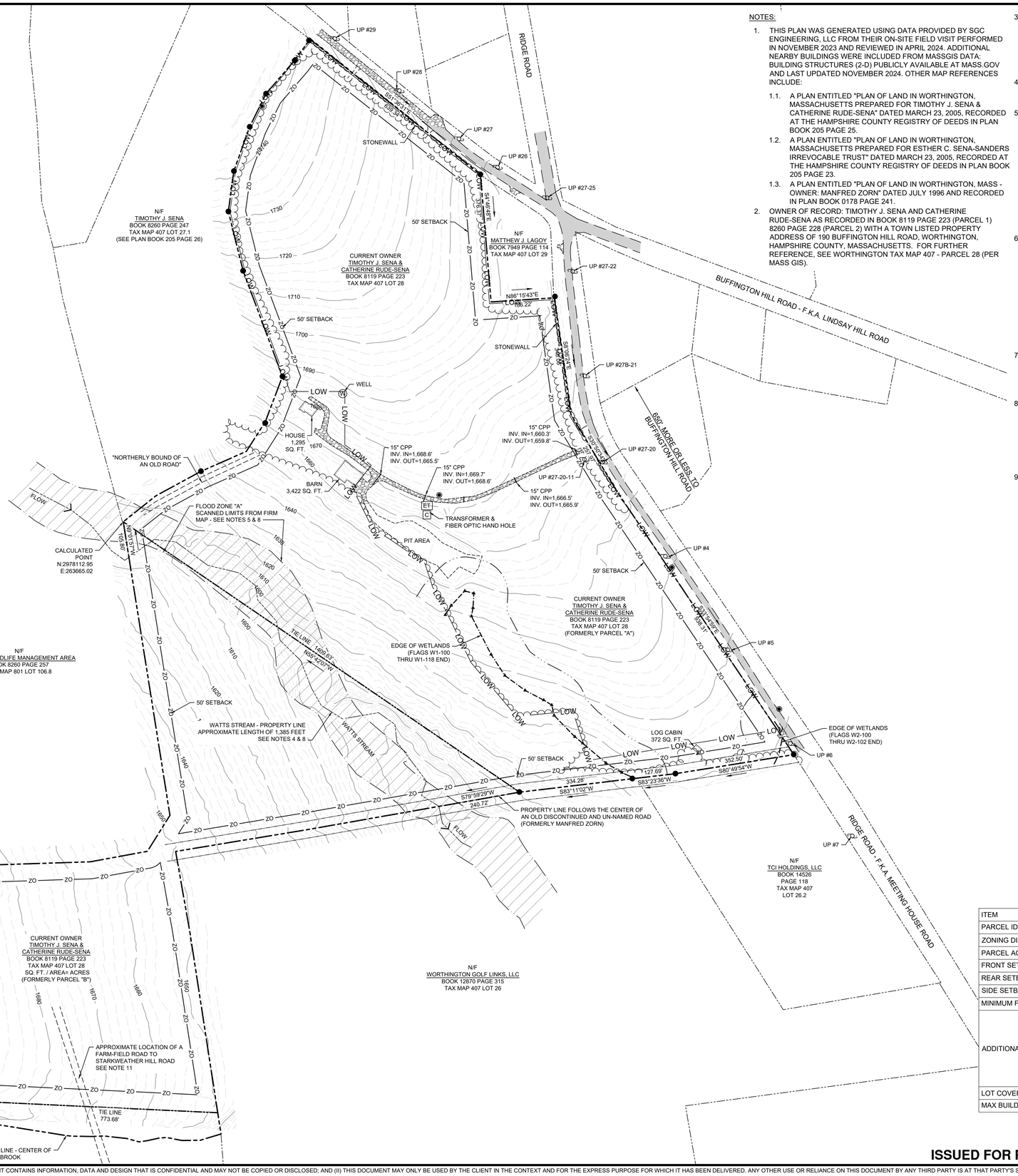

NOTES:

1. THIS PLAN WAS GENERATED USING DATA PROVIDED BY SGC ENGINEERING, LLC FROM THEIR ON-SITE FIELD VISIT PERFORMED IN NOVEMBER 2023 AND REVIEWED IN APRIL 2024. ADDITIONAL NEARBY BUILDINGS WERE INCLUDED FROM MASSGIS DATA: BUILDING STRUCTURES (2-D) PUBLICLY AVAILABLE AT MASS.GOV AND LAST UPDATED NOVEMBER 2024. OTHER MAP REFERENCES INCLUDE:
   - 1.1. A PLAN ENTITLED "PLAN OF LAND IN WORTHINGTON, MASSACHUSETTS PREPARED FOR TIMOTHY J. SENA & CATHERINE RUDE-SENA" DATED MARCH 23, 2005, RECORDED AT THE HAMPSHIRE COUNTY REGISTRY OF DEEDS IN PLAN BOOK 205 PAGE 25.
   - 1.2. A PLAN ENTITLED "PLAN OF LAND IN WORTHINGTON, MASSACHUSETTS PREPARED FOR ESTHER C. SENA-SANDERS IRREVOCABLE TRUST" DATED MARCH 23, 2005, RECORDED AT THE HAMPSHIRE COUNTY REGISTRY OF DEEDS IN PLAN BOOK 205 PAGE 23.
   - 1.3. A PLAN ENTITLED "PLAN OF LAND IN WORTHINGTON, MASS - OWNER: MANFRED ZORN" DATED JULY 1996 AND RECORDED IN PLAN BOOK 0178 PAGE 241.
2. OWNER OF RECORD: TIMOTHY J. SENA AND CATHERINE RUDE-SENA AS RECORDED IN BOOK 8119 PAGE 223 (PARCEL 1) 8260 PAGE 228 (PARCEL 2) WITH A TOWN LISTED PROPERTY ADDRESS OF 190 BUFFINGTON HILL ROAD, WORTHINGTON, HAMPSHIRE COUNTY, MASSACHUSETTS. FOR FURTHER REFERENCE, SEE WORTHINGTON TAX MAP 407 - PARCEL 28 (PER MASS GIS).
3. HORIZONTAL DATUM IS BASED ON MASSACHUSETTS STATE GRID COORDINATE SYSTEM NAD83 (2011 - MAINLAND). VERTICAL DATUM IS REFERENCED TO NAVD 88. TOPOGRAPHY SHOWN WAS DEVELOPED UTILIZING THE MOST UP TO DATE ONLINE ELECTRONIC LIDAR FILES FROM NGS. IN COMBINATION WITH ON THE GROUND DATA COLLECTION WITH SURVEY GRADE GPS AND OR ROBOTIC TOTAL STATION. CONTOUR INTERVAL SHOWN ON PLAN IS 2 FOOT.
4. THE WETLANDS SHOWN ON THIS PLAN WERE REVIEWED, DEFINED, AND FLAGGED BY OTHERS AND FIELD LOCATED BY SGC ENGINEERING DATED NOVEMBER 22, 2023.
5. A PREDOMINATE PORTION OF THE PROPERTY LIES WITHIN ZONE "X" AND THE PROPOSED SOLAR DEVELOPMENT IS NOT AFFECTED (SEE PLAN). A SMALL CENTRAL PORTION OF THE LOCUS PARCEL IS AFFECTED BY ZONE "A" AND IS CATEGORIZED AS A SPECIFIED FLOOD HAZARD ZONE. FOR FURTHER REFERENCE SEE F.I.R.M. - FLOOD INSURANCE RATE MAP - COMMUNITY PANEL NUMBER 250175 0008 SUFFIX B / MAP NUMBER 8 OF 25 FOR THE TOWN OF WORTHINGTON, HAMPSHIRE COUNTY (ALL JURISDICTIONS), MASSACHUSETTS. WITH AN EFFECTIVE DATE OF JUNE 19, 1989. ZONE "A" (WATTS STREAM SO-CALLED) IS DESCRIBED AS AN AREA THAT NO BASE FLOOD ELEVATION HAS BEEN DETERMINED. THE BASE FLOOD ELEVATION IS THE WATER SURFACE ELEVATION OF THE 1% ANNUAL CHANCE FLOOD. ZONE "X" IS DETERMINED AS AREAS OUTSIDE 500 - YEAR FLOOD PLAIN.
6. NEITHER SGC ENGINEERING, LLC NOR WSP HAVE INDEPENDENTLY VERIFIED THE LOCATION, EXISTENCE, AND SERVICEABILITY OF ANY UTILITIES AND MAKE NO GUARANTEE TO THE COMPLETENESS OR THE ACCURACY OF ANY UTILITIES SHOWN ON THIS PLAN. UTILITIES SHOWN WERE FIELD LOCATED ABOVEGROUND AND VISUAL, AND OR REFERENCED FROM PLANS AND MAP REFERENCES. ADDITIONAL UTILITIES MAY EXIST IN THE FIELD, WHICH ARE NOT SHOWN ON THIS PLAN. ACTUAL LOCATIONS MUST BE DETERMINED IN THE FIELD PRIOR TO EXCAVATION OR OTHER CONSTRUCTION ACTIVITIES. CALL "DIG SAFE" AT 1-888-344-7233 OR DIAL 811. SGC ENGINEERING, LLC AND WSP USA INC. ASSUME NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN ON THIS PLAN.
7. THIS SURVEY WAS PREPARED FOR THE EXCLUSIVE USE OF THE PERSON, PERSONS, OR ENTITY NAMED IN THE CERTIFICATION AND TITLE BLOCK OF THIS PLAN. THIS SURVEY DOES NOT EXTEND TO ANY UNNAMED PERSON, PERSONS, OR ENTITY WITHOUT HAVING SGC ENGINEERING'S CONSENT IN WRITING.
8. THE LOCATIONS OF THE WATTS STREAM, WITHIN PARCEL "A" (SO CALLED), AND AN UN-NAMED BROOK, THAT DEMARCATES A WESTERLY BOUNDARY LINE OF PARCEL "B", ARE BOTH BASED ON PHYSICAL FIELD EVIDENCE, DEED CALLS, AND OR PLANS OF RECORD AT TIME OF SURVEY. BOTH WATTS STREAM AND THE UN-NAMED BROOK MAY OR MAY NOT AFFECT THE PRESENT - FUTURE PROPERTY DUE TO AVULSION, ACCRETION, AND/OR RELICTION.
9. OBSERVATIONS OF THE PREMISES BY SGC IN NOVEMBER 2023:
   - 9.a. LOCUS PARCEL HAS FREE AND CLEAR ACCESS, IN AND TO BUFFINGTON HILL ROAD AND RIDGE ROAD AS SHOWN ON PLAN. BOTH ROADS ARE DEDICATED AND PUBLIC WAYS OF VARIABLE WIDTHS.
   - 9.b. THE LOCUS PARCEL IS THE SAME LAND AS DESCRIBED IN THE TITLE COMMITMENT AS EXHIBIT "A".
   - 9.c. NO EVIDENCE OF EARTH MOVING WORK, BUILDING CONSTRUCTION, AND BUILDING ADDITIONS WERE OBSERVED ON SURVEYED PREMISES.
   - 9.d. THE PROPERTY COMPRISES A SINGLE TAX LOT - TOWN OF WORTHINGTON TAX MAP NUMBER 407 PARCEL 28.
   - 9.e. NO EVIDENCE WAS NOTICED OF THE SITE BEING USED AS A SOLID WASTE DUMP.

LEGEND:

EXISTING:
- 710 MAJOR CONTOUR
- MINOR CONTOUR
- PROPERTY LINE
- INTERNAL PROPERTY LINE
- ABUTTER'S PROPERTY LINE
- RIGHT OF WAY
- ZO PROPERTY LINE SETBACK
- BUILDING
- ASPHALT
- GRAVEL
- STONE WALL
- EDGE OF VEGETATION
- EDGE OF GRASS
- TRAIL
- EDGE OF WETLAND
- WETLAND FLAG
- WATERBODY
- BUFFER
- FEMA FLOOD ZONE "A"
- OHE OVERHEAD WIRE
- CULVERT
- UTILITY POLE
- BOUNDARY EVIDENCE
- CONTROL POINT

PROPOSED:
- LOW LIMIT OF WORK

ITEM	REQUIRED		PROPOSED
PARCEL ID NUMBER(S)	TAX MAP 407 0 28		
ZONING DISTRICT	RESIDENTIAL - AGRICULTURAL DISTRICT		
PARCEL ACREAGE	2.0		71.6
FRONT SETBACK (FT)	50		50
REAR SETBACK (FT)	50		>500
SIDE SETBACK (FT)	50		50
MINIMUM FRONTAGE (FT)	400		1542
ADDITIONAL SETBACKS	ACCESS TO SIDE-REAR (FT)	25	>400
	ACCESS EASEMENT (FT)	15	-
	UTILITY EASEMENT (FT)	20	-
	LEASE TO FENCE (FT)	25	-
	LEASE TO BASINS (FT)	15	-
	WETLANDS (FT)	100	-
LOT COVERAGE	<50%		8.6%
MAX BUILDING HEIGHT (FT)	35		10

0' 75' 150' 225'
1" = 150' WHEN PLOTTED 24" X 36"

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190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
EXISTING CONDITIONS

CLIENT:
BWC WADES STREAM, LLC

SEAL:
COMMONWEALTH OF MASSACHUSETTS
ANDREW P VARDAKIS
CIVIL
No. 52524
REGISTERED PROFESSIONAL ENGINEER
08/23/2025

DESIGNED BY:	DRAWN BY:
OAC	MRB
CHECKED BY:	SCALE:
APV	AS SHOWN

PROJECT NUMBER: US-EI-365230438

DRAWING NUMBER: **V-101**

SHEET NUMBER: **2 OF 8**

D:\Blue\Vaveli\US-EI-365230437 - Ridge Rd Worthington\Permitting\Sheets\2 - Ridge Rd - V-101.dwg - V-101 - Sep 23, 2025 10:28am - wds_morgan.mcdonald

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NOTES:

1. ELECTRICAL DESIGN, INCLUDING UTILITY POLES, PERFORMED BY OTHERS. ELECTRICAL EQUIPMENT AND COMPONENTS SHOWN TO ILLUSTRATE LOCATIONS ONLY. REFER TO ELECTRICAL DRAWINGS FOR DETAILED ELECTRICAL SYSTEM.
2. ALL AREAS WITHIN LIMIT OF DISTURBANCE TO BE SEEDED AS SPECIFIED IN THE SEEDING & REVEGETATION PLAN ON SHEET G-001.

LEGEND:

EXISTING:
- PROPERTY LINE
- INTERNAL PROPERTY LINE
- ABUTTER'S PROPERTY LINE
- RIGHT OF WAY
- ZO — PROPERTY LINE SETBACK
- BUILDING
- ASPHALT
- GRAVEL
- STONE WALL
- EDGE OF VEGETATION
- EDGE OF GRASS
- TRAIL
- EDGE OF WETLAND
- WETLAND FLAG
- WATERBODY
- BUFFER
- FEMA FLOOD ZONE "A"
- OHE — OVERHEAD WIRE
- CULVERT
- UTILITY POLE
- BOUNDARY EVIDENCE
- CONTROL POINT

PROPOSED:
- LOW — LIMIT OF WORK
- 1670 — MAJOR CONTOUR
- MINOR CONTOUR
- FIXED KNOT GAME FENCE (10 C-501, 17 C-502)
- DOUBLE SWING GATE (7,11 C-501)
- SLIDING GATE (9 C-501)
- OHE — OVERHEAD ELECTRIC
- SB — SEDIMENT BARRIER (4 C-501)
- EC — ELECTRICAL CONDUIT (2 C-501)
- ACCESS ROAD (1 C-501)
- CONCRETE PAD (6 C-501)
- SOLAR PV ARRAY (8 C-501)
- UTILITY POLE
- CULVERT (3 C-501)
- INFILTRATION TRENCH (12 C-502)
- PERVIOUS BERM (12,16 C-502)
- VEGETATED FILTER STRIP (12 C-502)
- CONVEYANCE CHANNEL (15 C-502)
- RIPRAP APRON (13,14 C-502)

SYSTEM SIZE (MWDC; MWAC)	3.93 MWDC; 2.00 MWAC
PANEL COUNT (# OF PANELS)	7,423
PANEL SELECTION	HELIENE 530 W
GROUND COVERAGE RATIO	17.1%
INTER-ROW SPACING (FT)	18.07
PITCH (FT)	21.5
PROPOSED PANEL HEIGHT (FT)	10.0
LIMIT OF WORK AREA (ACRES)	31.89
VEGETATION CLEARING AREA (ACRES)	0.00
FENCED AREA (ACRES)	27.87
TOTAL EXISTING IMPERVIOUS AREA (SQFT)	42,040
TOTAL PROPOSED IMPERVIOUS AREA (SQFT)	58,527
TOTAL PROPOSED GRAVEL ROAD AREA (SQFT)	25,187
TOTAL ACCESS ROAD LENGTH (FT)	159.74
UTILITY MV RUN LENGTH (FT)	696
EQUIPMENT PAD AREA (SQFT)	4,000
WETLAND IMPACTS (SQFT)	<10
EXISTING LAND USE	AGRICULTURAL
PROPOSED DUAL USE	AGRICULTURAL / INDUSTRIAL

ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION

0' 50' 100' 150'
1" = 100' WHEN PLOTTED 24" X 36"

WSP USA INC.
100 APOLLO DRIVE, SUITE 302
CHELMSFORD MASSACHUSETTS 01824
TELEPHONE: (978) 692-9090
FAX: (978) 692-6633
WEB: WWW.WSP.COM

REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED	APPROVED
0	09/23/2025	ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION	MRB	OAC

PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
PROPOSED CONDITIONS

CLIENT:
BWC WADES STREAM, LLC

SEAL:
COMMONWEALTH OF MASSACHUSETTS
ANDREW P VARDAKIS
CIVIL
No. 52524
REGISTERED PROFESSIONAL ENGINEER
09/23/2025

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN
PROJECT NUMBER: US-EI-365230438	
DRAWING NUMBER: C-101	
SHEET NUMBER: 3 OF 8	

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NOTES:

1. ALL AREAS WITHIN LIMIT OF DISTURBANCE TO BE SEEDED AS SPECIFIED IN THE SEEDING & REVEGETATION PLAN ON SHEET G-001.
2. PROPOSED EQUIPMENT PAD LOCATION TO BE GRADED TO A MAXIMUM 2% SLOPE.

LEGEND:

EXISTING:
- 710 MAJOR CONTOUR
- MINOR CONTOUR
- PROPERTY LINE
- INTERNAL PROPERTY LINE
- ABUTTER'S PROPERTY LINE
- RIGHT OF WAY
- ZO PROPERTY LINE SETBACK
- BUILDING
- ASPHALT
- GRAVEL
- STONE WALL
- EDGE OF VEGETATION
- EDGE OF GRASS
- TRAIL
- EDGE OF WETLAND
- WETLAND FLAG
- WATERBODY
- BUFFER
- FEMA FLOOD ZONE "A"
- OHE OVERHEAD WIRE
- CULVERT
- UTILITY POLE
- BOUNDARY EVIDENCE
- CONTROL POINT

PROPOSED:
- LOW LIMIT OF WORK
- 1670 MAJOR CONTOUR
- MINOR CONTOUR
- SB SEDIMENT BARRIER (4 / C-501)
- EC ELECTRICAL CONDUIT (2 / C-501)
- ACCESS ROAD (1 / C-501)
- CONCRETE PAD (6 / C-501)
- CULVERT (3 / C-501)
- INFILTRATION TRENCH (12 / C-502)
- PERVIOUS BERM (12,16 / C-502)
- VEGETATED FILTER STRIP (12 / C-502)
- CONVEYANCE CHANNEL (15 / C-502)
- RIPRAP APRON (13,14 / C-502)

N/F
TIMOTHY J. SENA
BOOK 8260 PAGE 247
TAX MAP 407 LOT 27.1
(SEE PLAN BOOK 205 PAGE 26)

CURRENT OWNER
TIMOTHY J. SENA &
CATHERINE RUDE-SENA
BOOK 8119 PAGE 223
TAX MAP 407 LOT 28

N/F
MATTHEW J. LAGOY
BOOK 7949 PAGE 114
TAX MAP 407 LOT 29

50' SETBACK

UP #27
UP #26
UP #27-25
UP #27B-21
UP #27-20
UP #27-11
UP #4

STONEWALL

N86°18'43"E

WELL

HOUSE
1,295
SQ. FT.

BARN
3,422 SQ. FT.

TRANSFORMER &
FIBER OPTIC HAND HOLE

PIT AREA

~0.5 ACRE
LAYDOWN
AREA

15" CPP TO BE
REMOVED AND
REPLACED

6" GRASSED
CONVEYANCE
CHANNEL

3" GRASSED
CONVEYANCE
CHANNEL

RIPRAP
APRON

RIPRAP
APRON
(TYP.)

INFILTRATION
TRENCH (IT1)

INFILTRATION
TRENCH (IT2)

INFILTRATION
TRENCH (IT3)

ACCESS
ROAD

VEGETATED FILTER
STRIP (TYP.)

12" CPP

15" CPP
INV. IN=1,669.7'
INV. OUT=1,668.6'

15" CPP
INV. IN=1,668.6'
INV. OUT=1,665.5'

15" CPP
INV. IN=1,660.3'
INV. OUT=1,659.2'

15" CPP
INV. IN=1,666.9'
INV. OUT=1,665.9'

SOLAR & BESS
EQUIPMENT PAD (TYP.)

660' MORE OR LESS TO
BUTTINGTON HILL ROAD

WB-40 VEHICLE ROUTING

WB-67 VEHICLE ROUTING

0' 30' 60' 90'
1" = 60' WHEN PLOTTED 24" X 36"

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WSP USA INC.
100 APOLLO DRIVE, SUITE 302
CHELMSFORD MASSACHUSETTS 01824
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WEB: WWW.WSP.COM

REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED	APPROVED
0	09/23/2025	ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION	MRB	OAC

PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
GRADING/EARTHWORK PLAN

CLIENT:
BWC WADES STREAM, LLC

SEAL:
COMMONWEALTH OF MASSACHUSETTS
ANDREW P VARDAKIS
CIVIL
No. 52524
REGISTERED PROFESSIONAL ENGINEER
09/23/2025

DESIGNED BY:	DRAWN BY:
OAC	MRB
CHECKED BY:	SCALE:
APV	AS SHOWN

PROJECT NUMBER: US-EI-365230438

DRAWING NUMBER: **C-102**

SHEET NUMBER: **4 OF 8**

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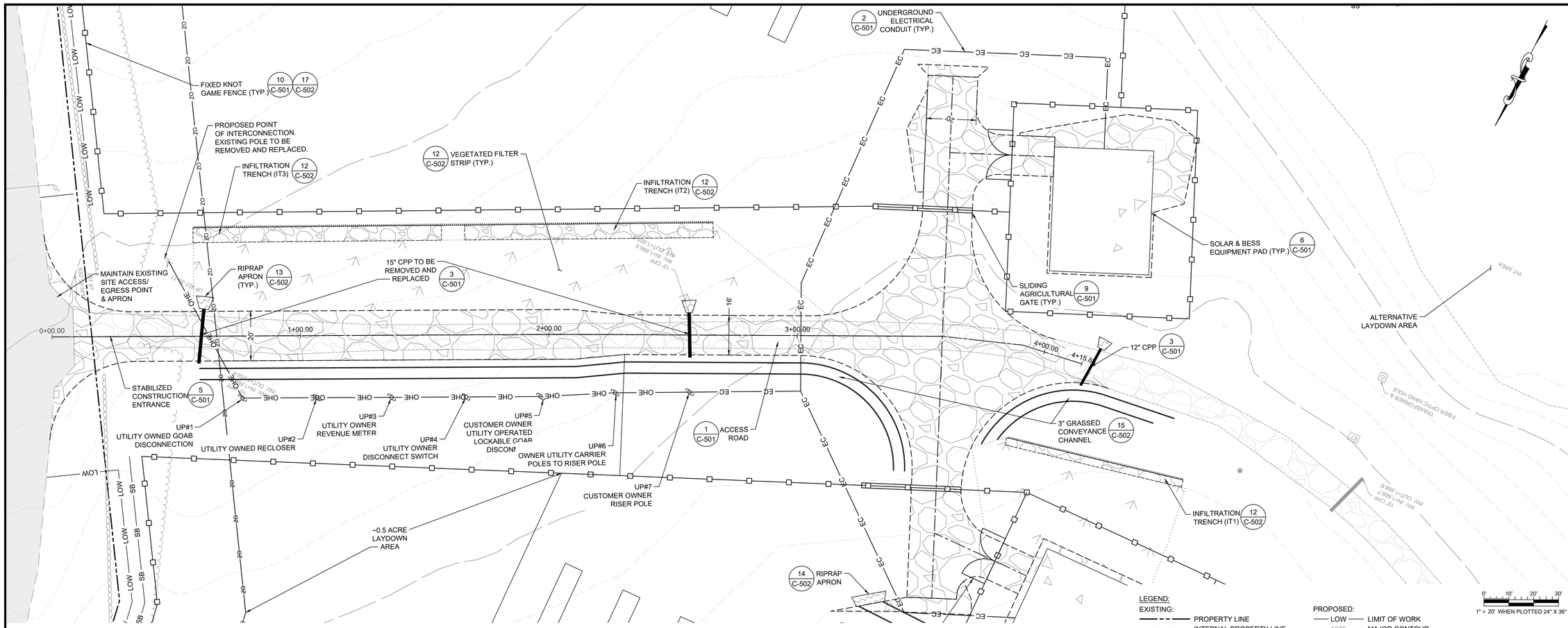

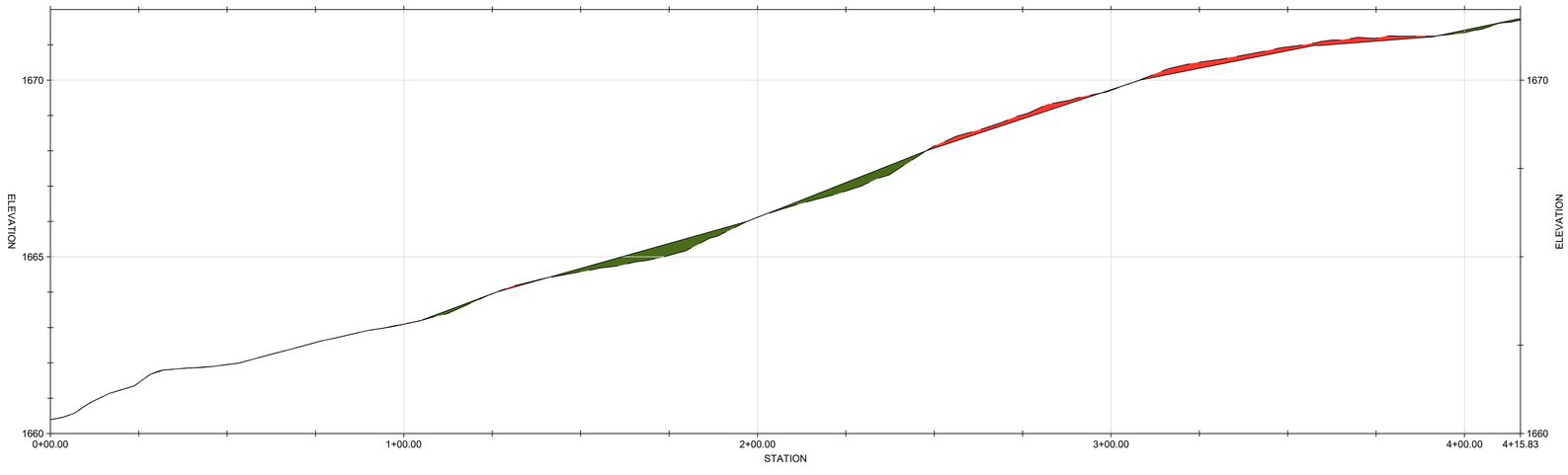

PROFILE LEGEND:
- EXISTING ELEVATION
- PROPOSED ELEVATION
- CUT AREA
- FILL AREA

LEGEND:

EXISTING:
- PROPERTY LINE
- INTERNAL PROPERTY LINE
- ABUTTER'S PROPERTY LINE
- RIGHT OF WAY
- PROPERTY LINE SETBACK
- BUILDING
- ASPHALT
- GRAVEL
- STONE WALL
- EDGE OF VEGETATION
- EDGE OF GRASS
- TRAIL
- EDGE OF WETLAND
- WETLAND FLAG
- WATERBODY
- BUFFER
- FEMA FLOOD ZONE "A"
- OVERHEAD WIRE
- CULVERT
- UTILITY POLE
- BOUNDARY EVIDENCE
- CONTROL POINT

PROPOSED:
- LIMIT OF WORK
- MAJOR CONTOUR
- MINOR CONTOUR
- FIXED KNOT GAME FENCE 10 C-501 17 C-502
- DOUBLE SWING GATE 7,11 C-501
- SLIDING GATE 9 C-501
- OVERHEAD ELECTRIC
- SEDIMENT BARRIER 4 C-501
- ELECTRICAL CONDUIT 2 C-501
- ACCESS ROAD 1 C-501
- CONCRETE PAD 6 C-501
- SOLAR PV ARRAY 8 C-501
- UTILITY POLE
- CULVERT 3 C-501
- INFILTRATION TRENCH 12 C-502
- PERVIOUS BERM 12,16 C-502
- VEGETATED FILTER STRIP 12 C-502
- CONVEYANCE CHANNEL 15 C-502
- RIPRAP APRON 13,14 C-502

NOTES:
1. ELECTRICAL DESIGN, INCLUDING UTILITY POLES, PERFORMED BY OTHERS. ELECTRICAL EQUIPMENT AND COMPONENTS SHOWN TO ILLUSTRATE LOCATIONS ONLY. REFER TO ELECTRICAL DRAWINGS FOR DETAILED ELECTRICAL SYSTEM.
2. ALL AREAS WITHIN LIMIT OF DISTURBANCE TO BE SEEDED AS SPECIFIED IN THE SEEDING & REVEGETATION PLAN ON SHEET G-001.
3. THE TOTAL GRADING CUT VOLUME IS 841.92 CUBIC YARDS. THE TOTAL GRADING FILL VOLUME IS 584.76 CUBIC YARDS. THE GRADING OF THE ACCESS ROAD AND EQUIPMENT PAD AREA WILL RESULT IN A NET CUT VOLUME OF 257.16 CUBIC YARDS.

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WSP USA INC.
100 APOLLO DRIVE, SUITE 302
CHELMSFORD MASSACHUSETTS 01824
TELEPHONE: (978) 692-9090
FAX: (978) 692-6633
WEB: WWW.WSP.COM

REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED	APPROVED
0	09/23/2025	ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION	MRB	OAC

PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
ACCESS ROAD TOPOGRAPHIC PROFILE ANALYSIS

CLIENT:
BWC WADES STREAM, LLC

SEAL:
COMMONWEALTH OF MASSACHUSETTS
ANDREW P VARDAKIS
CIVIL
No. 52524
REGISTERED PROFESSIONAL ENGINEER
09/23/2025

DESIGNED BY:	DRAWN BY:
OAC	MRB
CHECKED BY:	SCALE:
APV	AS SHOWN

PROJECT NUMBER: US-EI-365230438

DRAWING NUMBER: **C-103**

SHEET NUMBER: **5 OF 8**

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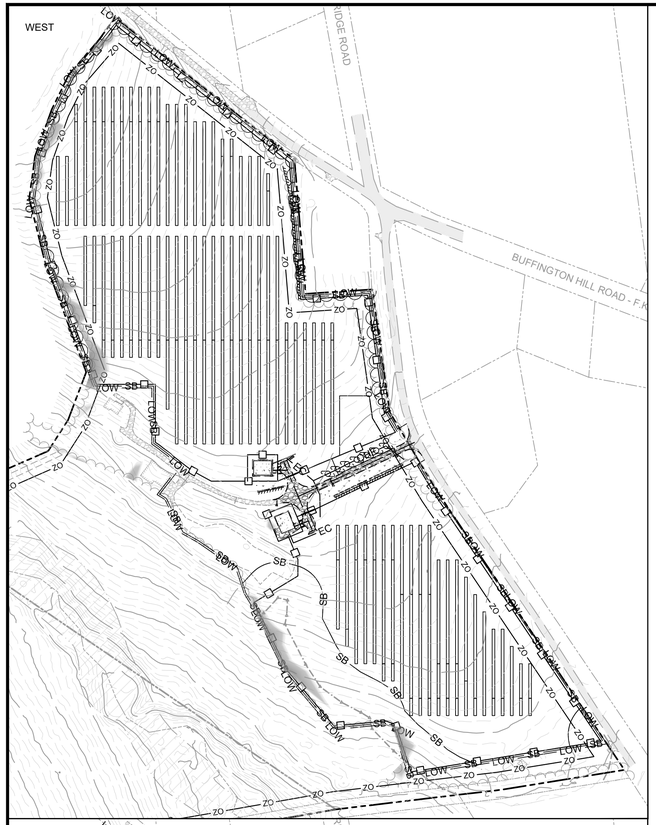
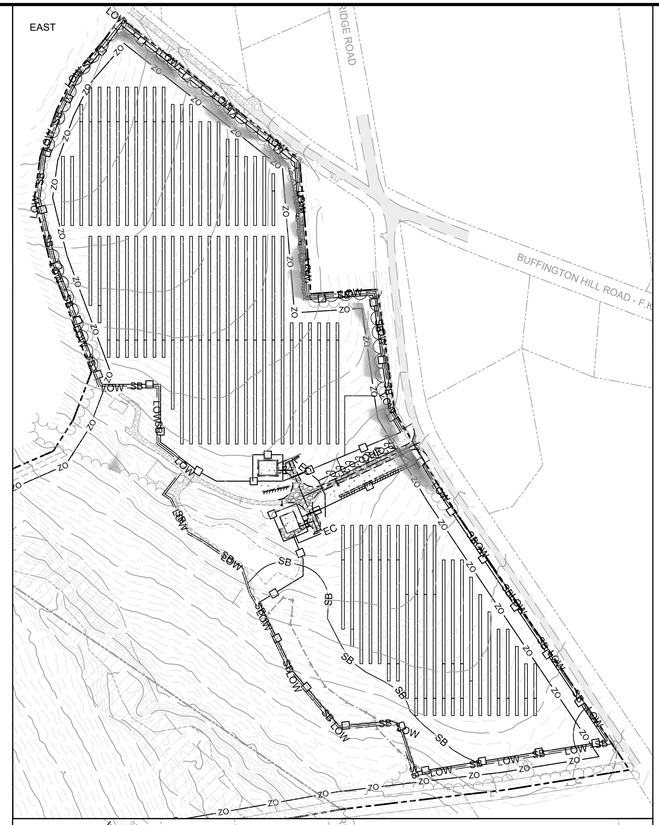
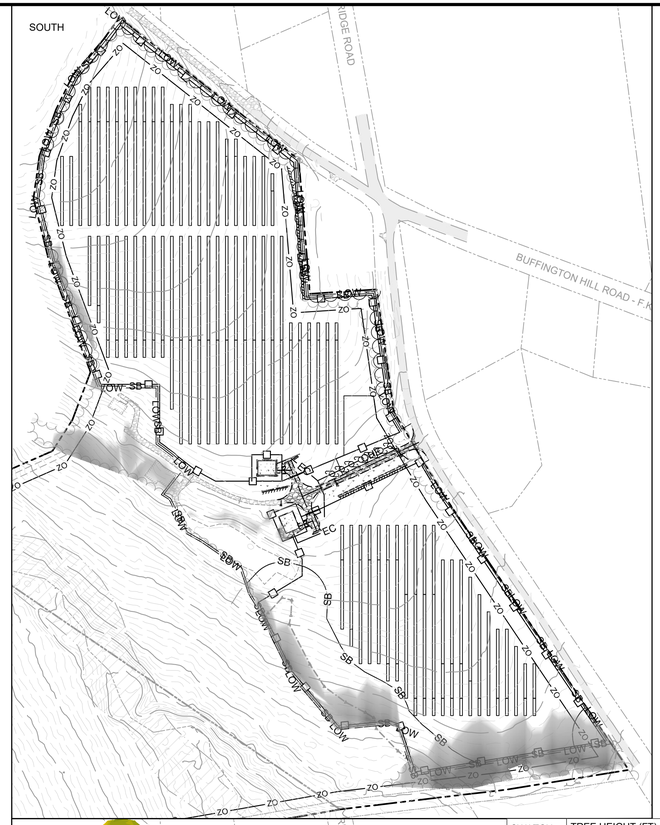
WEST



EAST



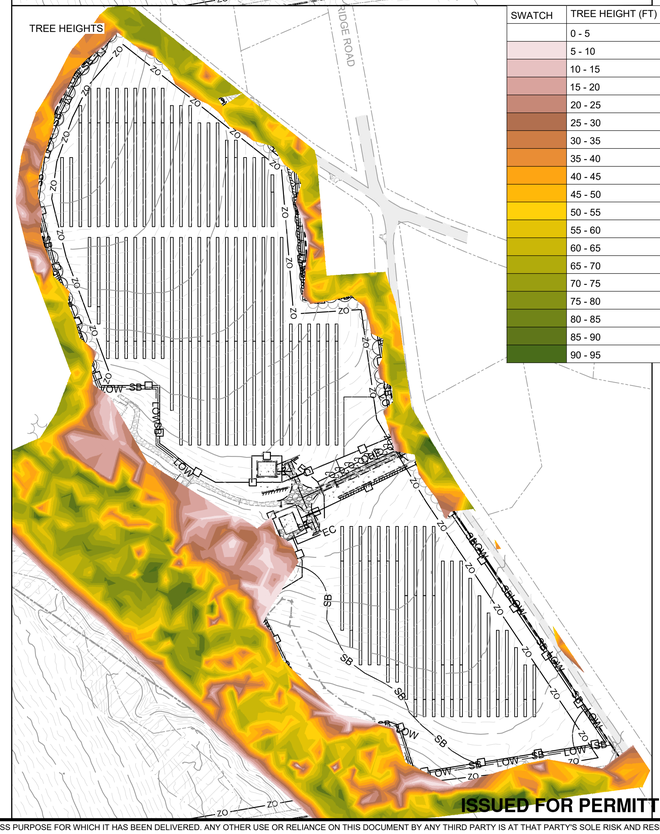
SOUTH



SOUTHWEST & NORTHWEST

SOUTHEAST & NORTHEAST

TREE HEIGHTS



SWATCH	TREE HEIGHT (FT)
	0 - 5
	5 - 10
	10 - 15
	15 - 20
	20 - 25
	25 - 30
	30 - 35
	35 - 40
	40 - 45
	45 - 50
	50 - 55
	55 - 60
	60 - 65
	65 - 70
	70 - 75
	75 - 80
	80 - 85
	85 - 90
	90 - 95

NOTES:

1. IDEAL SHADING SETBACKS:
   - 1.1. SOUTHERN TREES: 3X TREE HEIGHT
   - 1.2. EAST& WEST TREES: 2.5X TREE HEIGHT
   - 1.3. SOUTHWEST & SOUTHEAST TREES: 3X TREE HEIGHT
   - 1.4. NORTHWEST AND NORTHEAST TREES: 0.85X TREE HEIGHT

LEGEND:

EXISTING:
- PROPERTY LINE
- INTERNAL PROPERTY LINE
- ABUTTER'S PROPERTY LINE
- RIGHT OF WAY
- ZO — PROPERTY LINE SETBACK
- BUILDING
- ASPHALT
- GRAVEL
- STONE WALL
- EDGE OF VEGETATION
- EDGE OF GRASS
- TRAIL
- EDGE OF WETLAND
- WETLAND FLAG
- WATERBODY
- BUFFER
- FEMA FLOOD ZONE "A"
- OHE — OVERHEAD WIRE
- CULVERT
- UTILITY POLE
- BOUNDARY EVIDENCE
- CONTROL POINT

PROPOSED:
- LOW — LIMIT OF WORK
- 1670 — MAJOR CONTOUR
- MINOR CONTOUR
- FIXED KNOT GAME FENCE (10, C-501) (17, C-502)
- DOUBLE SWING GATE (7,11, C-501)
- SLIDING GATE (9, C-501)
- OHE — OVERHEAD ELECTRIC
- SB — SEDIMENT BARRIER (4, C-501)
- EC — ELECTRICAL CONDUIT (2, C-501)
- ACCESS ROAD (1, C-501)
- CONCRETE PAD (6, C-501)
- SOLAR PV ARRAY (8, C-501)
- UTILITY POLE
- CULVERT (3, C-501)
- INFILTRATION TRENCH (12, C-502)
- PERVIOUS BERM (12,16, C-502)
- VEGETATED FILTER STRIP (12, C-502)
- CONVEYANCE CHANNEL (15, C-502)
- RIPRAP APRON (13,14, C-502)

0' 100' 200' 300'
1" = 200' WHEN PLOTTED 24" X 36"

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PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
SHADOW ANALYSIS OF PROPOSED CONDITIONS

CLIENT:
BWC WADES STREAM, LLC

SEAL:
COMMONWEALTH OF MASSACHUSETTS
ANDREW P VARDAKIS
CIVIL
No. 52524
REGISTERED PROFESSIONAL ENGINEER
9/23/2025

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN
PROJECT NUMBER:	US-EI-365230438
DRAWING NUMBER:	C-104
SHEET NUMBER:	6 OF 8

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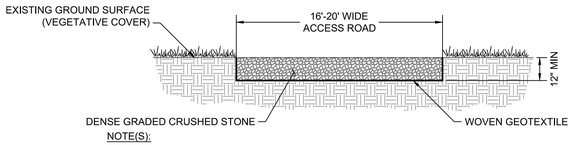
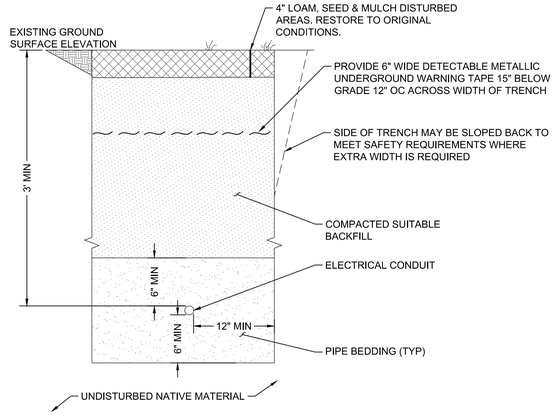


NOTE(S):

1. ACCESS ROAD TO BE CONSTRUCTED OF A MINIMUM 6" OF DENSE GRADED CRUSHED STONE.
2. WOVEN GEOTEXTILE TO BE PLACED BETWEEN THE GROUND SURFACE AND THE CRUSHED STONE.
3. CRUSHED STONE SHALL BE COMPACTED TO A FIRM AND NON-YIELDING CONDITION.

FLUSH CRUSHED STONE ACCESS ROAD 1

NOT TO SCALE

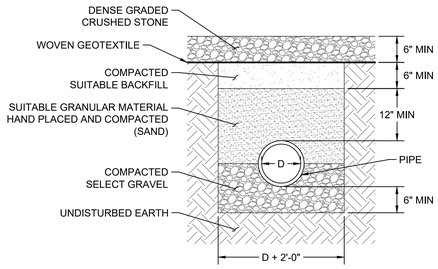


NOTE(S):

1. DETAIL SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. ELECTRICAL ENGINEER TO CONFIRM REGULATORY AND CODE COMPLIANCE.

TYPICAL ELECTRICAL CONDUIT UTILITY TRENCH 2

NOT TO SCALE

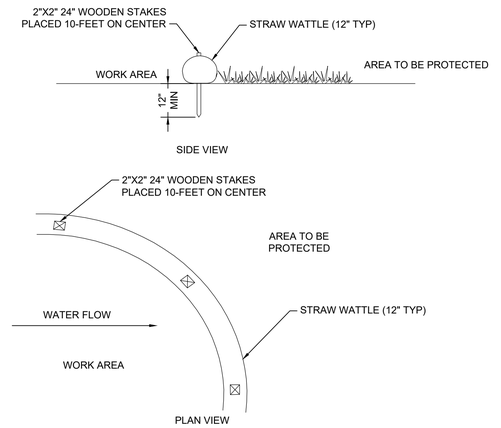


NOTE(S):

1. ALIGN CENTER OF PIPE WITH CENTERLINE OF DITCH AND BOTTOM OF PIPE WITH DITCH LINE.
2. PIPE EXTENDS A MINIMUM OF 3" BEYOND DENSE GRADED CRUSHED STONE AT INLET AND OUTLET.
3. PIPE SLOPE SHALL FOLLOW EXISTING DITCH LINE BUT BE NO LESS THAN 1.5% AND NO MORE THAN 10%.

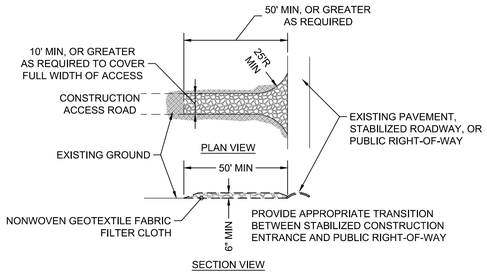
TYPICAL CULVERT TRENCH 3

NOT TO SCALE



SEDIMENT BARRIER - STRAW WATTLE 4

NOT TO SCALE

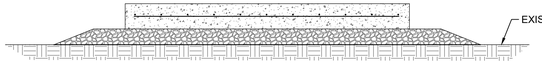


NOTE(S):

1. STONE TO BE 1"-3" STONE, RECLAIMED STONE, OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - AS REQUIRED, BUT NOT LESS THAN 50 FT.
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - TEN (10) FT. MIN, BUT NOT LESS THAN THE FULL TRAVELED WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
5. FILTER CLOTH - SHALL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCE SHALL BE PIPED ACROSS OR BENEATH THE ENTRANCE.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WASHING - WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHTS-OF-WAY. IF WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

STABILIZED CONSTRUCTION ENTRANCE 5

NOT TO SCALE

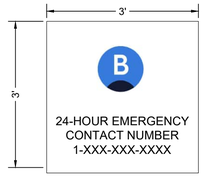


NOTE(S):

1. CONCRETE PAD SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. DESIGN TO BE FINALIZED AT LATER DATE.

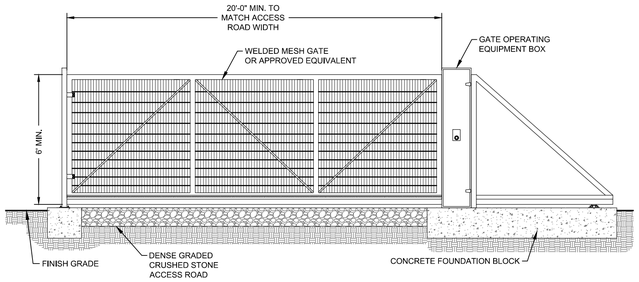
TYPICAL CONCRETE EQUIPMENT PAD SECTION 6

NOT TO SCALE



TYPICAL ENTRANCE SIGN 7

NOT TO SCALE

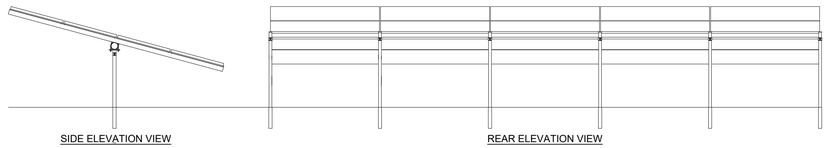


NOTE:

1. TYPICAL GATE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. DESIGN TO BE FINALIZED AT LATER DATE.

WELDED MESH ELECTRIC SLIDING GATE 9

NOT TO SCALE

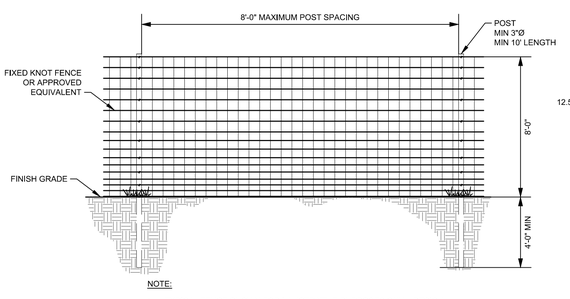


NOTE(S):

1. DESIGN FOR FOUNDATIONS, RACKING, AND MODULES BY OTHERS. DETAILS SHOWN FOR ILLUSTRATION PURPOSES ONLY.

TRACKER SOLAR PV ARRAY 8

NOT TO SCALE

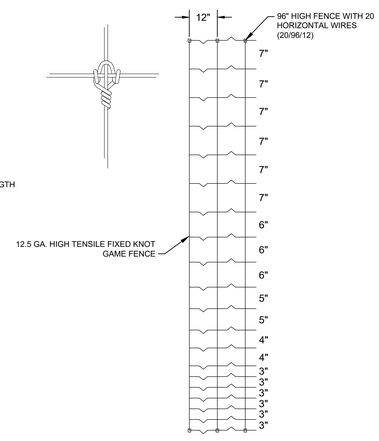


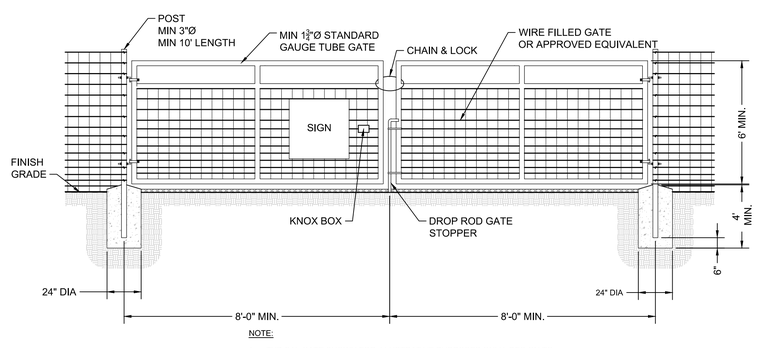
NOTE:

1. TYPICAL FENCE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. DESIGN TO BE FINALIZED AT LATER DATE.

WOVEN WIRE FENCE 10

NOT TO SCALE





NOTE:

1. TYPICAL GATE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. DESIGN TO BE FINALIZED AT LATER DATE.

WOVEN WIRE DOUBLE SWING GATE 11

NOT TO SCALE

ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION

WSP USA INC.
100 APOLLO DRIVE, SUITE 302
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FAX: (978) 692-6633
WEB: WWW.WSP.COM

REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED	APPROVED
0	09/23/2025	ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION	MRB	OAC

PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
DETAILS (SHEET 1 OF 2)

CLIENT:
BWC WADES STREAM, LLC

SEAL:
COMMONWEALTH OF MASSACHUSETTS
ANDREW P VARDAKIS
CIVIL
No. 52524
REGISTERED PROFESSIONAL ENGINEER
09/23/2025

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN
PROJECT NUMBER: US-EI-365230438	
DRAWING NUMBER: **C-501**	
SHEET NUMBER: **7 OF 8**	

D:\Box\Vaults\US-EI-365230437 - Ridge Rd Worthington\4 Permitting\Sheets\7-8 - Ridge Rd - C-501-2.dwg - C-501 - Sep 23, 2025 10:25am - wels_morgan.mcdonald

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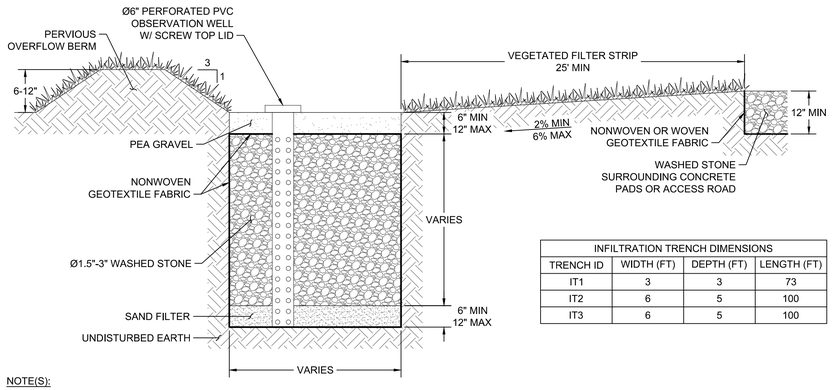
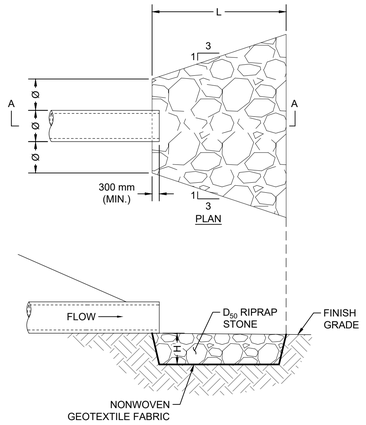


INFILTRATION TRENCH DIMENSIONS			
TRENCH ID	WIDTH (FT)	DEPTH (FT)	LENGTH (FT)
IT1	3	3	73
IT2	6	5	100
IT3	6	5	100

NOTE(S):

1. PERVIOUS BERM MAY VARY IN HEIGHT BETWEEN 6 TO 12 INCHES IN ORDER TO ACHEIVE A LEVEL ELEVATION ALONG THE TOP OF THE BERM TO THE MAXIMUM EXTENT POSSIBLE.
2. ONE SCREW TOP OBSERVATION WELL TO BE INSTALLED CENTRAL TO THE TRENCH LENGTH.

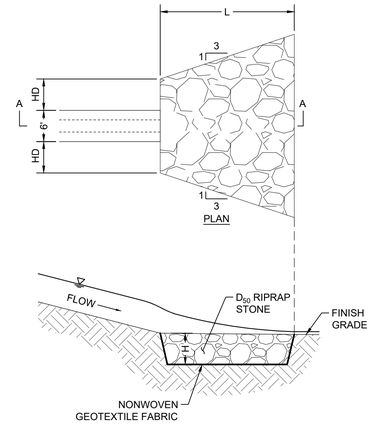
INFILTRATION TRENCH (12)
NOT TO SCALE



SECTION A-A

RIPRAP APRON DIMENSIONS				
PIPE Ø	CLASS	D_{50} (IN)	LENGTH L (FT)	HEIGHT H (IN)
12"	1	5	4	18
15"	1	5	5	18

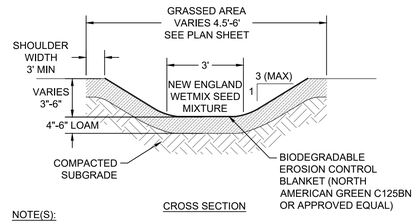
RIPRAP APRON (PIPE) (13)
NOT TO SCALE



SECTION A-A

RIPRAP APRON DIMENSIONS				
HYDRAULIC DIAMETER (HD)	CLASS	D_{50} (IN)	LENGTH L (FT)	HEIGHT H (IN)
0.75'	3	10	4	24

RIPRAP APRON (CHANNEL) (14)
NOT TO SCALE

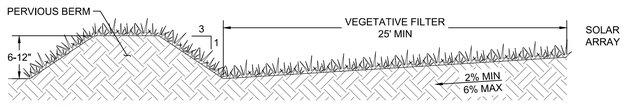


CROSS SECTION

NOTE(S):

1. THE LONGITUDINAL SLOPE OF THE CHANNEL BOTTOM SHOULD BE AS FLAT AS POSSIBLE AND NO GREATER THAN 5%.

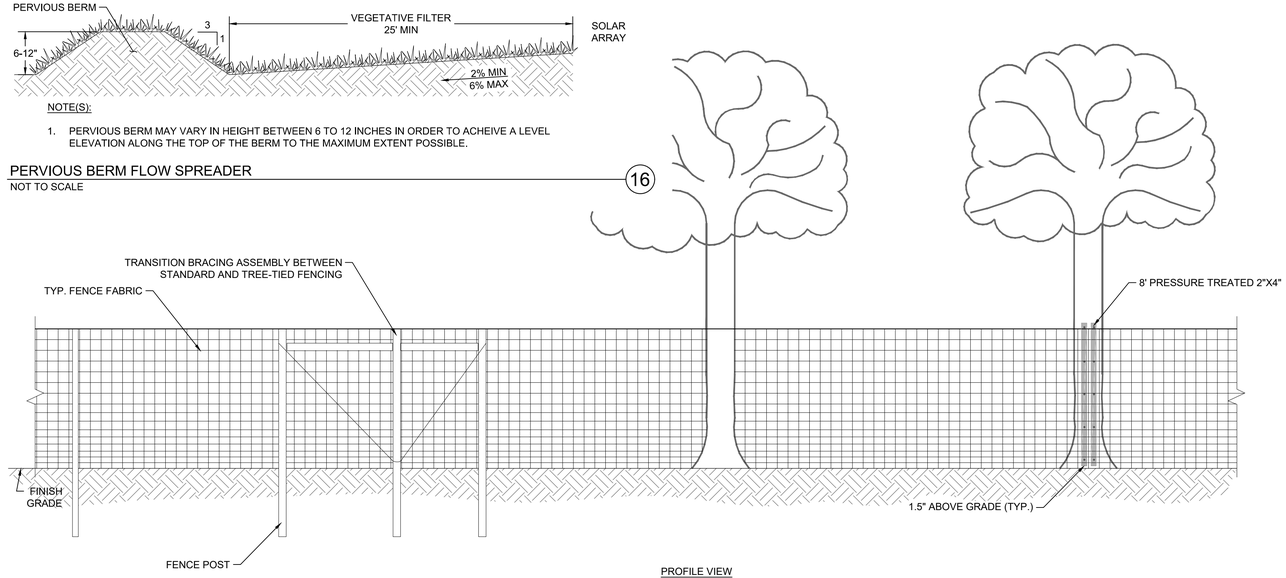
GRASSED CONVEYANCE CHANNEL (15)
NOT TO SCALE



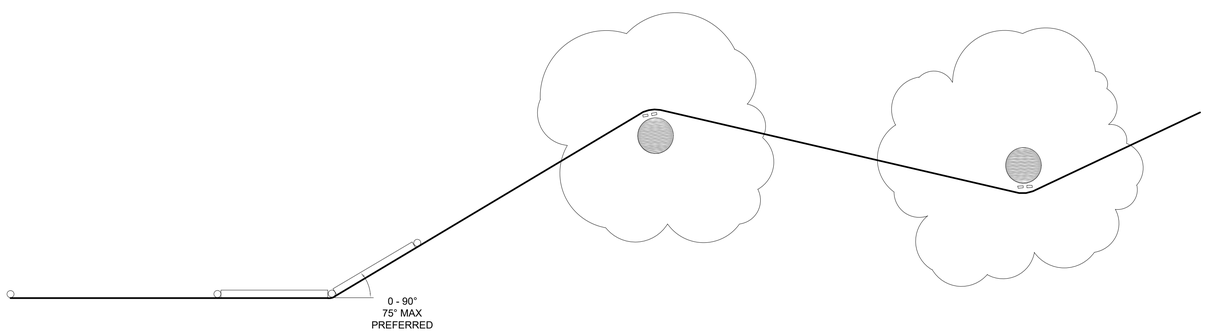
NOTE(S):

1. PERVIOUS BERM MAY VARY IN HEIGHT BETWEEN 6 TO 12 INCHES IN ORDER TO ACHEIVE A LEVEL ELEVATION ALONG THE TOP OF THE BERM TO THE MAXIMUM EXTENT POSSIBLE.

PERVIOUS BERM FLOW SPREADER (16)
NOT TO SCALE

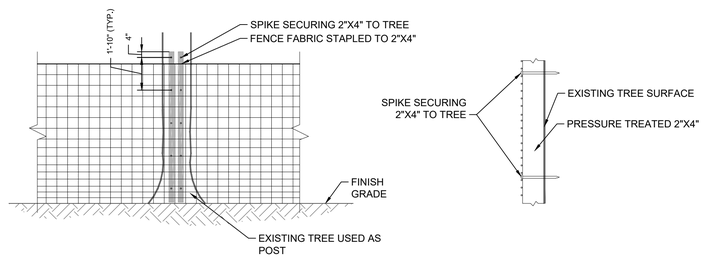


PROFILE VIEW

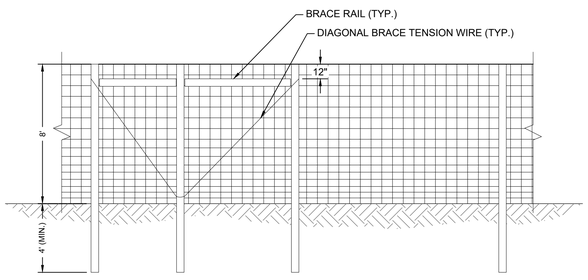


PLAN VIEW

TREE-TIED WOVEN WIRE FENCE (17)
NOT TO SCALE



MOUNTING DETAIL



BRACING DETAIL

NOTE(S):

1. ALL FENCING AND HARDWARE SHALL BE GALVANIZED.
2. FIXED KNOT WIRE MESH TO BE BEKAERT SOLIDLOCK (R) PRO 30 (2096-3), 12.5AWG-16 HIGH TENSILE FIXED KNOT GAME FENCE OR APPROVED EQUIVALENT, INSTALLED AND BRACED PER MANUFACTURERS RECOMMENDATIONS. NOT TO EXCEED 2" GAP ABOVE GRADE.
3. ONLY SOUND, HEALTHY TREES GREATER THAN 6" DBH SPACED 10' - 40' APART SHALL BE USED.
4. ROUTE FENCE TO AVOID IMPINGING ON GROWTH OF ADJACENT TREES.
5. ADD 2"X4" SPACERS AS NEEDED BASED ON ANGLE AND DBH TO ENSURE FENCING DOES NOT CONTACT TREE.
6. OBSTRUCTIVE LIMBS TO BE CLIPPED FROM TRUNK OF TREE.

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WSP USA INC.
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FAX: (978) 692-6633
WEB: WWW.WSP.COM

REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED	APPROVED
0	09/23/2025	ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION	MRB	OAC

PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
DETAILS (SHEET 2 OF 2)

CLIENT:
BWC WADES STREAM, LLC

SEAL:
COMMONWEALTH OF MASSACHUSETTS
ANDREW P VARDAKIS
CIVIL
No. 52524
REGISTERED PROFESSIONAL ENGINEER
09/23/2025

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN
PROJECT NUMBER: US-EI-365230438	
DRAWING NUMBER: **C-502**	
SHEET NUMBER: **8 OF 8**	

D:\BlueWave\US-EI-365220437 - Ridge Rd Worthington\4 Permitting\Sheets\7-8 - Ridge Rd - C-501-2.dwg - C-502 - Sep. 23, 2025 10:28am - wds_morgan.mcdonald

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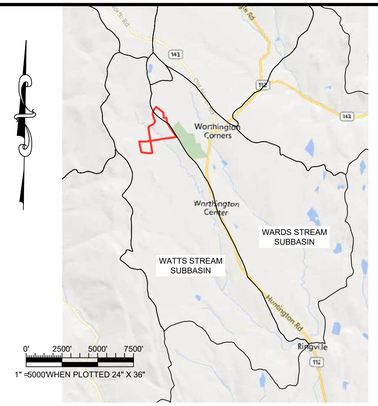
Appendix G – Drainage Figures



NOTES:

1. THIS PLAN WAS GENERATED USING DATA PROVIDED BY SGC ENGINEERING, LLC FROM THEIR ON-SITE FIELD VISIT PERFORMED IN NOVEMBER 2023 AND REVIEWED IN APRIL 2024. ADDITIONAL NEARBY BUILDINGS WERE INCLUDED FROM MASSGIS DATA: BUILDING STRUCTURES (2-D) PUBLICLY AVAILABLE AT MASS.GOV AND LAST UPDATED NOVEMBER 2024. OTHER MAP REFERENCES INCLUDE:
   - 1.1. A PLAN ENTITLED "PLAN OF LAND IN WORTHINGTON, MASSACHUSETTS PREPARED FOR TIMOTHY J. SENA & CATHERINE RUDE-SENA" DATED MARCH 23, 2005, RECORDED AT THE HAMPSHIRE COUNTY REGISTRY OF DEEDS IN PLAN BOOK 205 PAGE 25.
   - 1.2. A PLAN ENTITLED "PLAN OF LAND IN WORTHINGTON, MASSACHUSETTS PREPARED FOR ESTHER C. SENA-SANDERS IRREVOCABLE TRUST" DATED MARCH 23, 2005, RECORDED AT THE HAMPSHIRE COUNTY REGISTRY OF DEEDS IN PLAN BOOK 205 PAGE 23.
   - 1.3. A PLAN ENTITLED "PLAN OF LAND IN WORTHINGTON, MASS - OWNER: MANFRED ZORN" DATED JULY 1996 AND RECORDED IN PLAN BOOK 0178 PAGE 241.
2. OWNER OF RECORD: TIMOTHY J. SENA AND CATHERINE RUDE-SENA AS RECORDED IN BOOK 8119 PAGE 223 (PARCEL 1) 8260 PAGE 228 (PARCEL 2) WITH A TOWN LISTED PROPERTY ADDRESS OF 190 BUFFINGTON HILL ROAD, WORTHINGTON, HAMPSHIRE COUNTY, MASSACHUSETTS. FOR FURTHER REFERENCE, SEE WORTHINGTON TAX MAP 407 - PARCEL 28 (PER MASS GIS).
3. HORIZONTAL DATUM IS BASED ON MASSACHUSETTS STATE GRID COORDINATE SYSTEM NAD83 (2011 - MAINLAND). VERTICAL DATUM IS REFERENCED TO NAVD 88. TOPOGRAPHY SHOWN WAS DEVELOPED UTILIZING THE MOST UP TO DATE ONLINE ELECTRONIC LIDAR FILES FROM NGS. IN COMBINATION WITH ON THE GROUND DATA COLLECTION WITH SURVEY GRADE GPS AND OR ROBOTIC TOTAL STATION. CONTOUR INTERVAL SHOWN ON PLAN IS 2 FOOT.
4. THE WETLANDS SHOWN ON THIS PLAN WERE REVIEWED, DEFINED, AND FLAGGED BY OTHERS AND FIELD LOCATED BY SGC ENGINEERING DATED NOVEMBER 22, 2023.
5. A PREDOMINATE PORTION OF THE PROPERTY LIES WITHIN ZONE "X" AND THE PROPOSED SOLAR DEVELOPMENT IS NOT AFFECTED (SEE PLAN). A SMALL CENTRAL PORTION OF THE LOCUS PARCEL IS AFFECTED BY ZONE "A" AND IS CATEGORIZED AS A SPECIFIED FLOOD HAZARD ZONE. FOR FURTHER REFERENCE SEE F.I.R.M. - FLOOD INSURANCE RATE MAP - COMMUNITY PANEL NUMBER 250175 0008 SUFFIX B / MAP NUMBER 8 OF 25 FOR THE TOWN OF WORTHINGTON, HAMPSHIRE COUNTY (ALL JURISDICTIONS), MASSACHUSETTS. WITH AN EFFECTIVE DATE OF JUNE 19, 1989. ZONE "A" (WATTS STREAM SO-CALLED) IS DESCRIBED AS AN AREA THAT NO BASE FLOOD ELEVATION HAS BEEN DETERMINED. THE BASE FLOOD ELEVATION IS THE WATER SURFACE ELEVATION OF THE 1% ANNUAL CHANCE FLOOD. ZONE "X" IS DETERMINED AS AREAS OUTSIDE 500 - YEAR FLOOD PLAIN.
6. NEITHER SGC ENGINEERING, LLC NOR WSP HAVE INDEPENDENTLY VERIFIED THE LOCATION, EXISTENCE, AND SERVICEABILITY OF ANY UTILITIES AND MAKE NO GUARANTEE TO THE COMPLETENESS OR THE ACCURACY OF ANY UTILITIES SHOWN ON THIS PLAN. UTILITIES SHOWN WERE FIELD LOCATED ABOVEGROUND AND VISUAL, AND OR REFERENCED FROM PLANS AND MAP REFERENCES. ADDITIONAL UTILITIES MAY EXIST IN THE FIELD, WHICH ARE NOT SHOWN ON THIS PLAN. ACTUAL LOCATIONS MUST BE DETERMINED IN THE FIELD PRIOR TO EXCAVATION OR OTHER CONSTRUCTION ACTIVITIES. CALL "DIG SAFE" AT 1-888-344-7233 OR DIAL 811. SGC ENGINEERING, LLC AND WSP USA INC. ASSUME NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN ON THIS PLAN.
7. THIS SURVEY WAS PREPARED FOR THE EXCLUSIVE USE OF THE PERSON, PERSONS, OR ENTITY NAMED IN THE CERTIFICATION AND TITLE BLOCK OF THIS PLAN. THIS SURVEY DOES NOT EXTEND TO ANY UNNAMED PERSON, PERSONS, OR ENTITY WITHOUT HAVING SGC ENGINEERING'S CONSENT IN WRITING.
8. THE LOCATIONS OF THE WATTS STREAM, WITHIN PARCEL "A" (SO CALLED), AND AN UN-NAMED BROOK, THAT DEMARCATES A WESTERLY BOUNDARY LINE OF PARCEL "B", ARE BOTH BASED ON PHYSICAL FIELD EVIDENCE, DEED CALLS, AND OR PLANS OF RECORD AT TIME OF SURVEY. BOTH WATTS STREAM AND THE UN-NAMED BROOK MAY OR MAY NOT AFFECT THE PRESENT - FUTURE PROPERTY DUE TO AVULSION, ACCRETION, AND/OR RELICTION.
9. OBSERVATIONS OF THE PREMISES BY SGC IN NOVEMBER 2023:
   - 9.a. LOCUS PARCEL HAS FREE AND CLEAR ACCESS, IN AND TO BUFFINGTON HILL ROAD AND RIDGE ROAD AS SHOWN ON PLAN. BOTH ROADS ARE DEDICATED AND PUBLIC WAYS OF VARIABLE WIDTHS.
   - 9.b. THE LOCUS PARCEL IS THE SAME LAND AS DESCRIBED IN THE TITLE COMMITMENT AS EXHIBIT "A".
   - 9.c. NO EVIDENCE OF EARTH MOVING WORK, BUILDING CONSTRUCTION, AND BUILDING ADDITIONS WERE OBSERVED ON SURVEYED PREMISES.
   - 9.d. THE PROPERTY COMPRISES A SINGLE TAX LOT - TOWN OF WORTHINGTON TAX MAP NUMBER 407 PARCEL 28.
   - 9.e. NO EVIDENCE WAS NOTICED OF THE SITE BEING USED AS A SOLID WASTE DUMP.

LEGEND:

EXISTING:
- MAJOR CONTOUR
- MINOR CONTOUR
- PROPERTY LINE
- INTERNAL PROPERTY LINE
- ABUTTER'S PROPERTY LINE
- RIGHT OF WAY
- PROPERTY LINE SETBACK
- BUILDING
- ASPHALT
- GRAVEL
- STONE WALL
- EDGE OF VEGETATION
- EDGE OF GRASS
- TRAIL
- EDGE OF WETLAND
- WETLAND FLAG
- WATERBODY
- BUFFER
- FEMA FLOOD ZONE "A"
- OVERHEAD WIRE
- CULVERT
- UTILITY POLE
- BOUNDARY EVIDENCE
- CONTROL POINT

HYDROLOGY:
- SUBCATCHMENT BOUNDARY
- TIME OF CONCENTRATION
- LAG PATH
- HSG C SOIL
- FARMLAND OF STATEWIDE IMPORTANCE
- IWPA
- POND
- SUBCATCHMENT
- REACH
- LINK

ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION

0' 50' 100' 150'
1" = 100' WHEN PLOTTED 24" X 36"

WSP USA INC.
100 APOLLO DRIVE, SUITE 302
CHELMSFORD MASSACHUSETTS 01824
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WEB: WWW.WSP.COM

REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED	APPROVED
0	08/23/2025	ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION	MRB	OAC

PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
EXISTING CONDITIONS DRAINAGE ANALYSIS

CLIENT:
BWC WADES STREAM, LLC

SEAL:
APPROVED
NOT SEALED

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN
PROJECT NUMBER: US-EI-365230438	
DRAWING NUMBER: **D-101**	
SHEET NUMBER: **1 OF 2**	

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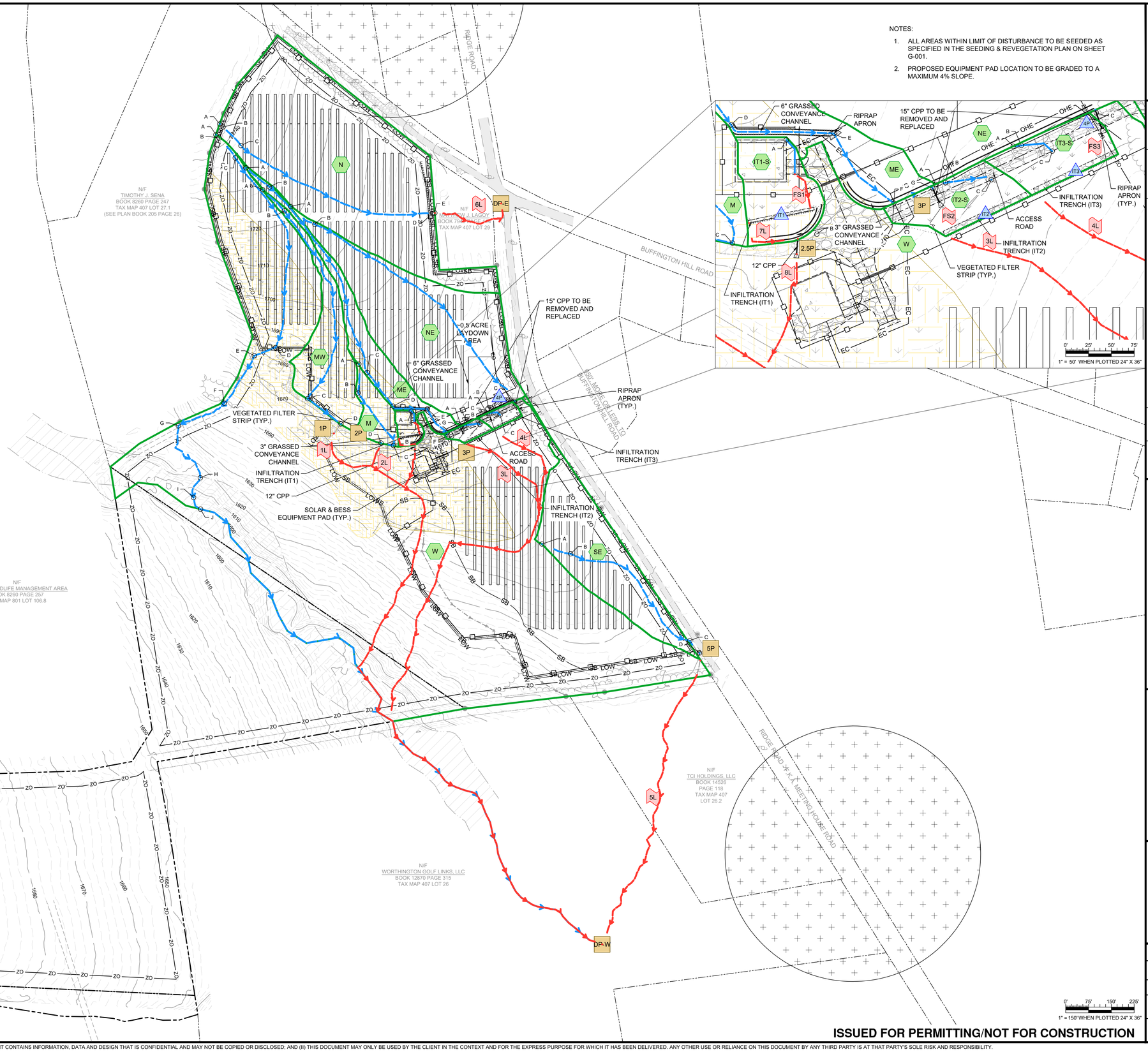
LEGEND:

EXISTING:
- 710 — MAJOR CONTOUR
- MINOR CONTOUR
- PROPERTY LINE
- INTERNAL PROPERTY LINE
- ABUTTER'S PROPERTY LINE
- RIGHT OF WAY
- ZO — PROPERTY LINE SETBACK
- BUILDING
- ASPHALT
- GRAVEL
- STONE WALL
- EDGE OF VEGETATION
- EDGE OF GRASS
- TRAIL
- EDGE OF WETLAND
- WETLAND FLAG
- WATERBODY
- BUFFER
- FEMA FLOOD ZONE "A"
- OHE — OVERHEAD WIRE
- CULVERT
- UTILITY POLE
- BOUNDARY EVIDENCE
- CONTROL POINT

PROPOSED:
- LOW — LIMIT OF WORK
- 1670 — MAJOR CONTOUR
- MINOR CONTOUR
- FIXED KNOT GAME FENCE
- DOUBLE SWING GATE
- SLIDING GATE
- OHE — OVERHEAD ELECTRIC
- SB — SEDIMENT BARRIER
- EC — ELECTRICAL CONDUIT
- ACCESS ROAD
- CONCRETE PAD
- SOLAR PV ARRAY
- UTILITY POLE
- CULVERT
- INFILTRATION TRENCH
- PERVIOUS BERM

HYDROLOGY:
- SUBCATCHMENT BOUNDARY
- TIME OF CONCENTRATION
- LAG PATH
- HSG C SOIL
- FARMLAND OF STATEWIDE IMPORTANCE
- IWPA
- LBL — POND
- LBL — SUBCATCHMENT
- LBL — REACH
- LBL — LINK

NOTES:
1. ALL AREAS WITHIN LIMIT OF DISTURBANCE TO BE SEEDED AS SPECIFIED IN THE SEEDING & REVEGETATION PLAN ON SHEET G-001.
2. PROPOSED EQUIPMENT PAD LOCATION TO BE GRADED TO A MAXIMUM 4% SLOPE.



WSP USA INC.
100 APOLLO DRIVE, SUITE 302
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REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED	APPROVED
0	09/23/2025	ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION	MRB	OAC

PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
PROPOSED CONDITIONS DRAINAGE ANALYSIS

CLIENT:
BWC WADES STREAM, LLC

SEAL:
APPROVED
NOT SEALED

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN
PROJECT NUMBER:	US-EI-365230438
DRAWING NUMBER:	D-102
SHEET NUMBER:	2 OF 2

ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION

C:\Users\WDS_MO~1.MCD\AppData\Local\Temp\AcPublish_39052\Ridge Rd - D-101-2.dwg - D-102 - Sep. 23, 2025 10:48am - wds_morgan.mcdonald

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Appendix H – Operation & Maintenance Log Forms

Operation & Maintenance Log Form

Site: Add name

Address: Click or tap here to enter text.

Inspector: Add name

Company: Add name

Date: YYYY-MM-DD

Date of last inspection: YYYY-MM-DD

General Site Maintenance

Activity	Details	Performed?	Notes
Inspect	Inspect for any eroded drainage paths and repair as necessary.	☐ Y ☐ N	
Clean	Remove trash, leaves, and other debris.	☐ Y ☐ N	
Mow	Grass height shall not exceed 18 inches.	☐ Y ☐ N	
Sweep	Remove sediment build-up on roadways and drives.	☐ Y ☐ N	

Crushed Stone Access Road

Activity	Details	Performed?	Notes
Inspect	Check for standing water, uneven surface, snowplow damage, and vegetation.	☐ Y ☐ N	
Re-grade the stone	Redistribute and compact washed crushed stone to restore grades in original design.	☐ Y ☐ N	
Remove vegetation	Manually remove vegetation that is growing within the road surface area.	☐ Y ☐ N	

Activity	Details	Performed?	Notes
Repair potholes and snowplow damage	Fill and compact potholes and other road damage with design specific material.	☐ Y ☐ N	
Restore infiltration	If water remains on road surface >48 hours after storm, excavate, scarify the underlying topsoil, and replace the stone.	☐ Y ☐ N	
Clean	Remove trash and debris from the road surface.	☐ Y ☐ N	

Drainage Channels

Activity	Details	Performed?	Notes
Inspect	Inspect channels to make sure vegetation is adequate and for signs of rilling and gullying. Repair rills and gullies. Replace dead vegetation.	☐ Y ☐ N	
Mow	Grass height shall not exceed 6 inches.	☐ Y ☐ N	
Remove sediment	Remove sediment and other debris manually.	☐ Y ☐ N	
Reseed	Reseed as necessary to ensure that vegetative cover is never below 80% across the channel.	☐ Y ☐ N	

Vegetated Filter Strips

Activity	Details	Performed?	Notes
Inspect	Inspect for sediment buildup and signs of erosion. Check the vegetation for bare spots and overall health.	☐ Y ☐ N	

Activity	Details	Performed?	Notes
Mow	Grass height shall not exceed 6 inches.	☐ Y ☐ N	
Remove sediment	Remove sediment and other debris manually.	☐ Y ☐ N	

Infiltration Trenches

Activity	Details	Performed?	Notes
Inspect	Inspect for sediment buildup and ponding.	☐ Y ☐ N	
Remove sediment	Remove sediment and other debris manually.	☐ Y ☐ N	
Unclog	If there is ponded water at the surface of the trench, remove and replace the first layer of stone aggregate and the filter fabric. If water is ponded inside the trench, sediment must be removed from the trench before scarifying and tilling the bottom to induce infiltration. This unclogging process requires removal and replacement of the stone aggregate and filter fabric.	☐ Y ☐ N	

Riprap Aprons

Activity	Details	Performed?	Notes
Inspect	Check for damaged/misplaced stones, sediment accumulation, significant erosion, vegetation growth.	☐ Y ☐ N	

Activity	Details	Performed?	Notes
Clean	Remove trash, sediment, and other debris.	☐ Y ☐ N	
Clear Vegetation	Manually remove vegetation from between or over the riprap stones.	☐ Y ☐ N	
Replace Stone	Replace or reconfigure missing or dislodged stones to maintain original design functionality.	☐ Y ☐ N	

Non-compliance/Corrective actions

Describe any incidents of non-compliance and corrective actions taken to address those not described above:

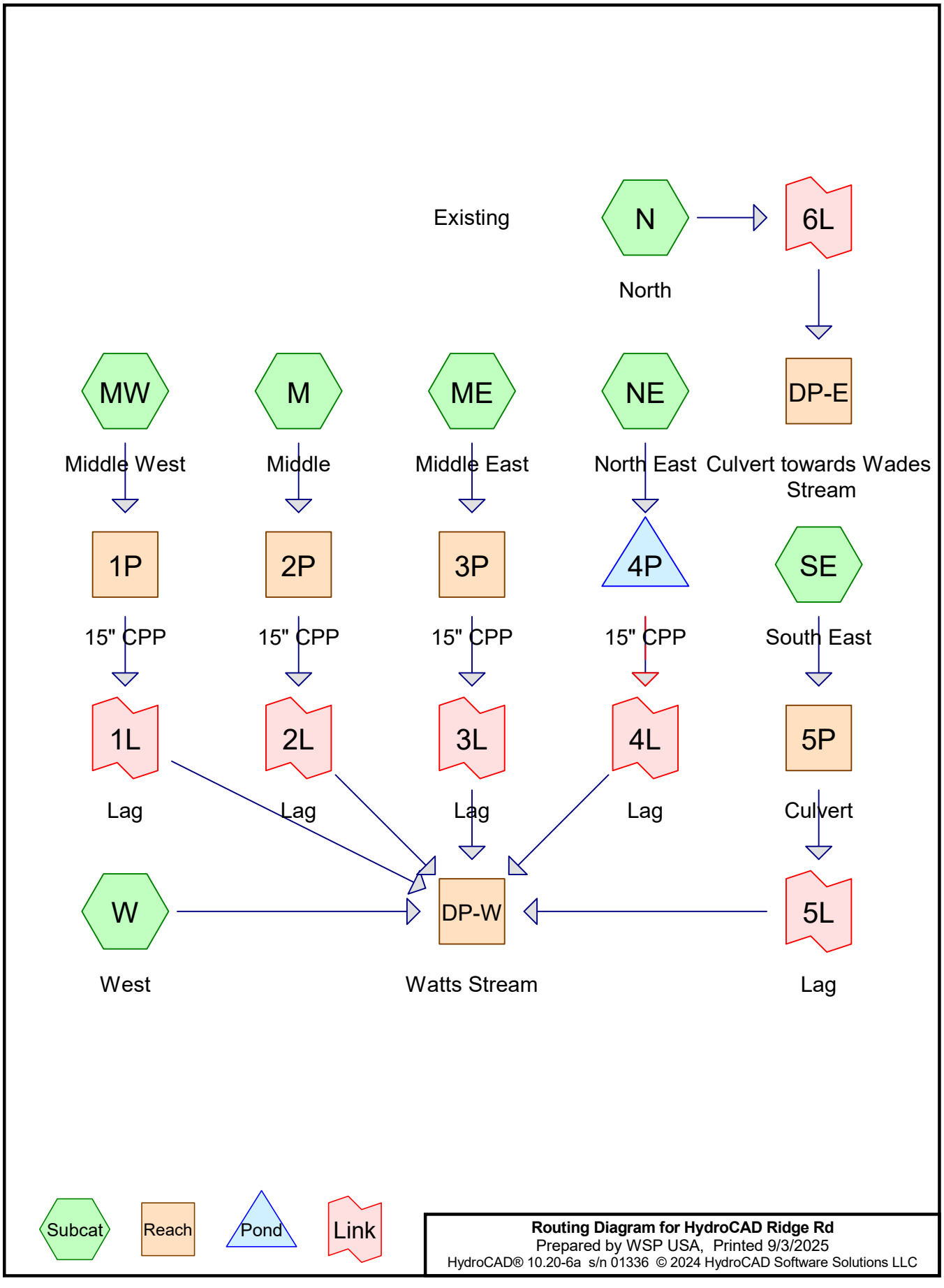
Print Name: Add name

Signature: Add name

Date: YYYY-MM-DD

Appendix I – HydroCAD Reports

Existing Conditions HydroCAD



Routing Diagram for HydroCAD Ridge Rd
Prepared by WSP USA, Printed 9/3/2025
HydroCAD® 10.20-6a s/n 01336 © 2024 HydroCAD Software Solutions LLC

Summary for Subcatchment M: Middle

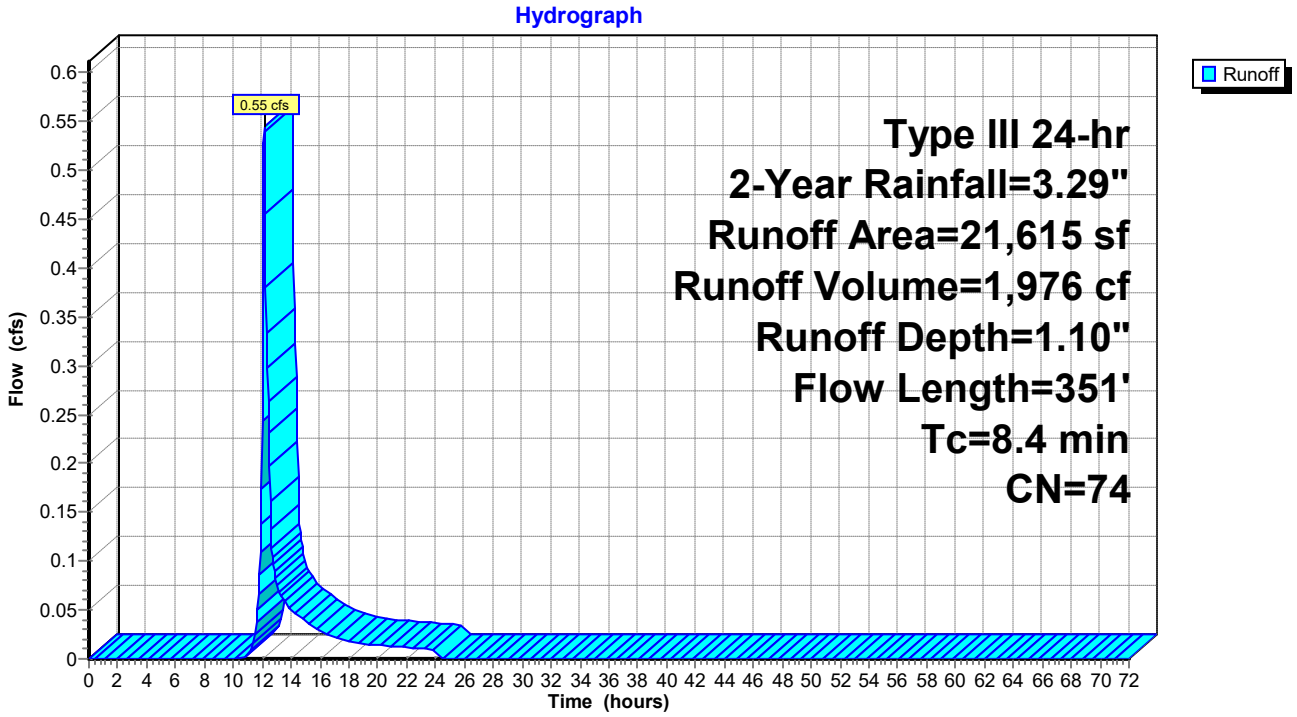
Runoff = 0.55 cfs @ 12.13 hrs, Volume= 1,976 cf, Depth= 1.10"
Routed to Reach 2P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.29"

Area (sf)	CN	Description
21,615	74	Pasture/grassland/range, Good, HSG C
21,615		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	95	0.0626	0.30		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
2.3	214	0.0510	1.58		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.9	42	0.0126	0.79		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
8.4	351	Total			

Subcatchment M: Middle



Summary for Subcatchment ME: Middle East

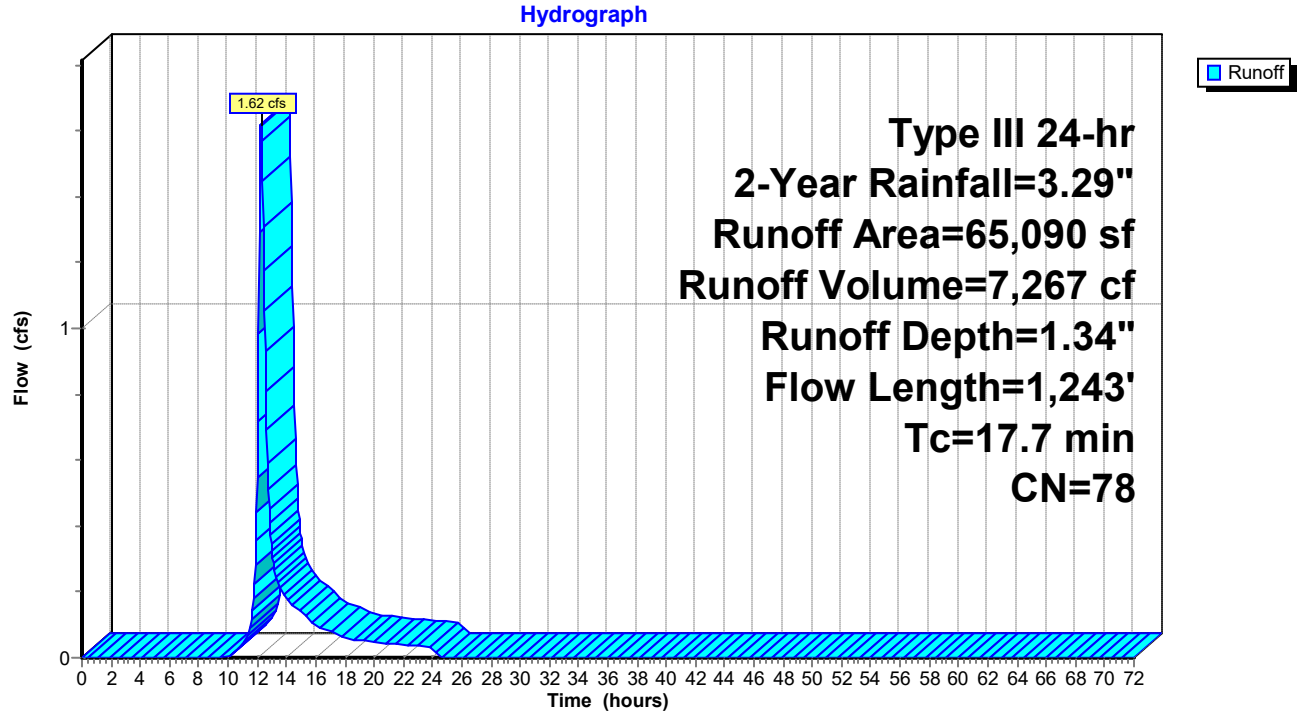
Runoff = 1.62 cfs @ 12.26 hrs, Volume= 7,267 cf, Depth= 1.34"
Routed to Reach 3P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.29"

Area (sf)	CN	Description
23,596	74	Pasture/grassland/range, Good, HSG C
41,494	80	Pasture/grassland/range, Good, HSG D
65,090	78	Weighted Average
65,090		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.0678	0.32		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
7.1	708	0.0566	1.67		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
3.1	295	0.0513	1.59		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
2.2	140	0.0223	1.05		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
17.7	1,243	Total			

Subcatchment ME: Middle East



Summary for Subcatchment MW: Middle West

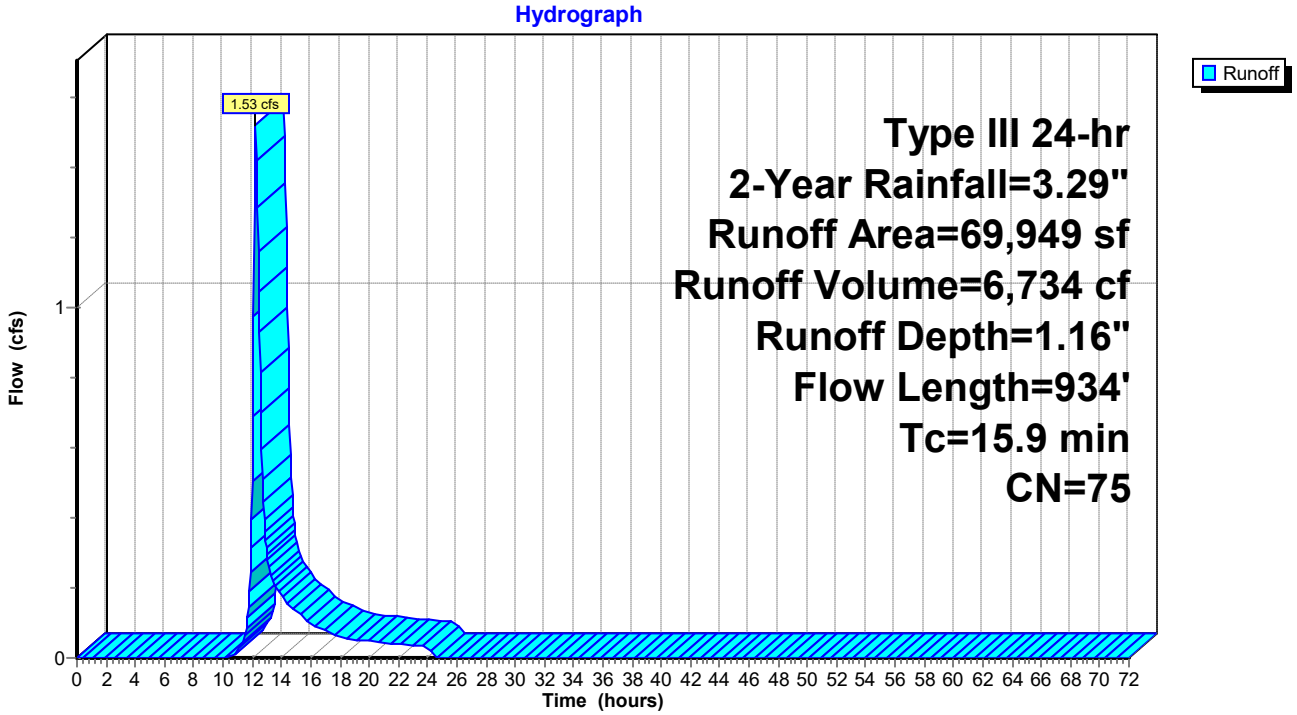
Runoff = 1.53 cfs @ 12.24 hrs, Volume= 6,734 cf, Depth= 1.16"
Routed to Reach 1P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.29"

Area (sf)	CN	Description
54,742	74	Pasture/grassland/range, Good, HSG C
15,207	80	Pasture/grassland/range, Good, HSG D
69,949	75	Weighted Average
69,949		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	100	0.0582	0.30		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
6.2	695	0.0716	1.87		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
4.1	139	0.0066	0.57		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
15.9	934	Total			

Subcatchment MW: Middle West



Summary for Subcatchment N: North

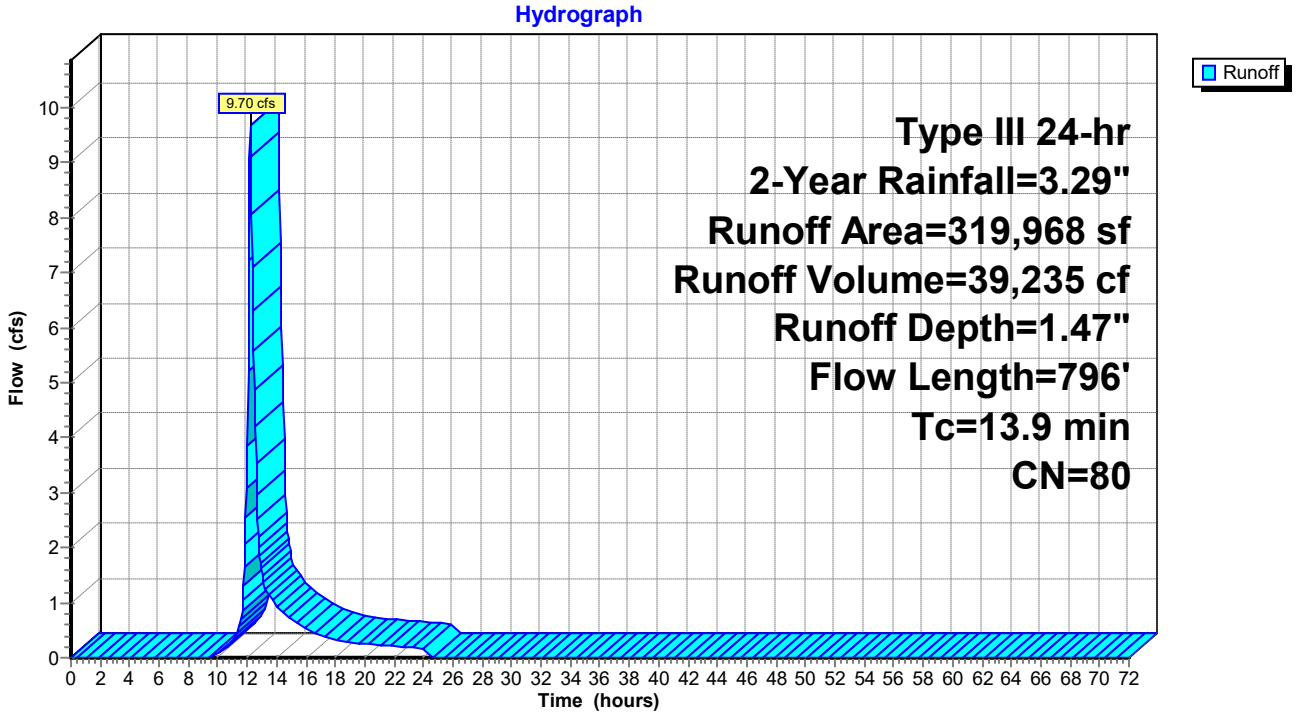
Runoff = 9.70 cfs @ 12.20 hrs, Volume= 39,235 cf, Depth= 1.47"
Routed to Link 6L :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.29"

Area (sf)	CN	Description
290,713	80	Pasture/grassland/range, Good, HSG D
29,255	77	Woods, Good, HSG D
319,968	80	Weighted Average
319,968		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	15	0.0850	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.29"
4.7	85	0.0656	0.30		**Sheet Flow, BC** Range n= 0.130 P2= 3.29"
6.5	689	0.0643	1.78		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.1	7	0.0590	1.21		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
13.9	796	Total			

Subcatchment N: North



Summary for Subcatchment NE: North East

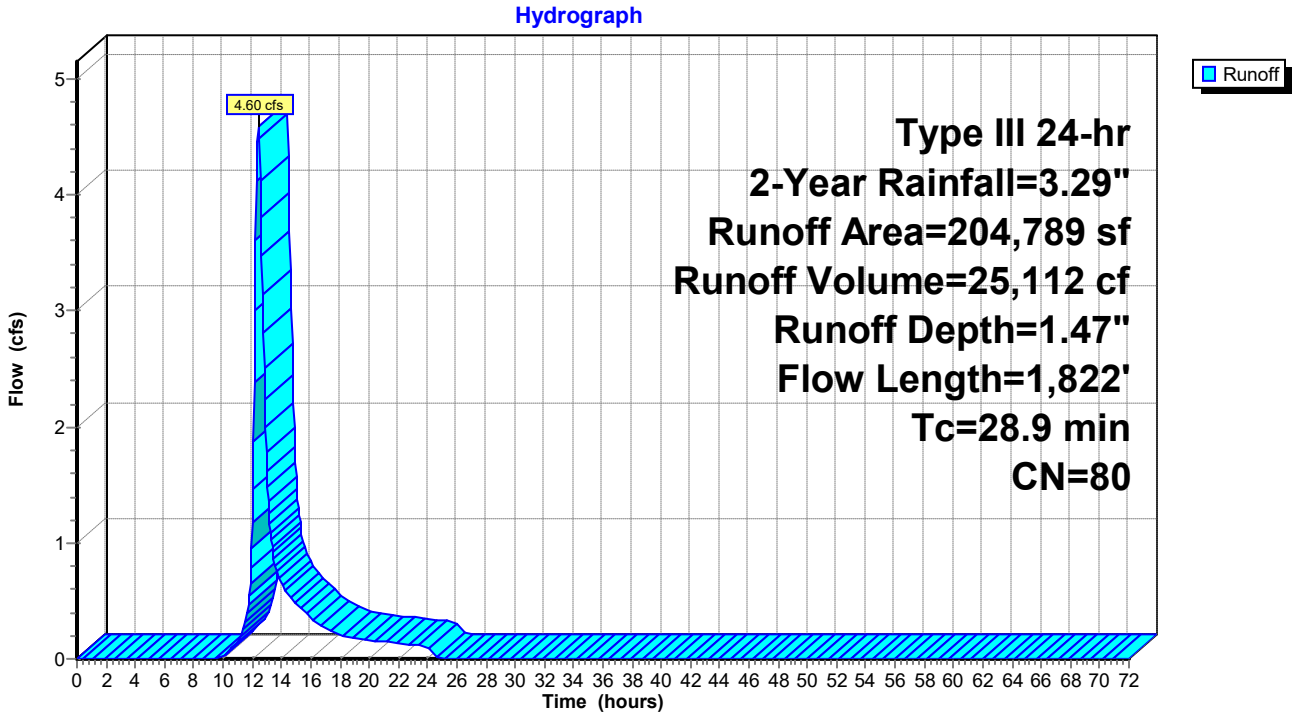
Runoff = 4.60 cfs @ 12.42 hrs, Volume= 25,112 cf, Depth= 1.47"
Routed to Pond 4P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.29"

Area (sf)	CN	Description
195,115	80	Pasture/grassland/range, Good, HSG D
9,674	77	Woods, Good, HSG D
204,789	80	Weighted Average
204,789		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	100	0.0558	0.29		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
23.2	1,722	0.0313	1.24		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
28.9	1,822	Total			

Subcatchment NE: North East



Summary for Subcatchment SE: South East

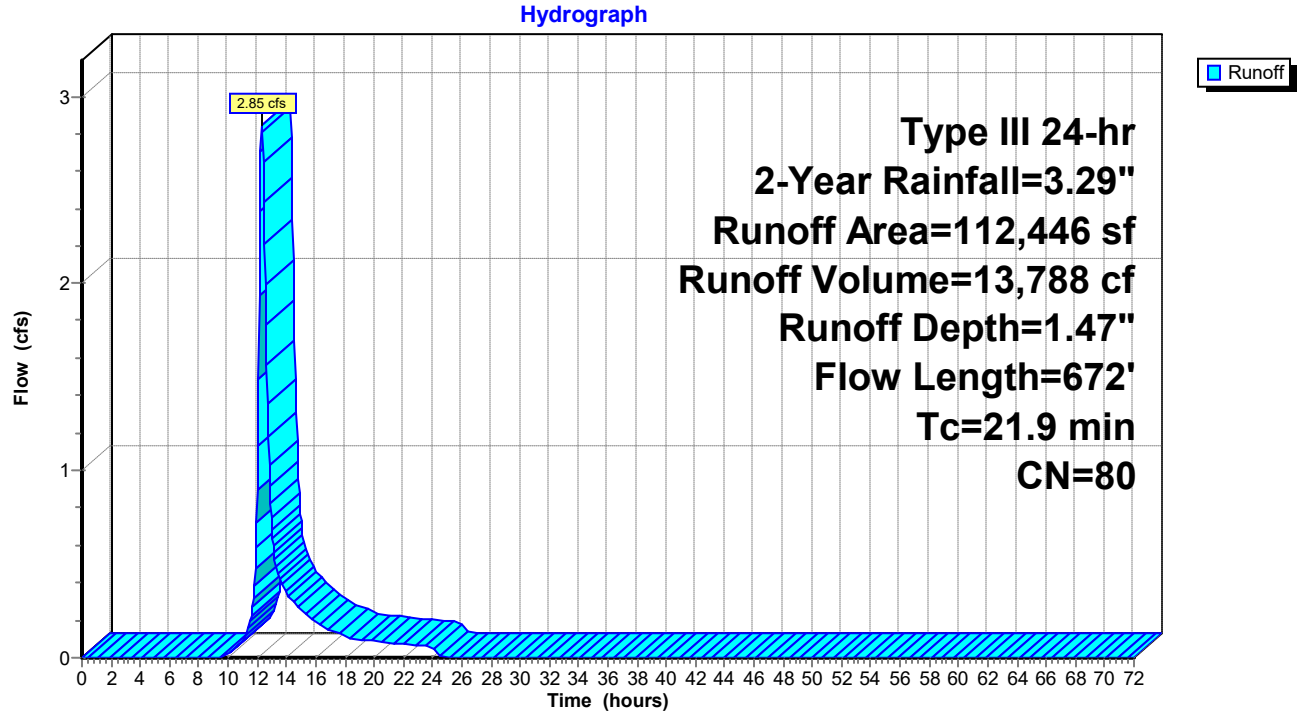
Runoff = 2.85 cfs @ 12.31 hrs, Volume= 13,788 cf, Depth= 1.47"
Routed to Reach 5P : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.29"

	Area (sf)	CN	Description
	110,724	80	Pasture/grassland/range, Good, HSG D
	1,536	77	Woods, Good, HSG D
*	186	96	Gravel surface
	112,446	80	Weighted Average
	112,446		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0428	0.11		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.29"
6.1	521	0.0416	1.43		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.2	51	0.0277	3.86	17.37	**Trap/Vee/Rect Channel Flow, CD** Bot.W=4.00' D=0.50' Z= 10.0 '/' Top.W=14.00' n= 0.030 Earth, grassed & winding
21.9	672	Total			

Subcatchment SE: South East



Summary for Subcatchment W: West

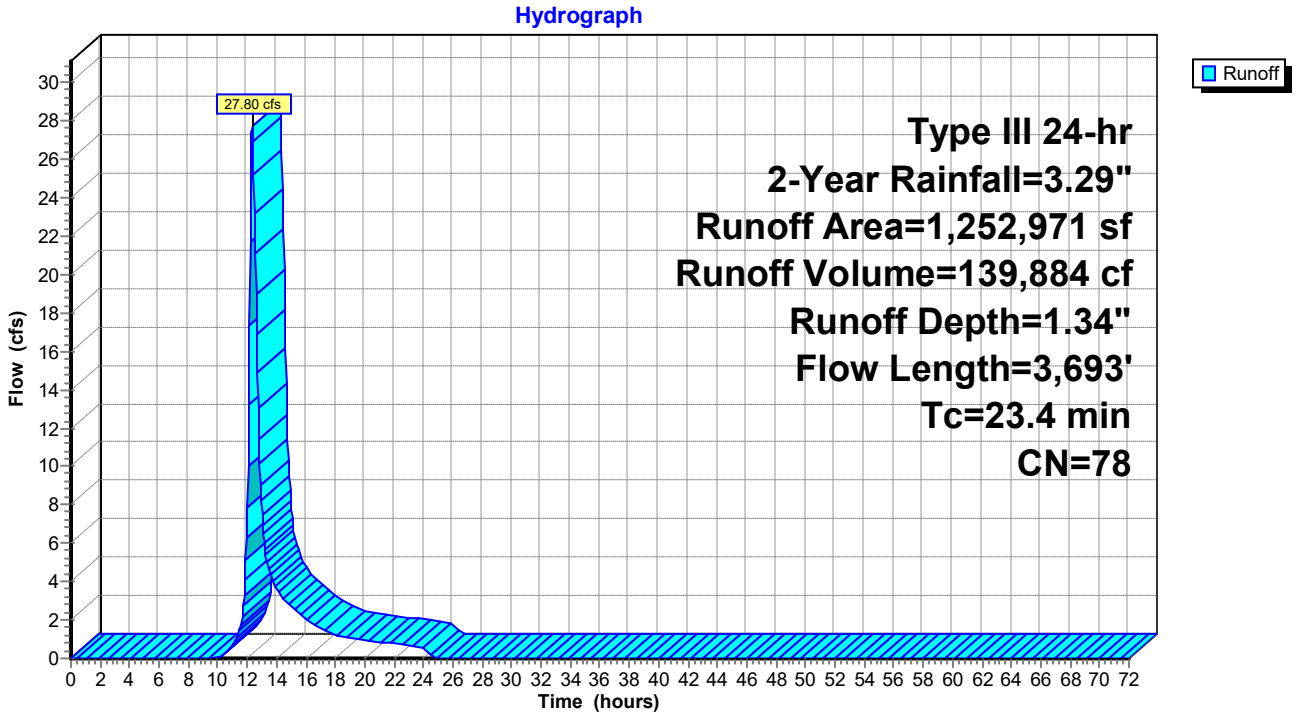
Runoff = 27.80 cfs @ 12.34 hrs, Volume= 139,884 cf, Depth= 1.34"
Routed to Reach DP-W : Watts Stream

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.29"

	Area (sf)	CN	Description
	243,483	74	Pasture/grassland/range, Good, HSG C
	405,275	80	Pasture/grassland/range, Good, HSG D
	40,930	70	Woods, Good, HSG C
	521,429	77	Woods, Good, HSG D
*	36,764	96	Gravel surface
*	5,090	98	Impervious
	1,252,971	78	Weighted Average
	1,247,881		99.59% Pervious Area
	5,090		0.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	15	0.0814	0.09		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.29"
4.8	85	0.0623	0.29		**Sheet Flow, BC** Range n= 0.130 P2= 3.29"
5.9	685	0.0763	1.93		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.1	75	0.0926	10.68	128.14	**Trap/Vee/Rect Channel Flow, DE** Bot.W=4.00' D=1.00' Z= 8.0 '/' Top.W=20.00' n= 0.030 Earth, grassed & winding
1.1	187	0.1510	2.72		**Shallow Concentrated Flow, EF** Short Grass Pasture Kv= 7.0 fps
1.7	174	0.1201	1.73		**Shallow Concentrated Flow, FG** Woodland Kv= 5.0 fps
3.1	214	0.0525	1.15		**Shallow Concentrated Flow, GH** Woodland Kv= 5.0 fps
0.6	73	0.1513	1.94		**Shallow Concentrated Flow, HI** Woodland Kv= 5.0 fps
0.9	49	0.0338	0.92		**Shallow Concentrated Flow, IJ** Woodland Kv= 5.0 fps
2.6	2,136	0.0318	13.70	945.01	**Trap/Vee/Rect Channel Flow, JK** Bot.W=11.00' D=3.00' Z= 4.0 '/' Top.W=35.00' n= 0.030 Earth, grassed & winding
23.4	3,693	Total			

Subcatchment W: West



Summary for Reach 1P: 15" CPP

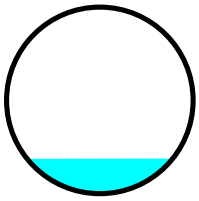
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 69,949 sf, 0.00% Impervious, Inflow Depth = 1.16" for 2-Year event
Inflow = 1.53 cfs @ 12.24 hrs, Volume= 6,734 cf
Outflow = 1.52 cfs @ 12.24 hrs, Volume= 6,734 cf, Atten= 0%, Lag= 0.1 min
Routed to Link 1L : Lag

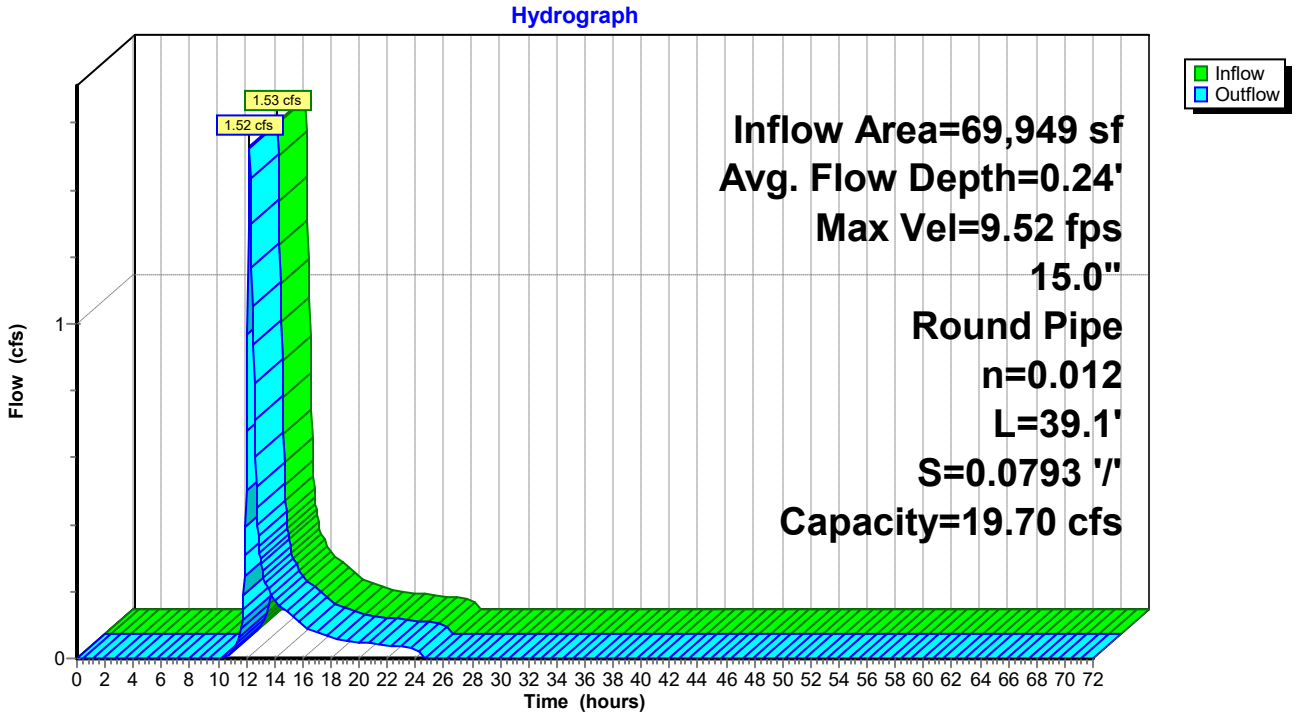
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.52 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.93 fps, Avg. Travel Time= 0.2 min

Peak Storage= 6 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.24' , Surface Width= 0.98'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 19.70 cfs

15.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 39.1' Slope= 0.0793 '/'
Inlet Invert= 1,668.60', Outlet Invert= 1,665.50'



Reach 1P: 15" CPP



Summary for Reach 2P: 15" CPP

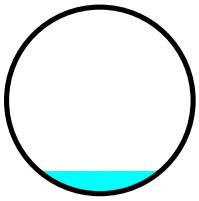
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 21,615 sf, 0.00% Impervious, Inflow Depth = 1.10" for 2-Year event
Inflow = 0.55 cfs @ 12.13 hrs, Volume= 1,976 cf
Outflow = 0.55 cfs @ 12.13 hrs, Volume= 1,976 cf, Atten= 0%, Lag= 0.1 min
Routed to Link 2L : Lag

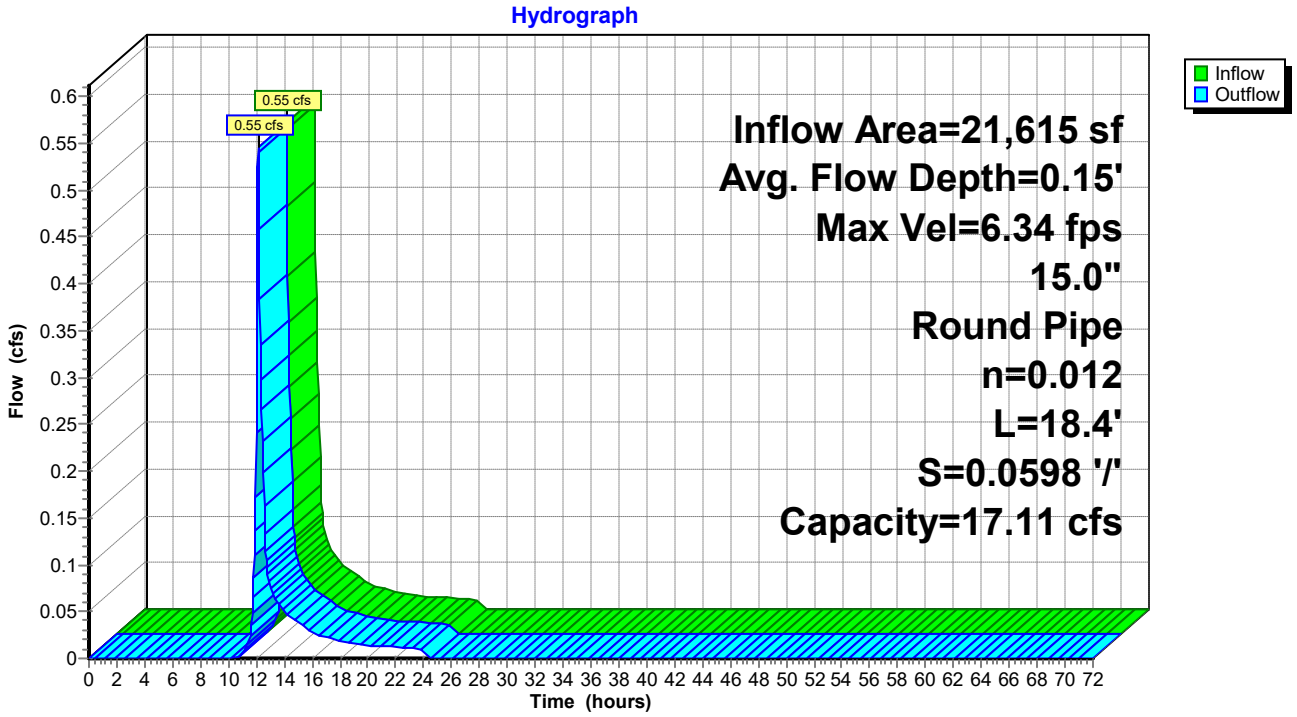
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.34 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.53 fps, Avg. Travel Time= 0.1 min

Peak Storage= 2 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 0.82'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 17.11 cfs

15.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 18.4' Slope= 0.0598 '/'
Inlet Invert= 1,669.70', Outlet Invert= 1,668.60'



Reach 2P: 15" CPP



Summary for Reach 3P: 15" CPP

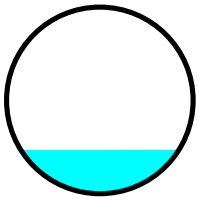
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 65,090 sf, 0.00% Impervious, Inflow Depth = 1.34" for 2-Year event
Inflow = 1.62 cfs @ 12.26 hrs, Volume= 7,267 cf
Outflow = 1.62 cfs @ 12.26 hrs, Volume= 7,267 cf, Atten= 0%, Lag= 0.1 min
Routed to Link 3L : Lag

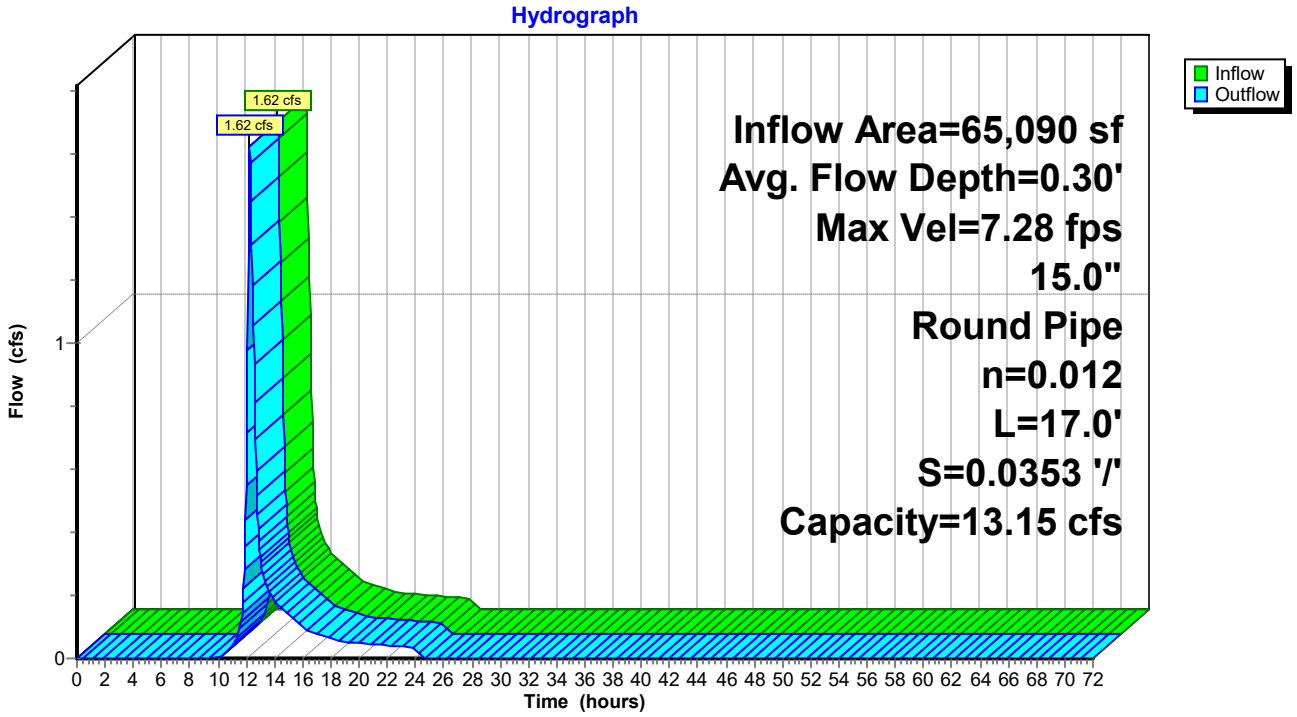
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.28 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.95 fps, Avg. Travel Time= 0.1 min

Peak Storage= 4 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.30' , Surface Width= 1.06'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 13.15 cfs

15.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 17.0' Slope= 0.0353 '/'
Inlet Invert= 1,666.50', Outlet Invert= 1,665.90'



Reach 3P: 15" CPP



Summary for Reach 5P: Culvert

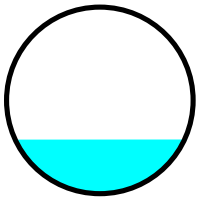
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 112,446 sf, 0.00% Impervious, Inflow Depth = 1.47" for 2-Year event
Inflow = 2.85 cfs @ 12.31 hrs, Volume= 13,788 cf
Outflow = 2.85 cfs @ 12.32 hrs, Volume= 13,788 cf, Atten= 0%, Lag= 0.1 min
Routed to Link 5L : Lag

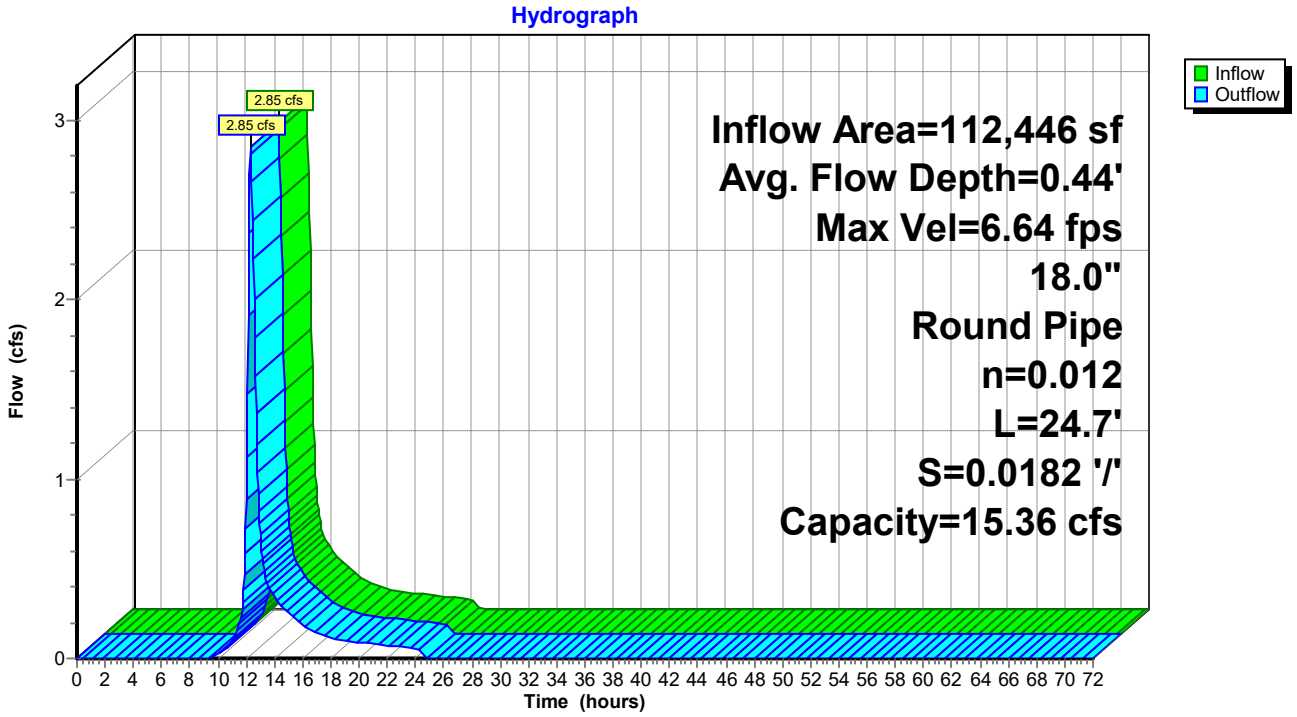
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.64 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.70 fps, Avg. Travel Time= 0.2 min

Peak Storage= 11 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.44' , Surface Width= 1.36'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 15.36 cfs

18.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 24.7' Slope= 0.0182 '/'
Inlet Invert= 1,620.00', Outlet Invert= 1,619.55'



Reach 5P: Culvert



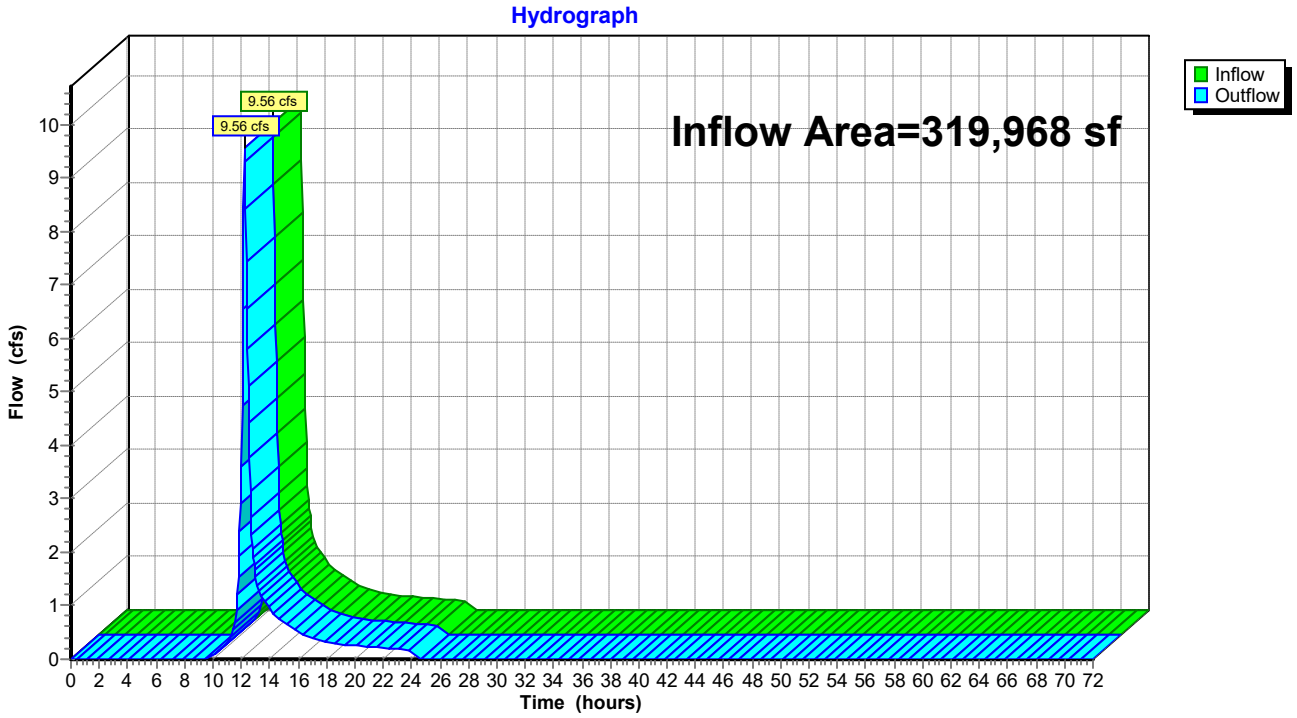
Summary for Reach DP-E: Culvert towards Wades Stream

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 319,968 sf, 0.00% Impervious, Inflow Depth = 1.47" for 2-Year event
Inflow = 9.56 cfs @ 12.22 hrs, Volume= 39,235 cf
Outflow = 9.56 cfs @ 12.22 hrs, Volume= 39,235 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP-E: Culvert towards Wades Stream



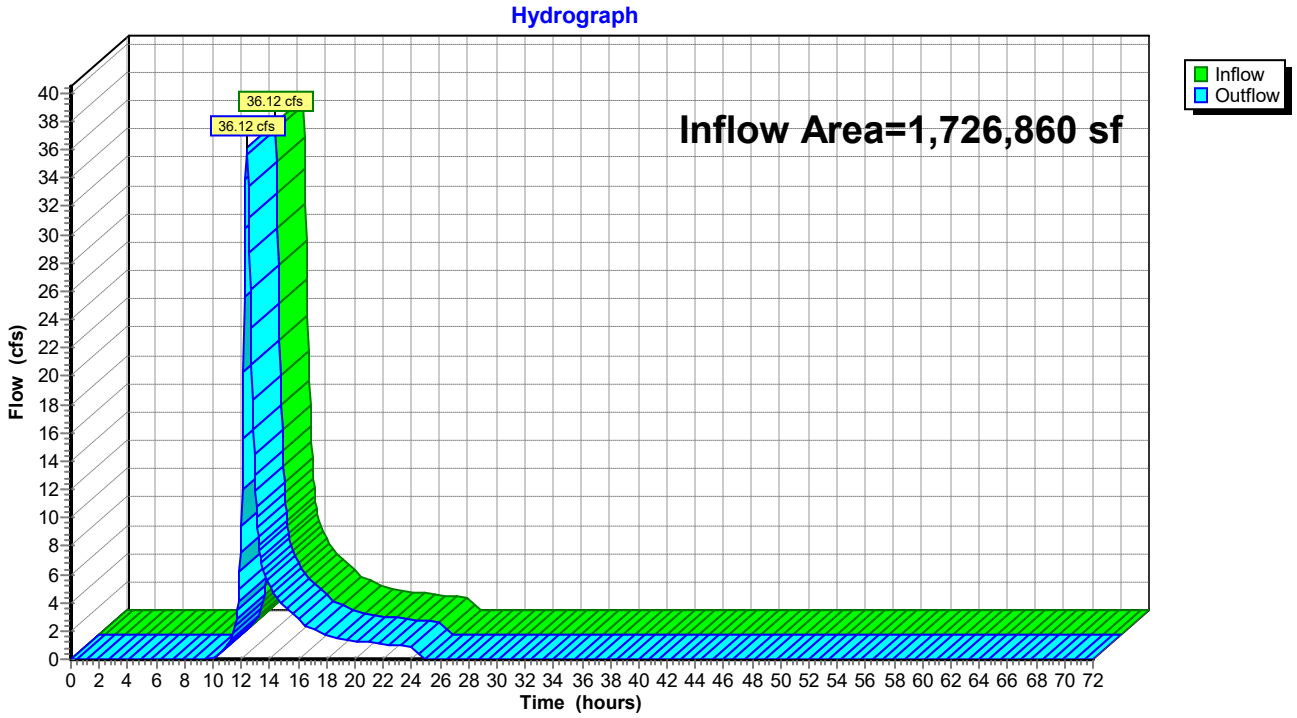
Summary for Reach DP-W: Watts Stream

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,726,860 sf, 0.29% Impervious, Inflow Depth = 1.35" for 2-Year event
Inflow = 36.12 cfs @ 12.39 hrs, Volume= 194,762 cf
Outflow = 36.12 cfs @ 12.39 hrs, Volume= 194,762 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP-W: Watts Stream



Summary for Pond 4P: 15" CPP

Inflow Area = 204,789 sf, 0.00% Impervious, Inflow Depth = 1.47" for 2-Year event
Inflow = 4.60 cfs @ 12.42 hrs, Volume= 25,112 cf
Outflow = 4.59 cfs @ 12.43 hrs, Volume= 25,113 cf, Atten= 0%, Lag= 0.7 min
Primary = 4.59 cfs @ 12.43 hrs, Volume= 25,113 cf
Routed to Link 4L : Lag
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link 4L : Lag

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1,661.89' @ 12.43 hrs Surf.Area= 98 sf Storage= 57 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.1 min (862.7 - 862.6)

Volume	Invert	Avail.Storage	Storage Description
#1	1,660.30'	837 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

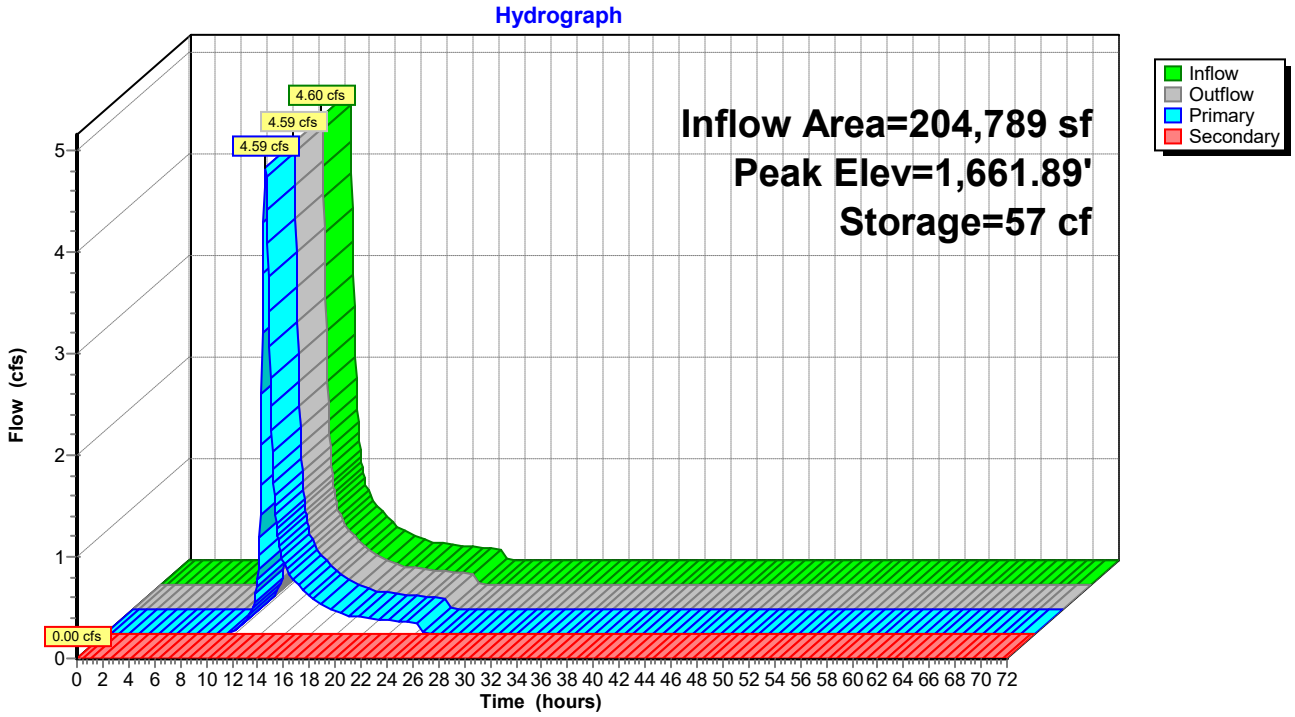
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
1,660.30	1	3.9	0	0	1
1,663.00	258	82.3	248	248	551
1,664.00	1,003	166.4	590	837	2,220

Device	Routing	Invert	Outlet Devices
#1	Primary	1,660.30'	**15.0" Round Culvert** L= 16.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1,660.30' / 1,659.80' S= 0.0305 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf
#2	Secondary	1,662.50'	**8.0' long + 35.0 '/' SideZ x 13.0' 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) 2.60 2.64 2.70 2.66 2.65 2.66 2.65 2.63

Primary OutFlow Max=4.57 cfs @ 12.43 hrs HW=1,661.88' (Free Discharge)
1=Culvert (Inlet Controls 4.57 cfs @ 3.72 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,660.30' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 4P: 15" CPP

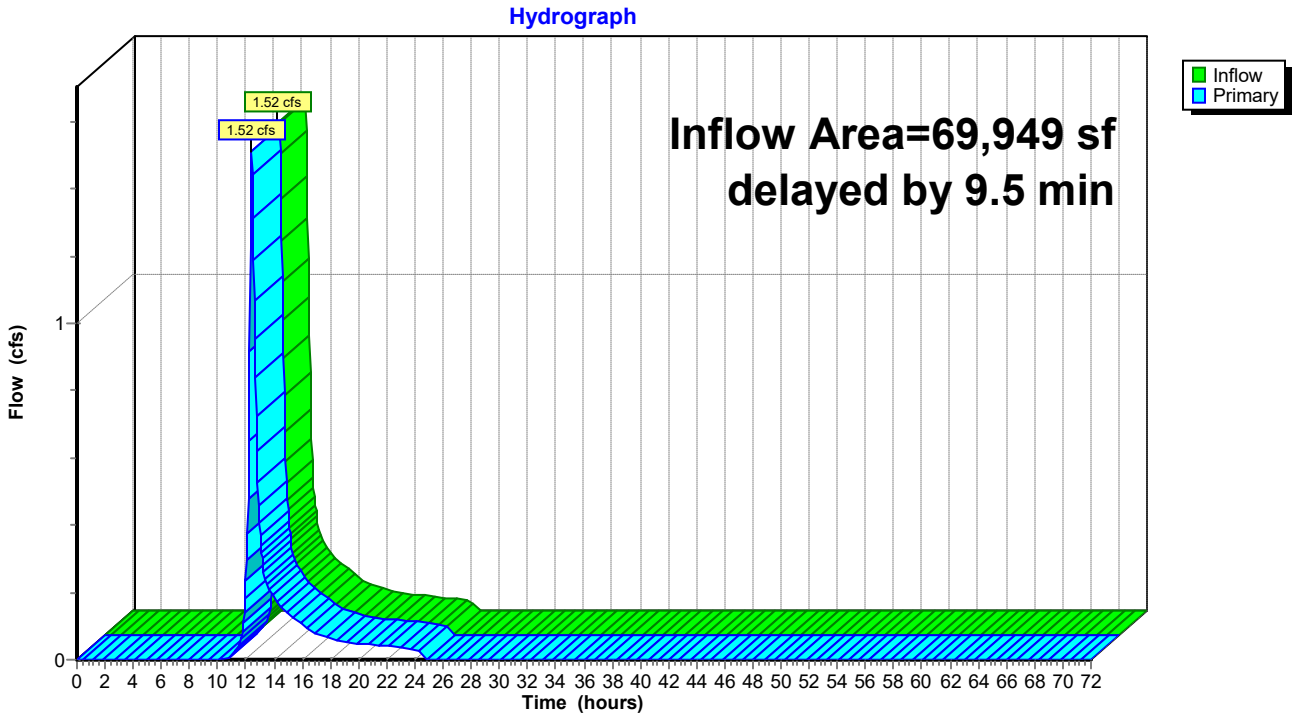


Summary for Link 1L: Lag

Inflow Area = 69,949 sf, 0.00% Impervious, Inflow Depth = 1.16" for 2-Year event
Inflow = 1.52 cfs @ 12.24 hrs, Volume= 6,734 cf
Primary = 1.52 cfs @ 12.40 hrs, Volume= 6,734 cf, Atten= 1%, Lag= 9.6 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 9.5 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: Lag

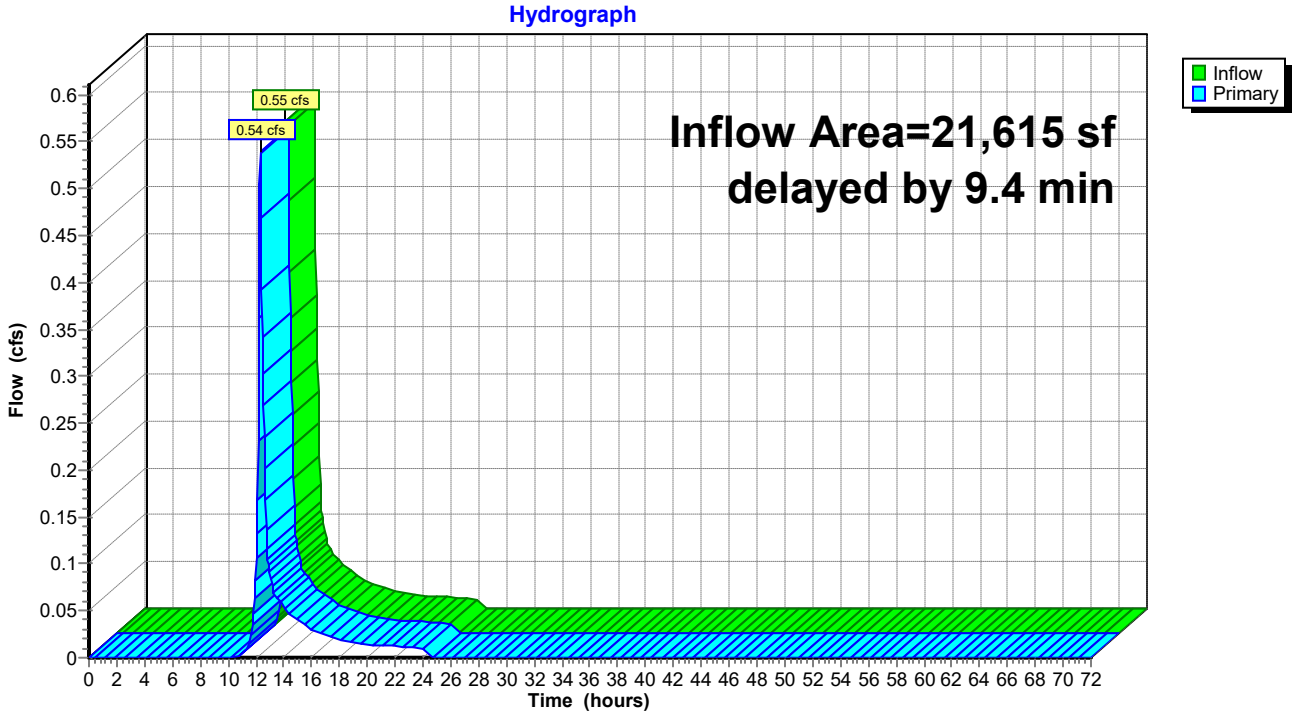


Summary for Link 2L: Lag

Inflow Area = 21,615 sf, 0.00% Impervious, Inflow Depth = 1.10" for 2-Year event
Inflow = 0.55 cfs @ 12.13 hrs, Volume= 1,976 cf
Primary = 0.54 cfs @ 12.29 hrs, Volume= 1,976 cf, Atten= 1%, Lag= 9.5 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 9.4 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 2L: Lag

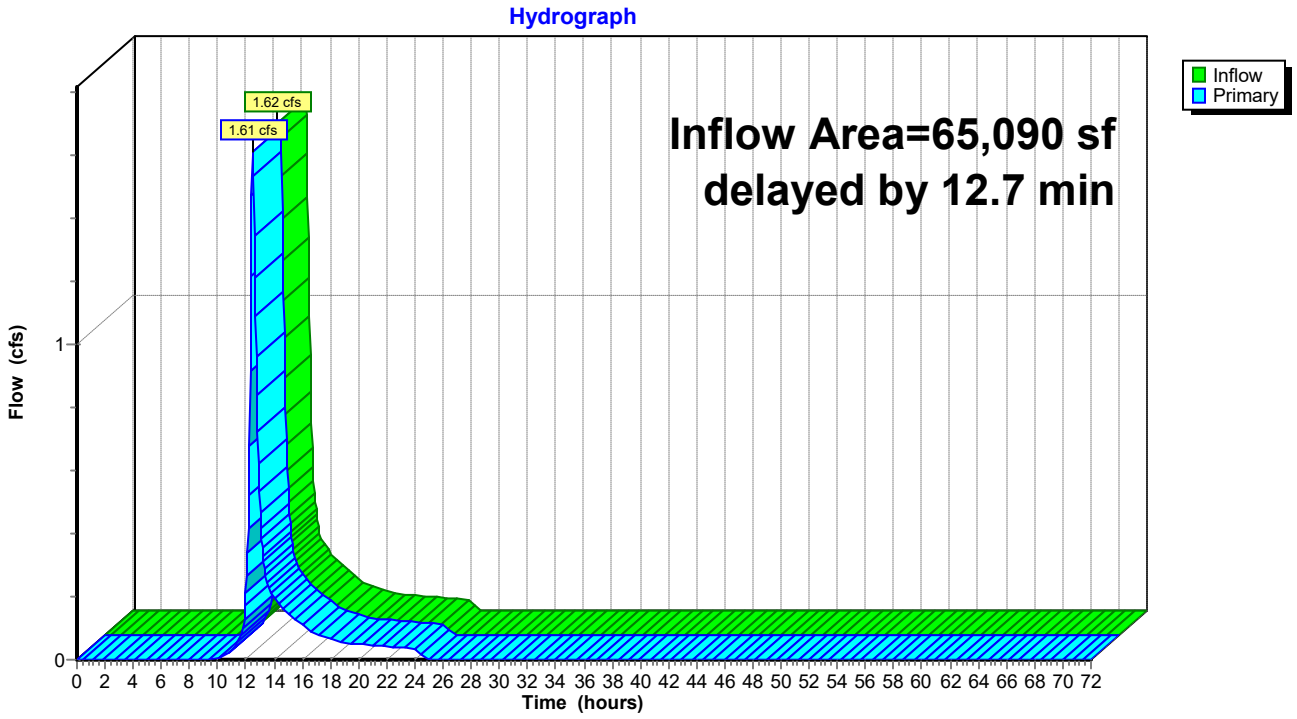


Summary for Link 3L: Lag

Inflow Area = 65,090 sf, 0.00% Impervious, Inflow Depth = 1.34" for 2-Year event
Inflow = 1.62 cfs @ 12.26 hrs, Volume= 7,267 cf
Primary = 1.61 cfs @ 12.47 hrs, Volume= 7,267 cf, Atten= 1%, Lag= 12.7 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 12.7 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 3L: Lag

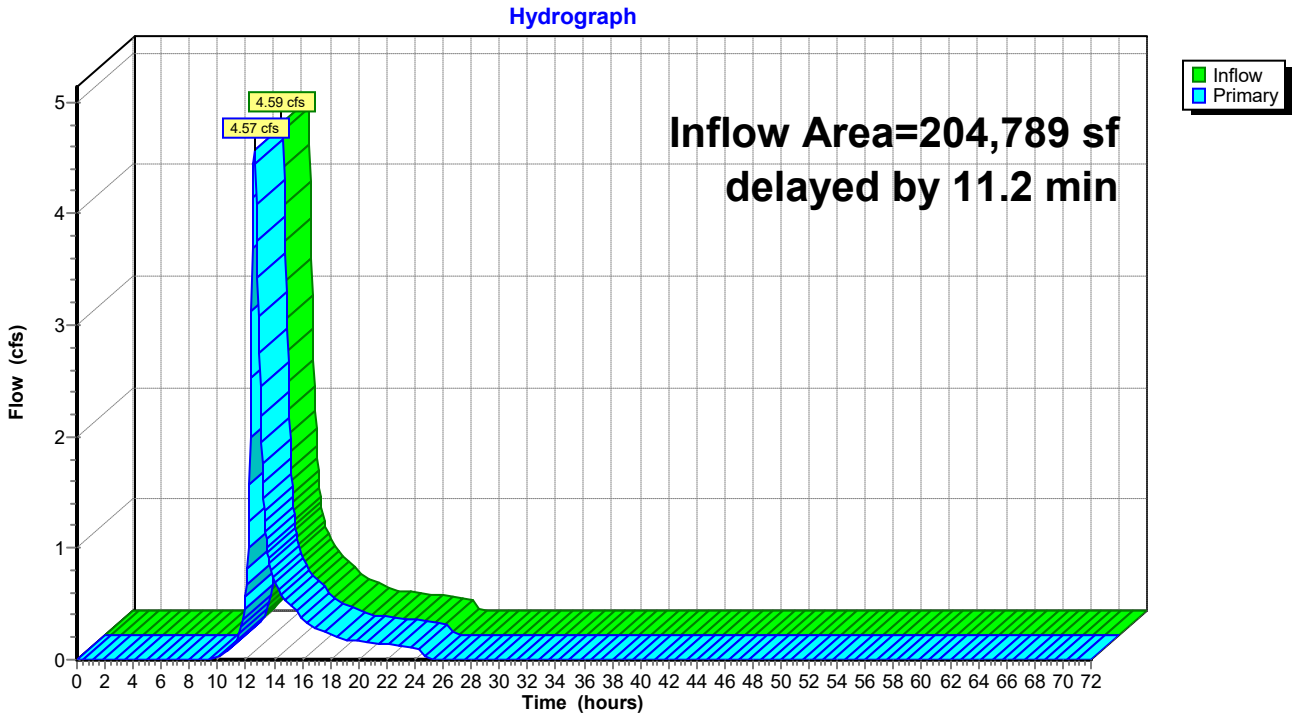


Summary for Link 4L: Lag

Inflow Area = 204,789 sf, 0.00% Impervious, Inflow Depth = 1.47" for 2-Year event
Inflow = 4.59 cfs @ 12.43 hrs, Volume= 25,113 cf
Primary = 4.57 cfs @ 12.62 hrs, Volume= 25,113 cf, Atten= 0%, Lag= 11.2 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 11.2 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 4L: Lag

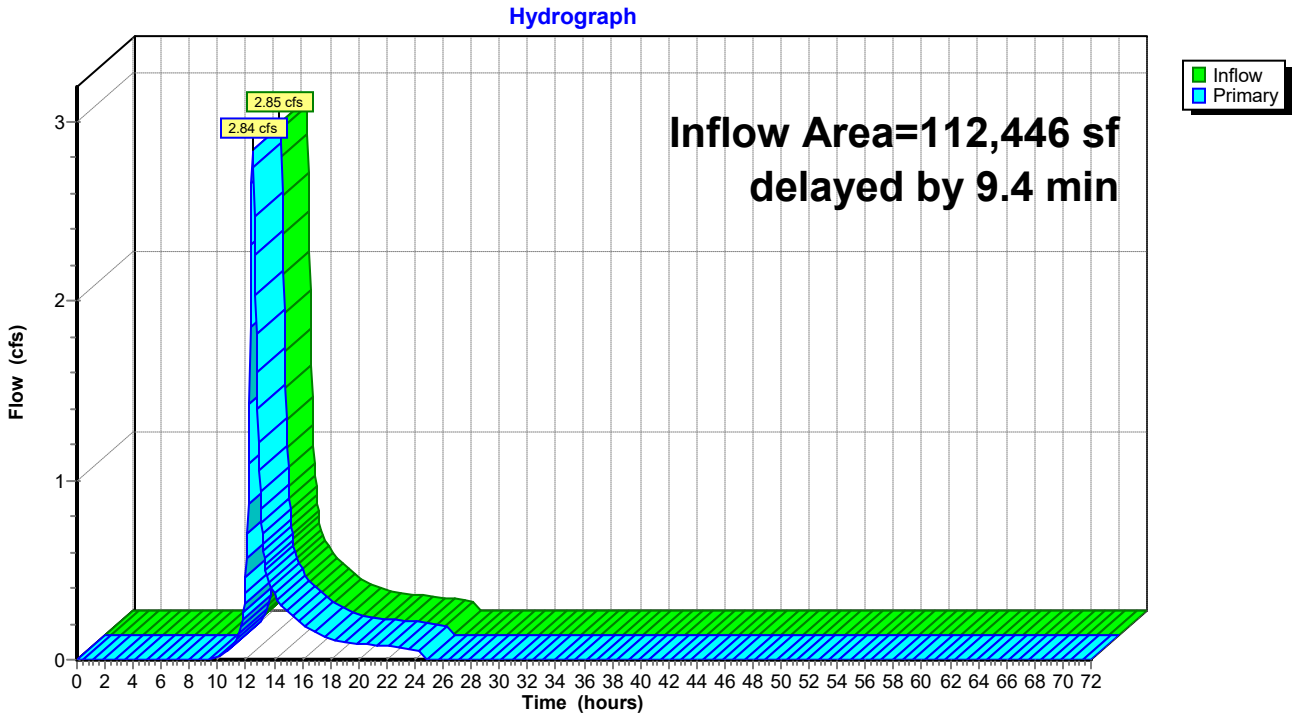


Summary for Link 5L: Lag

Inflow Area = 112,446 sf, 0.00% Impervious, Inflow Depth = 1.47" for 2-Year event
Inflow = 2.85 cfs @ 12.32 hrs, Volume= 13,788 cf
Primary = 2.84 cfs @ 12.47 hrs, Volume= 13,788 cf, Atten= 0%, Lag= 9.4 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 9.4 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 5L: Lag

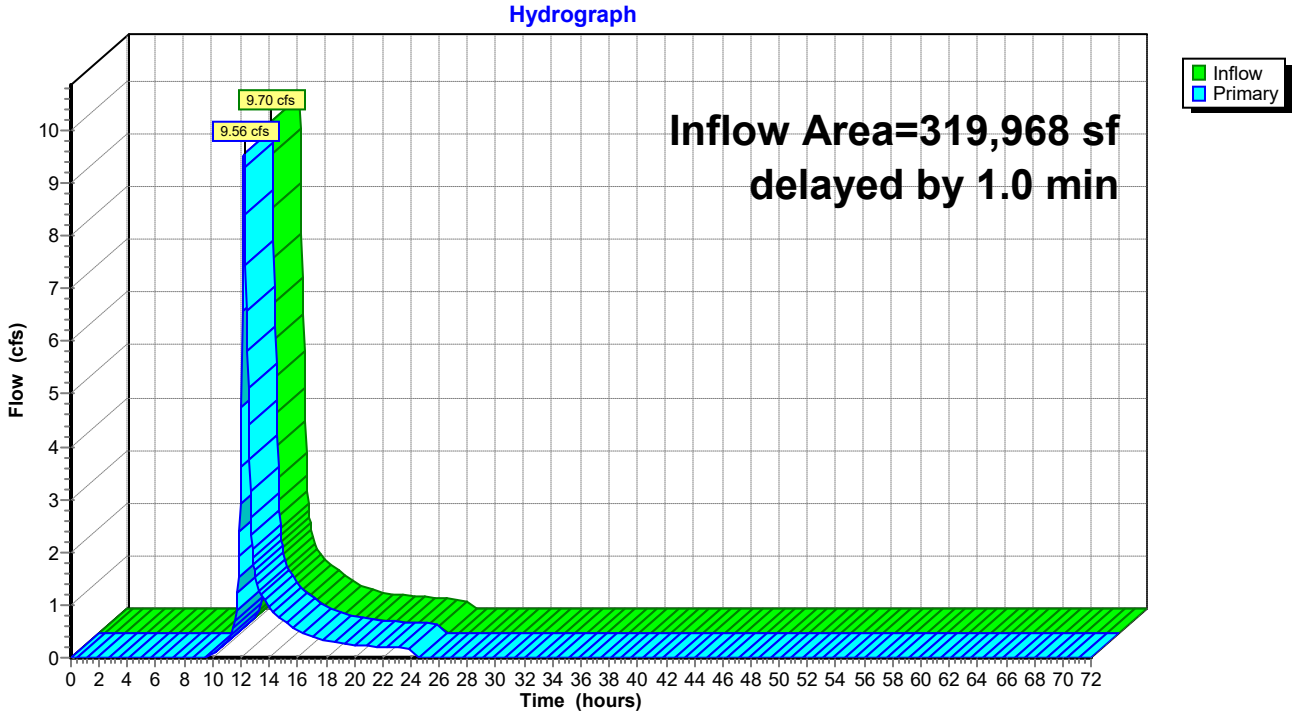


Summary for Link 6L:

Inflow Area = 319,968 sf, 0.00% Impervious, Inflow Depth = 1.47" for 2-Year event
Inflow = 9.70 cfs @ 12.20 hrs, Volume= 39,235 cf
Primary = 9.56 cfs @ 12.22 hrs, Volume= 39,235 cf, Atten= 1%, Lag= 1.0 min
Routed to Reach DP-E : Culvert towards Wades Stream

Primary outflow = Inflow delayed by 1.0 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 6L:



Summary for Subcatchment M: Middle

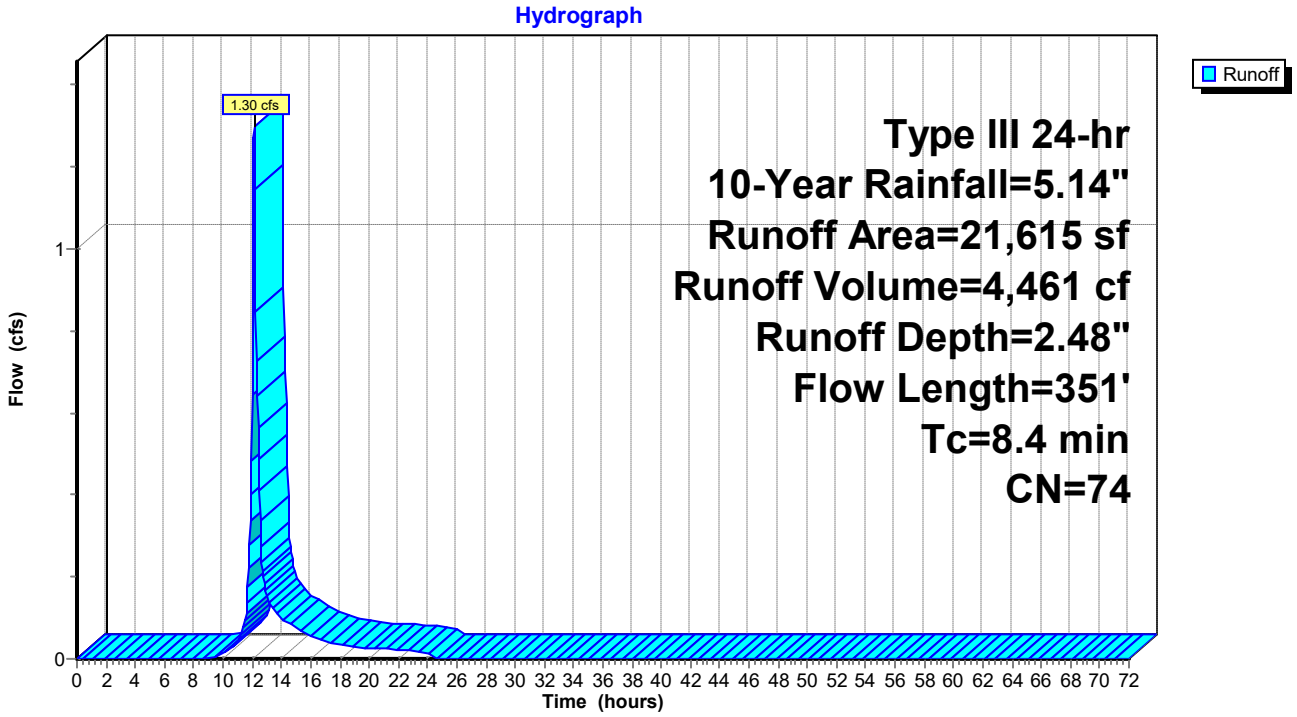
Runoff = 1.30 cfs @ 12.12 hrs, Volume= 4,461 cf, Depth= 2.48"
Routed to Reach 2P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.14"

Area (sf)	CN	Description
21,615	74	Pasture/grassland/range, Good, HSG C
21,615		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	95	0.0626	0.30		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
2.3	214	0.0510	1.58		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.9	42	0.0126	0.79		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
8.4	351	Total			

Subcatchment M: Middle



Summary for Subcatchment ME: Middle East

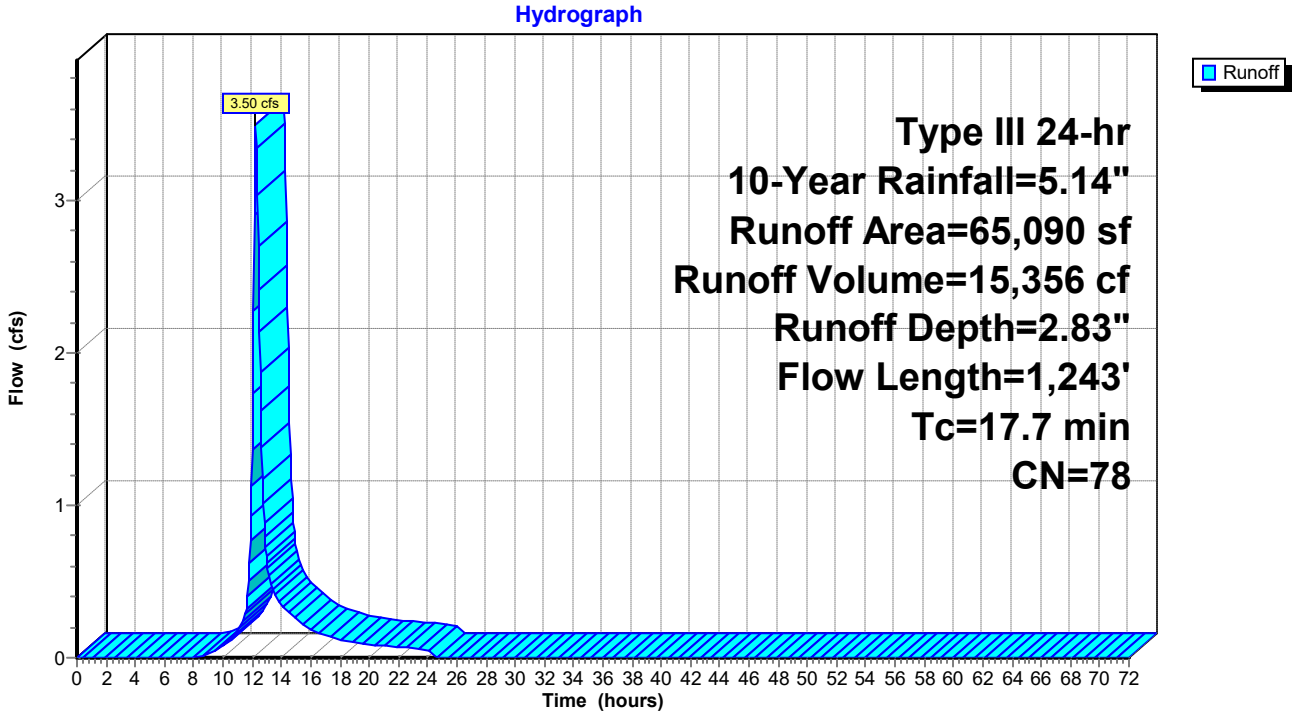
Runoff = 3.50 cfs @ 12.25 hrs, Volume= 15,356 cf, Depth= 2.83"
Routed to Reach 3P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.14"

Area (sf)	CN	Description
23,596	74	Pasture/grassland/range, Good, HSG C
41,494	80	Pasture/grassland/range, Good, HSG D
65,090	78	Weighted Average
65,090		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.0678	0.32		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
7.1	708	0.0566	1.67		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
3.1	295	0.0513	1.59		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
2.2	140	0.0223	1.05		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
17.7	1,243	Total			

Subcatchment ME: Middle East



Summary for Subcatchment MW: Middle West

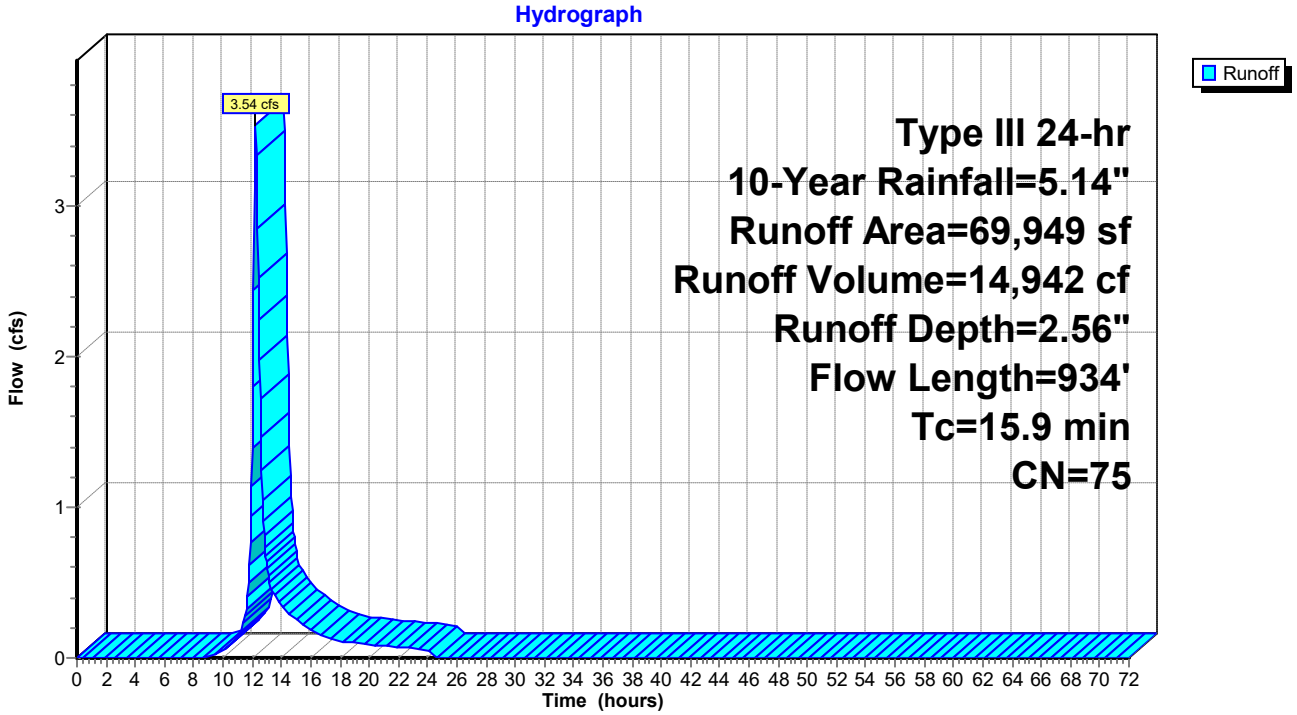
Runoff = 3.54 cfs @ 12.22 hrs, Volume= 14,942 cf, Depth= 2.56"
Routed to Reach 1P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.14"

Area (sf)	CN	Description
54,742	74	Pasture/grassland/range, Good, HSG C
15,207	80	Pasture/grassland/range, Good, HSG D
69,949	75	Weighted Average
69,949		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	100	0.0582	0.30		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
6.2	695	0.0716	1.87		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
4.1	139	0.0066	0.57		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
15.9	934	Total			

Subcatchment MW: Middle West



Summary for Subcatchment N: North

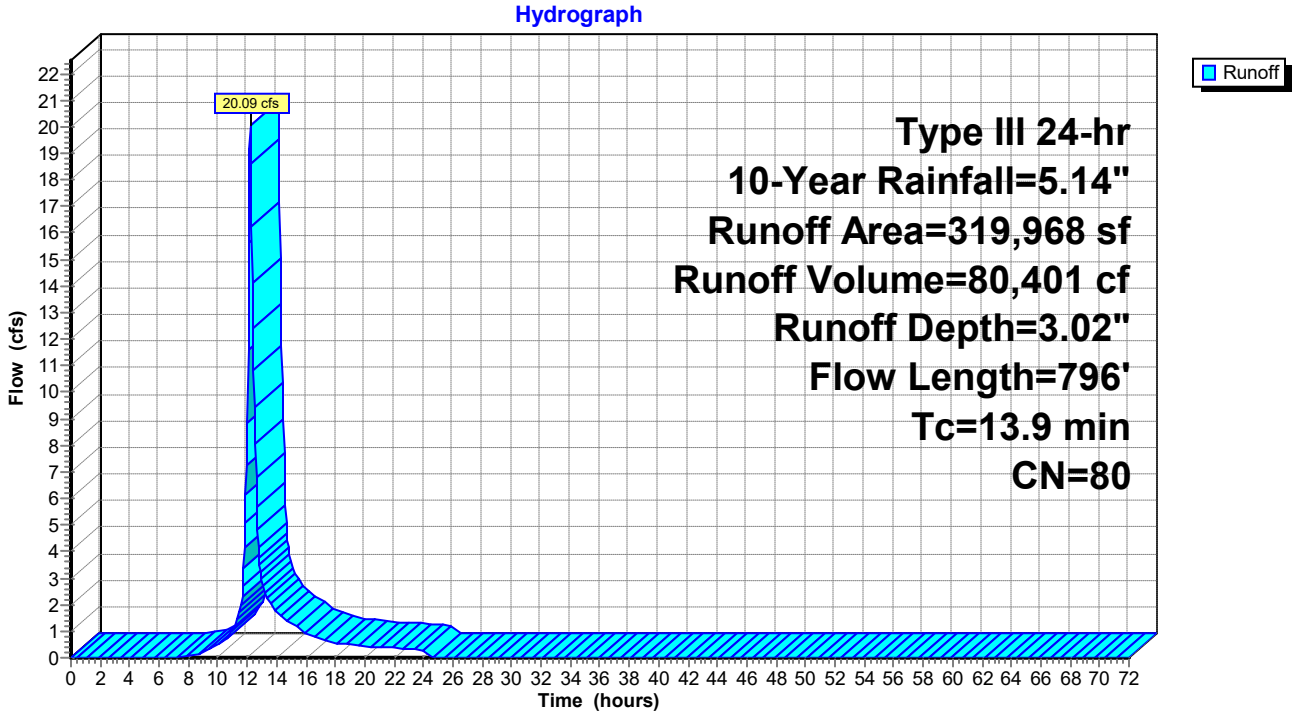
Runoff = 20.09 cfs @ 12.19 hrs, Volume= 80,401 cf, Depth= 3.02"
Routed to Link 6L :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.14"

Area (sf)	CN	Description
290,713	80	Pasture/grassland/range, Good, HSG D
29,255	77	Woods, Good, HSG D
319,968	80	Weighted Average
319,968		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	15	0.0850	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.29"
4.7	85	0.0656	0.30		**Sheet Flow, BC** Range n= 0.130 P2= 3.29"
6.5	689	0.0643	1.78		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.1	7	0.0590	1.21		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
13.9	796	Total			

Subcatchment N: North



Summary for Subcatchment NE: North East

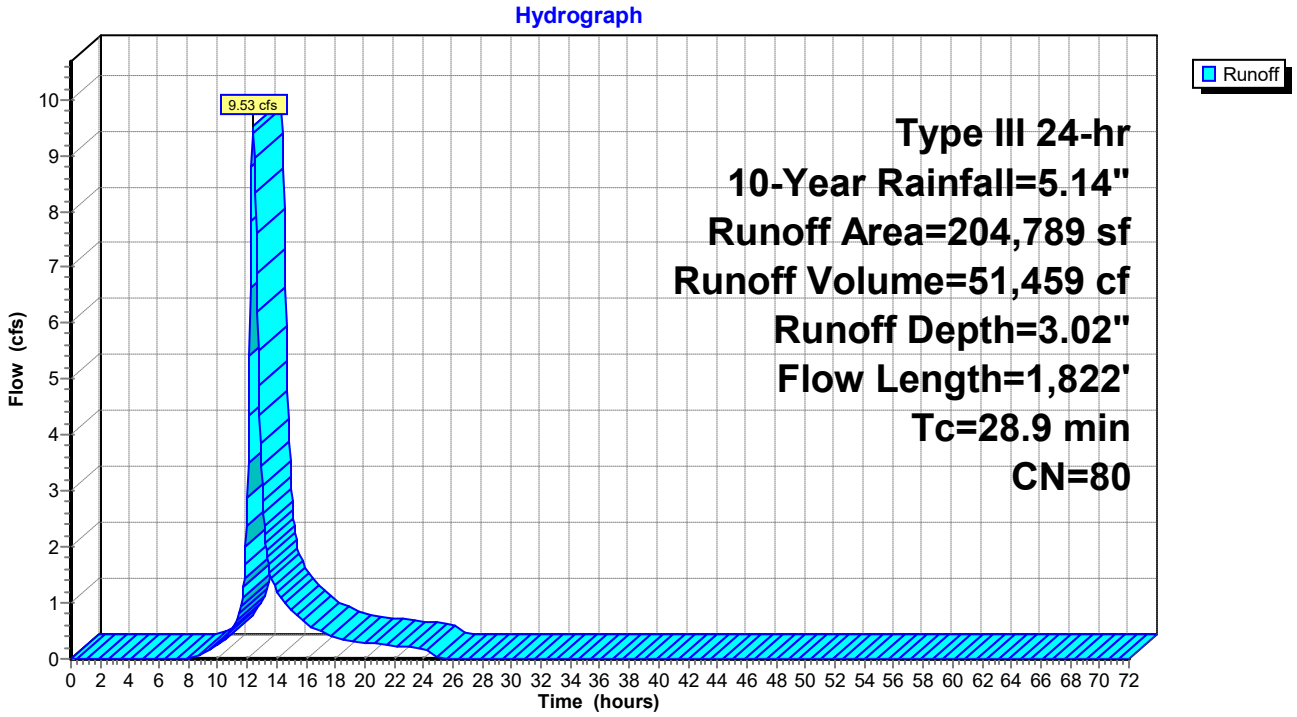
Runoff = 9.53 cfs @ 12.40 hrs, Volume= 51,459 cf, Depth= 3.02"
Routed to Pond 4P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.14"

Area (sf)	CN	Description
195,115	80	Pasture/grassland/range, Good, HSG D
9,674	77	Woods, Good, HSG D
204,789	80	Weighted Average
204,789		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	100	0.0558	0.29		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
23.2	1,722	0.0313	1.24		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
28.9	1,822	Total			

Subcatchment NE: North East



Summary for Subcatchment SE: South East

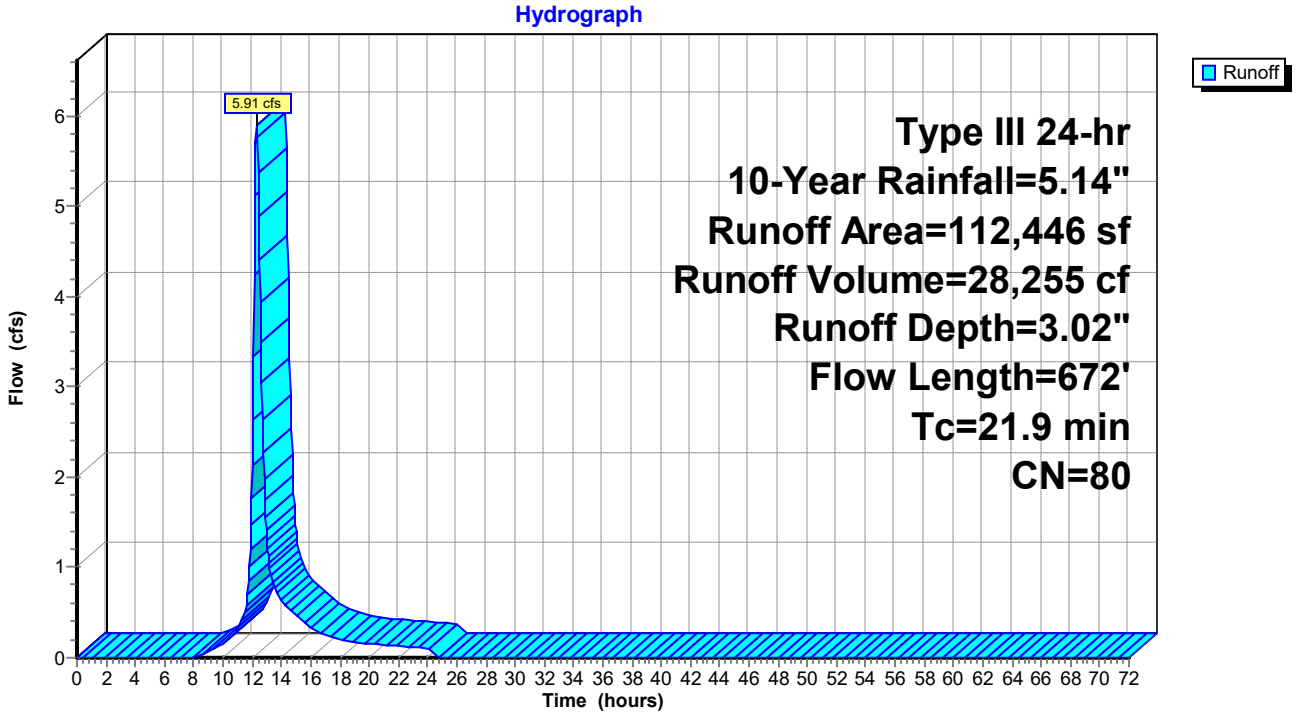
Runoff = 5.91 cfs @ 12.30 hrs, Volume= 28,255 cf, Depth= 3.02"
Routed to Reach 5P : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.14"

	Area (sf)	CN	Description
	110,724	80	Pasture/grassland/range, Good, HSG D
	1,536	77	Woods, Good, HSG D
*	186	96	Gravel surface
	112,446	80	Weighted Average
	112,446		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0428	0.11		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.29"
6.1	521	0.0416	1.43		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.2	51	0.0277	3.86	17.37	**Trap/Vee/Rect Channel Flow, CD** Bot.W=4.00' D=0.50' Z= 10.0 '/' Top.W=14.00' n= 0.030 Earth, grassed & winding
21.9	672	Total			

Subcatchment SE: South East



Summary for Subcatchment W: West

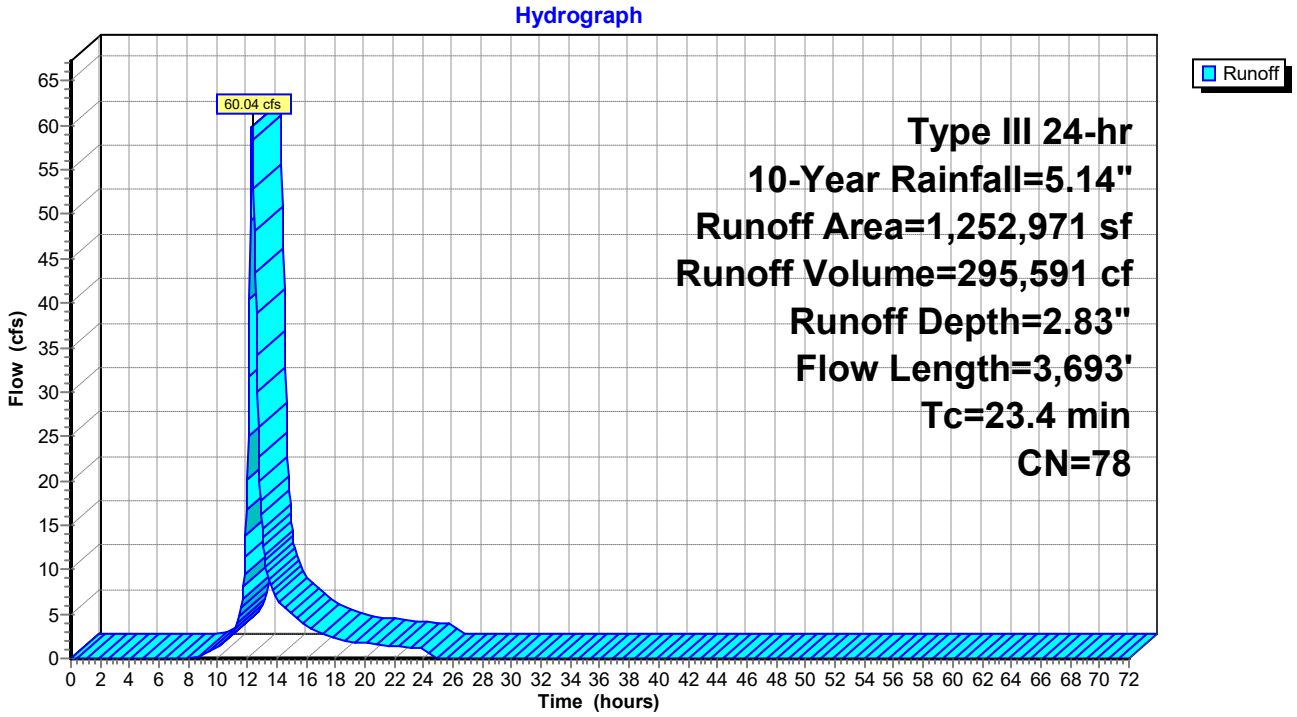
Runoff = 60.04 cfs @ 12.33 hrs, Volume= 295,591 cf, Depth= 2.83"
Routed to Reach DP-W : Watts Stream

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.14"

	Area (sf)	CN	Description
	243,483	74	Pasture/grassland/range, Good, HSG C
	405,275	80	Pasture/grassland/range, Good, HSG D
	40,930	70	Woods, Good, HSG C
	521,429	77	Woods, Good, HSG D
*	36,764	96	Gravel surface
*	5,090	98	Impervious
	1,252,971	78	Weighted Average
	1,247,881		99.59% Pervious Area
	5,090		0.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	15	0.0814	0.09		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.29"
4.8	85	0.0623	0.29		**Sheet Flow, BC** Range n= 0.130 P2= 3.29"
5.9	685	0.0763	1.93		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.1	75	0.0926	10.68	128.14	**Trap/Vee/Rect Channel Flow, DE** Bot.W=4.00' D=1.00' Z= 8.0 '/' Top.W=20.00' n= 0.030 Earth, grassed & winding
1.1	187	0.1510	2.72		**Shallow Concentrated Flow, EF** Short Grass Pasture Kv= 7.0 fps
1.7	174	0.1201	1.73		**Shallow Concentrated Flow, FG** Woodland Kv= 5.0 fps
3.1	214	0.0525	1.15		**Shallow Concentrated Flow, GH** Woodland Kv= 5.0 fps
0.6	73	0.1513	1.94		**Shallow Concentrated Flow, HI** Woodland Kv= 5.0 fps
0.9	49	0.0338	0.92		**Shallow Concentrated Flow, IJ** Woodland Kv= 5.0 fps
2.6	2,136	0.0318	13.70	945.01	**Trap/Vee/Rect Channel Flow, JK** Bot.W=11.00' D=3.00' Z= 4.0 '/' Top.W=35.00' n= 0.030 Earth, grassed & winding
23.4	3,693	Total			

Subcatchment W: West



Summary for Reach 1P: 15" CPP

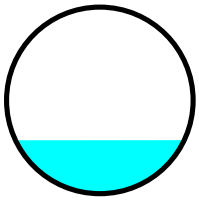
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 69,949 sf, 0.00% Impervious, Inflow Depth = 2.56" for 10-Year event
Inflow = 3.54 cfs @ 12.22 hrs, Volume= 14,942 cf
Outflow = 3.54 cfs @ 12.22 hrs, Volume= 14,942 cf, Atten= 0%, Lag= 0.1 min
Routed to Link 1L : Lag

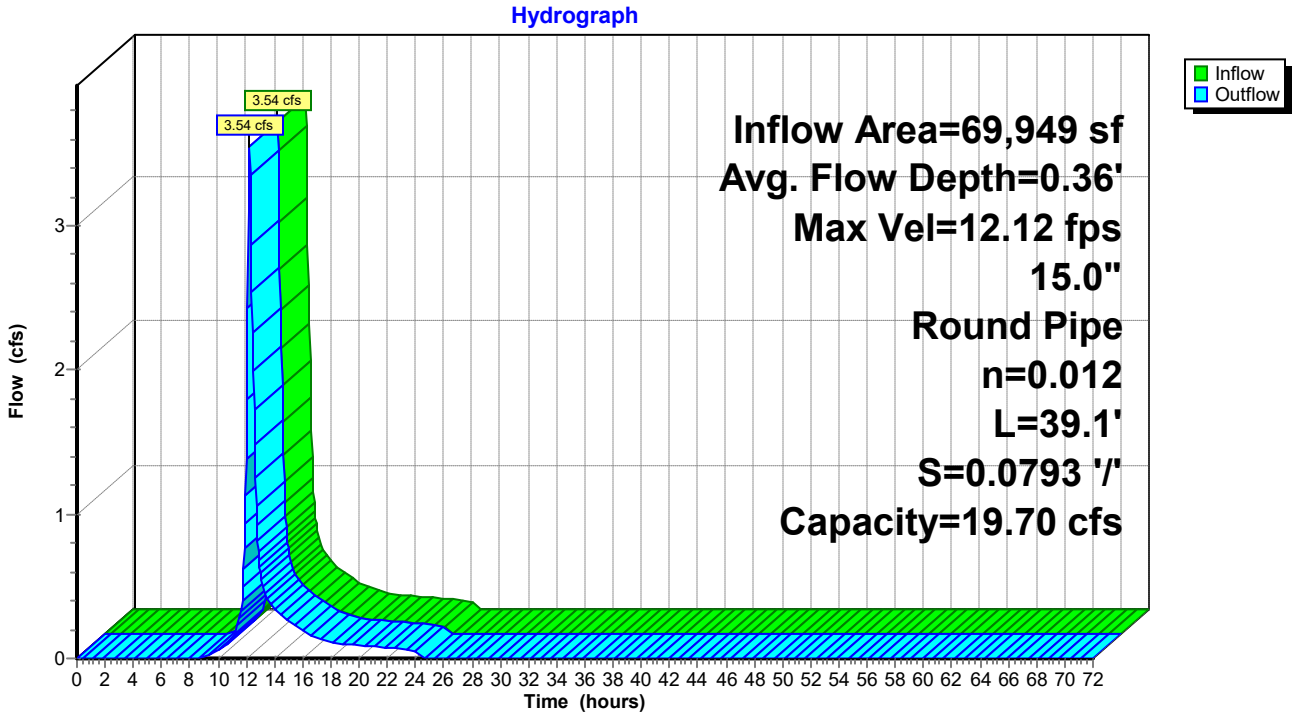
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 12.12 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.71 fps, Avg. Travel Time= 0.1 min

Peak Storage= 11 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.36' , Surface Width= 1.13'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 19.70 cfs

15.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 39.1' Slope= 0.0793 '/'
Inlet Invert= 1,668.60', Outlet Invert= 1,665.50'



Reach 1P: 15" CPP



Summary for Reach 2P: 15" CPP

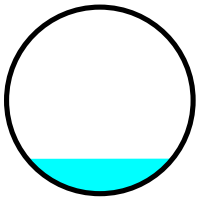
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 21,615 sf, 0.00% Impervious, Inflow Depth = 2.48" for 10-Year event
Inflow = 1.30 cfs @ 12.12 hrs, Volume= 4,461 cf
Outflow = 1.30 cfs @ 12.12 hrs, Volume= 4,461 cf, Atten= 0%, Lag= 0.1 min
Routed to Link 2L : Lag

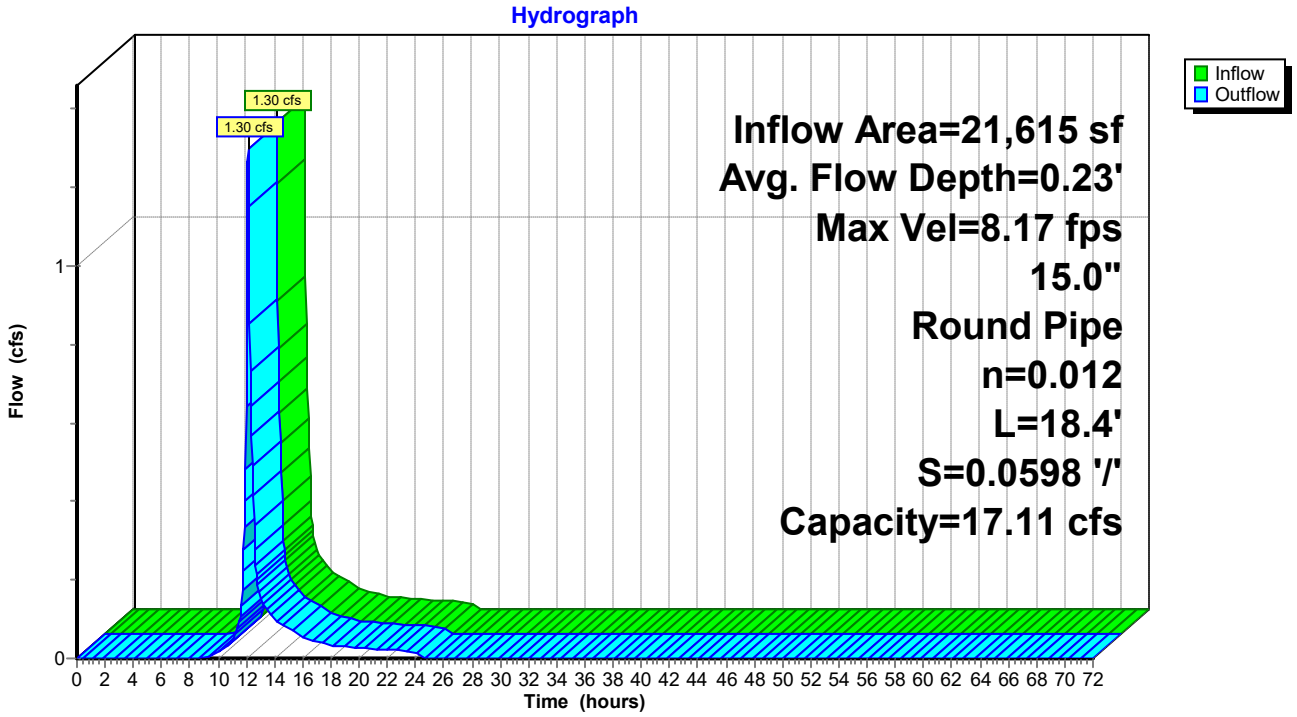
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.17 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 3.04 fps, Avg. Travel Time= 0.1 min

Peak Storage= 3 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 0.97'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 17.11 cfs

15.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 18.4' Slope= 0.0598 '/'
Inlet Invert= 1,669.70', Outlet Invert= 1,668.60'



Reach 2P: 15" CPP



Summary for Reach 3P: 15" CPP

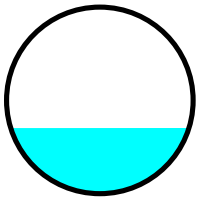
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 65,090 sf, 0.00% Impervious, Inflow Depth = 2.83" for 10-Year event
Inflow = 3.50 cfs @ 12.25 hrs, Volume= 15,356 cf
Outflow = 3.50 cfs @ 12.25 hrs, Volume= 15,356 cf, Atten= 0%, Lag= 0.1 min
Routed to Link 3L : Lag

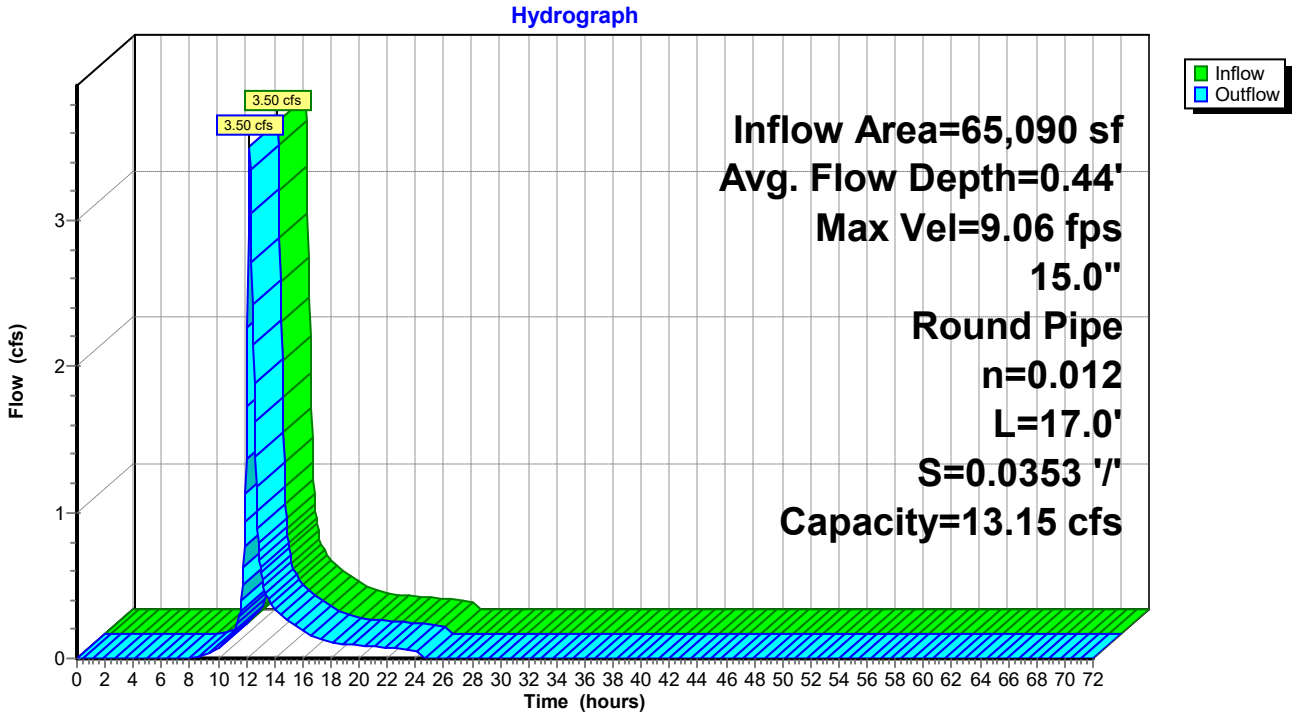
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.06 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 3.49 fps, Avg. Travel Time= 0.1 min

Peak Storage= 7 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.44' , Surface Width= 1.19'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 13.15 cfs

15.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 17.0' Slope= 0.0353 '/'
Inlet Invert= 1,666.50', Outlet Invert= 1,665.90'



Reach 3P: 15" CPP



Summary for Reach 5P: Culvert

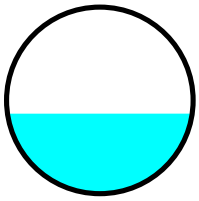
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 112,446 sf, 0.00% Impervious, Inflow Depth = 3.02" for 10-Year event
Inflow = 5.91 cfs @ 12.30 hrs, Volume= 28,255 cf
Outflow = 5.91 cfs @ 12.31 hrs, Volume= 28,255 cf, Atten= 0%, Lag= 0.1 min
Routed to Link 5L : Lag

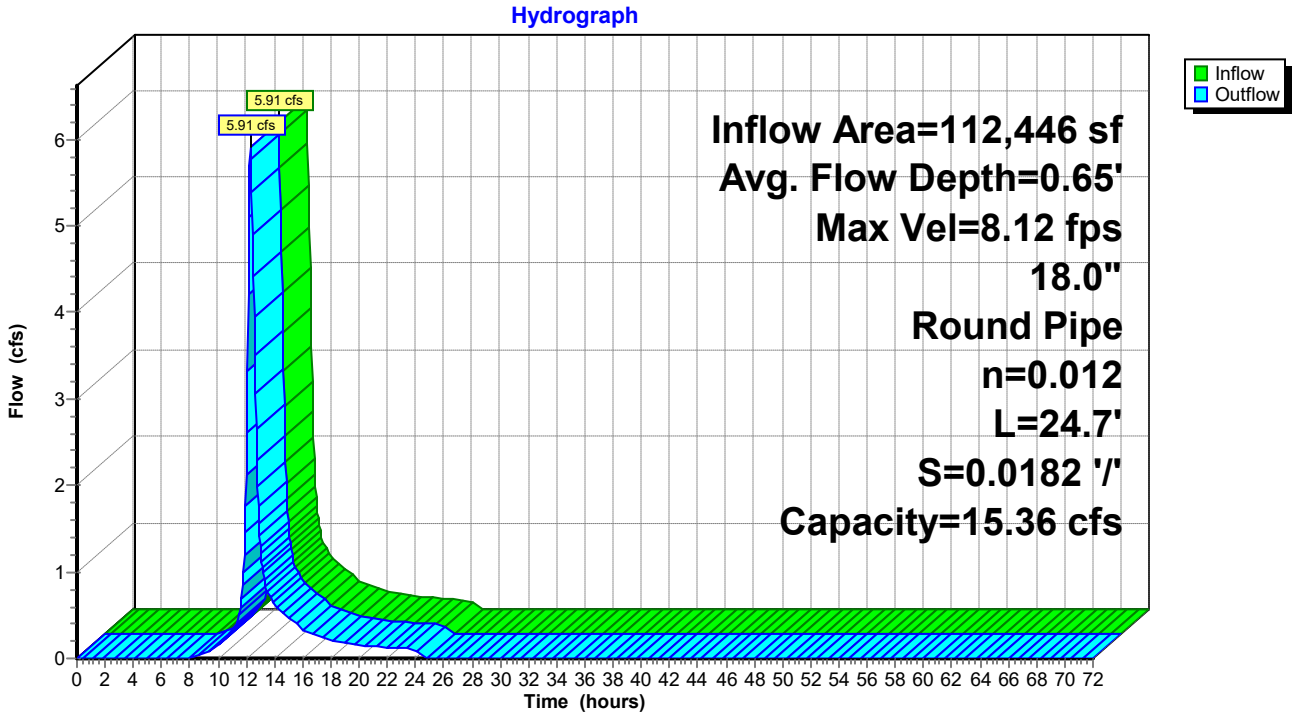
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.12 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.18 fps, Avg. Travel Time= 0.1 min

Peak Storage= 18 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.65' , Surface Width= 1.49'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 15.36 cfs

18.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 24.7' Slope= 0.0182 '/'
Inlet Invert= 1,620.00', Outlet Invert= 1,619.55'



Reach 5P: Culvert



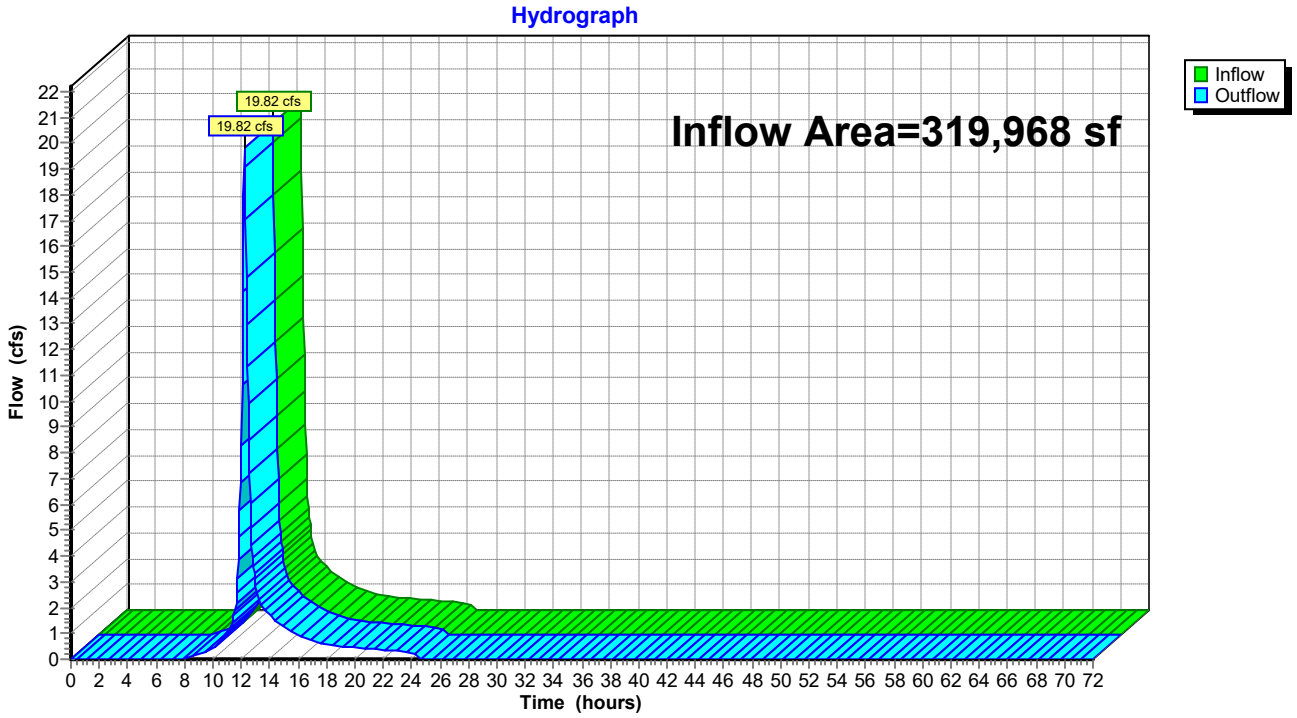
Summary for Reach DP-E: Culvert towards Wades Stream

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 319,968 sf, 0.00% Impervious, Inflow Depth = 3.02" for 10-Year event
Inflow = 19.82 cfs @ 12.21 hrs, Volume= 80,401 cf
Outflow = 19.82 cfs @ 12.21 hrs, Volume= 80,401 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP-E: Culvert towards Wades Stream



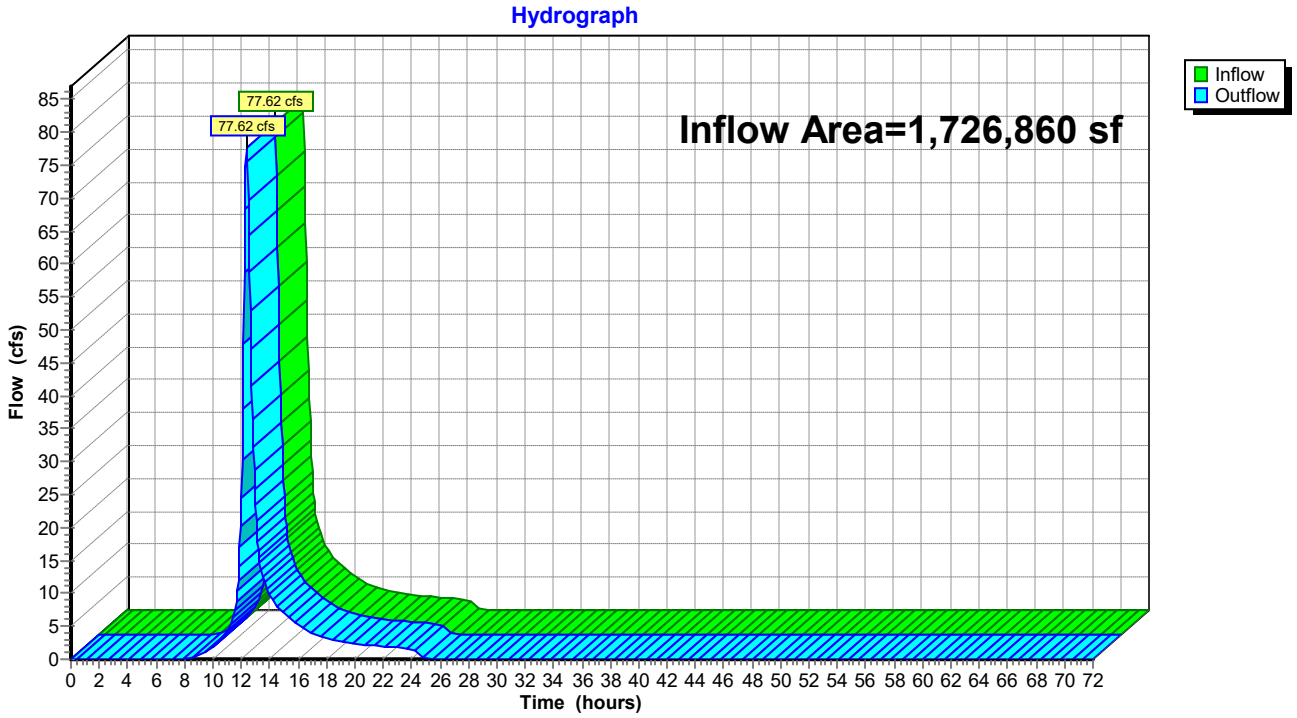
Summary for Reach DP-W: Watts Stream

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,726,860 sf, 0.29% Impervious, Inflow Depth = 2.85" for 10-Year event
Inflow = 77.62 cfs @ 12.37 hrs, Volume= 410,024 cf
Outflow = 77.62 cfs @ 12.37 hrs, Volume= 410,024 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP-W: Watts Stream



Summary for Pond 4P: 15" CPP

Inflow Area = 204,789 sf, 0.00% Impervious, Inflow Depth = 3.02" for 10-Year event
Inflow = 9.53 cfs @ 12.40 hrs, Volume= 51,459 cf
Outflow = 9.50 cfs @ 12.40 hrs, Volume= 51,419 cf, Atten= 0%, Lag= 0.2 min
Primary = 6.22 cfs @ 12.40 hrs, Volume= 47,521 cf
Routed to Link 4L : Lag
Secondary = 3.28 cfs @ 12.40 hrs, Volume= 3,899 cf
Routed to Link 4L : Lag

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1,662.70' @ 12.40 hrs Surf.Area= 208 sf Storage= 179 cf

Plug-Flow detention time= 0.7 min calculated for 51,384 cf (100% of inflow)
Center-of-Mass det. time= 0.3 min (842.1 - 841.8)

Volume	Invert	Avail.Storage	Storage Description
#1	1,660.30'	837 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

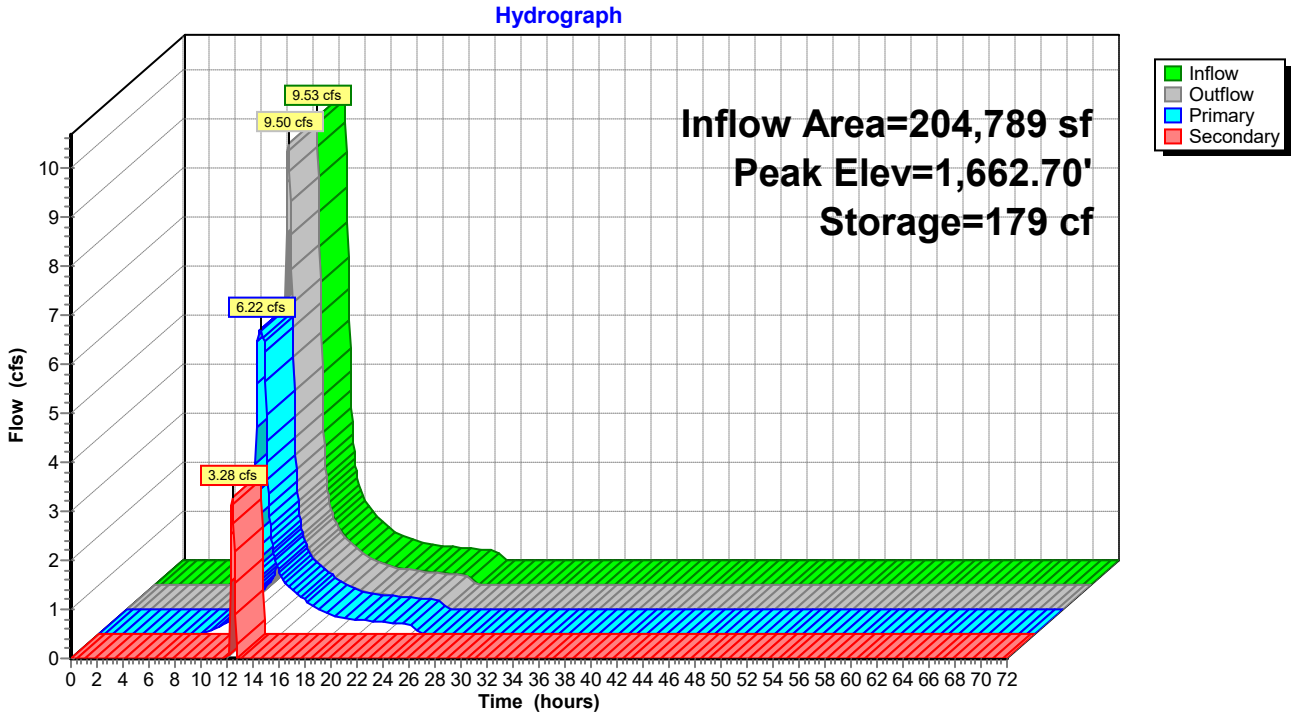
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
1,660.30	1	3.9	0	0	1
1,663.00	258	82.3	248	248	551
1,664.00	1,003	166.4	590	837	2,220

Device	Routing	Invert	Outlet Devices
#1	Primary	1,660.30'	**15.0" Round Culvert** L= 16.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1,660.30' / 1,659.80' S= 0.0305 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf
#2	Secondary	1,662.50'	**8.0' long + 35.0 '/' SideZ x 13.0' 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) 2.60 2.64 2.70 2.66 2.65 2.66 2.65 2.63

Primary OutFlow Max=6.22 cfs @ 12.40 hrs HW=1,662.70' (Free Discharge)
1=Culvert (Inlet Controls 6.22 cfs @ 5.07 fps)

Secondary OutFlow Max=3.26 cfs @ 12.40 hrs HW=1,662.70' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 3.26 cfs @ 1.06 fps)

Pond 4P: 15" CPP

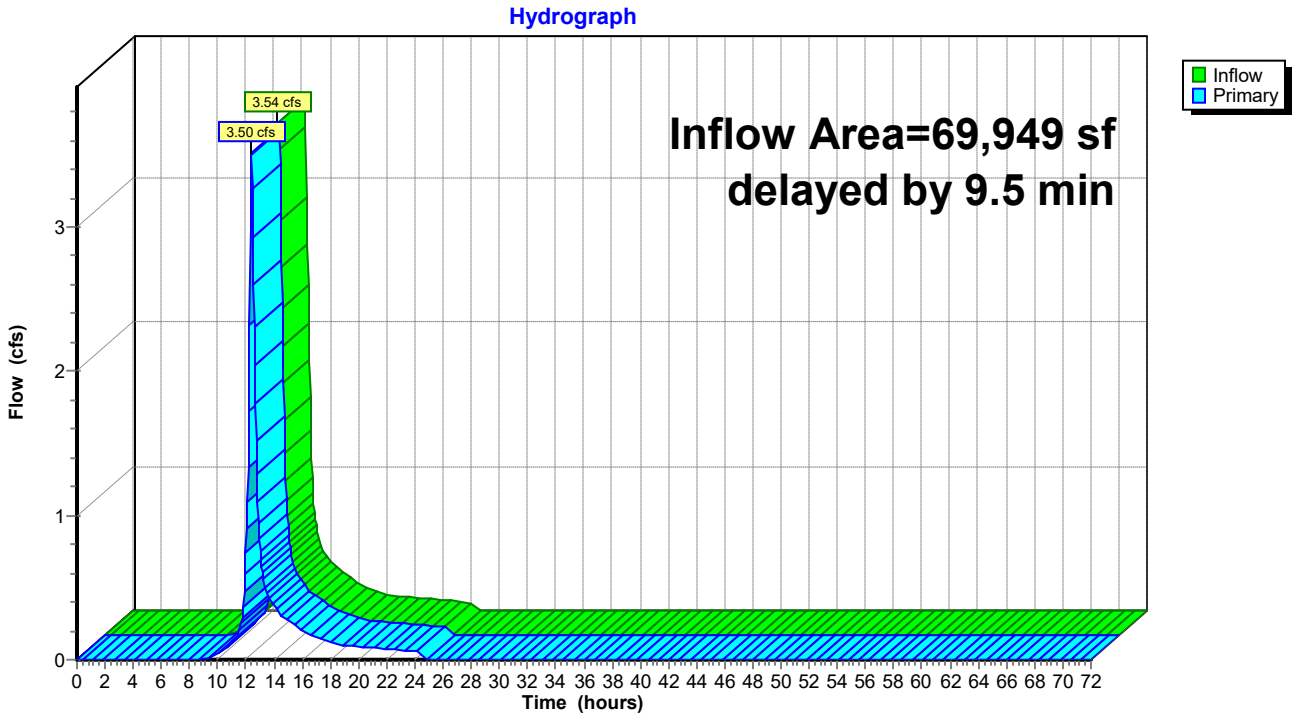


Summary for Link 1L: Lag

Inflow Area = 69,949 sf, 0.00% Impervious, Inflow Depth = 2.56" for 10-Year event
Inflow = 3.54 cfs @ 12.22 hrs, Volume= 14,942 cf
Primary = 3.50 cfs @ 12.39 hrs, Volume= 14,942 cf, Atten= 1%, Lag= 9.7 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 9.5 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: Lag

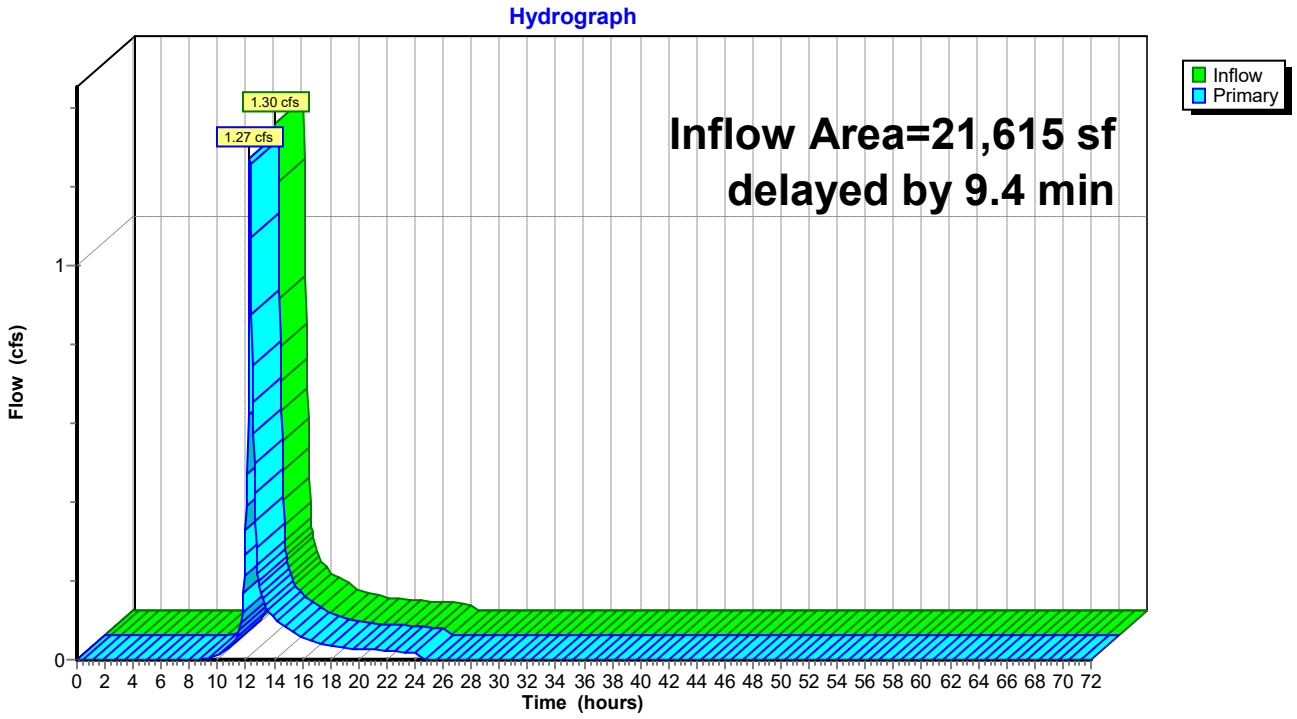


Summary for Link 2L: Lag

Inflow Area = 21,615 sf, 0.00% Impervious, Inflow Depth = 2.48" for 10-Year event
Inflow = 1.30 cfs @ 12.12 hrs, Volume= 4,461 cf
Primary = 1.27 cfs @ 12.28 hrs, Volume= 4,461 cf, Atten= 2%, Lag= 9.5 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 9.4 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 2L: Lag

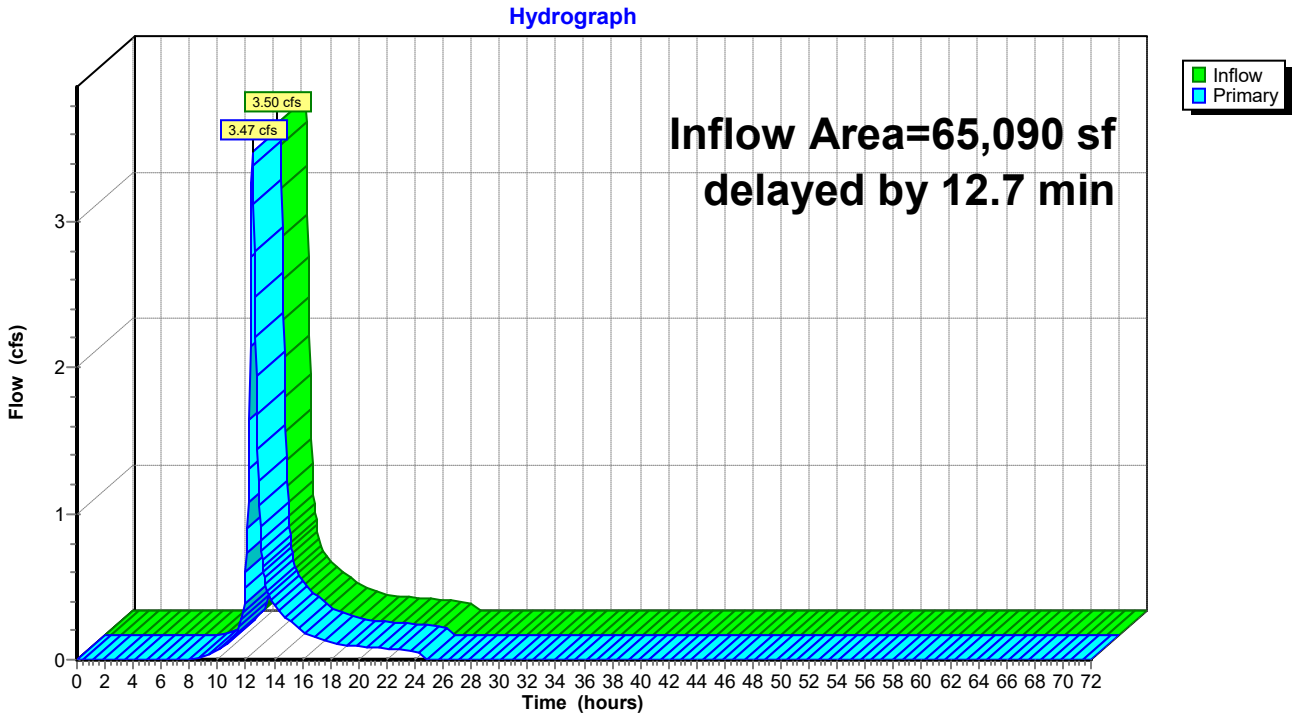


Summary for Link 3L: Lag

Inflow Area = 65,090 sf, 0.00% Impervious, Inflow Depth = 2.83" for 10-Year event
Inflow = 3.50 cfs @ 12.25 hrs, Volume= 15,356 cf
Primary = 3.47 cfs @ 12.46 hrs, Volume= 15,356 cf, Atten= 1%, Lag= 12.7 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 12.7 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 3L: Lag

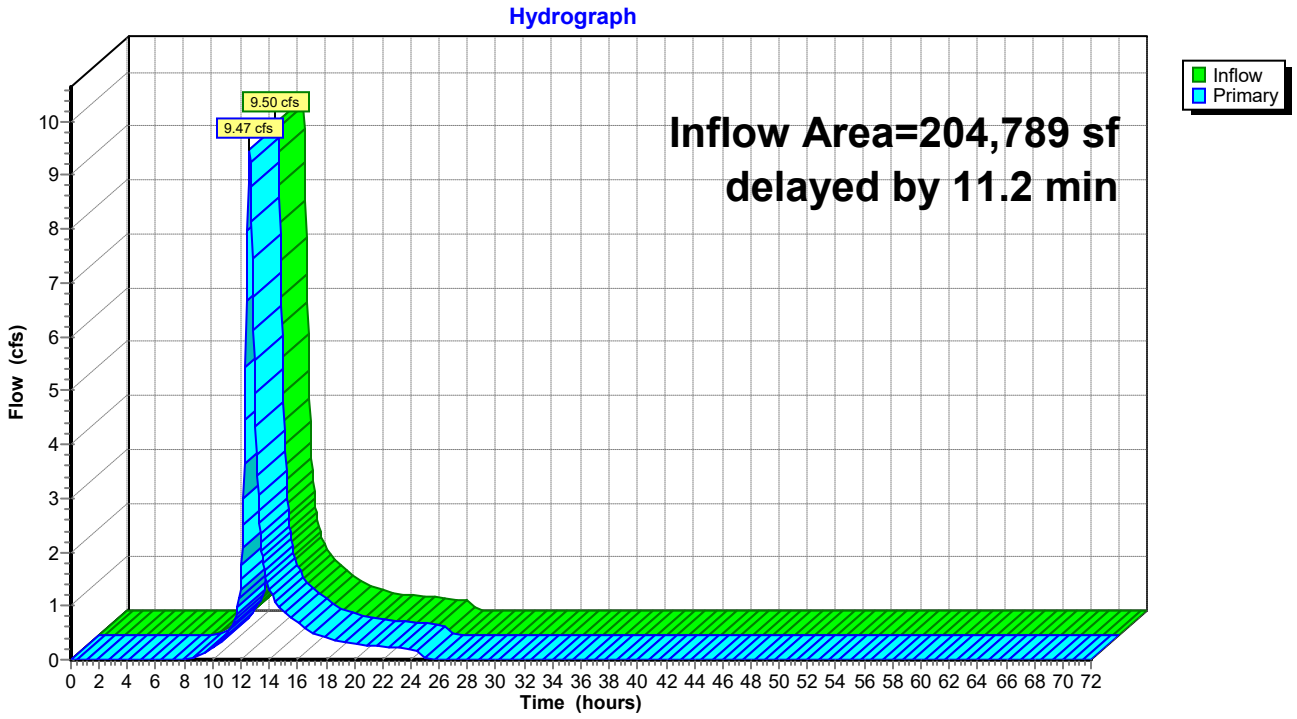


Summary for Link 4L: Lag

Inflow Area = 204,789 sf, 0.00% Impervious, Inflow Depth = 3.01" for 10-Year event
Inflow = 9.50 cfs @ 12.40 hrs, Volume= 51,419 cf
Primary = 9.47 cfs @ 12.59 hrs, Volume= 51,419 cf, Atten= 0%, Lag= 11.2 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 11.2 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 4L: Lag

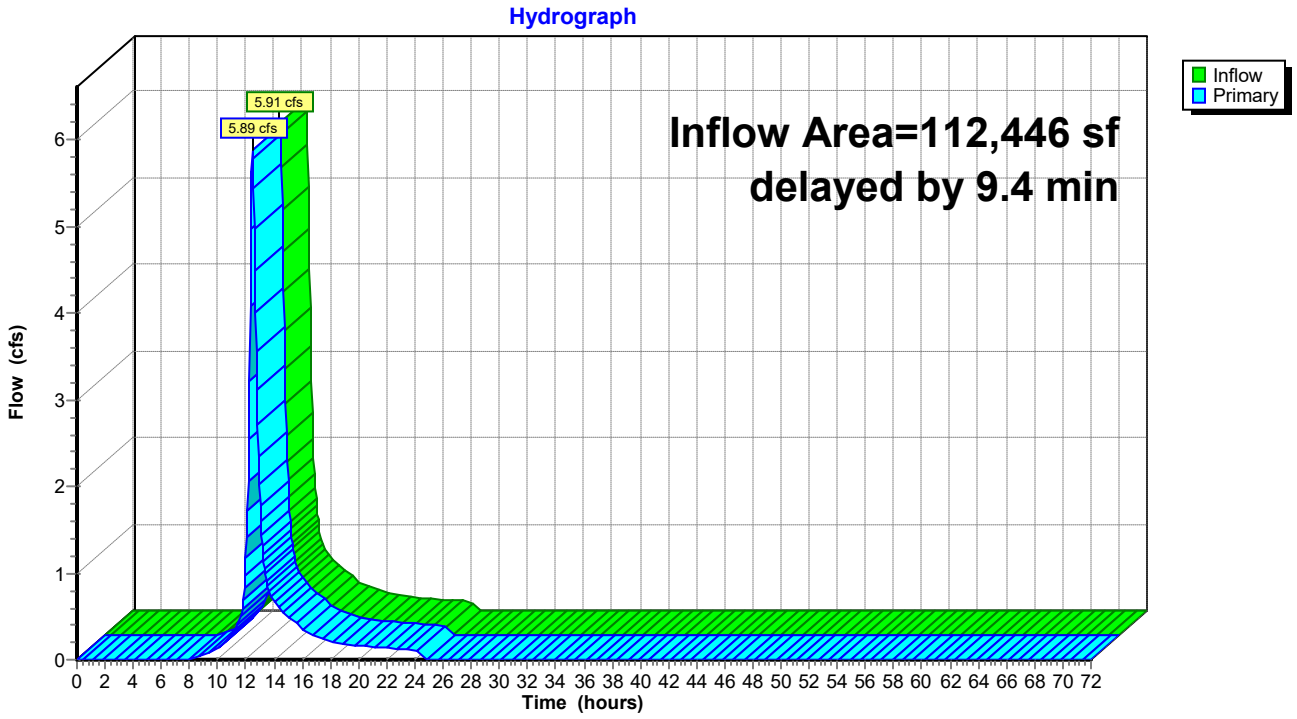


Summary for Link 5L: Lag

Inflow Area = 112,446 sf, 0.00% Impervious, Inflow Depth = 3.02" for 10-Year event
Inflow = 5.91 cfs @ 12.31 hrs, Volume= 28,255 cf
Primary = 5.89 cfs @ 12.46 hrs, Volume= 28,255 cf, Atten= 0%, Lag= 9.4 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 9.4 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 5L: Lag

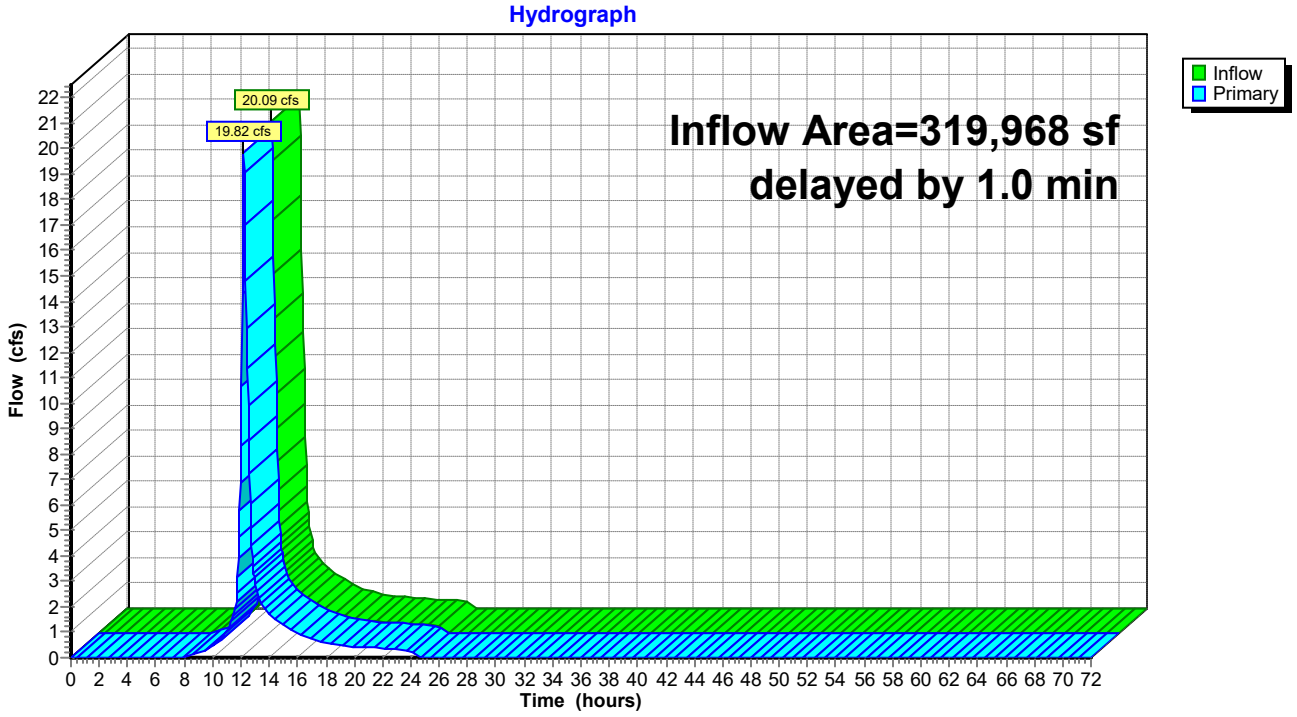


Summary for Link 6L:

Inflow Area = 319,968 sf, 0.00% Impervious, Inflow Depth = 3.02" for 10-Year event
Inflow = 20.09 cfs @ 12.19 hrs, Volume= 80,401 cf
Primary = 19.82 cfs @ 12.21 hrs, Volume= 80,401 cf, Atten= 1%, Lag= 1.0 min
Routed to Reach DP-E : Culvert towards Wades Stream

Primary outflow = Inflow delayed by 1.0 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 6L:



Summary for Subcatchment M: Middle

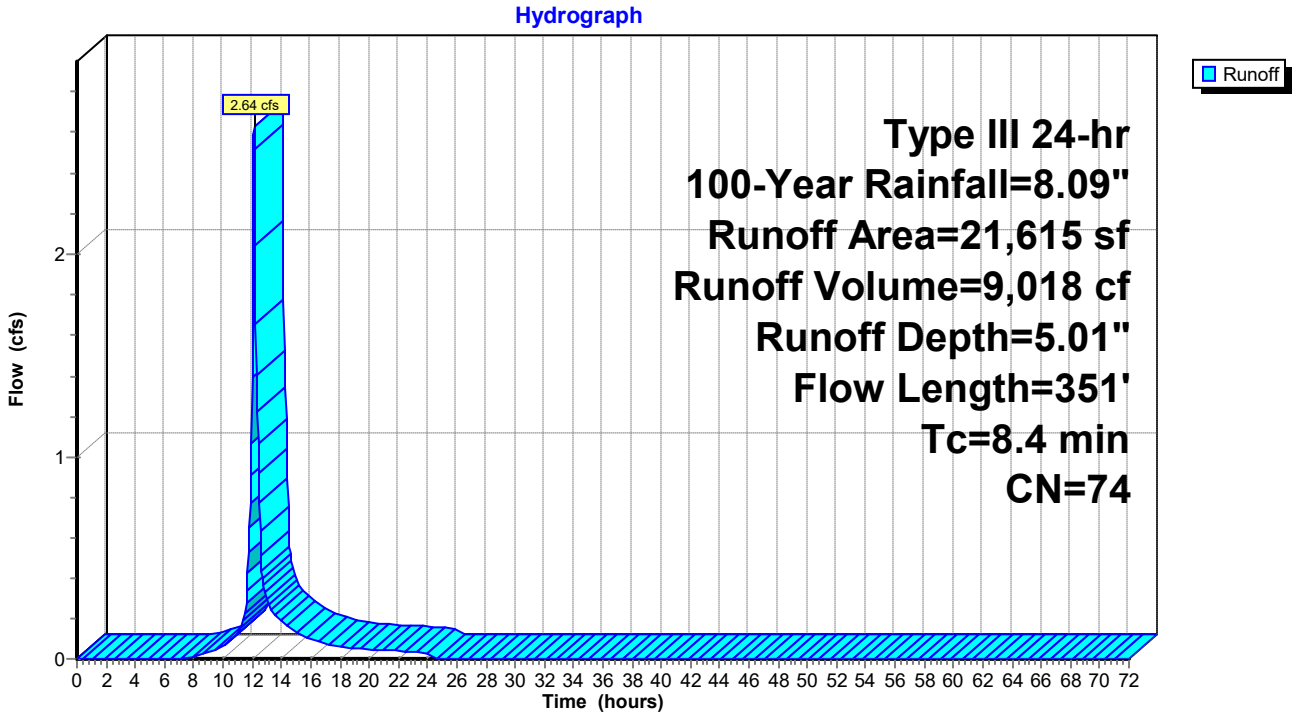
Runoff = 2.64 cfs @ 12.12 hrs, Volume= 9,018 cf, Depth= 5.01"
Routed to Reach 2P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.09"

Area (sf)	CN	Description
21,615	74	Pasture/grassland/range, Good, HSG C
21,615		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	95	0.0626	0.30		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
2.3	214	0.0510	1.58		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.9	42	0.0126	0.79		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
8.4	351	Total			

Subcatchment M: Middle



Summary for Subcatchment ME: Middle East

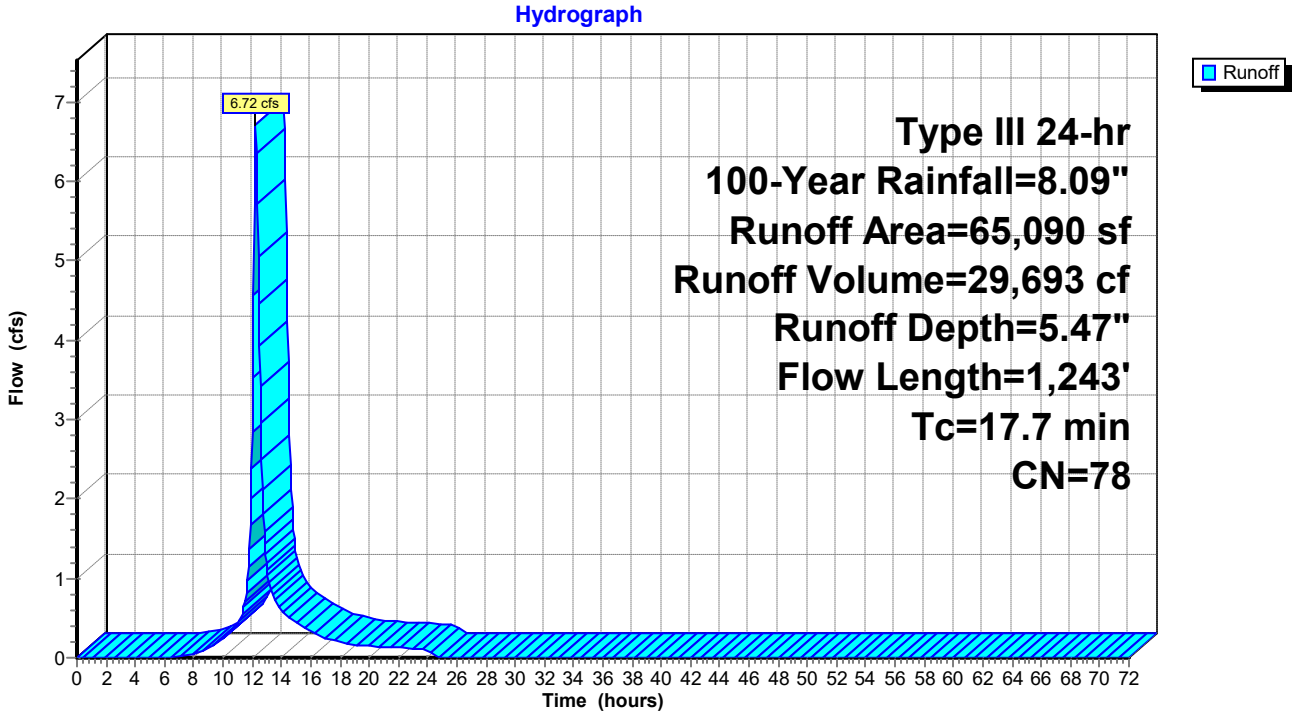
Runoff = 6.72 cfs @ 12.24 hrs, Volume= 29,693 cf, Depth= 5.47"
Routed to Reach 3P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.09"

Area (sf)	CN	Description
23,596	74	Pasture/grassland/range, Good, HSG C
41,494	80	Pasture/grassland/range, Good, HSG D
65,090	78	Weighted Average
65,090		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.0678	0.32		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
7.1	708	0.0566	1.67		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
3.1	295	0.0513	1.59		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
2.2	140	0.0223	1.05		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
17.7	1,243	Total			

Subcatchment ME: Middle East



Summary for Subcatchment MW: Middle West

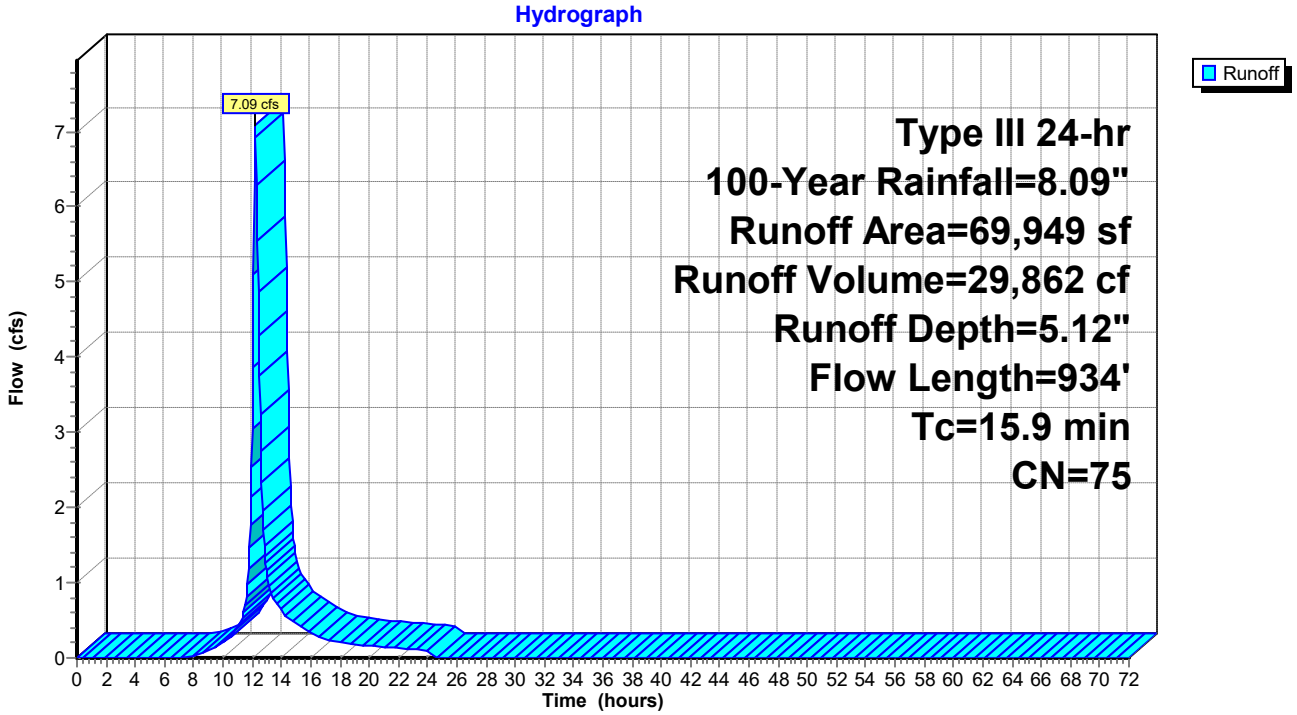
Runoff = 7.09 cfs @ 12.22 hrs, Volume= 29,862 cf, Depth= 5.12"
Routed to Reach 1P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.09"

Area (sf)	CN	Description
54,742	74	Pasture/grassland/range, Good, HSG C
15,207	80	Pasture/grassland/range, Good, HSG D
69,949	75	Weighted Average
69,949		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	100	0.0582	0.30		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
6.2	695	0.0716	1.87		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
4.1	139	0.0066	0.57		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
15.9	934	Total			

Subcatchment MW: Middle West



Summary for Subcatchment N: North

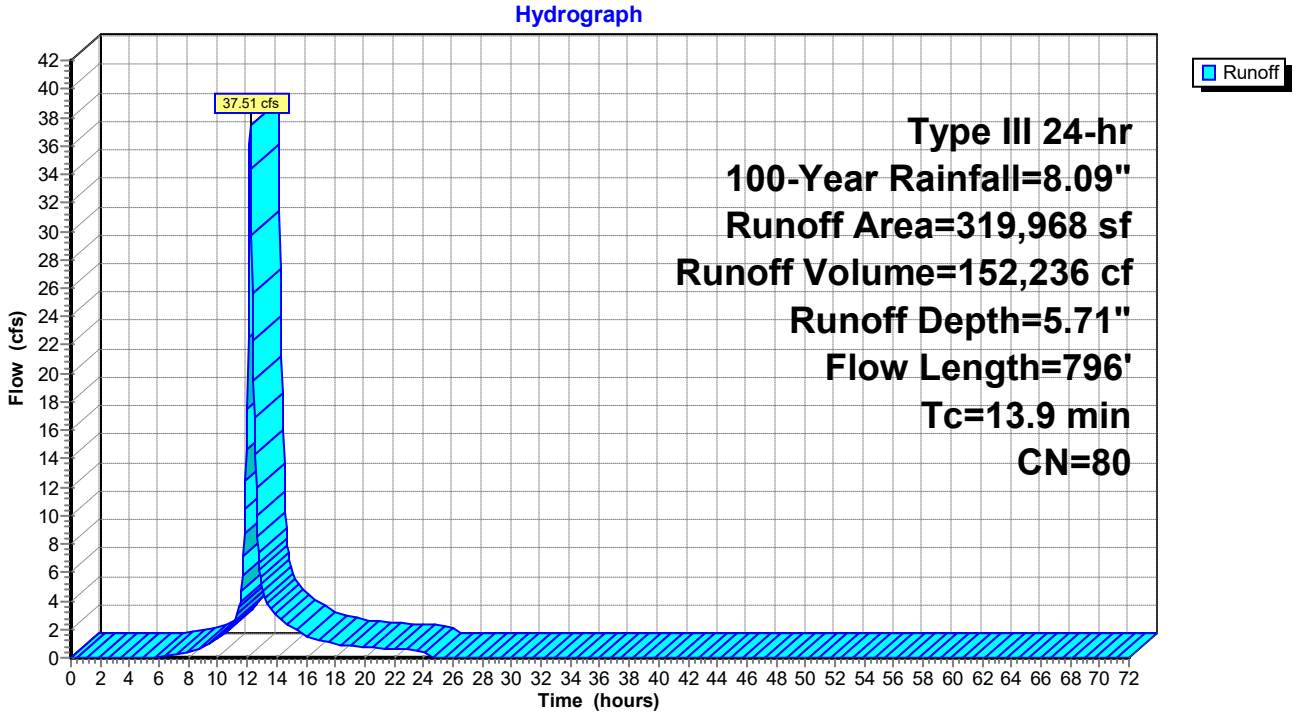
Runoff = 37.51 cfs @ 12.19 hrs, Volume= 152,236 cf, Depth= 5.71"
Routed to Link 6L :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.09"

Area (sf)	CN	Description
290,713	80	Pasture/grassland/range, Good, HSG D
29,255	77	Woods, Good, HSG D
319,968	80	Weighted Average
319,968		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	15	0.0850	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.29"
4.7	85	0.0656	0.30		**Sheet Flow, BC** Range n= 0.130 P2= 3.29"
6.5	689	0.0643	1.78		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.1	7	0.0590	1.21		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
13.9	796	Total			

Subcatchment N: North



Summary for Subcatchment NE: North East

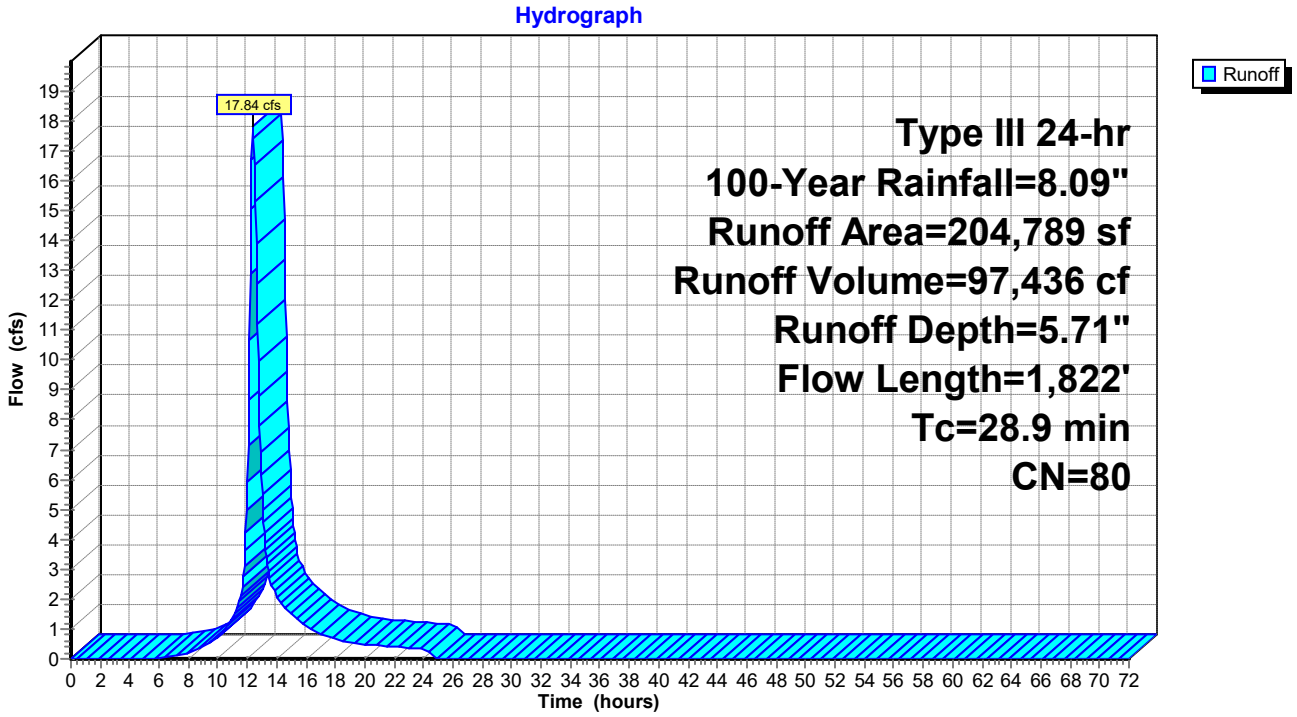
Runoff = 17.84 cfs @ 12.39 hrs, Volume= 97,436 cf, Depth= 5.71"
Routed to Pond 4P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.09"

Area (sf)	CN	Description
195,115	80	Pasture/grassland/range, Good, HSG D
9,674	77	Woods, Good, HSG D
204,789	80	Weighted Average
204,789		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	100	0.0558	0.29		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
23.2	1,722	0.0313	1.24		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
28.9	1,822	Total			

Subcatchment NE: North East



Summary for Subcatchment SE: South East

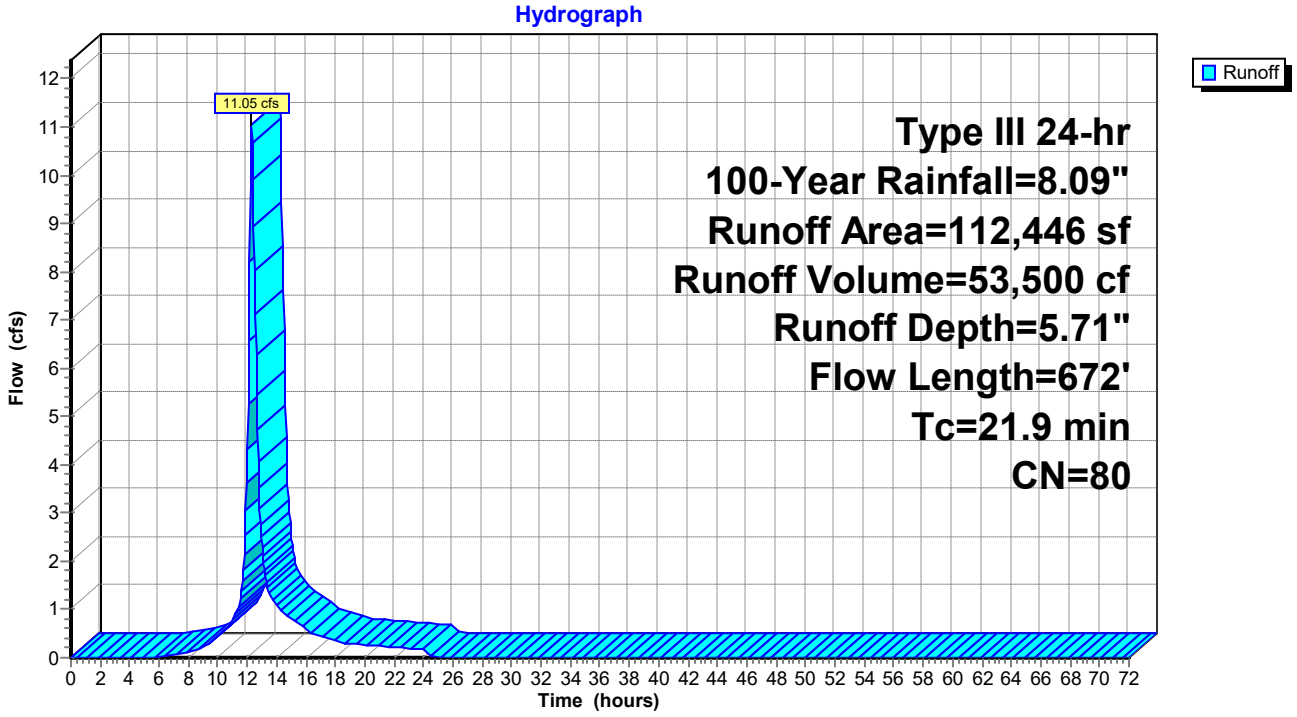
Runoff = 11.05 cfs @ 12.30 hrs, Volume= 53,500 cf, Depth= 5.71"
Routed to Reach 5P : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.09"

	Area (sf)	CN	Description
	110,724	80	Pasture/grassland/range, Good, HSG D
	1,536	77	Woods, Good, HSG D
*	186	96	Gravel surface
	112,446	80	Weighted Average
	112,446		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0428	0.11		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.29"
6.1	521	0.0416	1.43		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.2	51	0.0277	3.86	17.37	**Trap/Vee/Rect Channel Flow, CD** Bot.W=4.00' D=0.50' Z= 10.0 '/' Top.W=14.00' n= 0.030 Earth, grassed & winding
21.9	672	Total			

Subcatchment SE: South East



Summary for Subcatchment W: West

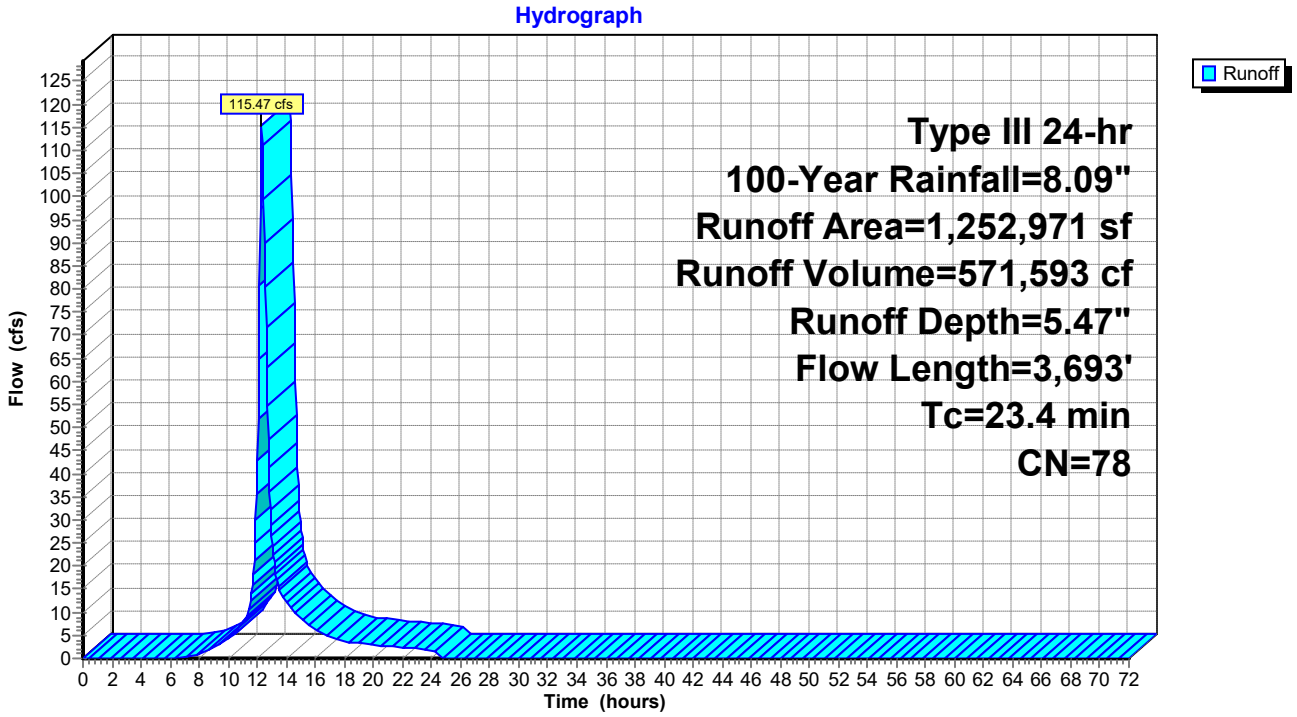
Runoff = 115.47 cfs @ 12.32 hrs, Volume= 571,593 cf, Depth= 5.47"
Routed to Reach DP-W : Watts Stream

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.09"

	Area (sf)	CN	Description
	243,483	74	Pasture/grassland/range, Good, HSG C
	405,275	80	Pasture/grassland/range, Good, HSG D
	40,930	70	Woods, Good, HSG C
	521,429	77	Woods, Good, HSG D
*	36,764	96	Gravel surface
*	5,090	98	Impervious
	1,252,971	78	Weighted Average
	1,247,881		99.59% Pervious Area
	5,090		0.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	15	0.0814	0.09		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.29"
4.8	85	0.0623	0.29		**Sheet Flow, BC** Range n= 0.130 P2= 3.29"
5.9	685	0.0763	1.93		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.1	75	0.0926	10.68	128.14	**Trap/Vee/Rect Channel Flow, DE** Bot.W=4.00' D=1.00' Z= 8.0 '/' Top.W=20.00' n= 0.030 Earth, grassed & winding
1.1	187	0.1510	2.72		**Shallow Concentrated Flow, EF** Short Grass Pasture Kv= 7.0 fps
1.7	174	0.1201	1.73		**Shallow Concentrated Flow, FG** Woodland Kv= 5.0 fps
3.1	214	0.0525	1.15		**Shallow Concentrated Flow, GH** Woodland Kv= 5.0 fps
0.6	73	0.1513	1.94		**Shallow Concentrated Flow, HI** Woodland Kv= 5.0 fps
0.9	49	0.0338	0.92		**Shallow Concentrated Flow, IJ** Woodland Kv= 5.0 fps
2.6	2,136	0.0318	13.70	945.01	**Trap/Vee/Rect Channel Flow, JK** Bot.W=11.00' D=3.00' Z= 4.0 '/' Top.W=35.00' n= 0.030 Earth, grassed & winding
23.4	3,693	Total			

Subcatchment W: West



Summary for Reach 1P: 15" CPP

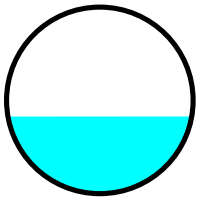
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 69,949 sf, 0.00% Impervious, Inflow Depth = 5.12" for 100-Year event
Inflow = 7.09 cfs @ 12.22 hrs, Volume= 29,862 cf
Outflow = 7.09 cfs @ 12.22 hrs, Volume= 29,862 cf, Atten= 0%, Lag= 0.1 min
Routed to Link 1L : Lag

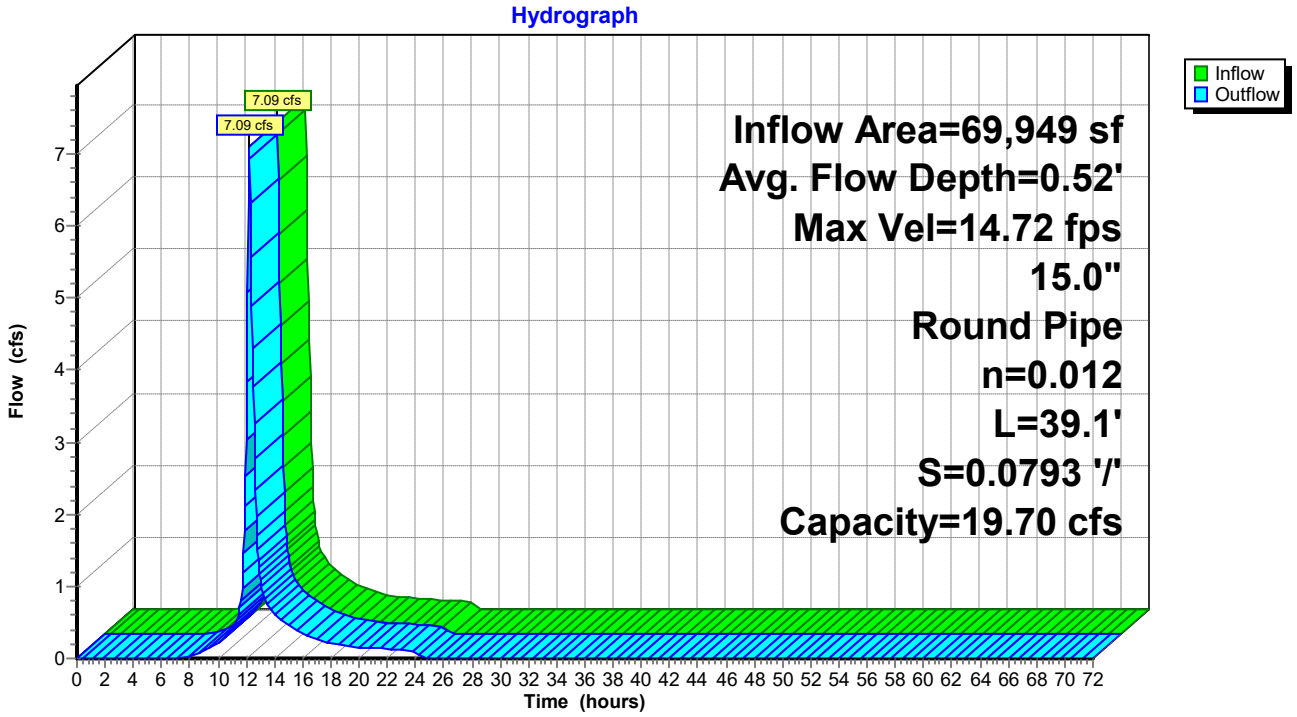
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 14.72 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 5.50 fps, Avg. Travel Time= 0.1 min

Peak Storage= 19 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.52' , Surface Width= 1.23'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 19.70 cfs

15.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 39.1' Slope= 0.0793 '/'
Inlet Invert= 1,668.60', Outlet Invert= 1,665.50'



Reach 1P: 15" CPP



Summary for Reach 2P: 15" CPP

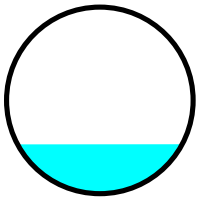
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 21,615 sf, 0.00% Impervious, Inflow Depth = 5.01" for 100-Year event
Inflow = 2.64 cfs @ 12.12 hrs, Volume= 9,018 cf
Outflow = 2.63 cfs @ 12.12 hrs, Volume= 9,018 cf, Atten= 0%, Lag= 0.1 min
Routed to Link 2L : Lag

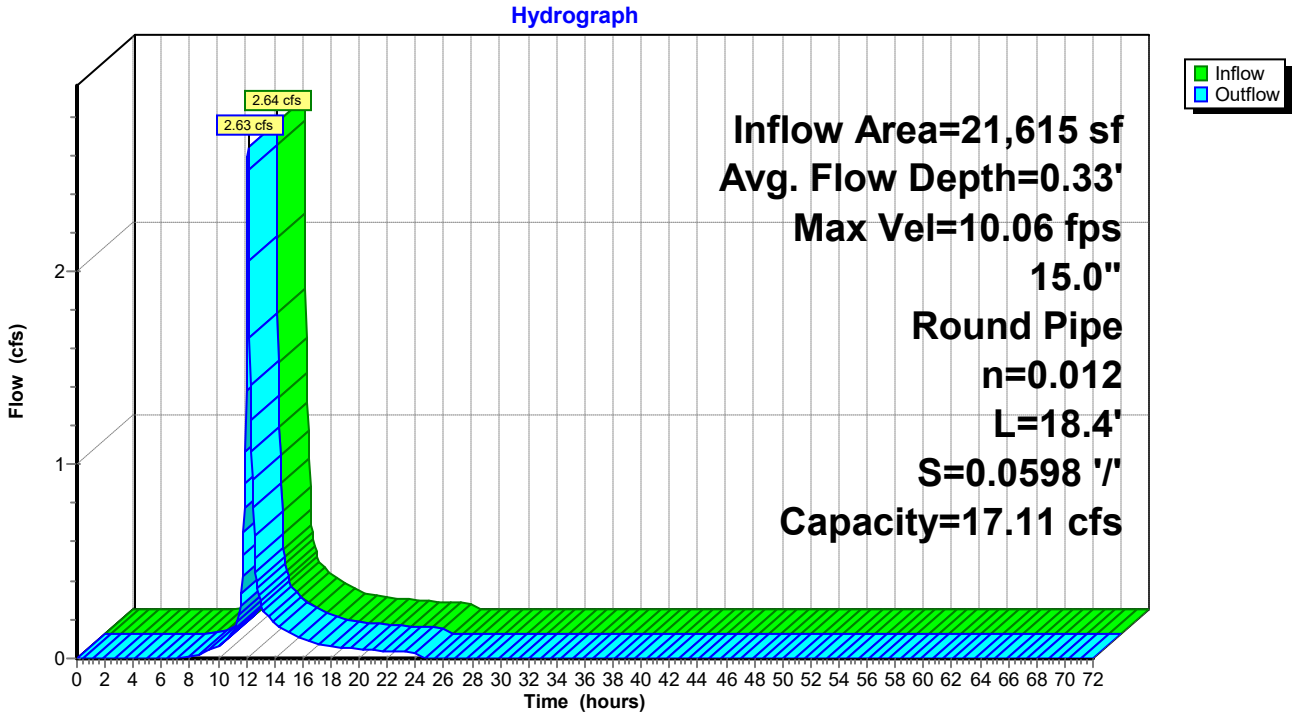
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 10.06 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 3.56 fps, Avg. Travel Time= 0.1 min

Peak Storage= 5 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.33' , Surface Width= 1.10'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 17.11 cfs

15.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 18.4' Slope= 0.0598 '/'
Inlet Invert= 1,669.70', Outlet Invert= 1,668.60'



Reach 2P: 15" CPP



Summary for Reach 3P: 15" CPP

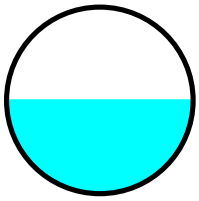
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 65,090 sf, 0.00% Impervious, Inflow Depth = 5.47" for 100-Year event
Inflow = 6.72 cfs @ 12.24 hrs, Volume= 29,693 cf
Outflow = 6.71 cfs @ 12.24 hrs, Volume= 29,693 cf, Atten= 0%, Lag= 0.1 min
Routed to Link 3L : Lag

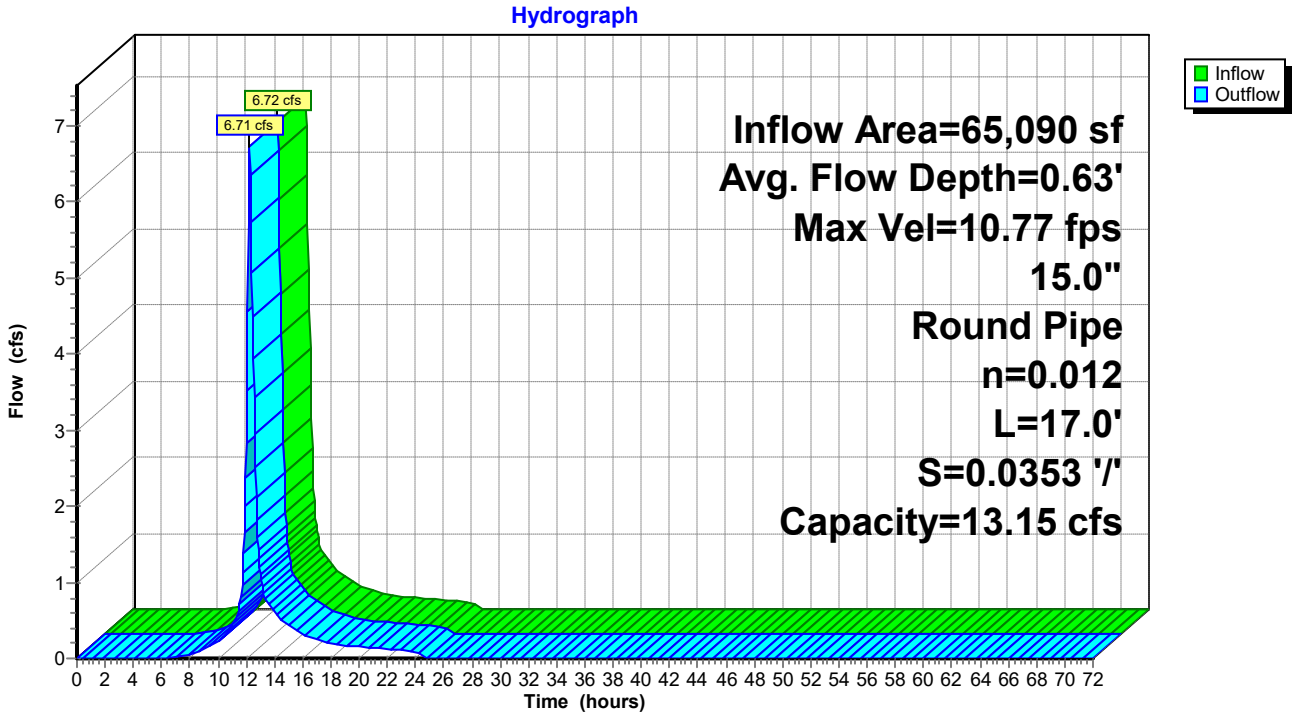
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 10.77 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 4.05 fps, Avg. Travel Time= 0.1 min

Peak Storage= 11 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.63' , Surface Width= 1.25'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 13.15 cfs

15.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 17.0' Slope= 0.0353 '/'
Inlet Invert= 1,666.50', Outlet Invert= 1,665.90'



Reach 3P: 15" CPP



Summary for Reach 5P: Culvert

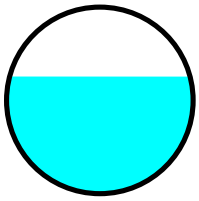
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 112,446 sf, 0.00% Impervious, Inflow Depth = 5.71" for 100-Year event
Inflow = 11.05 cfs @ 12.30 hrs, Volume= 53,500 cf
Outflow = 11.05 cfs @ 12.30 hrs, Volume= 53,500 cf, Atten= 0%, Lag= 0.1 min
Routed to Link 5L : Lag

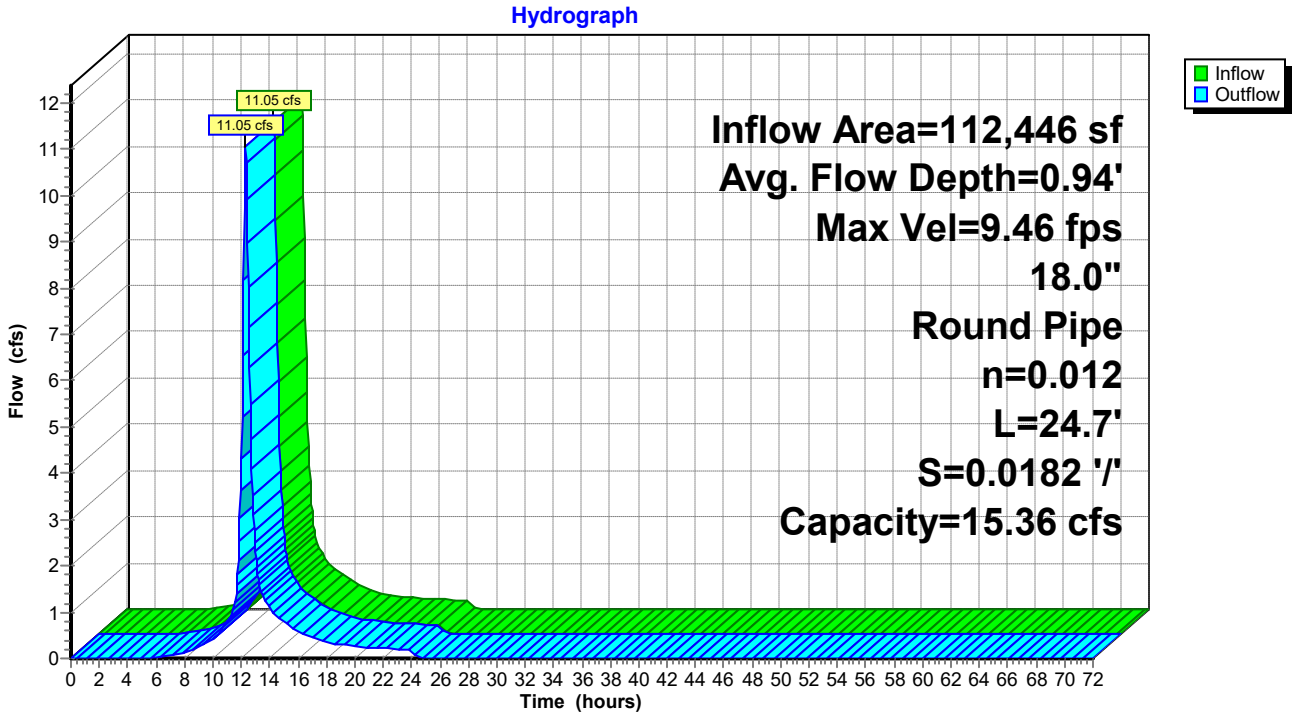
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.46 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 3.66 fps, Avg. Travel Time= 0.1 min

Peak Storage= 29 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.94' , Surface Width= 1.45'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 15.36 cfs

18.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 24.7' Slope= 0.0182 '/'
Inlet Invert= 1,620.00', Outlet Invert= 1,619.55'



Reach 5P: Culvert



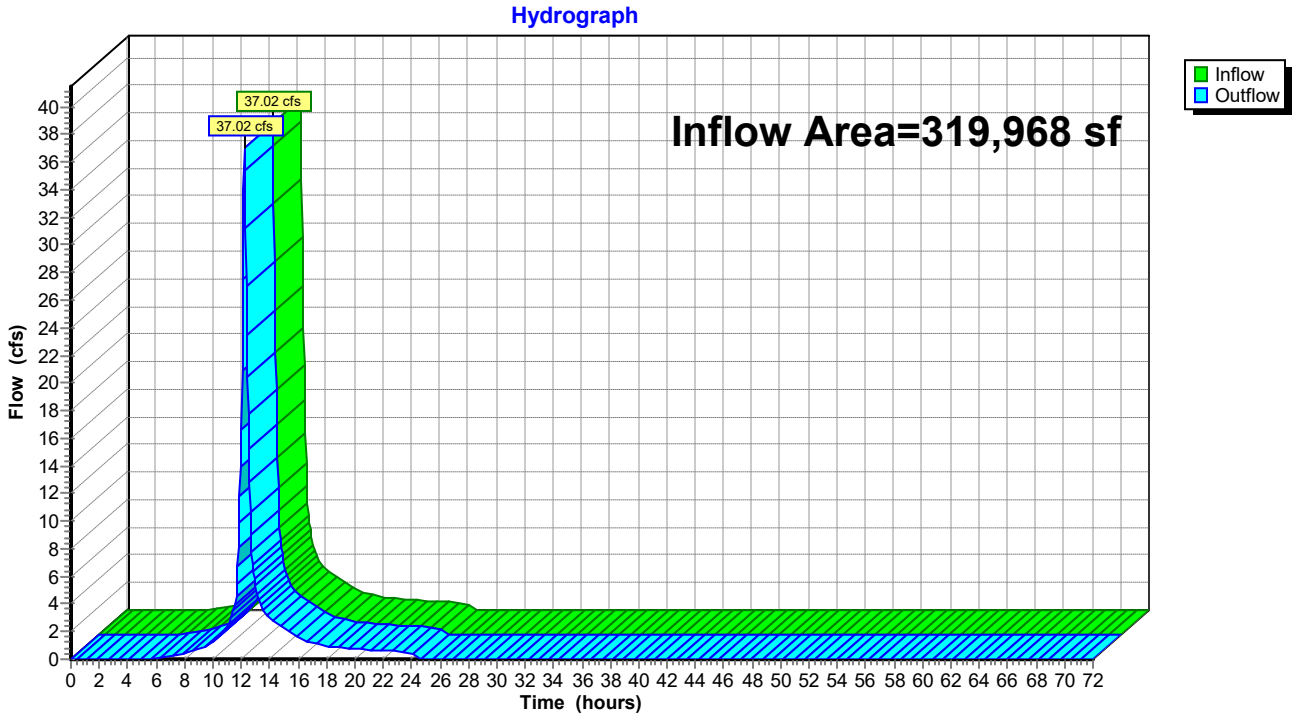
Summary for Reach DP-E: Culvert towards Wades Stream

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 319,968 sf, 0.00% Impervious, Inflow Depth = 5.71" for 100-Year event
Inflow = 37.02 cfs @ 12.21 hrs, Volume= 152,236 cf
Outflow = 37.02 cfs @ 12.21 hrs, Volume= 152,236 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP-E: Culvert towards Wades Stream



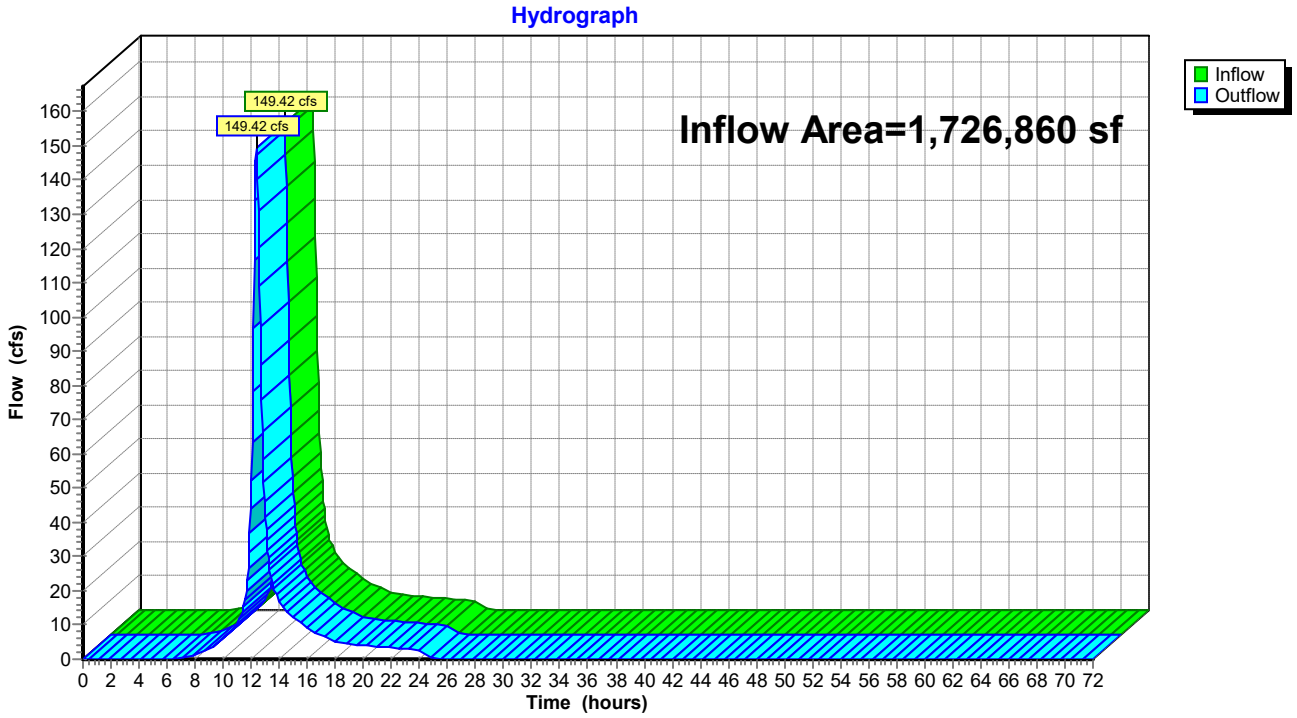
Summary for Reach DP-W: Watts Stream

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,726,860 sf, 0.29% Impervious, Inflow Depth = 5.50" for 100-Year event
Inflow = 149.42 cfs @ 12.36 hrs, Volume= 791,167 cf
Outflow = 149.42 cfs @ 12.36 hrs, Volume= 791,167 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP-W: Watts Stream



Summary for Pond 4P: 15" CPP

Inflow Area = 204,789 sf, 0.00% Impervious, Inflow Depth = 5.71" for 100-Year event
Inflow = 17.84 cfs @ 12.39 hrs, Volume= 97,436 cf
Outflow = 17.82 cfs @ 12.39 hrs, Volume= 97,501 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.52 cfs @ 12.39 hrs, Volume= 77,087 cf
Routed to Link 4L : Lag
Secondary = 11.30 cfs @ 12.39 hrs, Volume= 20,414 cf
Routed to Link 4L : Lag

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1,662.88' @ 12.39 hrs Surf.Area= 236 sf Storage= 217 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.1 min (823.8 - 823.7)

Volume	Invert	Avail.Storage	Storage Description
#1	1,660.30'	837 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

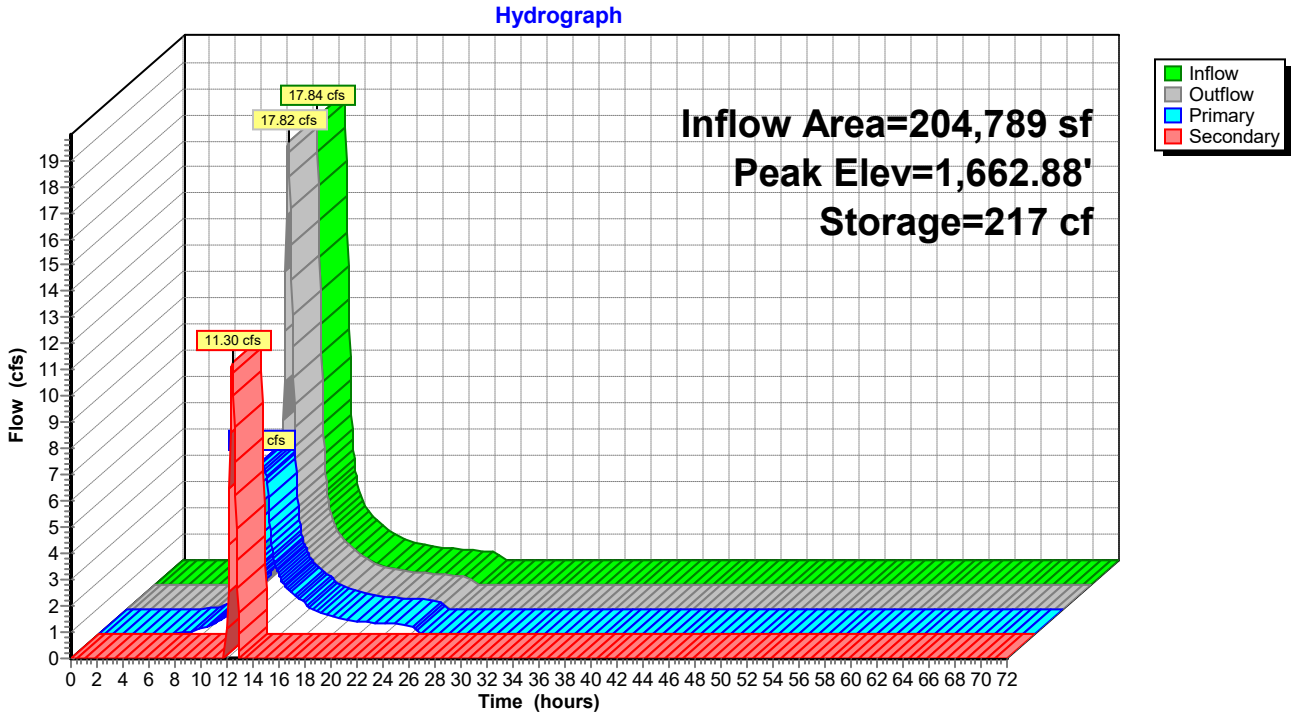
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
1,660.30	1	3.9	0	0	1
1,663.00	258	82.3	248	248	551
1,664.00	1,003	166.4	590	837	2,220

Device	Routing	Invert	Outlet Devices
#1	Primary	1,660.30'	**15.0" Round Culvert** L= 16.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1,660.30' / 1,659.80' S= 0.0305 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf
#2	Secondary	1,662.50'	**8.0' long + 35.0 '/' SideZ x 13.0' 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) 2.60 2.64 2.70 2.66 2.65 2.66 2.65 2.63

Primary OutFlow Max=6.52 cfs @ 12.39 hrs HW=1,662.88' (Free Discharge)
1=Culvert (Inlet Controls 6.52 cfs @ 5.31 fps)

Secondary OutFlow Max=11.23 cfs @ 12.39 hrs HW=1,662.88' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 11.23 cfs @ 1.41 fps)

Pond 4P: 15" CPP

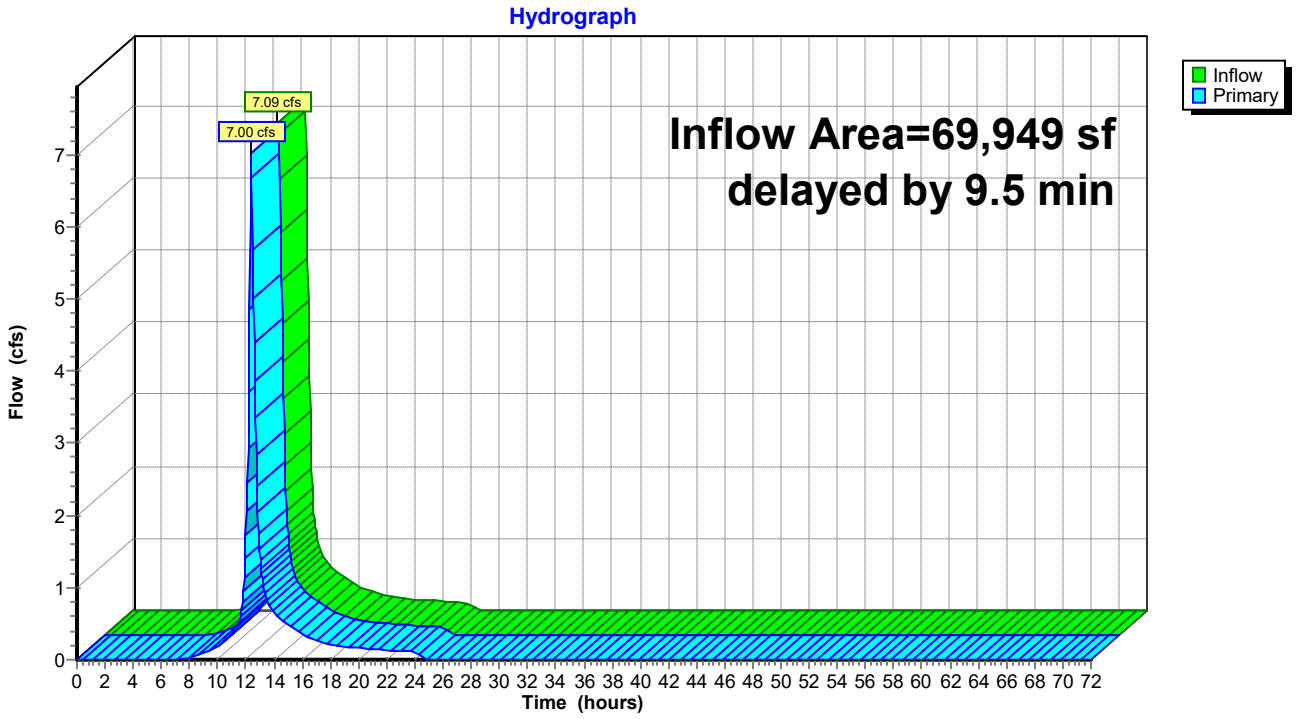


Summary for Link 1L: Lag

Inflow Area = 69,949 sf, 0.00% Impervious, Inflow Depth = 5.12" for 100-Year event
Inflow = 7.09 cfs @ 12.22 hrs, Volume= 29,862 cf
Primary = 7.00 cfs @ 12.38 hrs, Volume= 29,862 cf, Atten= 1%, Lag= 9.5 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 9.5 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: Lag

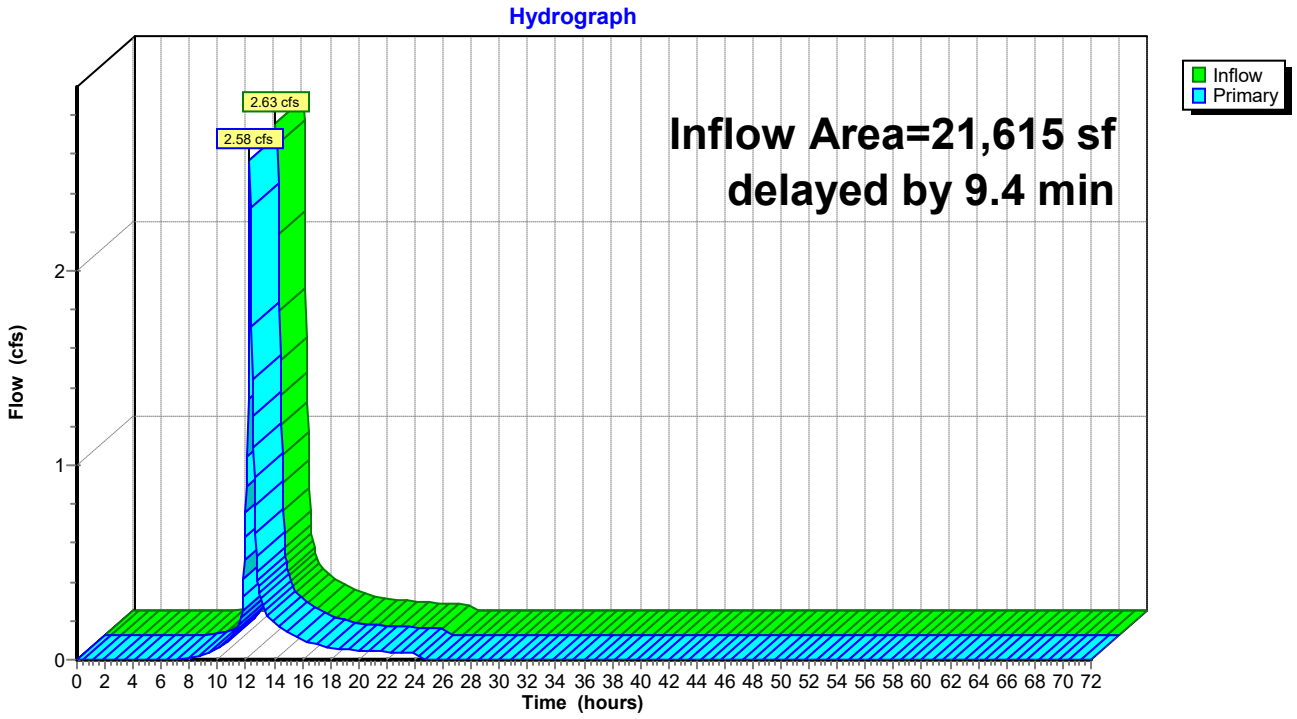


Summary for Link 2L: Lag

Inflow Area = 21,615 sf, 0.00% Impervious, Inflow Depth = 5.01" for 100-Year event
Inflow = 2.63 cfs @ 12.12 hrs, Volume= 9,018 cf
Primary = 2.58 cfs @ 12.28 hrs, Volume= 9,018 cf, Atten= 2%, Lag= 9.4 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 9.4 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 2L: Lag

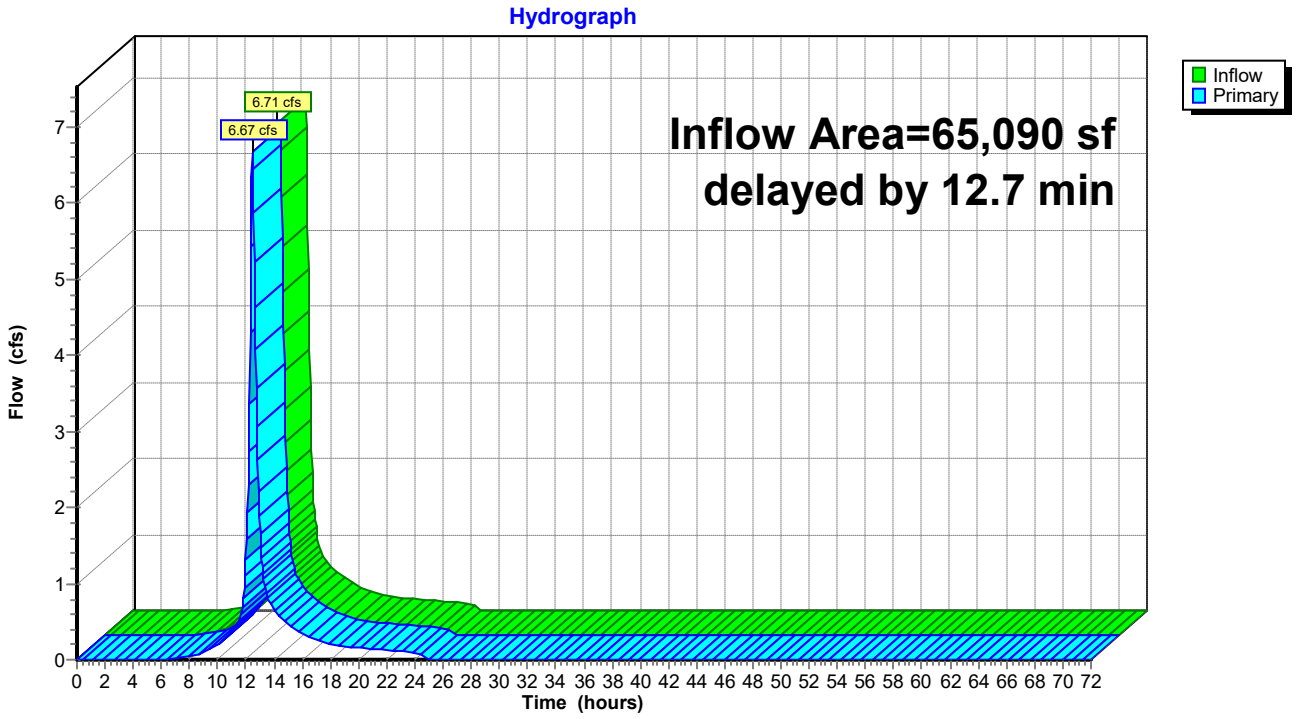


Summary for Link 3L: Lag

Inflow Area = 65,090 sf, 0.00% Impervious, Inflow Depth = 5.47" for 100-Year event
Inflow = 6.71 cfs @ 12.24 hrs, Volume= 29,693 cf
Primary = 6.67 cfs @ 12.45 hrs, Volume= 29,693 cf, Atten= 1%, Lag= 12.7 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 12.7 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 3L: Lag

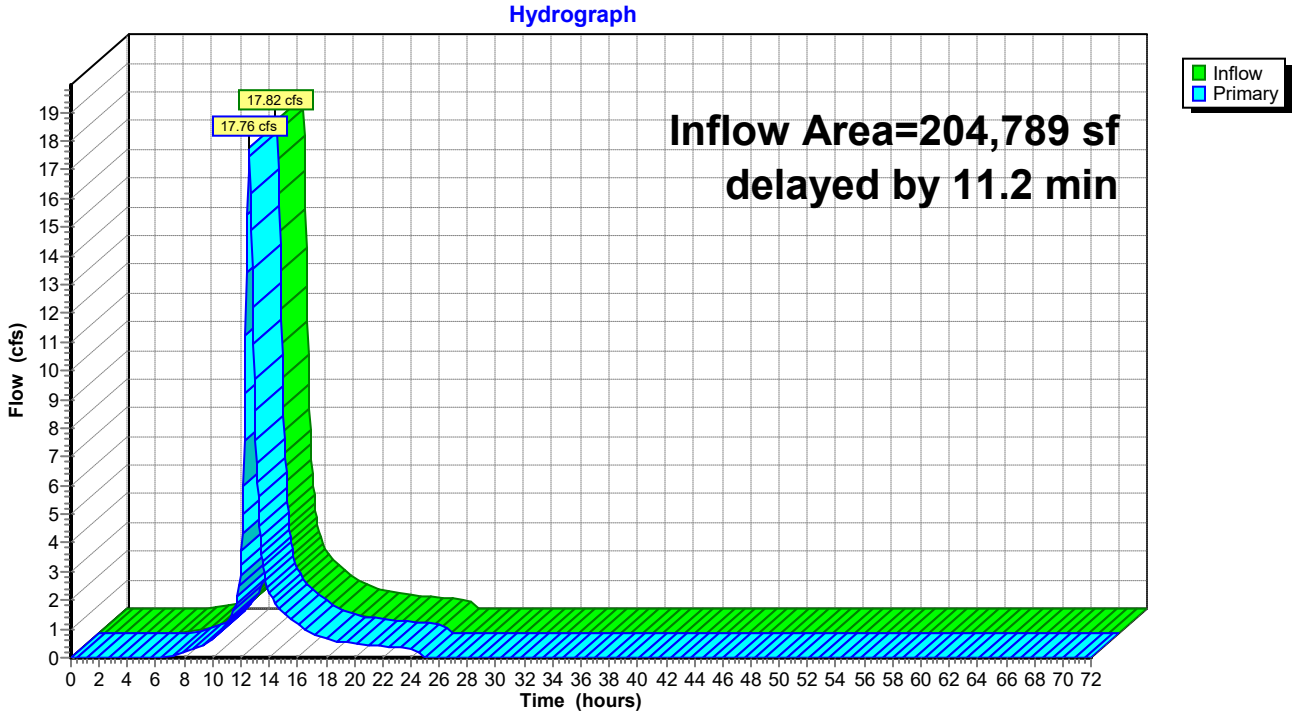


Summary for Link 4L: Lag

Inflow Area = 204,789 sf, 0.00% Impervious, Inflow Depth = 5.71" for 100-Year event
Inflow = 17.82 cfs @ 12.39 hrs, Volume= 97,501 cf
Primary = 17.76 cfs @ 12.58 hrs, Volume= 97,501 cf, Atten= 0%, Lag= 11.2 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 11.2 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 4L: Lag

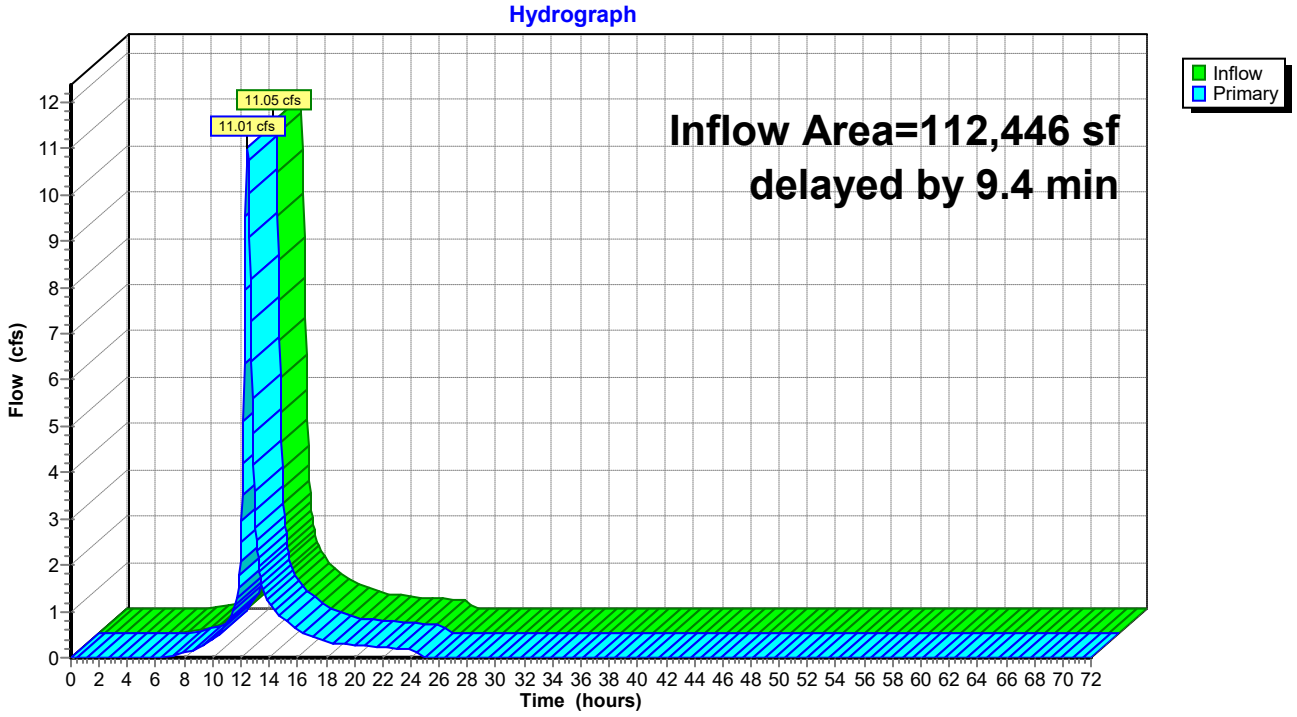


Summary for Link 5L: Lag

Inflow Area = 112,446 sf, 0.00% Impervious, Inflow Depth = 5.71" for 100-Year event
Inflow = 11.05 cfs @ 12.30 hrs, Volume= 53,500 cf
Primary = 11.01 cfs @ 12.45 hrs, Volume= 53,500 cf, Atten= 0%, Lag= 9.4 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 9.4 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 5L: Lag

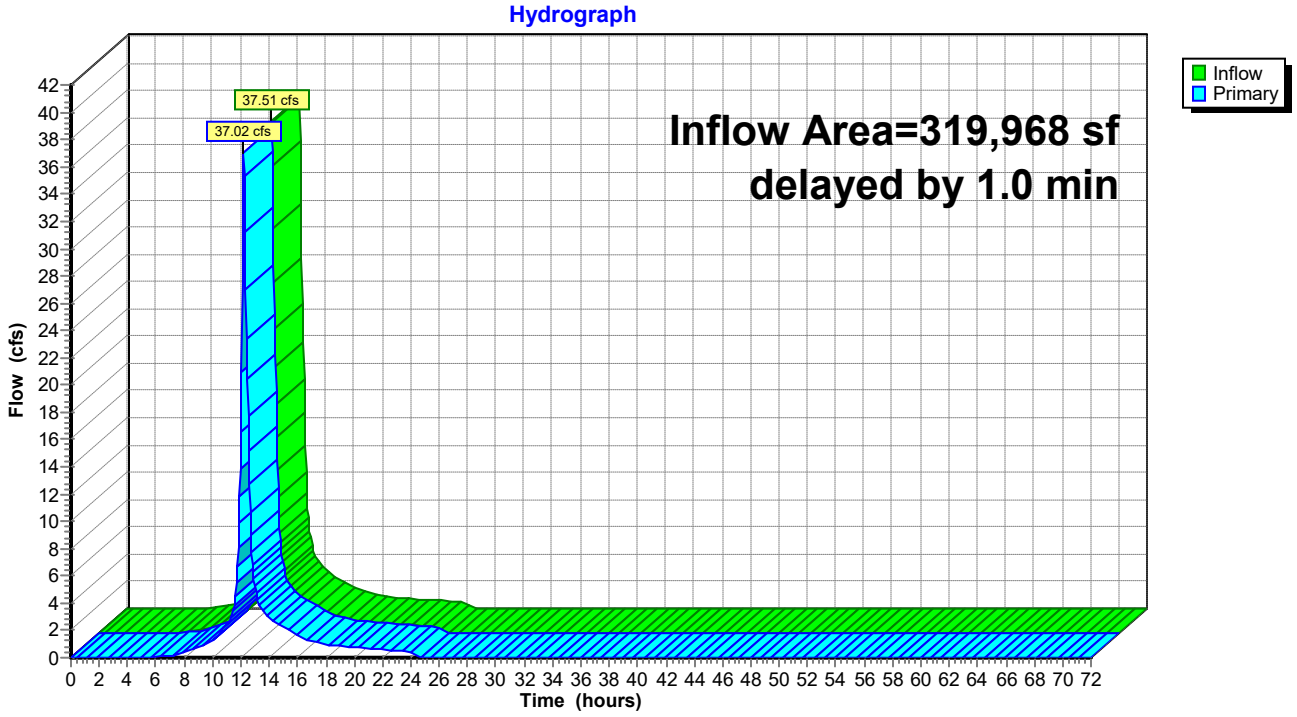


Summary for Link 6L:

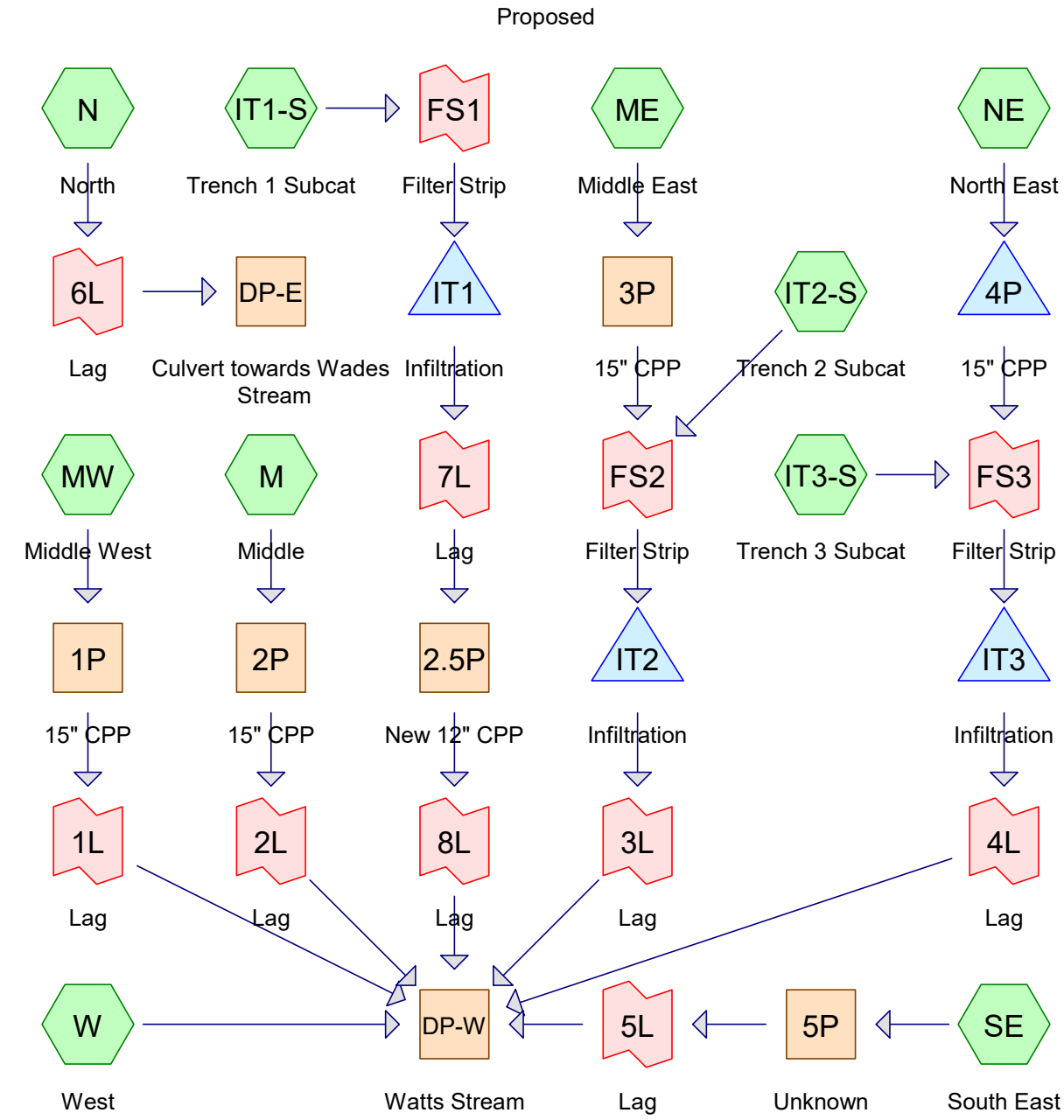
Inflow Area = 319,968 sf, 0.00% Impervious, Inflow Depth = 5.71" for 100-Year event
Inflow = 37.51 cfs @ 12.19 hrs, Volume= 152,236 cf
Primary = 37.02 cfs @ 12.21 hrs, Volume= 152,236 cf, Atten= 1%, Lag= 1.0 min
Routed to Reach DP-E : Culvert towards Wades Stream

Primary outflow = Inflow delayed by 1.0 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 6L:



Proposed Conditions HydroCAD



Routing Diagram for HydroCAD Ridge Rd - Proposed Only
Prepared by WSP USA, Printed 9/3/2025
HydroCAD® 10.20-6a s/n 01336 © 2024 HydroCAD Software Solutions LLC

Summary for Subcatchment IT1-S: Trench 1 Subcat

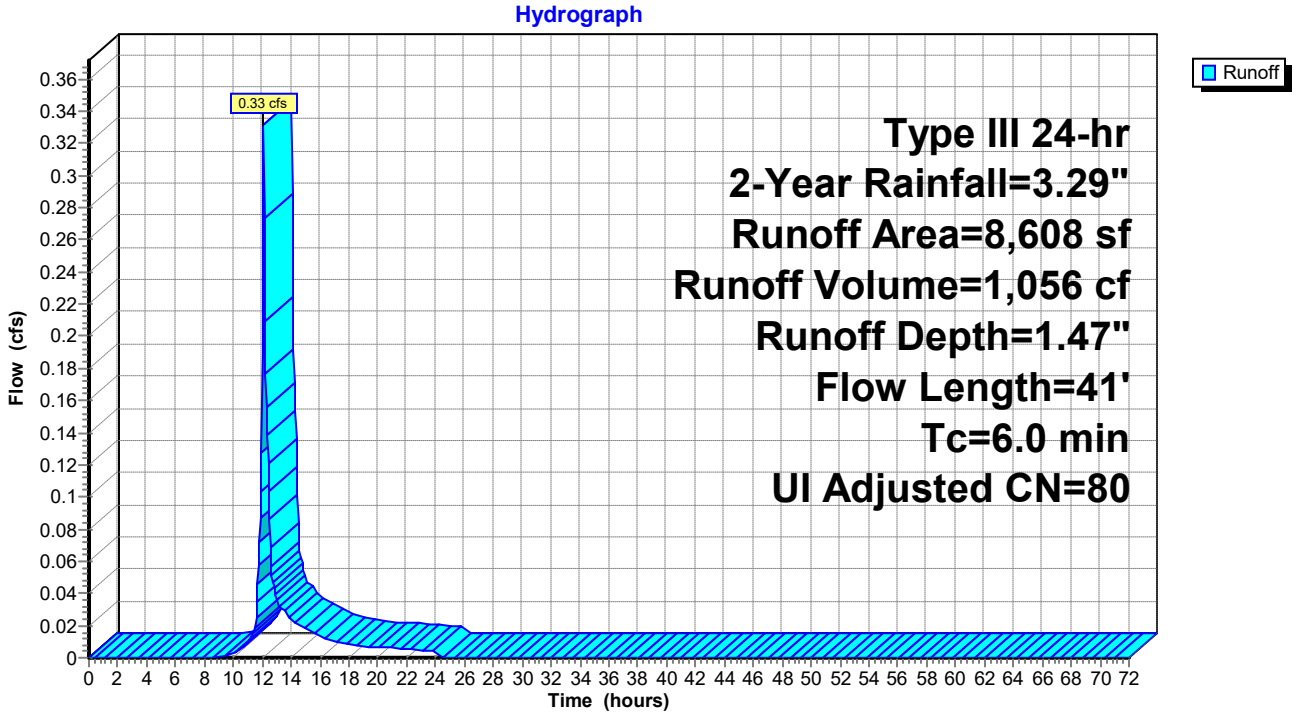
Runoff = 0.33 cfs @ 12.10 hrs, Volume= 1,056 cf, Depth= 1.47"
Routed to Link FS1 : Filter Strip

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.29"

Area (sf)	CN	Adj	Description
5,679	74		Pasture/grassland/range, Good, HSG C
219	98		Water Surface, 0% imp, HSG C
726	96		Gravel surface, HSG C
1,984	98		Unconnected pavement, HSG C
8,608	82	80	Weighted Average, UI Adjusted
6,624			76.95% Pervious Area
1,984			23.05% Impervious Area
1,984			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	25	0.0780	0.25		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
0.5	16	0.0049	0.55		**Sheet Flow, BC** Smooth surfaces n= 0.011 P2= 3.29"
2.1	41	Total, Increased to minimum Tc = 6.0 min			

Subcatchment IT1-S: Trench 1 Subcat



Summary for Subcatchment IT2-S: Trench 2 Subcat

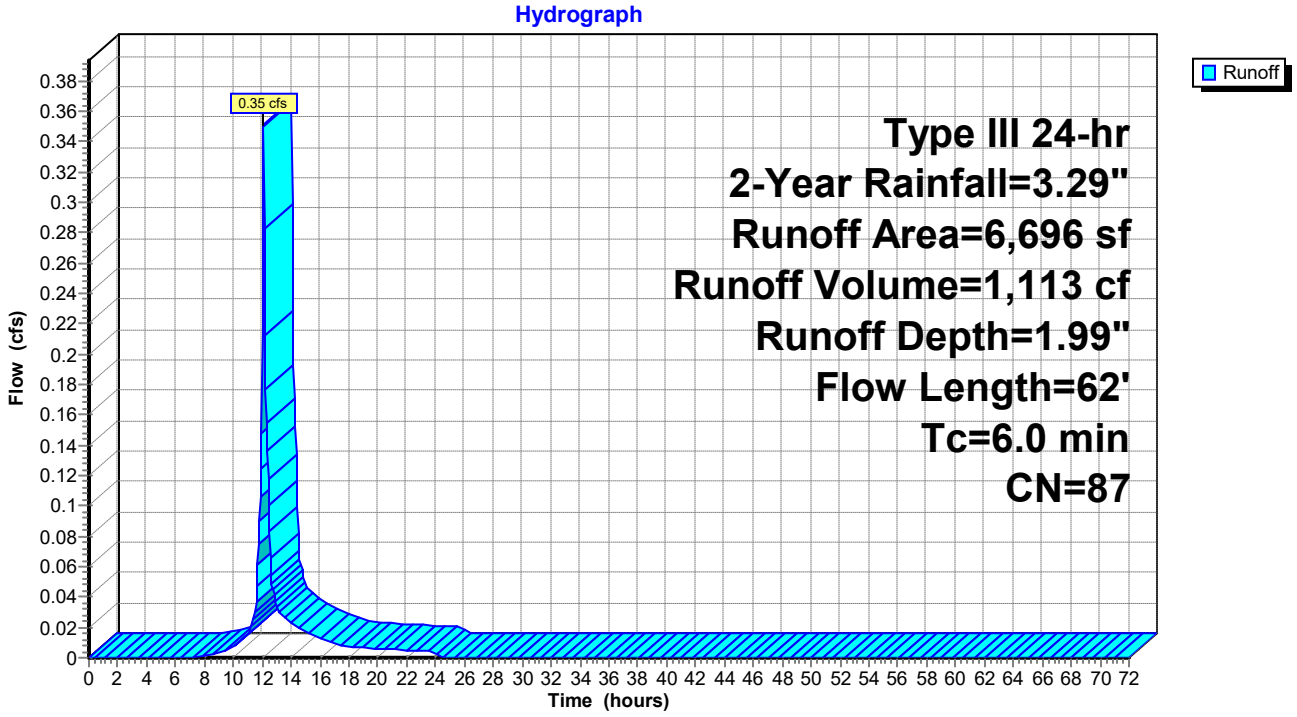
Runoff = 0.35 cfs @ 12.09 hrs, Volume= 1,113 cf, Depth= 1.99"
Routed to Link FS2 : Filter Strip

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.29"

Area (sf)	CN	Description
3,881	80	Pasture/grassland/range, Good, HSG D
2,212	96	Gravel surface, HSG D
600	98	Water Surface, 0% imp, HSG D
3	98	Unconnected pavement, HSG D
6,696	87	Weighted Average
6,693		99.96% Pervious Area
3		0.04% Impervious Area
3		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	11	0.0521	0.18		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
0.5	51	0.0456	1.70		**Sheet Flow, BC** Smooth surfaces n= 0.011 P2= 3.29"
1.5	62	Total, Increased to minimum Tc = 6.0 min			

Subcatchment IT2-S: Trench 2 Subcat



Summary for Subcatchment IT3-S: Trench 3 Subcat

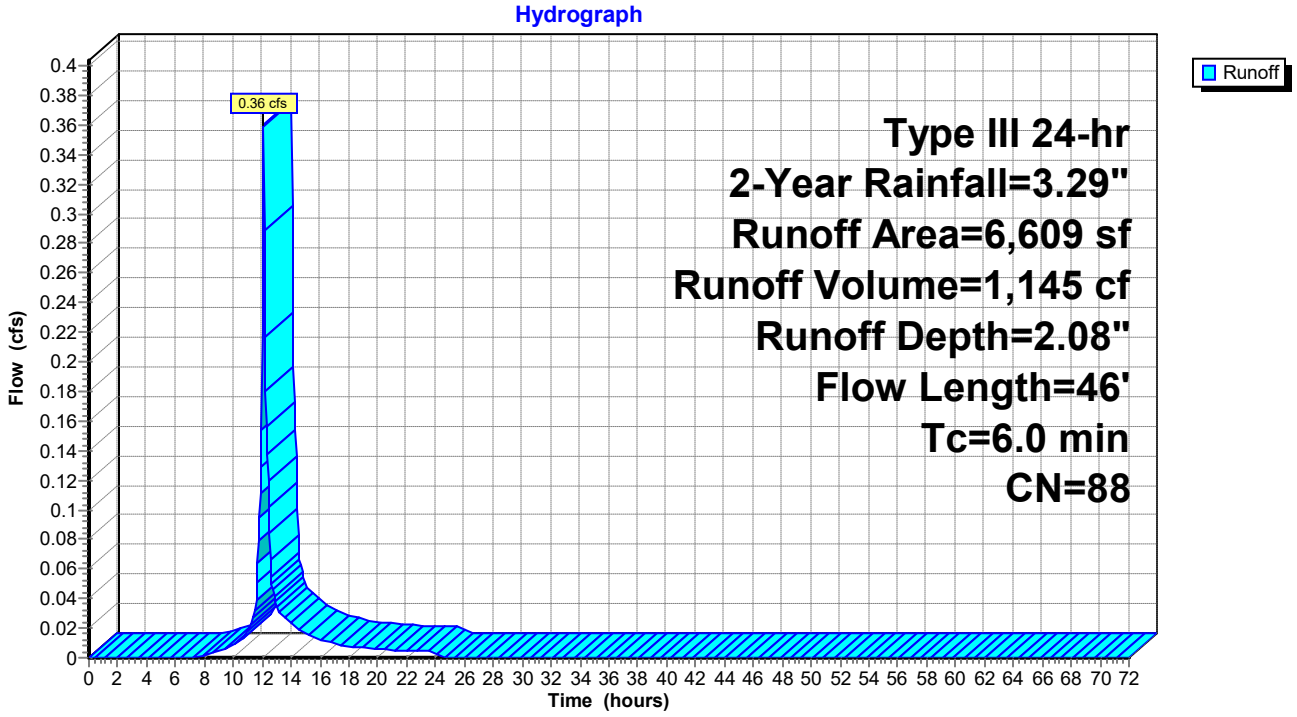
Runoff = 0.36 cfs @ 12.09 hrs, Volume= 1,145 cf, Depth= 2.08"
Routed to Link FS3 : Filter Strip

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.29"

Area (sf)	CN	Description
3,539	80	Pasture/grassland/range, Good, HSG D
2,466	96	Gravel surface, HSG D
600	98	Water Surface, 0% imp, HSG D
4	98	Unconnected pavement, HSG D
6,609	88	Weighted Average
6,605		99.94% Pervious Area
4		0.06% Impervious Area
4		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	9	0.0226	0.13		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
0.4	37	0.0506	1.66		**Sheet Flow, BC** Smooth surfaces n= 0.011 P2= 3.29"
1.6	46	Total, Increased to minimum Tc = 6.0 min			

Subcatchment IT3-S: Trench 3 Subcat



Summary for Subcatchment M: Middle

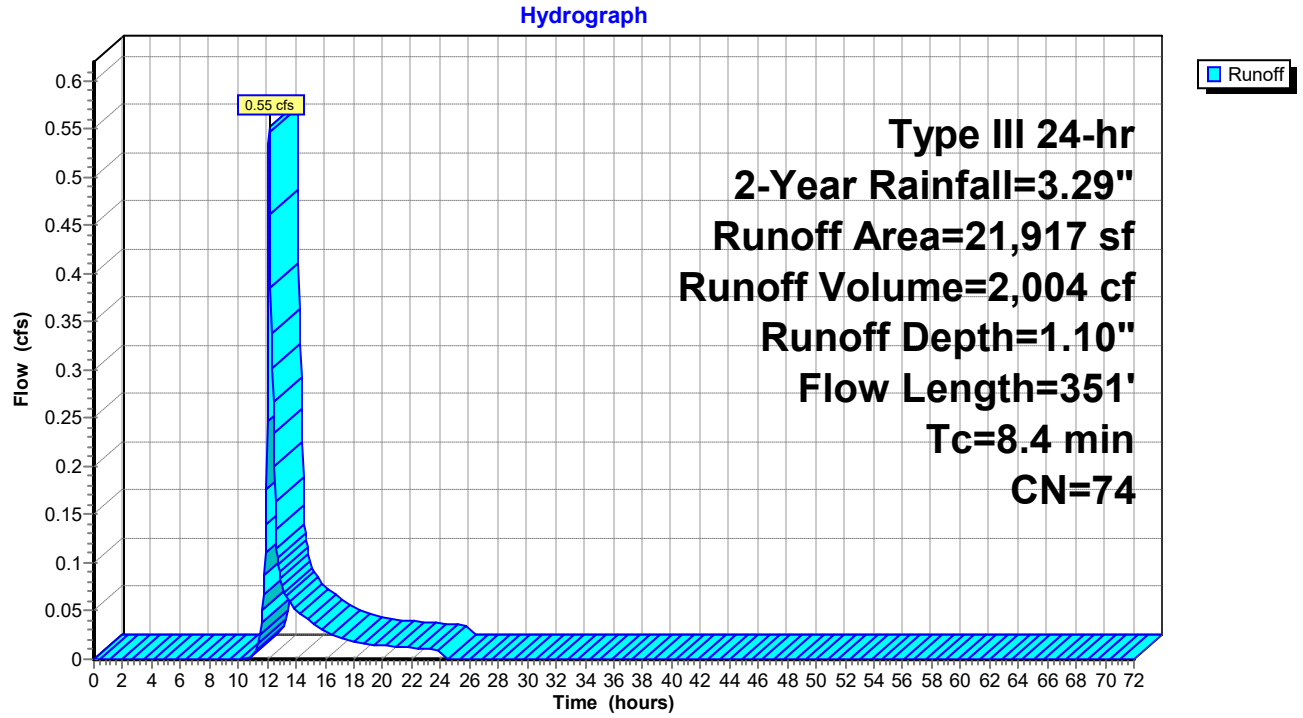
Runoff = 0.55 cfs @ 12.13 hrs, Volume= 2,004 cf, Depth= 1.10"
Routed to Reach 2P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.29"

Area (sf)	CN	Description
21,742	74	Pasture/grassland/range, Good, HSG C
152	96	Gravel surface, HSG C
23	98	Unconnected pavement, HSG C
21,917	74	Weighted Average
21,894		99.90% Pervious Area
23		0.10% Impervious Area
23		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	95	0.0626	0.30		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
2.3	214	0.0510	1.58		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.9	42	0.0126	0.79		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
8.4	351	Total			

Subcatchment M: Middle



Summary for Subcatchment ME: Middle East

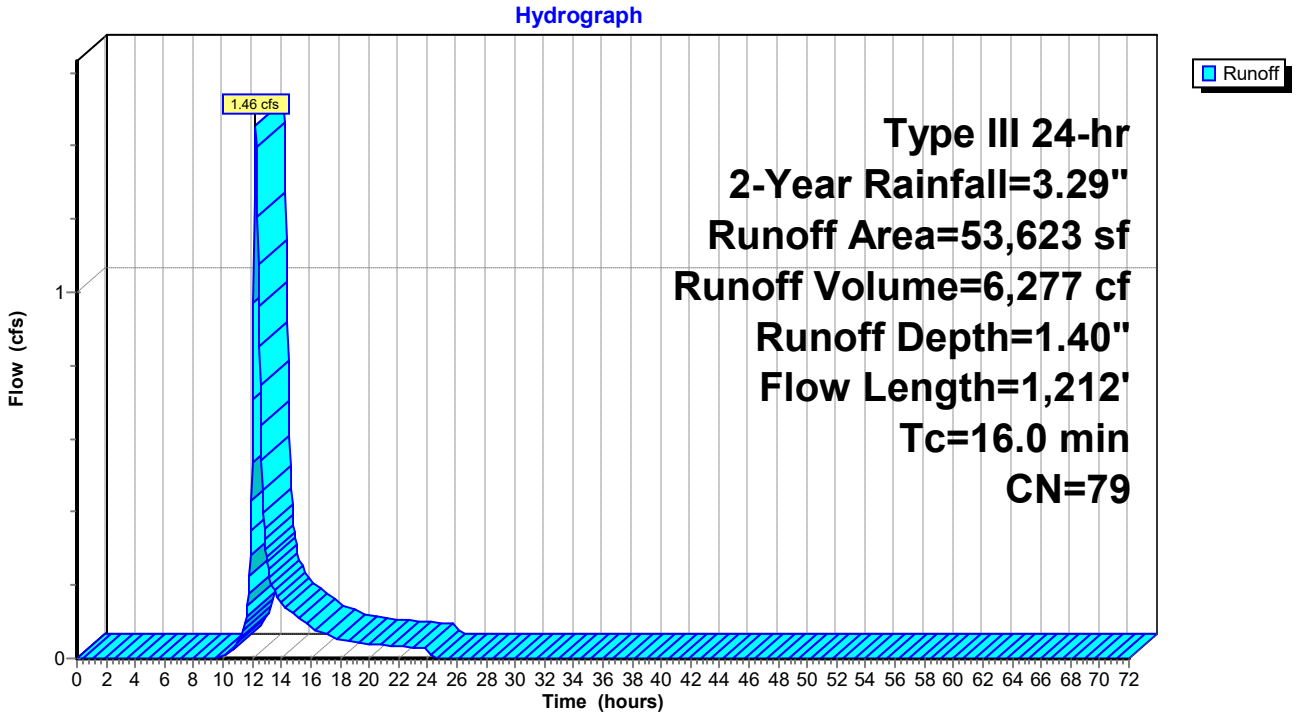
Runoff = 1.46 cfs @ 12.23 hrs, Volume= 6,277 cf, Depth= 1.40"
Routed to Reach 3P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.29"

Area (sf)	CN	Description
11,328	74	Pasture/grassland/range, Good, HSG C
41,933	80	Pasture/grassland/range, Good, HSG D
82	96	Gravel surface, HSG C
239	96	Gravel surface, HSG D
8	98	Unconnected pavement, HSG C
33	98	Unconnected pavement, HSG D
53,623	79	Weighted Average
53,582		99.92% Pervious Area
41		0.08% Impervious Area
41		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.0678	0.32		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
7.1	708	0.0566	1.67		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
1.5	140	0.0508	1.58		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.4	116	0.0409	5.12	11.51	**Trap/Vee/Rect Channel Flow, DE** Bot.W=3.00' D=0.50' Z= 3.0 '/' Top.W=6.00' n= 0.030 Earth, grassed & winding
0.0	5	0.0154	2.00		**Shallow Concentrated Flow, EF** Unpaved Kv= 16.1 fps
1.0	98	0.0528	1.61		**Shallow Concentrated Flow, FG** Short Grass Pasture Kv= 7.0 fps
0.7	45	0.0258	1.12		**Shallow Concentrated Flow, GH** Short Grass Pasture Kv= 7.0 fps
16.0	1,212	Total			

Subcatchment ME: Middle East



Summary for Subcatchment MW: Middle West

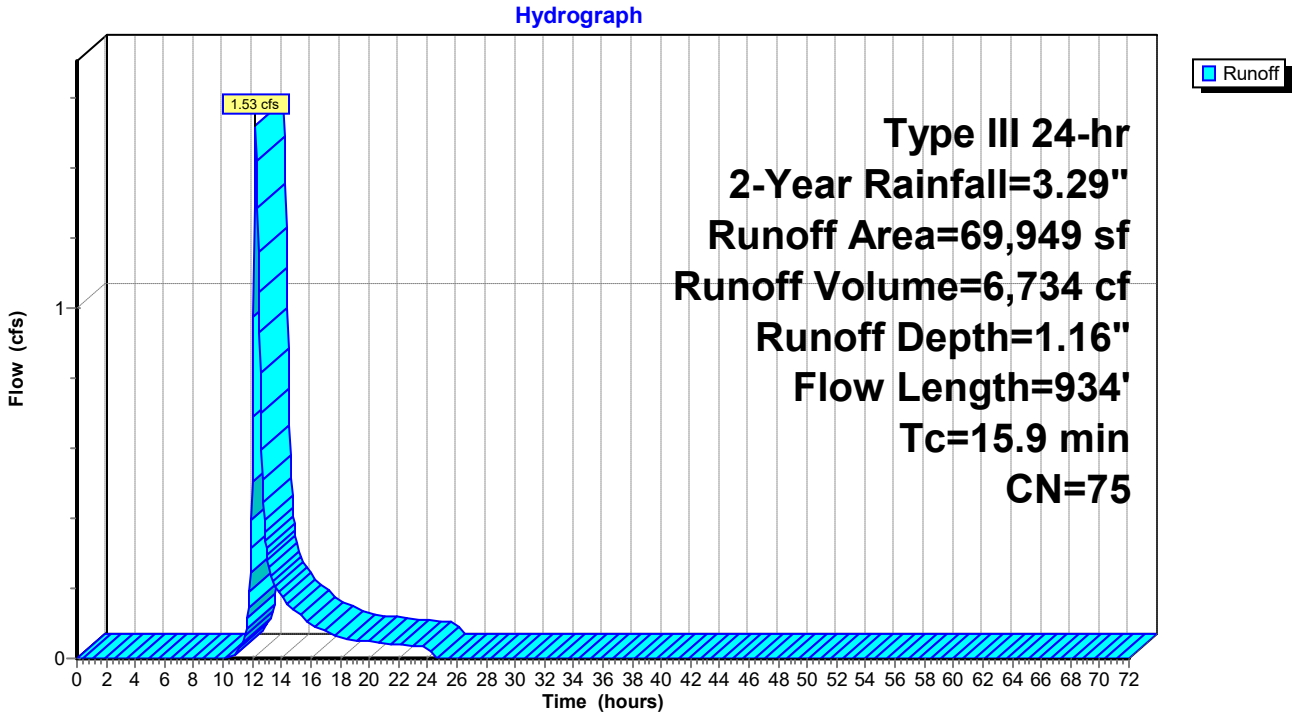
Runoff = 1.53 cfs @ 12.24 hrs, Volume= 6,734 cf, Depth= 1.16"
Routed to Reach 1P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.29"

Area (sf)	CN	Description
54,713	74	Pasture/grassland/range, Good, HSG C
15,194	80	Pasture/grassland/range, Good, HSG D
29	98	Unconnected pavement, HSG C
13	98	Unconnected pavement, HSG D
69,949	75	Weighted Average
69,907		99.94% Pervious Area
42		0.06% Impervious Area
42		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	100	0.0582	0.30		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
6.2	695	0.0716	1.87		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
4.1	139	0.0066	0.57		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
15.9	934	Total			

Subcatchment MW: Middle West



Summary for Subcatchment N: North

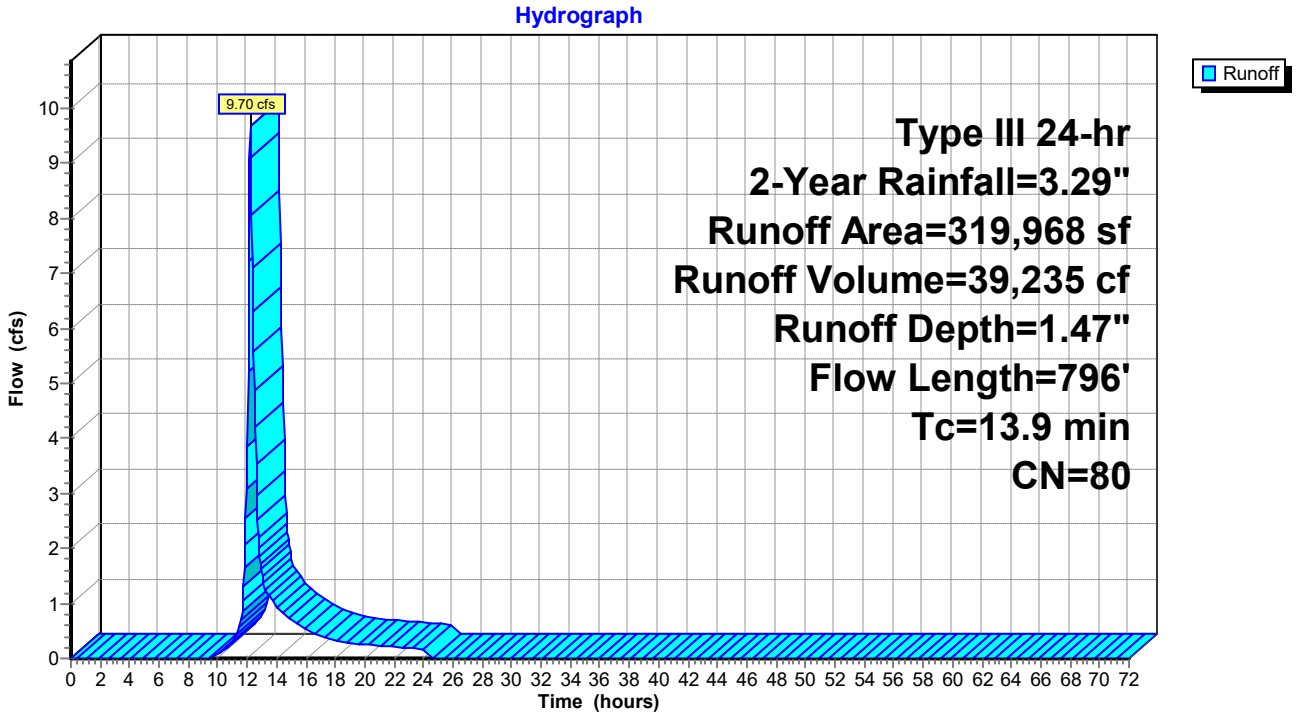
Runoff = 9.70 cfs @ 12.20 hrs, Volume= 39,235 cf, Depth= 1.47"
Routed to Link 6L : Lag

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.29"

Area (sf)	CN	Description
290,514	80	Pasture/grassland/range, Good, HSG D
29,255	77	Woods, Good, HSG D
199	98	Unconnected pavement, HSG D
319,968	80	Weighted Average
319,769		99.94% Pervious Area
199		0.06% Impervious Area
199		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	15	0.0850	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.29"
4.7	85	0.0656	0.30		**Sheet Flow, BC** Range n= 0.130 P2= 3.29"
6.5	689	0.0643	1.78		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.1	7	0.0590	1.21		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
13.9	796	Total			

Subcatchment N: North



Summary for Subcatchment NE: North East

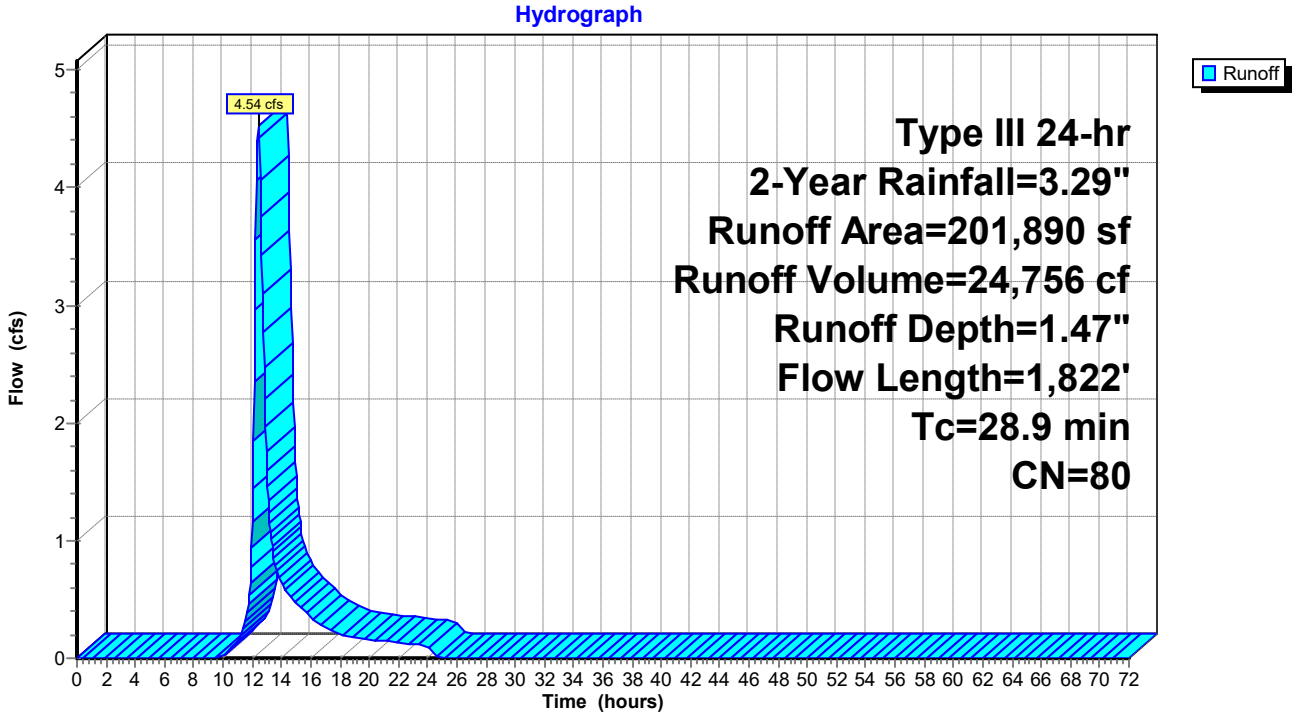
Runoff = 4.54 cfs @ 12.42 hrs, Volume= 24,756 cf, Depth= 1.47"
Routed to Pond 4P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.29"

Area (sf)	CN	Description
192,277	80	Pasture/grassland/range, Good, HSG D
9,482	77	Woods, Good, HSG D
131	98	Unconnected pavement, HSG D
201,890	80	Weighted Average
201,759		99.94% Pervious Area
131		0.06% Impervious Area
131		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	100	0.0558	0.29		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
23.2	1,722	0.0311	1.23		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
28.9	1,822	Total			

Subcatchment NE: North East



Summary for Subcatchment SE: South East

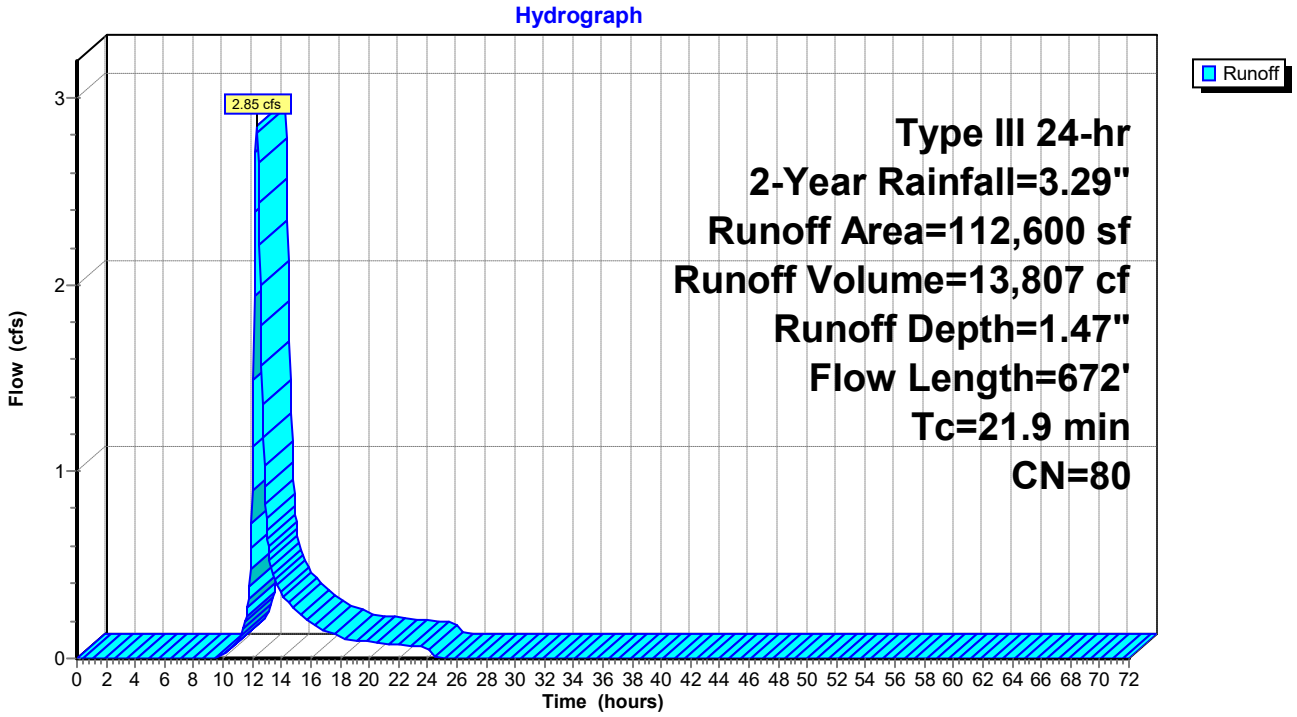
Runoff = 2.85 cfs @ 12.31 hrs, Volume= 13,807 cf, Depth= 1.47"
Routed to Reach 5P : Unknown

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.29"

Area (sf)	CN	Description
110,642	80	Pasture/grassland/range, Good, HSG D
1,536	77	Woods, Good, HSG D
368	96	Gravel surface, HSG D
54	98	Unconnected pavement, HSG D
112,600	80	Weighted Average
112,546		99.95% Pervious Area
54		0.05% Impervious Area
54		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0428	0.11		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.29"
6.1	521	0.0416	1.43		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.2	51	0.0277	3.86	17.37	**Trap/Vee/Rect Channel Flow, CD** Bot.W=4.00' D=0.50' Z= 10.0 '/' Top.W=14.00' n= 0.030 Earth, grassed & winding
21.9	672	Total			

Subcatchment SE: South East



Summary for Subcatchment W: West

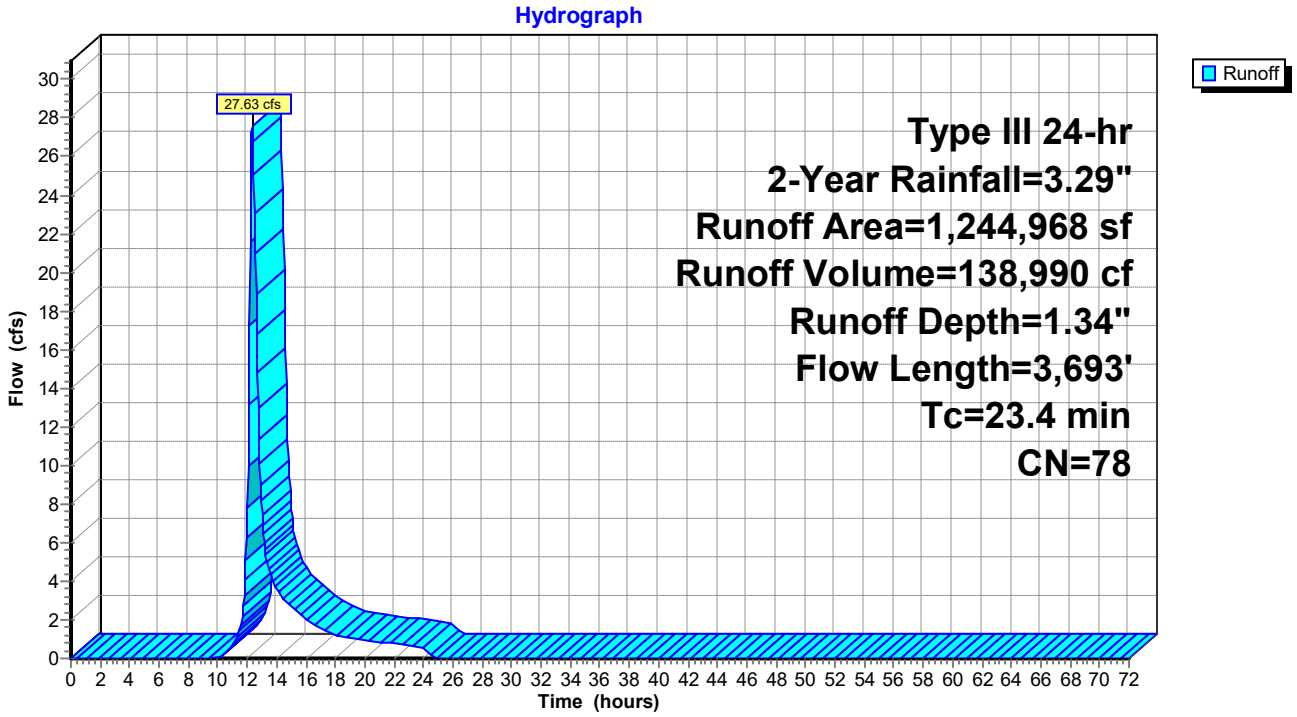
Runoff = 27.63 cfs @ 12.34 hrs, Volume= 138,990 cf, Depth= 1.34"
Routed to Reach DP-W : Watts Stream

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.29"

Area (sf)	CN	Description
236,639	74	Pasture/grassland/range, Good, HSG C
396,169	80	Pasture/grassland/range, Good, HSG D
40,930	70	Woods, Good, HSG C
521,429	77	Woods, Good, HSG D
41,310	96	Gravel surface, HSG C
1,146	96	Gravel surface, HSG D
6,801	98	Unconnected pavement, HSG C
544	98	Unconnected pavement, HSG D
1,244,968	78	Weighted Average
1,237,623		99.41% Pervious Area
7,345		0.59% Impervious Area
7,345		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	15	0.0814	0.09		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.29"
4.8	85	0.0623	0.29		**Sheet Flow, BC** Range n= 0.130 P2= 3.29"
5.9	685	0.0763	1.93		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.1	75	0.0926	10.68	128.14	**Trap/Vee/Rect Channel Flow, DE** Bot.W=4.00' D=1.00' Z= 8.0 '/' Top.W=20.00' n= 0.030 Earth, grassed & winding
1.1	187	0.1510	2.72		**Shallow Concentrated Flow, EF** Short Grass Pasture Kv= 7.0 fps
1.7	174	0.1201	1.73		**Shallow Concentrated Flow, FG** Woodland Kv= 5.0 fps
3.1	214	0.0525	1.15		**Shallow Concentrated Flow, GH** Woodland Kv= 5.0 fps
0.6	73	0.1513	1.94		**Shallow Concentrated Flow, HI** Woodland Kv= 5.0 fps
0.9	49	0.0338	0.92		**Shallow Concentrated Flow, IJ** Woodland Kv= 5.0 fps
2.6	2,136	0.0318	13.70	945.01	**Trap/Vee/Rect Channel Flow, JK** Bot.W=11.00' D=3.00' Z= 4.0 '/' Top.W=35.00' n= 0.030 Earth, grassed & winding
23.4	3,693	Total			

Subcatchment W: West



Summary for Reach 1P: 15" CPP

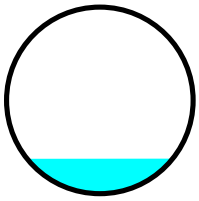
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 69,949 sf, 0.06% Impervious, Inflow Depth = 1.16" for 2-Year event
Inflow = 1.53 cfs @ 12.24 hrs, Volume= 6,734 cf
Outflow = 1.52 cfs @ 12.24 hrs, Volume= 6,734 cf, Atten= 0%, Lag= 0.1 min
Routed to Link 1L : Lag

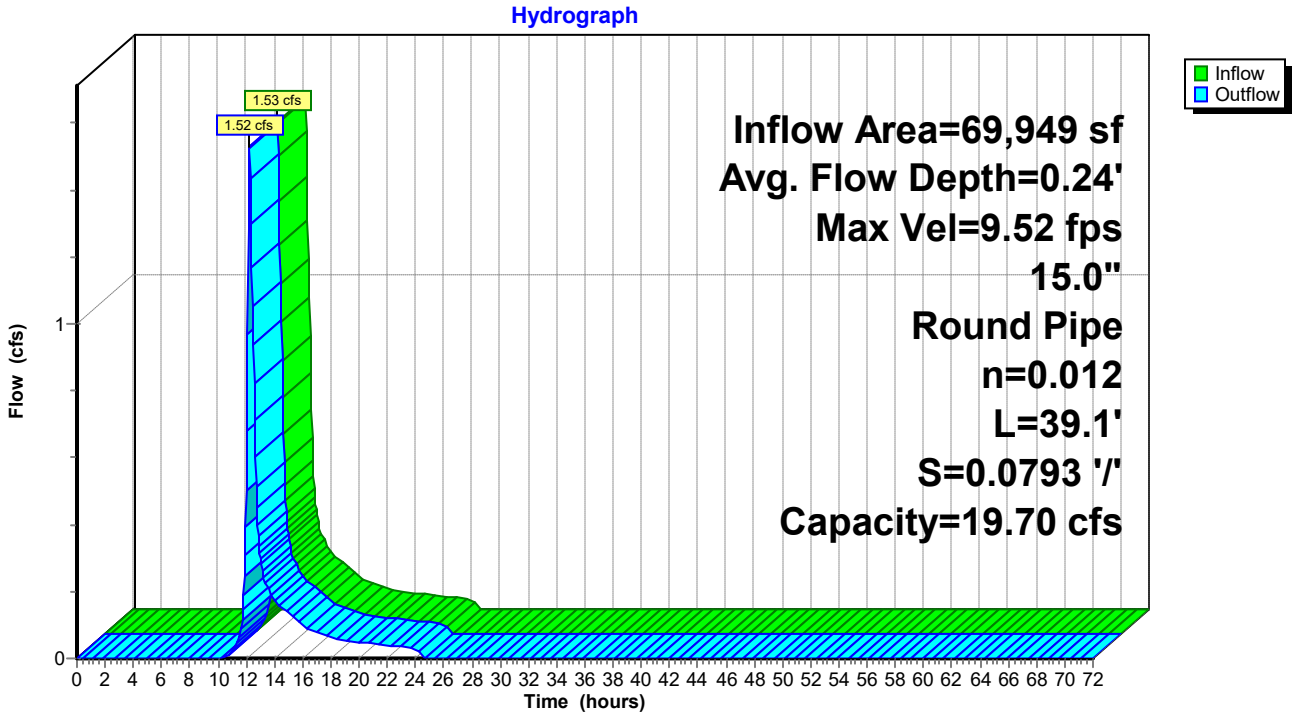
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.52 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.93 fps, Avg. Travel Time= 0.2 min

Peak Storage= 6 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.24' , Surface Width= 0.98'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 19.70 cfs

15.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 39.1' Slope= 0.0793 '/'
Inlet Invert= 1,668.60', Outlet Invert= 1,665.50'



Reach 1P: 15" CPP



Summary for Reach 2.5P: New 12" CPP

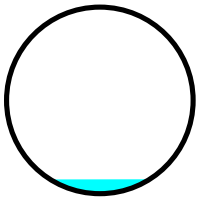
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 8,608 sf, 23.05% Impervious, Inflow Depth = 0.77" for 2-Year event
Inflow = 0.11 cfs @ 12.44 hrs, Volume= 550 cf
Outflow = 0.11 cfs @ 12.44 hrs, Volume= 551 cf, Atten= 0%, Lag= 0.1 min
Routed to Link 8L : Lag

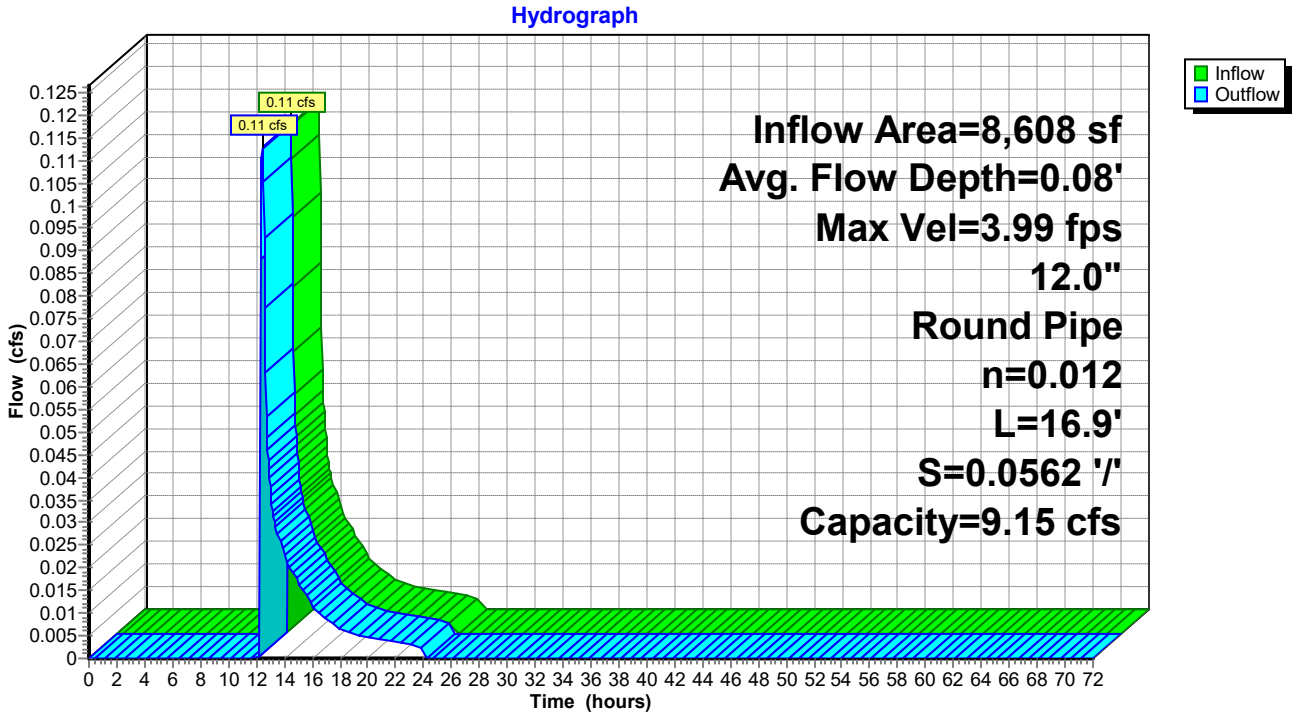
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 3.99 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.89 fps, Avg. Travel Time= 0.1 min

Peak Storage= 0 cf @ 12.44 hrs
Average Depth at Peak Storage= 0.08' , Surface Width= 0.54'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 9.15 cfs

12.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 16.9' Slope= 0.0562 '/'
Inlet Invert= 1,672.13', Outlet Invert= 1,671.18'



Reach 2.5P: New 12" CPP



Summary for Reach 2P: 15" CPP

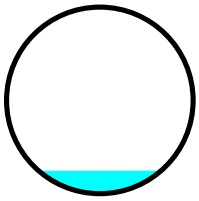
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 21,917 sf, 0.10% Impervious, Inflow Depth = 1.10" for 2-Year event
Inflow = 0.55 cfs @ 12.13 hrs, Volume= 2,004 cf
Outflow = 0.55 cfs @ 12.13 hrs, Volume= 2,004 cf, Atten= 0%, Lag= 0.1 min
Routed to Link 2L : Lag

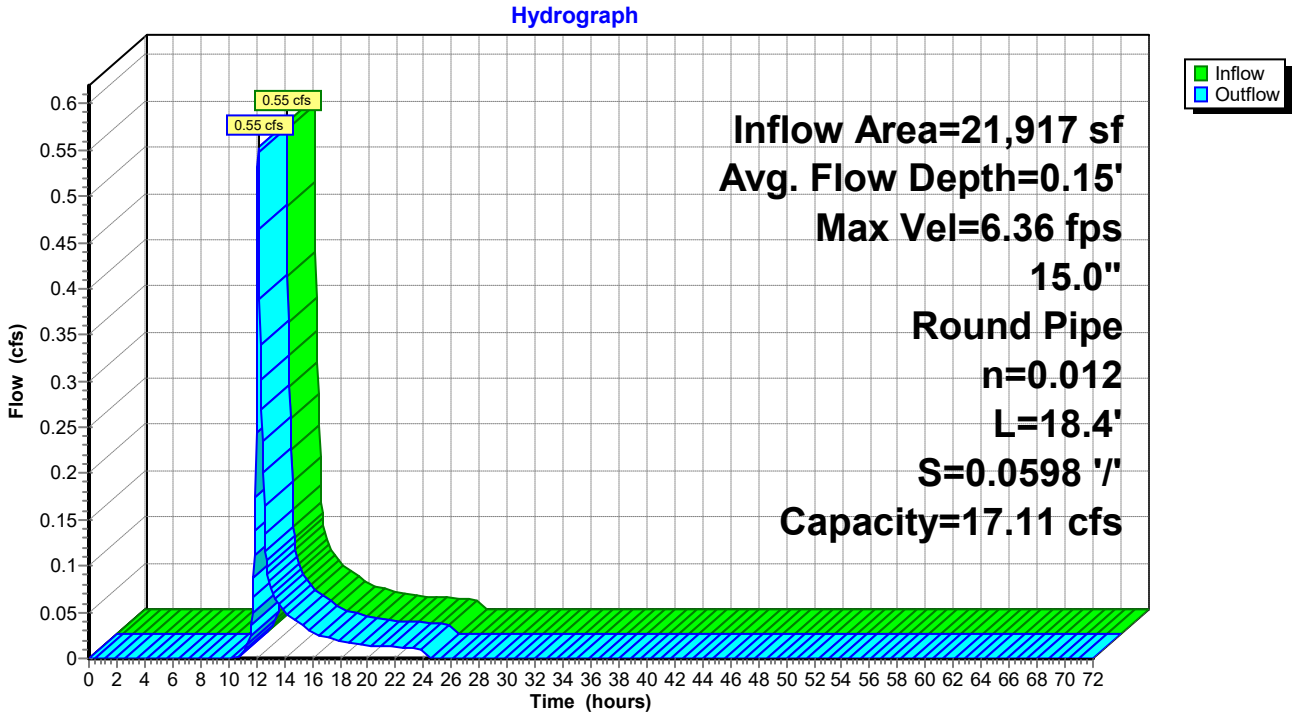
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.36 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.54 fps, Avg. Travel Time= 0.1 min

Peak Storage= 2 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 0.82'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 17.11 cfs

15.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 18.4' Slope= 0.0598 '/'
Inlet Invert= 1,669.70', Outlet Invert= 1,668.60'



Reach 2P: 15" CPP



Summary for Reach 3P: 15" CPP

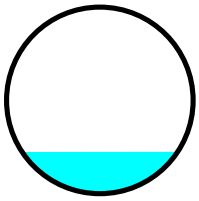
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 53,623 sf, 0.08% Impervious, Inflow Depth = 1.40" for 2-Year event
Inflow = 1.46 cfs @ 12.23 hrs, Volume= 6,277 cf
Outflow = 1.46 cfs @ 12.23 hrs, Volume= 6,277 cf, Atten= 0%, Lag= 0.1 min
Routed to Link FS2 : Filter Strip

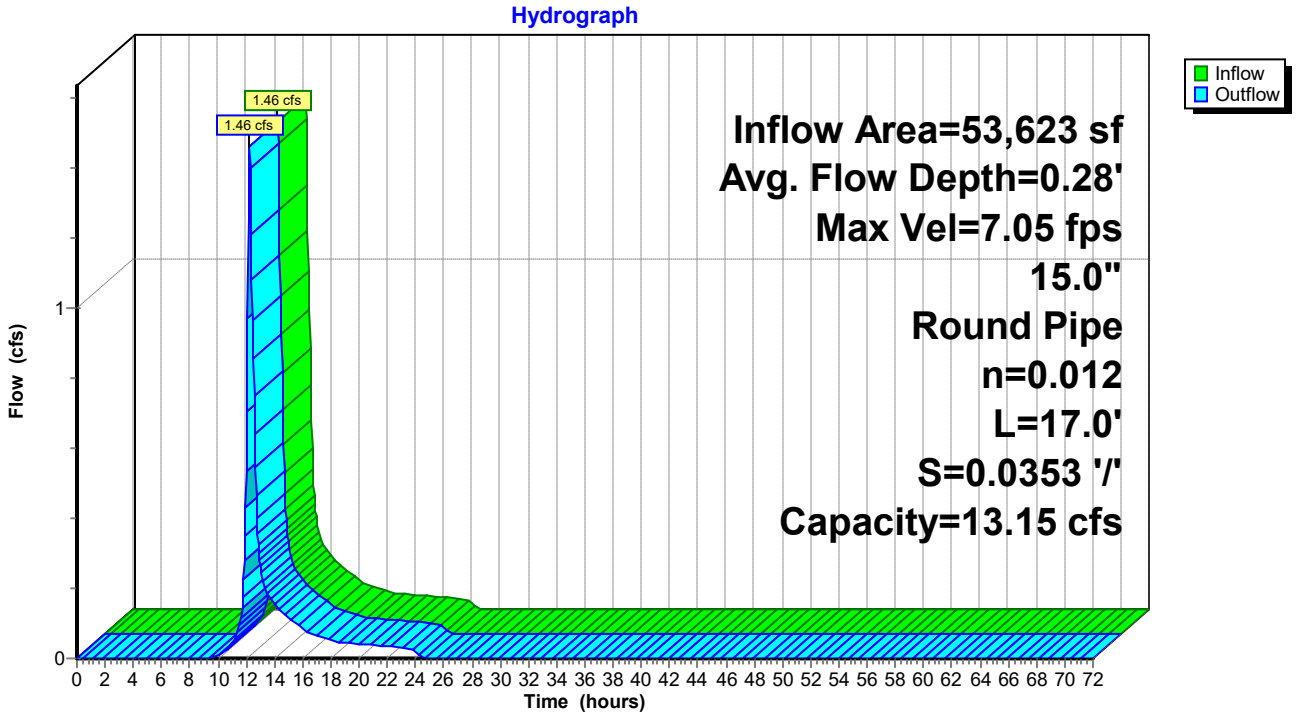
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.05 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.81 fps, Avg. Travel Time= 0.1 min

Peak Storage= 4 cf @ 12.23 hrs
Average Depth at Peak Storage= 0.28' , Surface Width= 1.04'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 13.15 cfs

15.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 17.0' Slope= 0.0353 '/'
Inlet Invert= 1,666.50', Outlet Invert= 1,665.90'



Reach 3P: 15" CPP



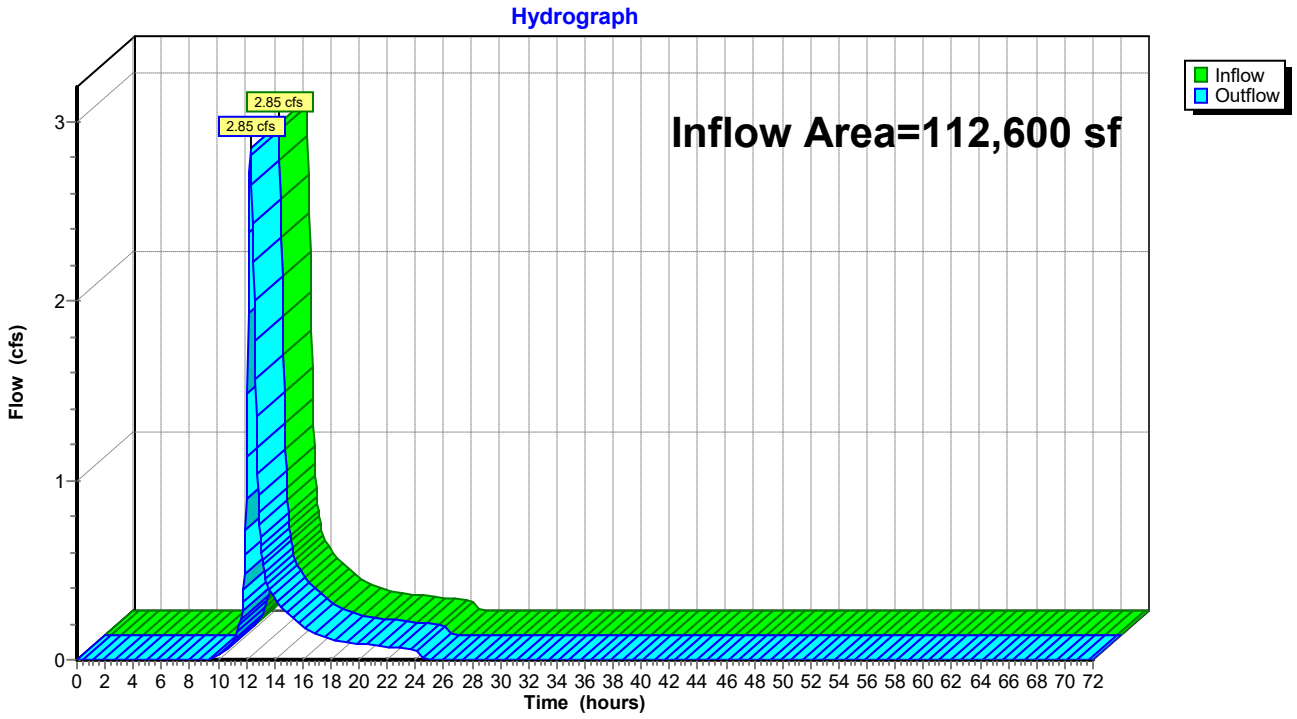
Summary for Reach 5P: Unknown

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 112,600 sf, 0.05% Impervious, Inflow Depth = 1.47" for 2-Year event
Inflow = 2.85 cfs @ 12.31 hrs, Volume= 13,807 cf
Outflow = 2.85 cfs @ 12.31 hrs, Volume= 13,807 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 5L : Lag

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach 5P: Unknown



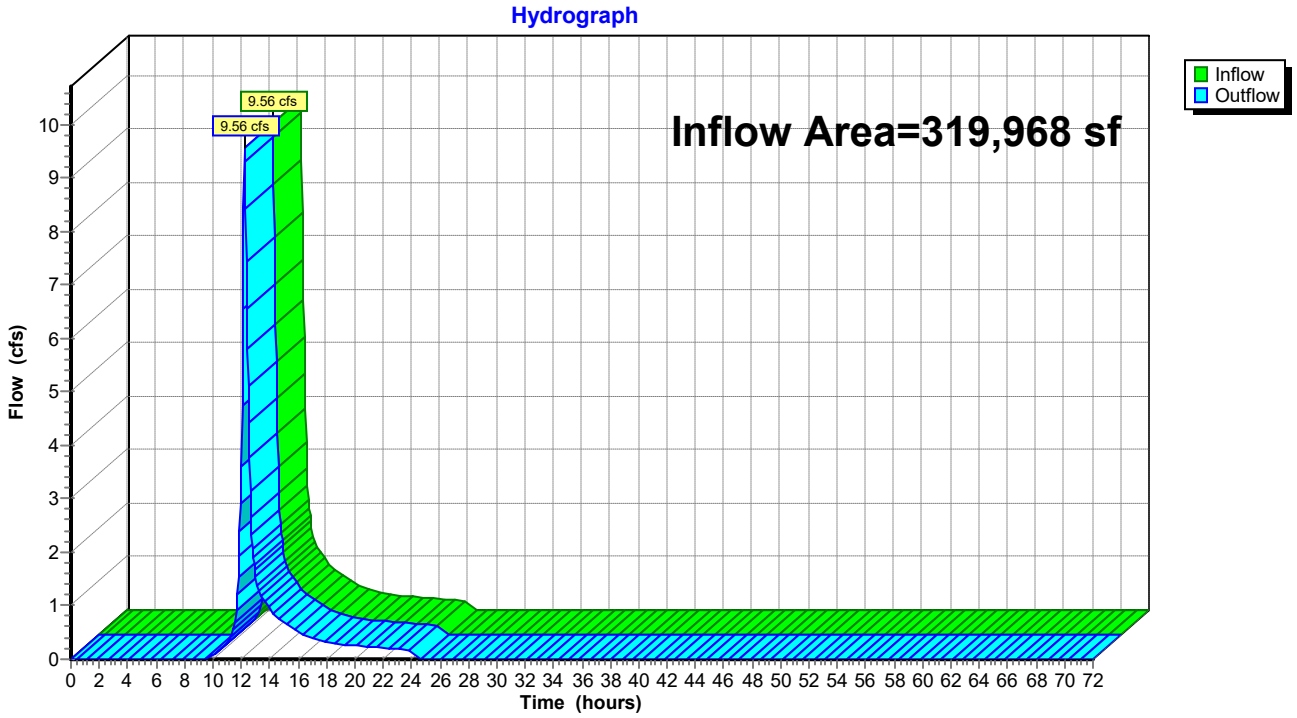
Summary for Reach DP-E: Culvert towards Wades Stream

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 319,968 sf, 0.06% Impervious, Inflow Depth = 1.47" for 2-Year event
Inflow = 9.56 cfs @ 12.22 hrs, Volume= 39,235 cf
Outflow = 9.56 cfs @ 12.22 hrs, Volume= 39,235 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP-E: Culvert towards Wades Stream



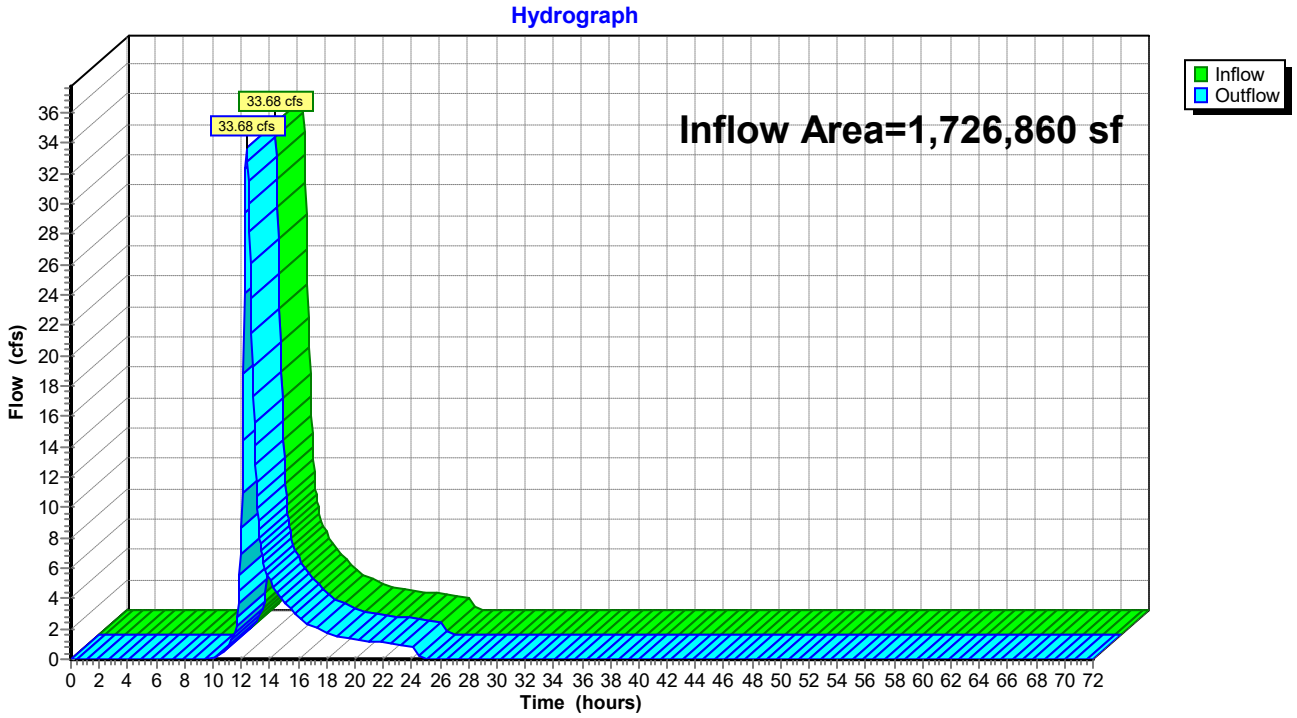
Summary for Reach DP-W: Watts Stream

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,726,860 sf, 0.56% Impervious, Inflow Depth = 1.33" for 2-Year event
Inflow = 33.68 cfs @ 12.37 hrs, Volume= 191,833 cf
Outflow = 33.68 cfs @ 12.37 hrs, Volume= 191,833 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP-W: Watts Stream



Summary for Pond 4P: 15" CPP

Inflow Area = 201,890 sf, 0.06% Impervious, Inflow Depth = 1.47" for 2-Year event
Inflow = 4.54 cfs @ 12.42 hrs, Volume= 24,756 cf
Outflow = 4.52 cfs @ 12.42 hrs, Volume= 24,754 cf, Atten= 0%, Lag= 0.3 min
Primary = 4.52 cfs @ 12.42 hrs, Volume= 24,754 cf
Routed to Link FS3 : Filter Strip

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1,661.87' @ 12.42 hrs Surf.Area= 42 sf Storage= 26 cf

Plug-Flow detention time= 0.1 min calculated for 24,737 cf (100% of inflow)
Center-of-Mass det. time= 0.1 min (862.6 - 862.6)

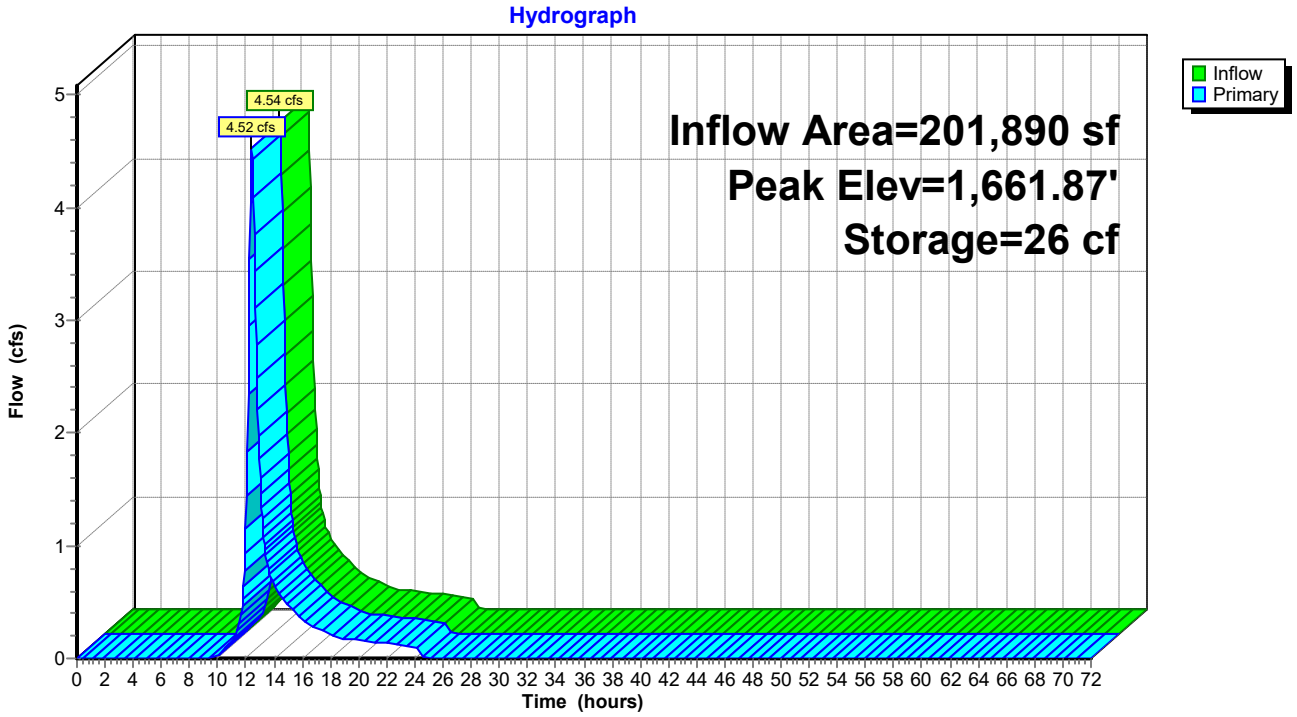
Volume	Invert	Avail.Storage	Storage Description
#1	1,660.30'	490 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
1,660.30	1	3.9	0	0	1
1,663.00	110	67.9	109	109	379
1,664.00	745	151.8	380	490	1,850

Device	Routing	Invert	Outlet Devices
#1	Primary	1,660.30'	**15.0" Round Culvert** L= 16.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1,660.30' / 1,659.80' S= 0.0305 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf
#2	Primary	1,662.50'	**8.0' long + 35.0 '/' SideZ x 13.0' 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) 2.60 2.64 2.70 2.66 2.65 2.66 2.65 2.63

Primary OutFlow Max=4.51 cfs @ 12.42 hrs HW=1,661.86' (Free Discharge)
1=Culvert (Inlet Controls 4.51 cfs @ 3.67 fps)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 4P: 15" CPP



Summary for Pond IT1: Infiltration

Inflow Area = 8,608 sf, 23.05% Impervious, Inflow Depth = 1.47" for 2-Year event
Inflow = 0.32 cfs @ 12.13 hrs, Volume= 1,056 cf
Outflow = 0.11 cfs @ 12.39 hrs, Volume= 863 cf, Atten= 64%, Lag= 15.3 min
Discarded = 0.00 cfs @ 12.39 hrs, Volume= 313 cf
Primary = 0.11 cfs @ 12.39 hrs, Volume= 550 cf
Routed to Link 7L : Lag

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1,674.50' @ 12.39 hrs Surf.Area= 438 sf Storage= 373 cf

Plug-Flow detention time= 600.5 min calculated for 862 cf (82% of inflow)
Center-of-Mass det. time= 527.4 min (1,370.9 - 843.4)

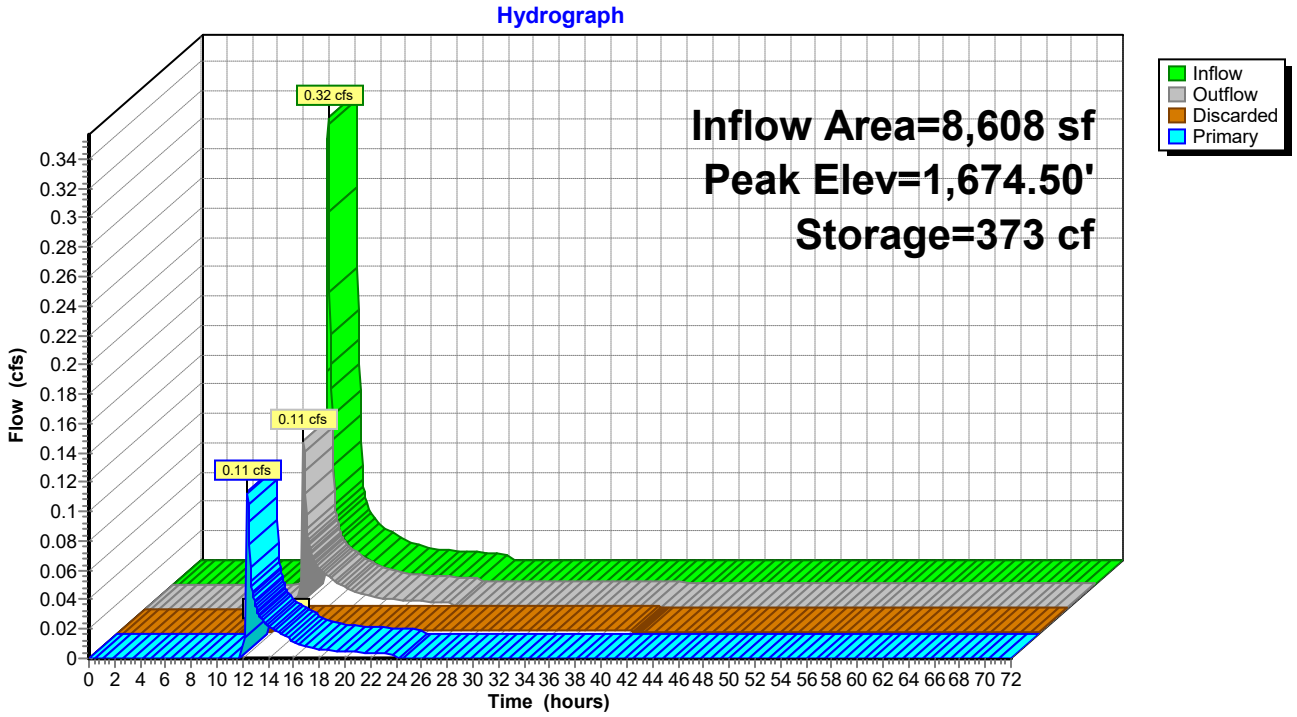
Volume	Invert	Avail.Storage	Storage Description
#1	1,671.00'	263 cf	**3.00'W x 73.00'L x 3.00'H Prismatoid** 657 cf Overall x 40.0% Voids
#2	1,674.00'	219 cf	**3.00'W x 73.00'L x 1.00'H Overflow Storage**
		482 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,671.00'	**0.170 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,654.00'
#2	Primary	1,674.50'	**73.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.00 cfs @ 12.39 hrs HW=1,674.50' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.05 cfs @ 12.39 hrs HW=1,674.50' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.05 cfs @ 0.17 fps)

Pond IT1: Infiltration



Summary for Pond IT2: Infiltration

Inflow Area = 60,319 sf, 0.07% Impervious, Inflow Depth = 1.47" for 2-Year event
Inflow = 1.64 cfs @ 12.25 hrs, Volume= 7,390 cf
Outflow = 1.43 cfs @ 12.30 hrs, Volume= 6,437 cf, Atten= 13%, Lag= 3.1 min
Discarded = 0.01 cfs @ 12.30 hrs, Volume= 936 cf
Primary = 1.42 cfs @ 12.30 hrs, Volume= 5,501 cf
Routed to Link 3L : Lag

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1,664.53' @ 12.30 hrs Surf.Area= 1,200 sf Storage= 1,516 cf

Plug-Flow detention time= 279.5 min calculated for 6,433 cf (87% of inflow)
Center-of-Mass det. time= 222.3 min (1,072.7 - 850.3)

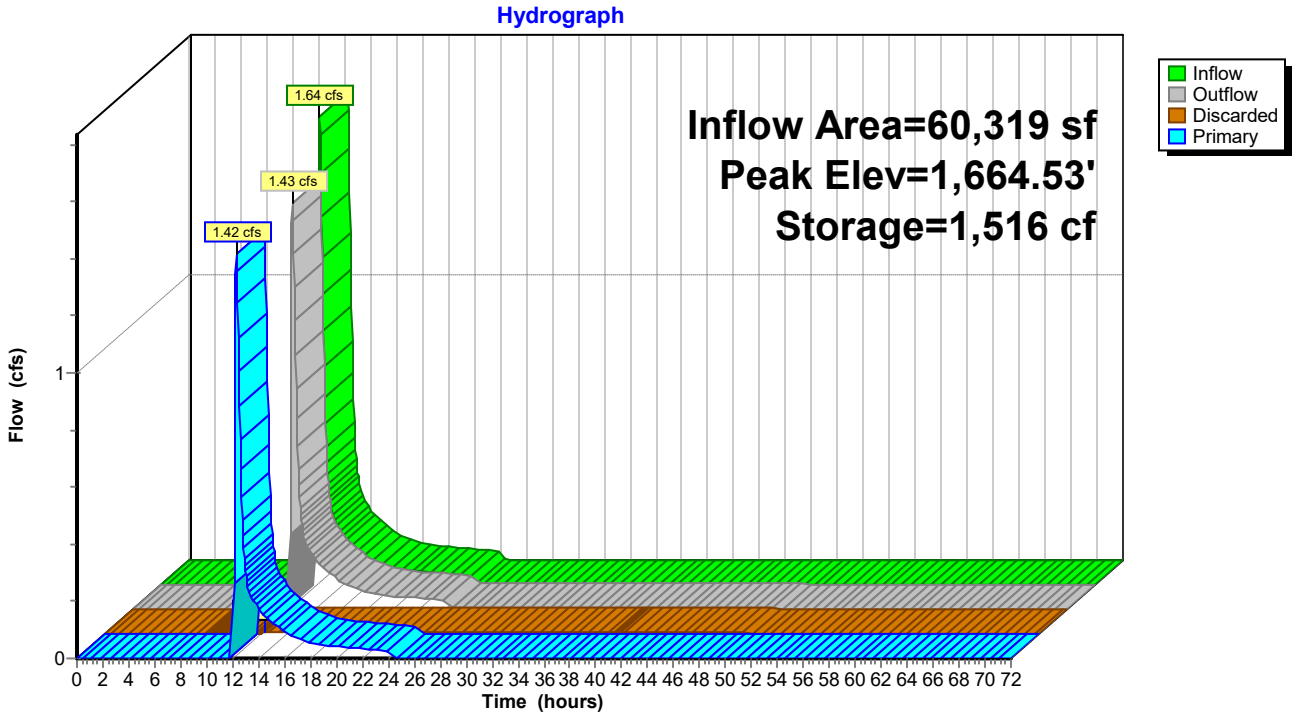
Volume	Invert	Avail.Storage	Storage Description
#1	1,659.00'	1,200 cf	**6.00'W x 100.00'L x 5.00'H Prismatoid** 3,000 cf Overall x 40.0% Voids
#2	1,664.00'	600 cf	**6.00'W x 100.00'L x 1.00'H Overflow Storage**
		1,800 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,659.00'	**0.170 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,644.00'
#2	Primary	1,664.50'	**100.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.01 cfs @ 12.30 hrs HW=1,664.53' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=1.22 cfs @ 12.30 hrs HW=1,664.53' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 1.22 cfs @ 0.45 fps)

Pond IT2: Infiltration



Summary for Pond IT3: Infiltration

Inflow Area = 208,499 sf, 0.06% Impervious, Inflow Depth = 1.49" for 2-Year event
Inflow = 4.62 cfs @ 12.45 hrs, Volume= 25,899 cf
Outflow = 4.61 cfs @ 12.45 hrs, Volume= 25,194 cf, Atten= 0%, Lag= 0.1 min
Discarded = 0.01 cfs @ 12.45 hrs, Volume= 949 cf
Primary = 4.61 cfs @ 12.45 hrs, Volume= 24,246 cf
Routed to Link 4L : Lag

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1,660.56' @ 12.45 hrs Surf.Area= 1,200 sf Storage= 1,538 cf

Plug-Flow detention time= 73.3 min calculated for 25,194 cf (97% of inflow)
Center-of-Mass det. time= 57.8 min (920.2 - 862.4)

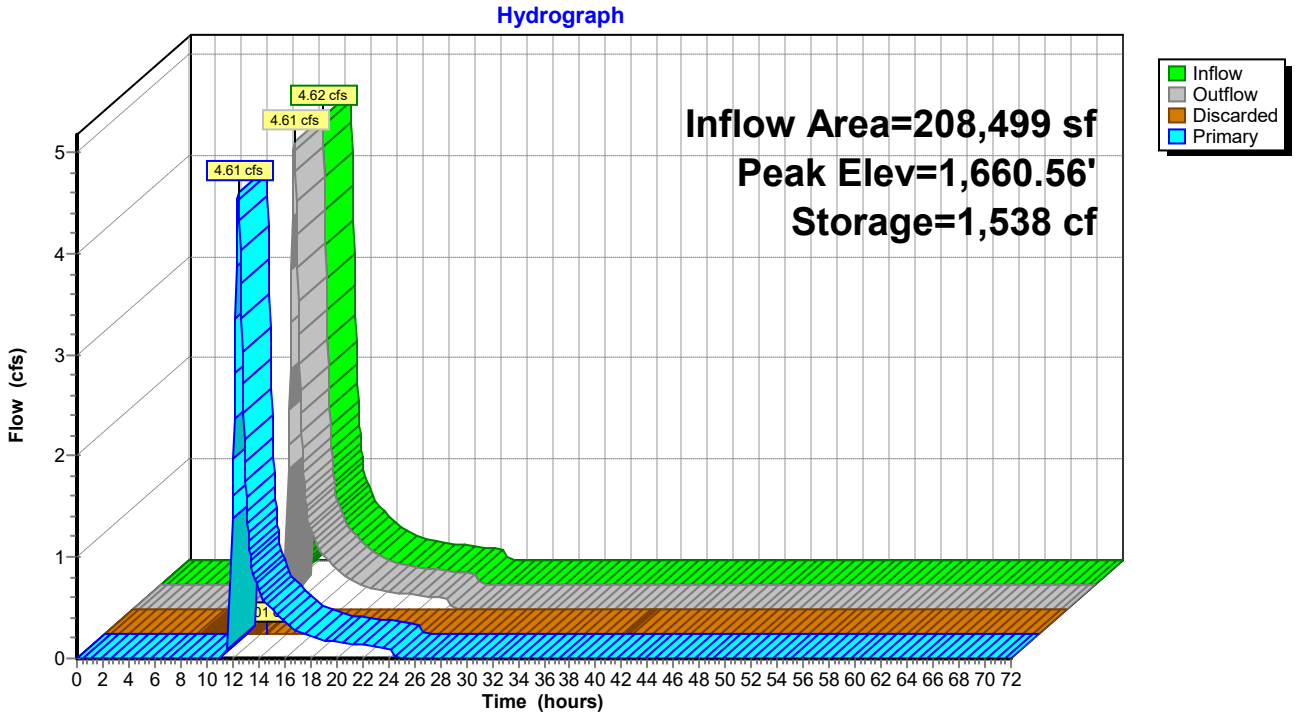
Volume	Invert	Avail.Storage	Storage Description
#1	1,655.00'	1,200 cf	**6.00'W x 100.00'L x 5.00'H Prismatoid** 3,000 cf Overall x 40.0% Voids
#2	1,660.00'	600 cf	**6.00'W x 100.00'L x 1.00'H Overflow Storage**
		1,800 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,655.00'	**0.170 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,640.00'
#2	Primary	1,660.50'	**100.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.01 cfs @ 12.45 hrs HW=1,660.56' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=4.29 cfs @ 12.45 hrs HW=1,660.56' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 4.29 cfs @ 0.68 fps)

Pond IT3: Infiltration

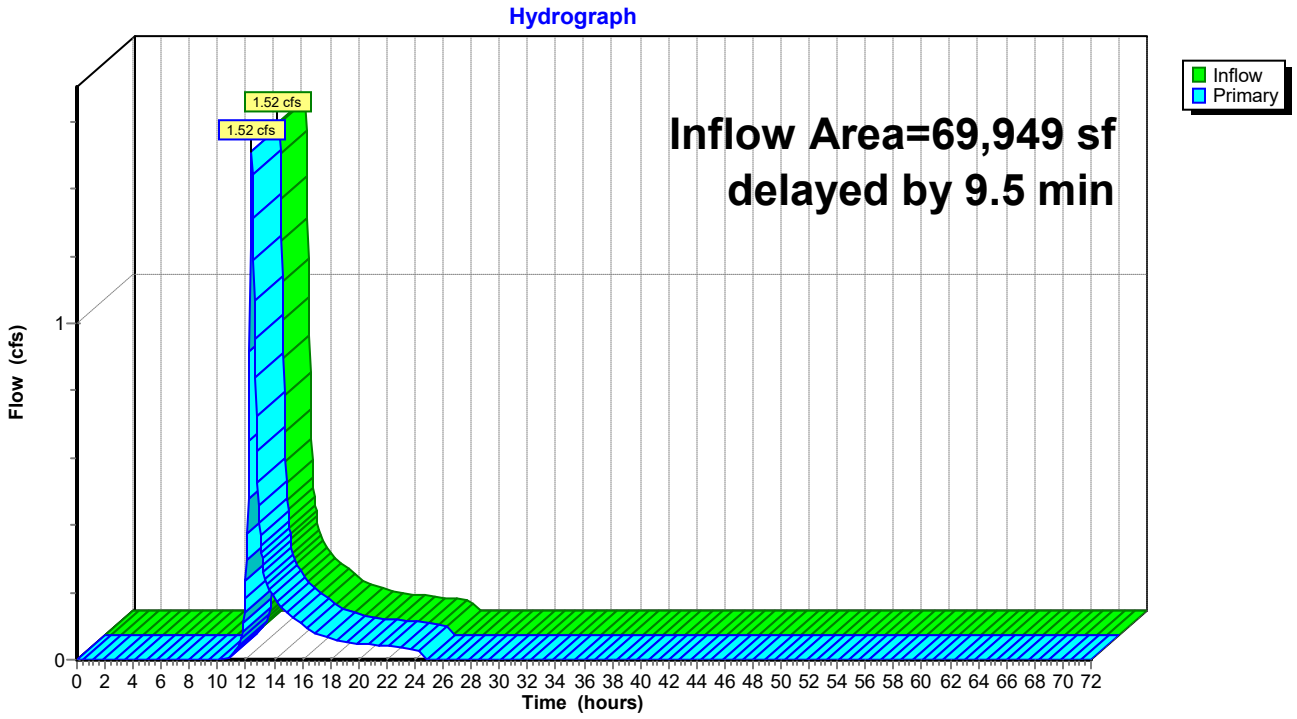


Summary for Link 1L: Lag

Inflow Area = 69,949 sf, 0.06% Impervious, Inflow Depth = 1.16" for 2-Year event
Inflow = 1.52 cfs @ 12.24 hrs, Volume= 6,734 cf
Primary = 1.52 cfs @ 12.40 hrs, Volume= 6,734 cf, Atten= 1%, Lag= 9.6 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 9.5 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: Lag

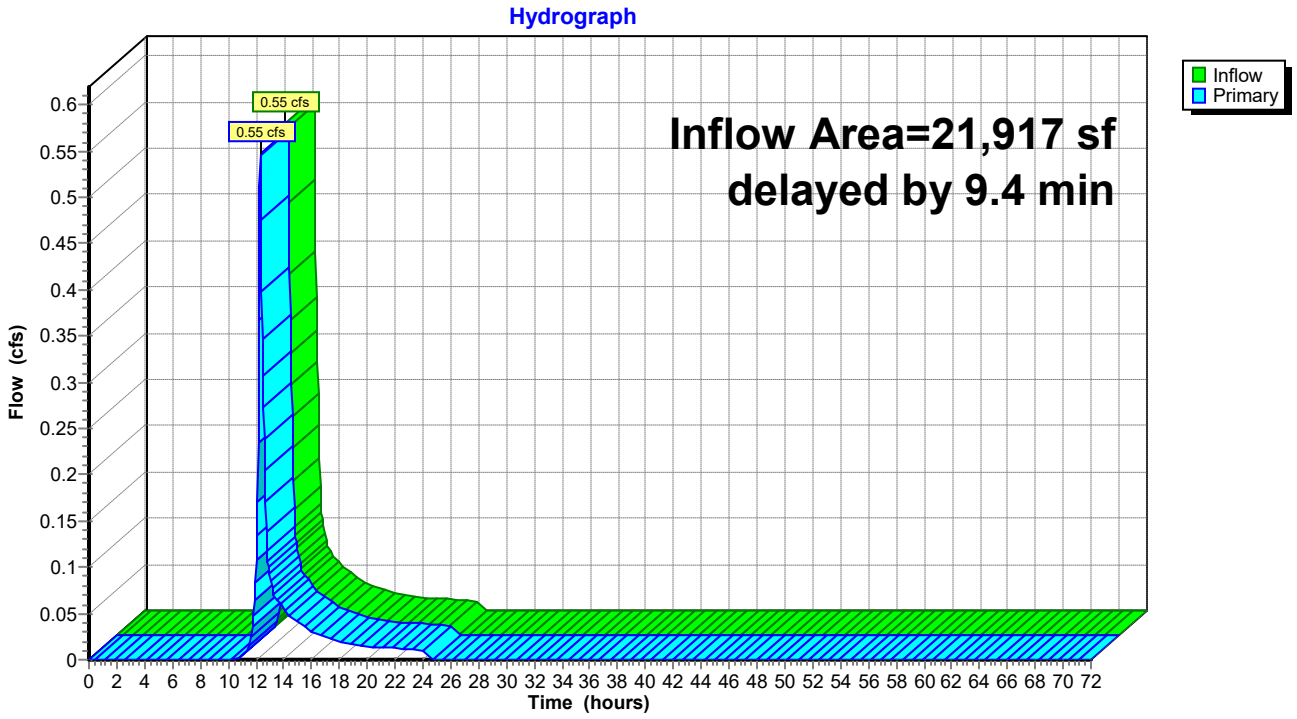


Summary for Link 2L: Lag

Inflow Area = 21,917 sf, 0.10% Impervious, Inflow Depth = 1.10" for 2-Year event
Inflow = 0.55 cfs @ 12.13 hrs, Volume= 2,004 cf
Primary = 0.55 cfs @ 12.29 hrs, Volume= 2,004 cf, Atten= 1%, Lag= 9.5 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 9.4 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 2L: Lag

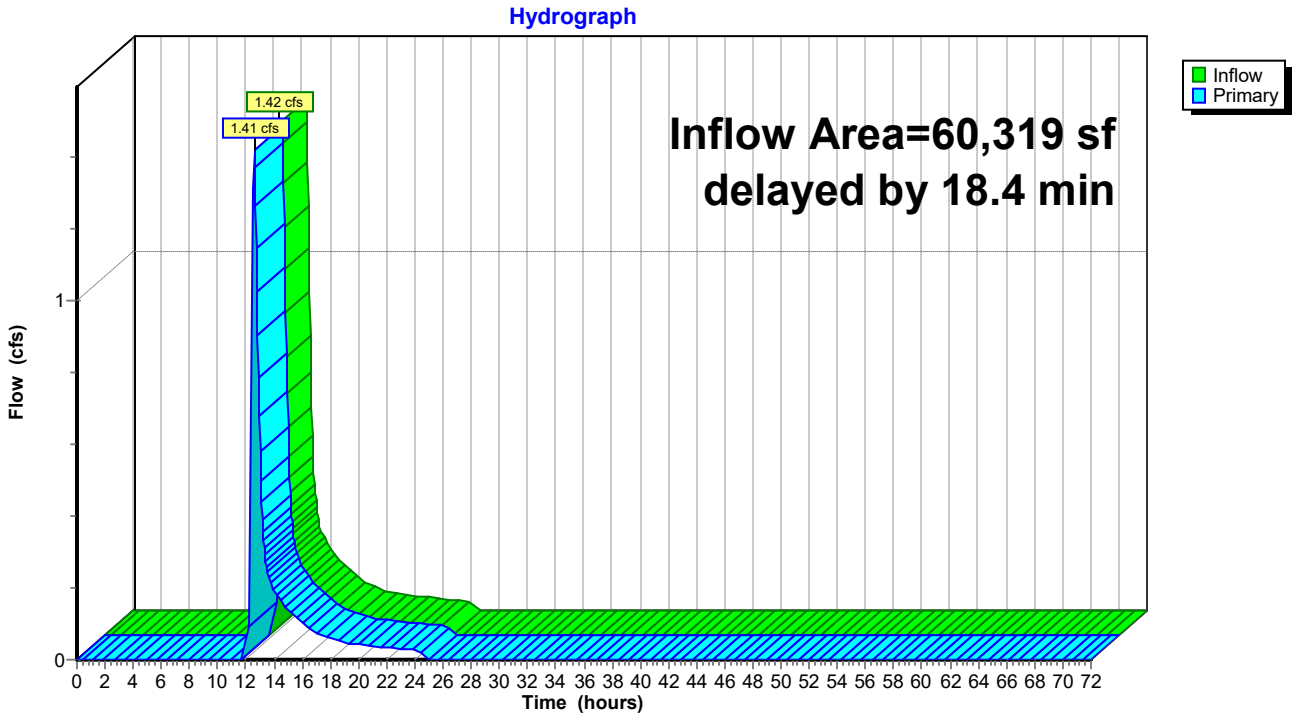


Summary for Link 3L: Lag

Inflow Area = 60,319 sf, 0.07% Impervious, Inflow Depth = 1.09" for 2-Year event
Inflow = 1.42 cfs @ 12.30 hrs, Volume= 5,501 cf
Primary = 1.41 cfs @ 12.61 hrs, Volume= 5,501 cf, Atten= 0%, Lag= 18.5 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 18.4 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 3L: Lag

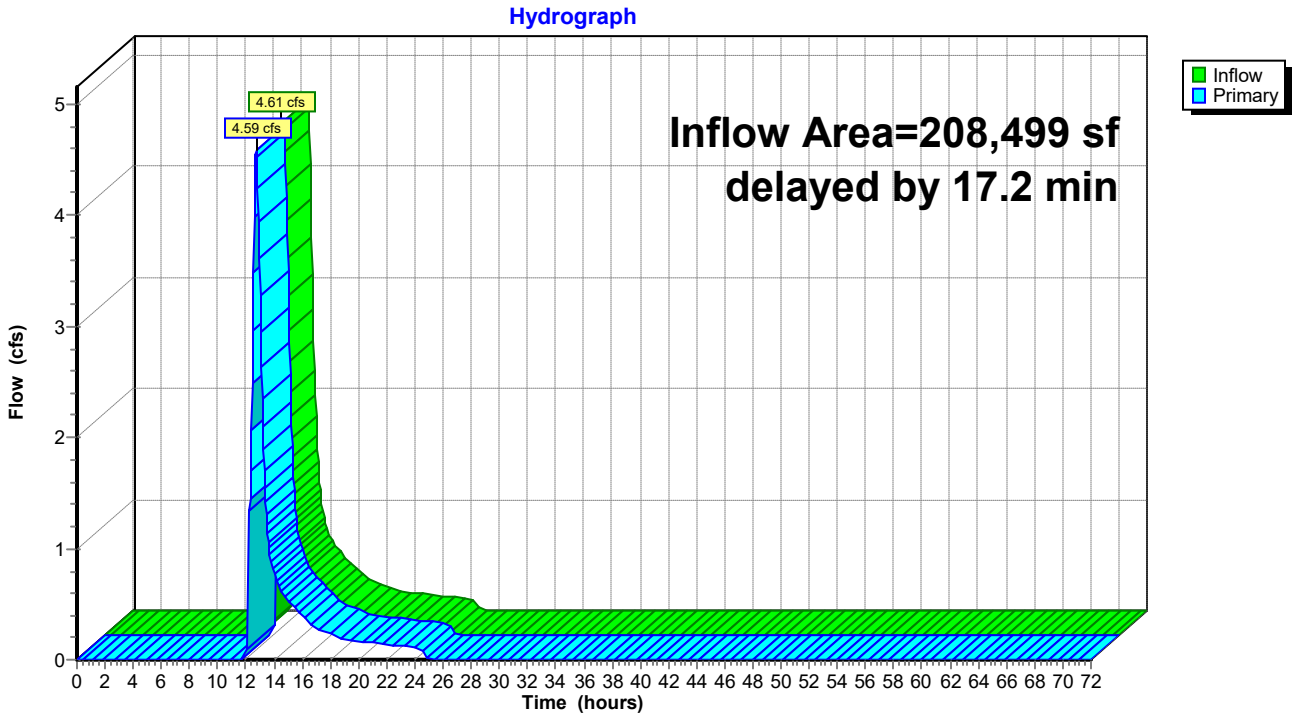


Summary for Link 4L: Lag

Inflow Area = 208,499 sf, 0.06% Impervious, Inflow Depth = 1.40" for 2-Year event
Inflow = 4.61 cfs @ 12.45 hrs, Volume= 24,246 cf
Primary = 4.59 cfs @ 12.74 hrs, Volume= 24,246 cf, Atten= 0%, Lag= 17.2 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 17.2 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 4L: Lag

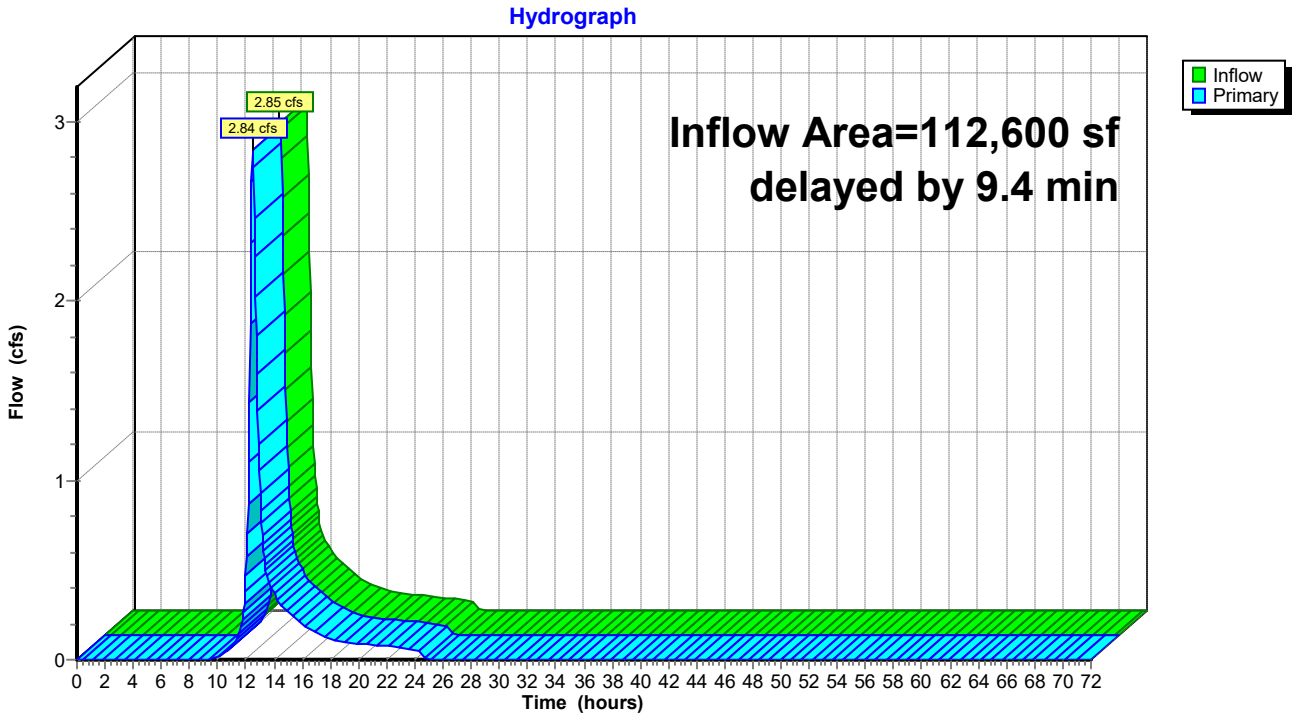


Summary for Link 5L: Lag

Inflow Area = 112,600 sf, 0.05% Impervious, Inflow Depth = 1.47" for 2-Year event
Inflow = 2.85 cfs @ 12.31 hrs, Volume= 13,807 cf
Primary = 2.84 cfs @ 12.47 hrs, Volume= 13,807 cf, Atten= 0%, Lag= 9.4 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 9.4 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 5L: Lag

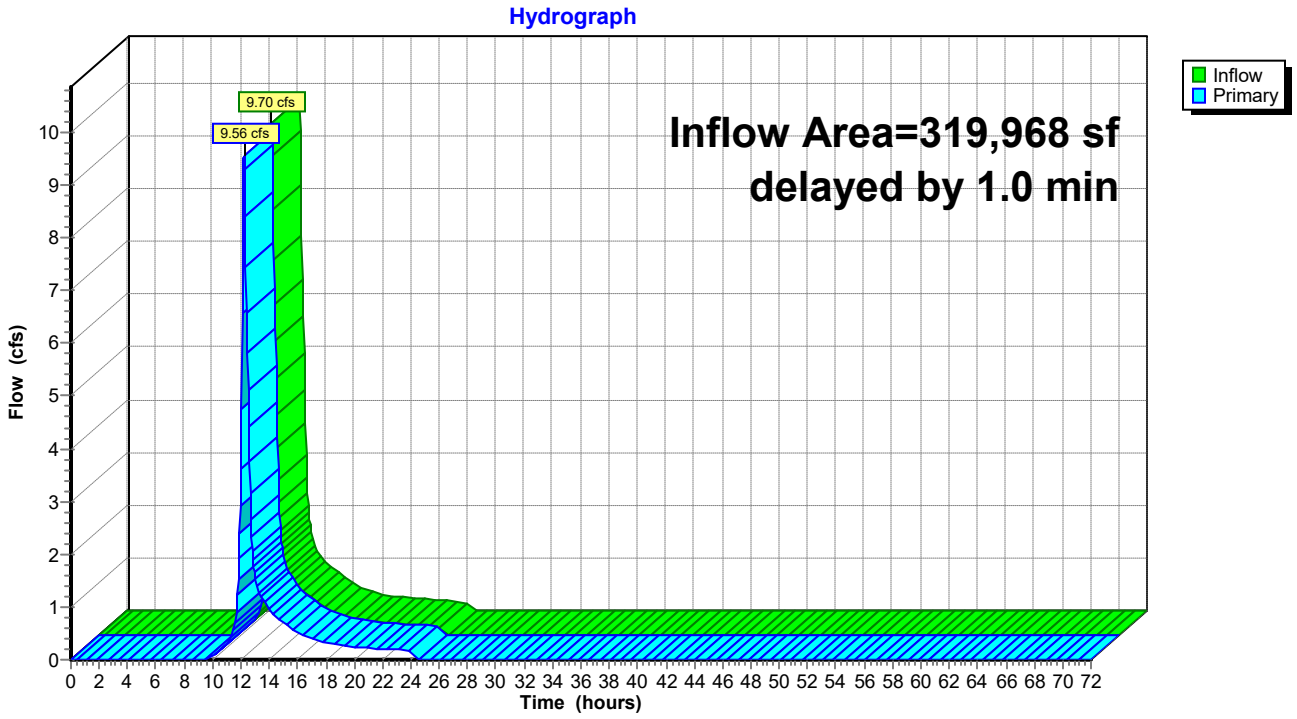


Summary for Link 6L: Lag

Inflow Area = 319,968 sf, 0.06% Impervious, Inflow Depth = 1.47" for 2-Year event
Inflow = 9.70 cfs @ 12.20 hrs, Volume= 39,235 cf
Primary = 9.56 cfs @ 12.22 hrs, Volume= 39,235 cf, Atten= 1%, Lag= 1.0 min
Routed to Reach DP-E : Culvert towards Wades Stream

Primary outflow = Inflow delayed by 1.0 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 6L: Lag

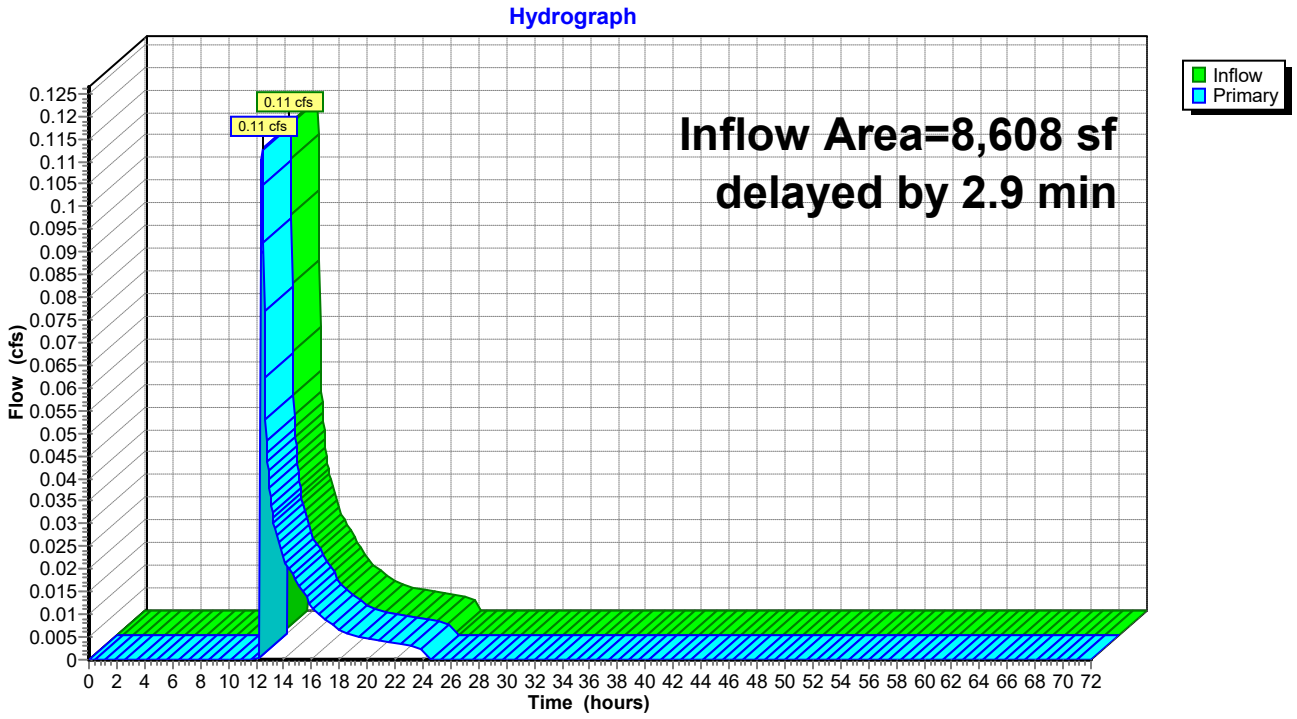


Summary for Link 7L: Lag

Inflow Area = 8,608 sf, 23.05% Impervious, Inflow Depth = 0.77" for 2-Year event
Inflow = 0.11 cfs @ 12.39 hrs, Volume= 550 cf
Primary = 0.11 cfs @ 12.44 hrs, Volume= 550 cf, Atten= 0%, Lag= 2.9 min
Routed to Reach 2.5P : New 12" CPP

Primary outflow = Inflow delayed by 2.9 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 7L: Lag

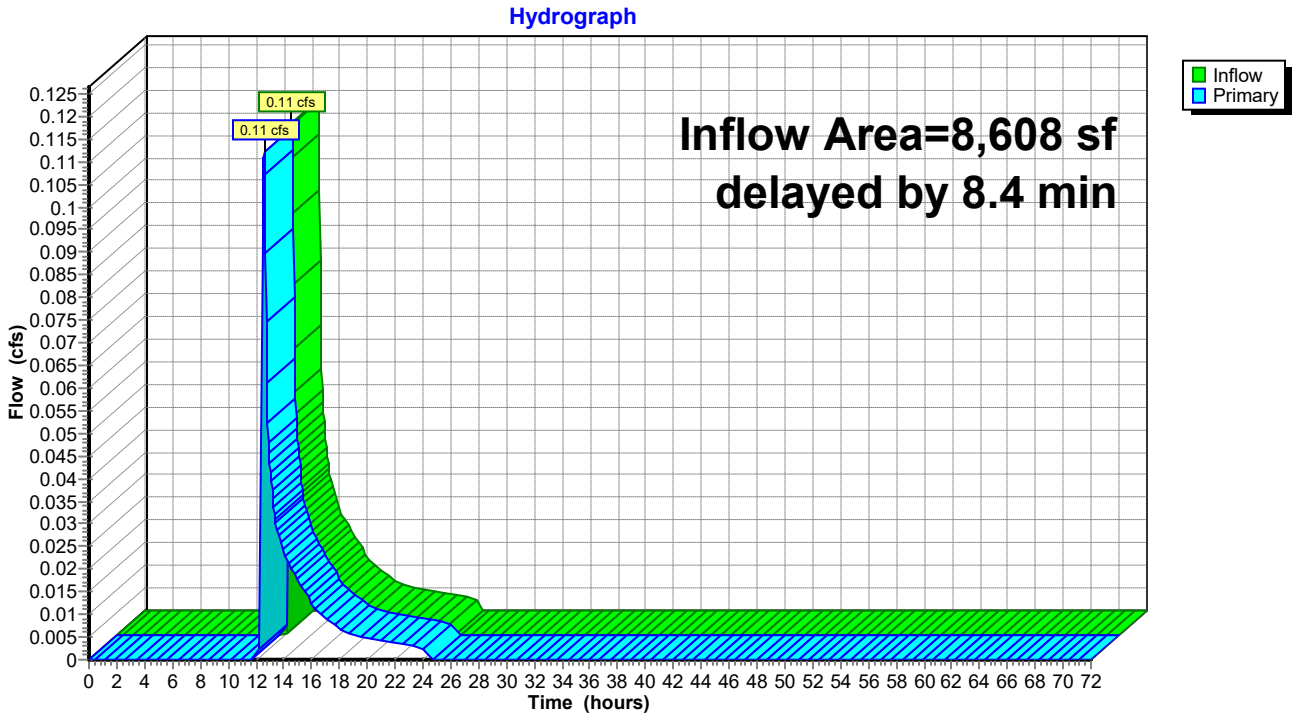


Summary for Link 8L: Lag

Inflow Area = 8,608 sf, 23.05% Impervious, Inflow Depth = 0.77" for 2-Year event
Inflow = 0.11 cfs @ 12.44 hrs, Volume= 551 cf
Primary = 0.11 cfs @ 12.58 hrs, Volume= 551 cf, Atten= 1%, Lag= 8.4 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 8.4 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 8L: Lag

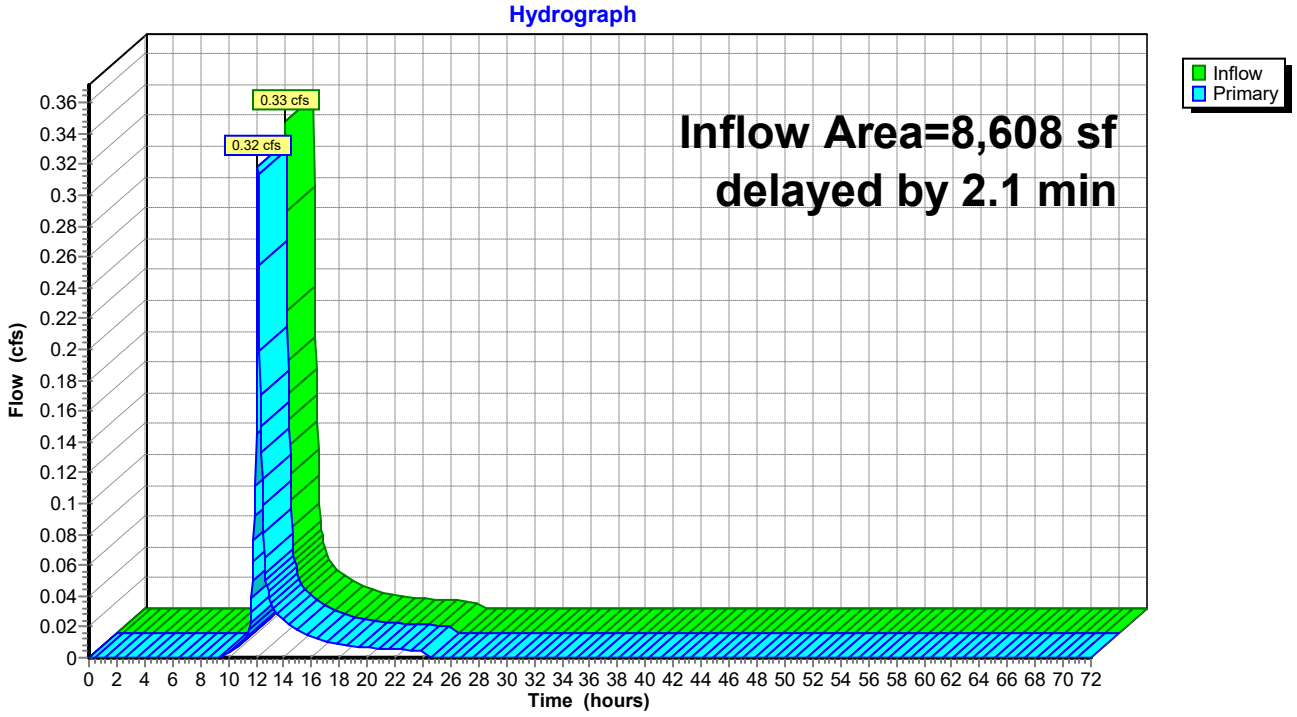


Summary for Link FS1: Filter Strip

Inflow Area = 8,608 sf, 23.05% Impervious, Inflow Depth = 1.47" for 2-Year event
Inflow = 0.33 cfs @ 12.10 hrs, Volume= 1,056 cf
Primary = 0.32 cfs @ 12.13 hrs, Volume= 1,056 cf, Atten= 4%, Lag= 2.2 min
Routed to Pond IT1 : Infiltration

Primary outflow = Inflow delayed by 2.1 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link FS1: Filter Strip

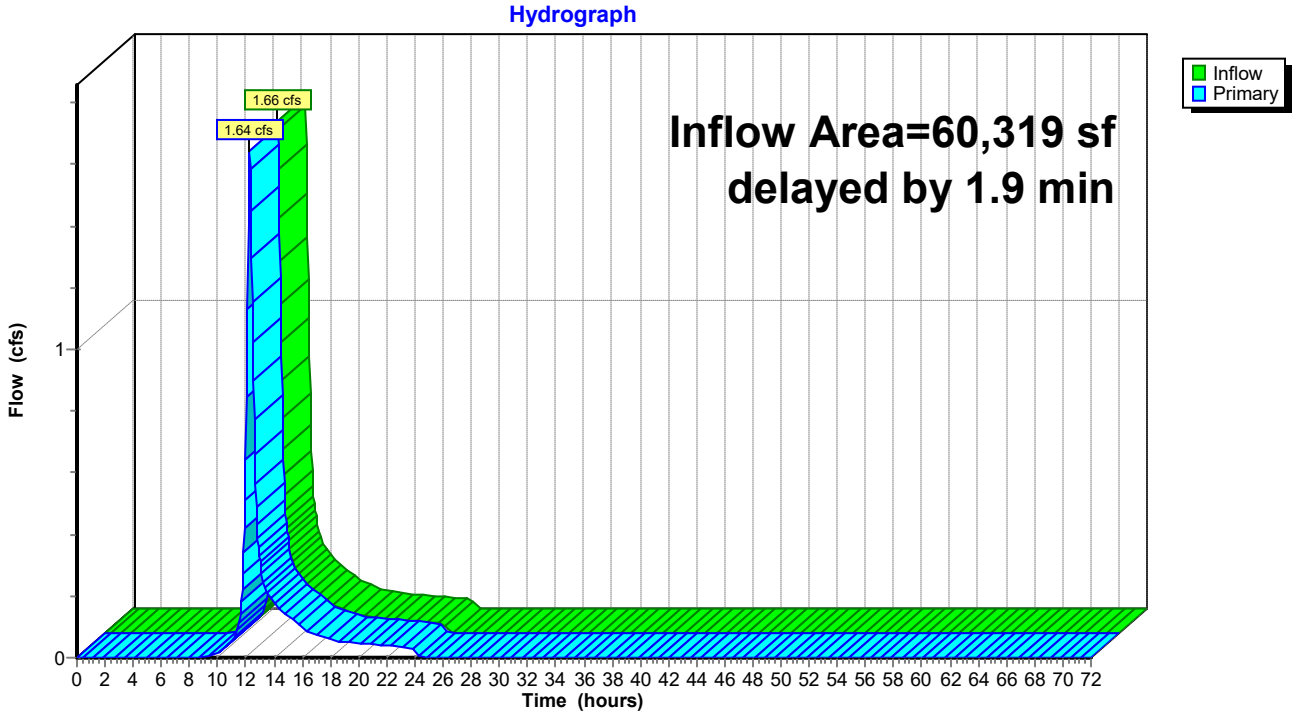


Summary for Link FS2: Filter Strip

Inflow Area = 60,319 sf, 0.07% Impervious, Inflow Depth = 1.47" for 2-Year event
Inflow = 1.66 cfs @ 12.22 hrs, Volume= 7,390 cf
Primary = 1.64 cfs @ 12.25 hrs, Volume= 7,390 cf, Atten= 1%, Lag= 2.0 min
Routed to Pond IT2 : Infiltration

Primary outflow = Inflow delayed by 1.9 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link FS2: Filter Strip

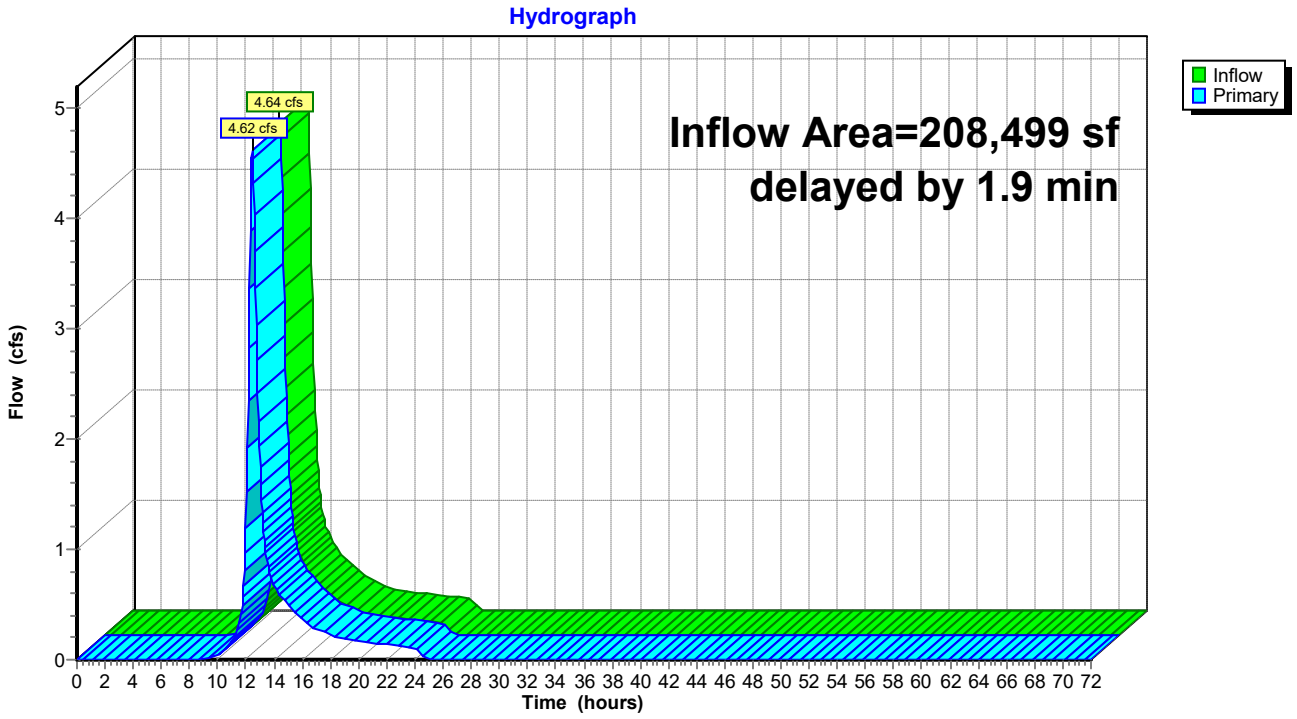


Summary for Link FS3: Filter Strip

Inflow Area = 208,499 sf, 0.06% Impervious, Inflow Depth = 1.49" for 2-Year event
Inflow = 4.64 cfs @ 12.42 hrs, Volume= 25,899 cf
Primary = 4.62 cfs @ 12.45 hrs, Volume= 25,899 cf, Atten= 0%, Lag= 1.9 min
Routed to Pond IT3 : Infiltration

Primary outflow = Inflow delayed by 1.9 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link FS3: Filter Strip



Summary for Subcatchment IT1-S: Trench 1 Subcat

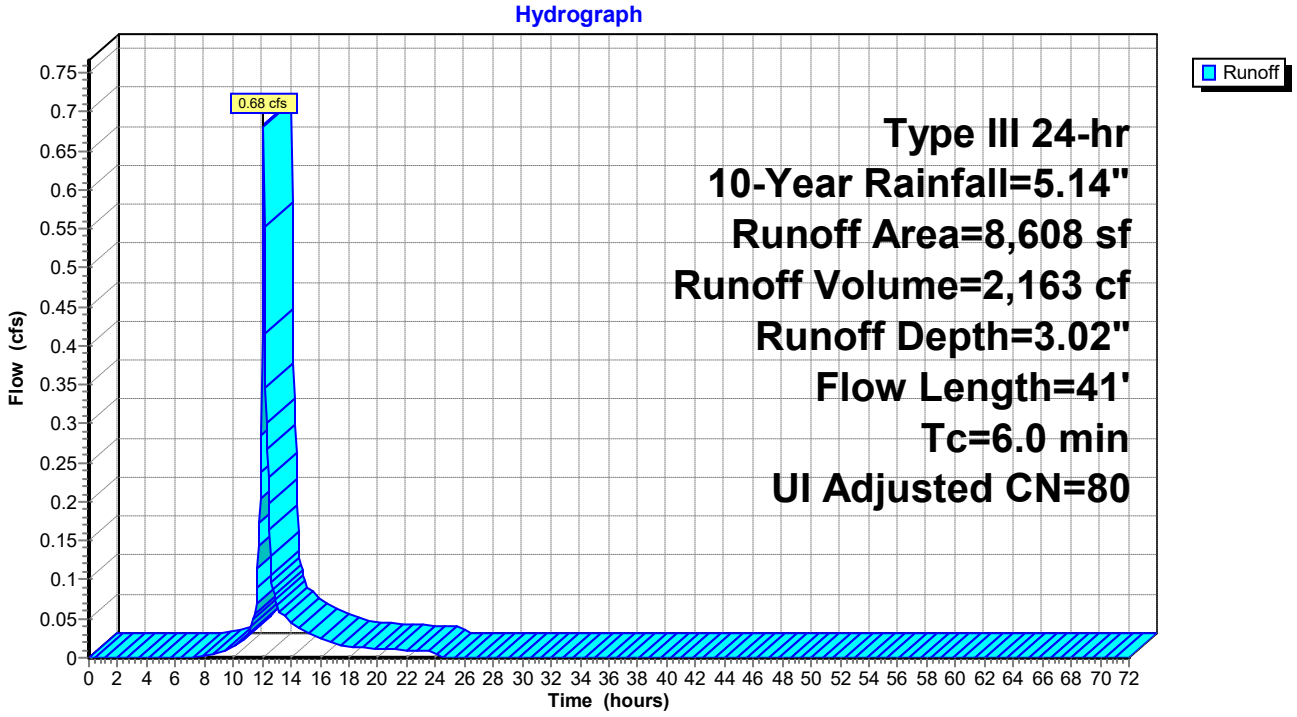
Runoff = 0.68 cfs @ 12.09 hrs, Volume= 2,163 cf, Depth= 3.02"
Routed to Link FS1 : Filter Strip

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.14"

Area (sf)	CN	Adj	Description
5,679	74		Pasture/grassland/range, Good, HSG C
219	98		Water Surface, 0% imp, HSG C
726	96		Gravel surface, HSG C
1,984	98		Unconnected pavement, HSG C
8,608	82	80	Weighted Average, UI Adjusted
6,624			76.95% Pervious Area
1,984			23.05% Impervious Area
1,984			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	25	0.0780	0.25		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
0.5	16	0.0049	0.55		**Sheet Flow, BC** Smooth surfaces n= 0.011 P2= 3.29"
2.1	41	Total, Increased to minimum Tc = 6.0 min			

Subcatchment IT1-S: Trench 1 Subcat



Summary for Subcatchment IT2-S: Trench 2 Subcat

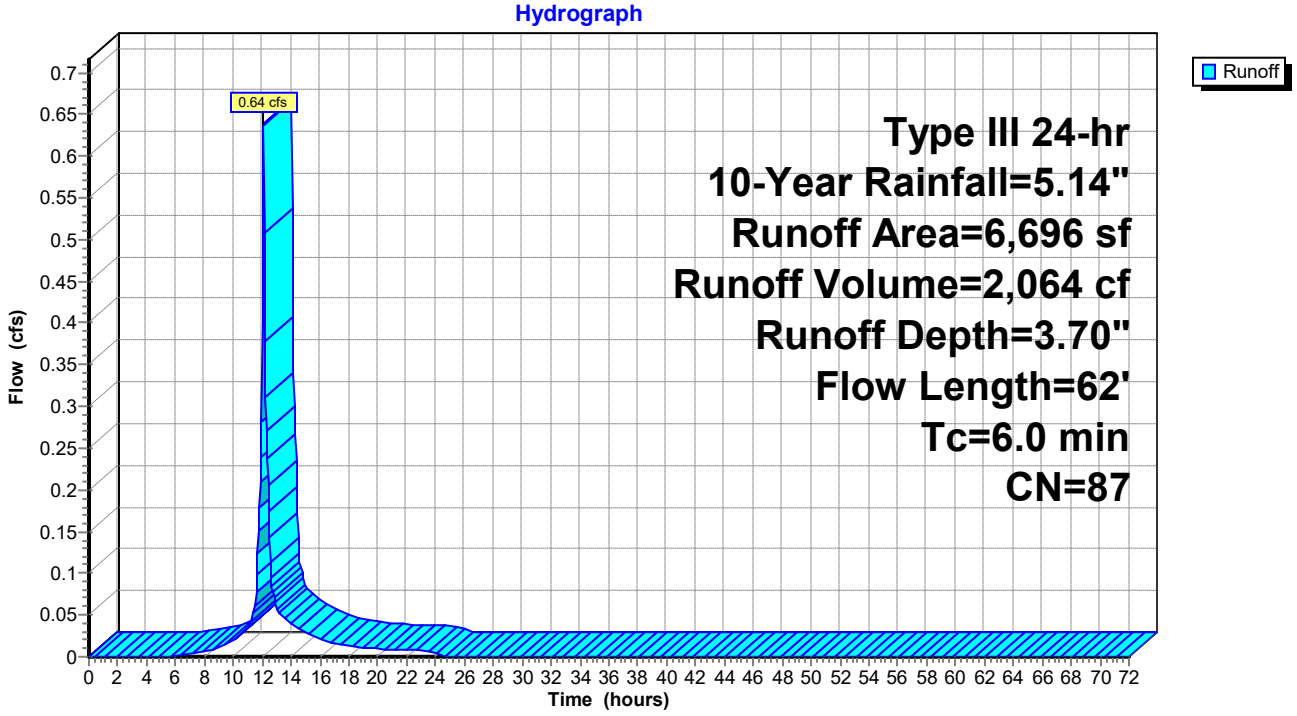
Runoff = 0.64 cfs @ 12.09 hrs, Volume= 2,064 cf, Depth= 3.70"
Routed to Link FS2 : Filter Strip

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.14"

Area (sf)	CN	Description
3,881	80	Pasture/grassland/range, Good, HSG D
2,212	96	Gravel surface, HSG D
600	98	Water Surface, 0% imp, HSG D
3	98	Unconnected pavement, HSG D
6,696	87	Weighted Average
6,693		99.96% Pervious Area
3		0.04% Impervious Area
3		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	11	0.0521	0.18		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
0.5	51	0.0456	1.70		**Sheet Flow, BC** Smooth surfaces n= 0.011 P2= 3.29"
1.5	62	Total, Increased to minimum Tc = 6.0 min			

Subcatchment IT2-S: Trench 2 Subcat



Summary for Subcatchment IT3-S: Trench 3 Subcat

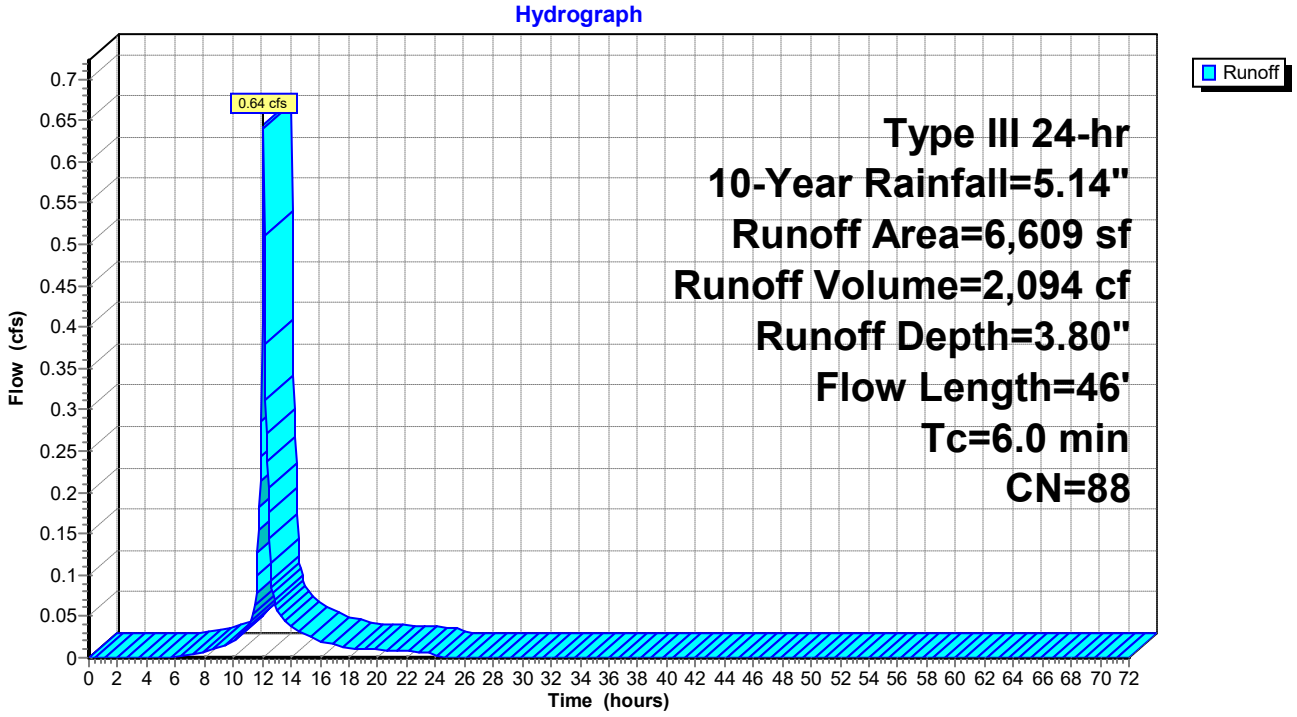
Runoff = 0.64 cfs @ 12.09 hrs, Volume= 2,094 cf, Depth= 3.80"
Routed to Link FS3 : Filter Strip

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.14"

Area (sf)	CN	Description
3,539	80	Pasture/grassland/range, Good, HSG D
2,466	96	Gravel surface, HSG D
600	98	Water Surface, 0% imp, HSG D
4	98	Unconnected pavement, HSG D
6,609	88	Weighted Average
6,605		99.94% Pervious Area
4		0.06% Impervious Area
4		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	9	0.0226	0.13		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
0.4	37	0.0506	1.66		**Sheet Flow, BC** Smooth surfaces n= 0.011 P2= 3.29"
1.6	46	Total, Increased to minimum Tc = 6.0 min			

Subcatchment IT3-S: Trench 3 Subcat



Summary for Subcatchment M: Middle

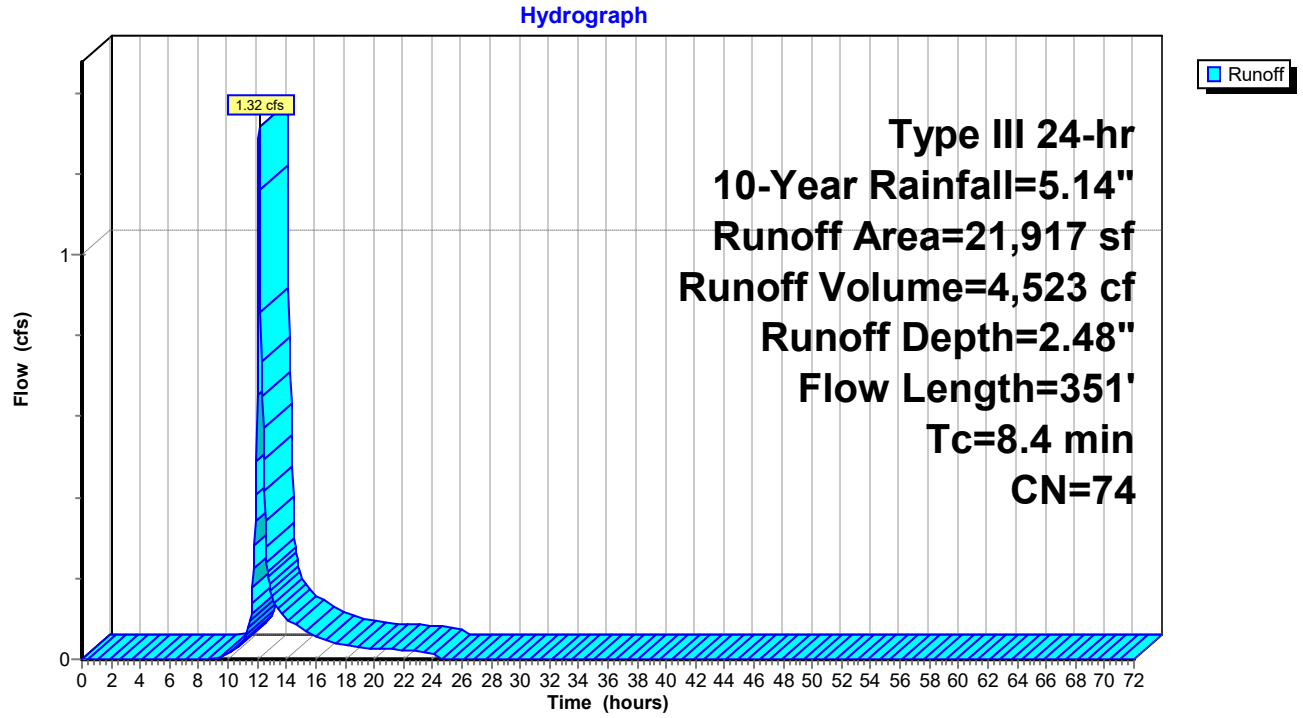
Runoff = 1.32 cfs @ 12.12 hrs, Volume= 4,523 cf, Depth= 2.48"
Routed to Reach 2P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.14"

Area (sf)	CN	Description
21,742	74	Pasture/grassland/range, Good, HSG C
152	96	Gravel surface, HSG C
23	98	Unconnected pavement, HSG C
21,917	74	Weighted Average
21,894		99.90% Pervious Area
23		0.10% Impervious Area
23		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	95	0.0626	0.30		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
2.3	214	0.0510	1.58		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.9	42	0.0126	0.79		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
8.4	351	Total			

Subcatchment M: Middle



Summary for Subcatchment ME: Middle East

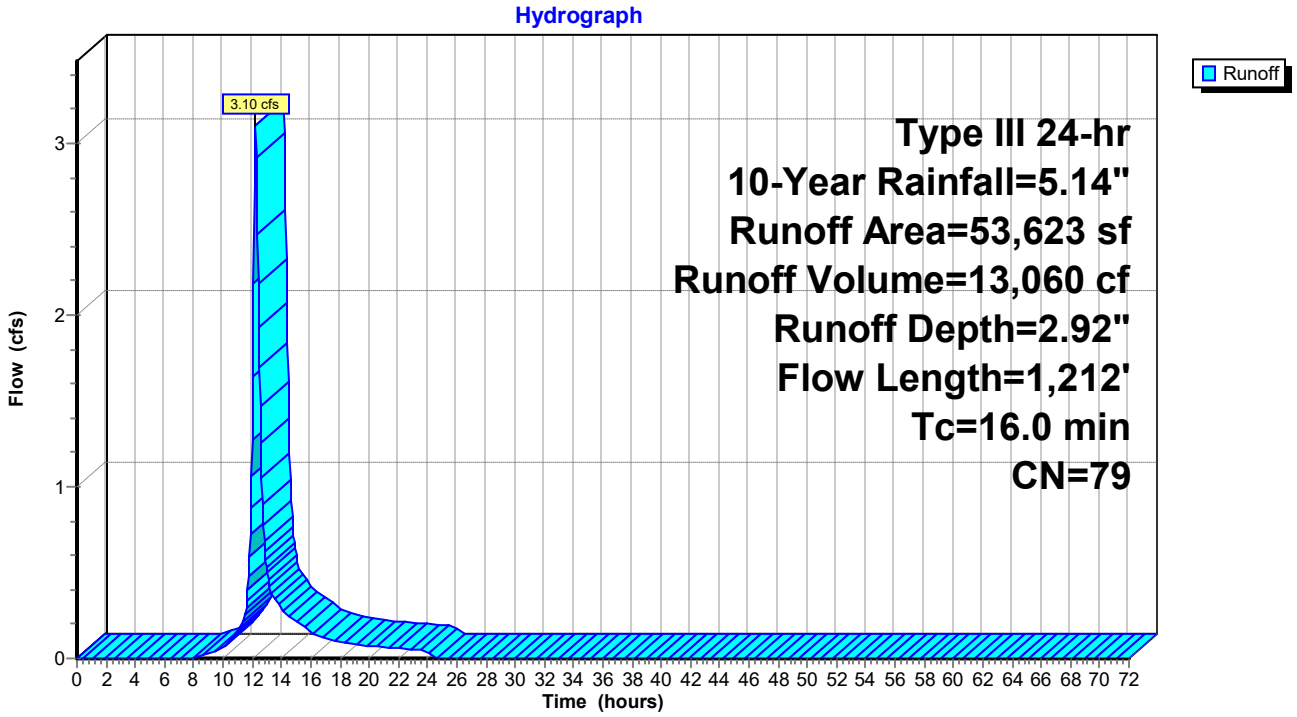
Runoff = 3.10 cfs @ 12.22 hrs, Volume= 13,060 cf, Depth= 2.92"
Routed to Reach 3P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.14"

Area (sf)	CN	Description
11,328	74	Pasture/grassland/range, Good, HSG C
41,933	80	Pasture/grassland/range, Good, HSG D
82	96	Gravel surface, HSG C
239	96	Gravel surface, HSG D
8	98	Unconnected pavement, HSG C
33	98	Unconnected pavement, HSG D
53,623	79	Weighted Average
53,582		99.92% Pervious Area
41		0.08% Impervious Area
41		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.0678	0.32		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
7.1	708	0.0566	1.67		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
1.5	140	0.0508	1.58		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.4	116	0.0409	5.12	11.51	**Trap/Vee/Rect Channel Flow, DE** Bot.W=3.00' D=0.50' Z= 3.0 '/' Top.W=6.00' n= 0.030 Earth, grassed & winding
0.0	5	0.0154	2.00		**Shallow Concentrated Flow, EF** Unpaved Kv= 16.1 fps
1.0	98	0.0528	1.61		**Shallow Concentrated Flow, FG** Short Grass Pasture Kv= 7.0 fps
0.7	45	0.0258	1.12		**Shallow Concentrated Flow, GH** Short Grass Pasture Kv= 7.0 fps
16.0	1,212	Total			

Subcatchment ME: Middle East



Summary for Subcatchment MW: Middle West

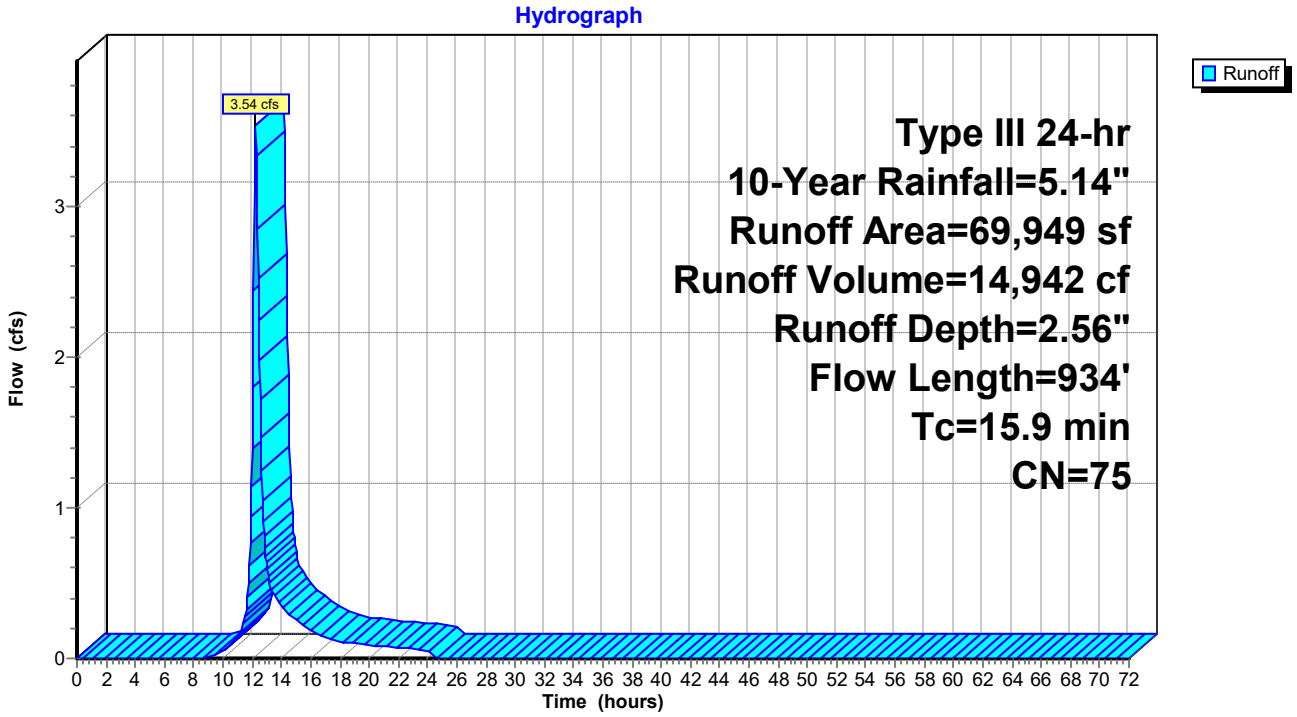
Runoff = 3.54 cfs @ 12.22 hrs, Volume= 14,942 cf, Depth= 2.56"
Routed to Reach 1P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.14"

Area (sf)	CN	Description
54,713	74	Pasture/grassland/range, Good, HSG C
15,194	80	Pasture/grassland/range, Good, HSG D
29	98	Unconnected pavement, HSG C
13	98	Unconnected pavement, HSG D
69,949	75	Weighted Average
69,907		99.94% Pervious Area
42		0.06% Impervious Area
42		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	100	0.0582	0.30		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
6.2	695	0.0716	1.87		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
4.1	139	0.0066	0.57		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
15.9	934	Total			

Subcatchment MW: Middle West



Summary for Subcatchment N: North

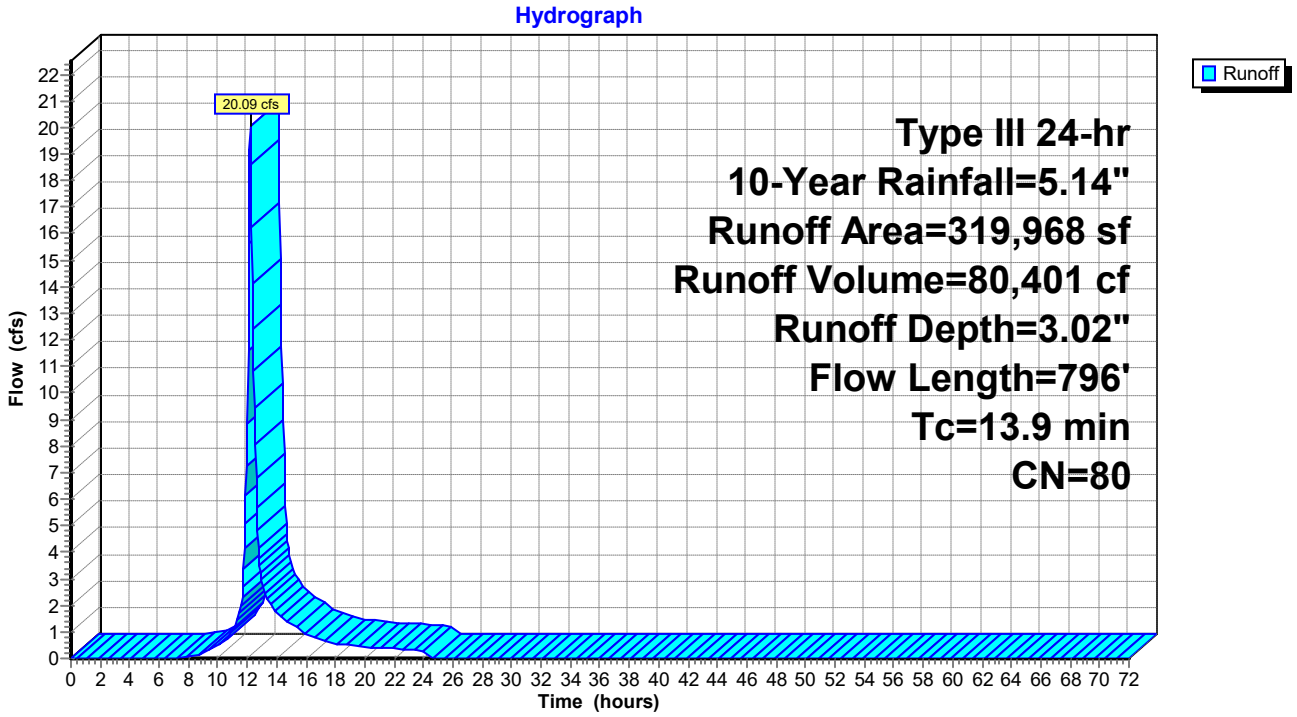
Runoff = 20.09 cfs @ 12.19 hrs, Volume= 80,401 cf, Depth= 3.02"
Routed to Link 6L : Lag

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.14"

Area (sf)	CN	Description
290,514	80	Pasture/grassland/range, Good, HSG D
29,255	77	Woods, Good, HSG D
199	98	Unconnected pavement, HSG D
319,968	80	Weighted Average
319,769		99.94% Pervious Area
199		0.06% Impervious Area
199		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	15	0.0850	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.29"
4.7	85	0.0656	0.30		**Sheet Flow, BC** Range n= 0.130 P2= 3.29"
6.5	689	0.0643	1.78		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.1	7	0.0590	1.21		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
13.9	796	Total			

Subcatchment N: North



Summary for Subcatchment NE: North East

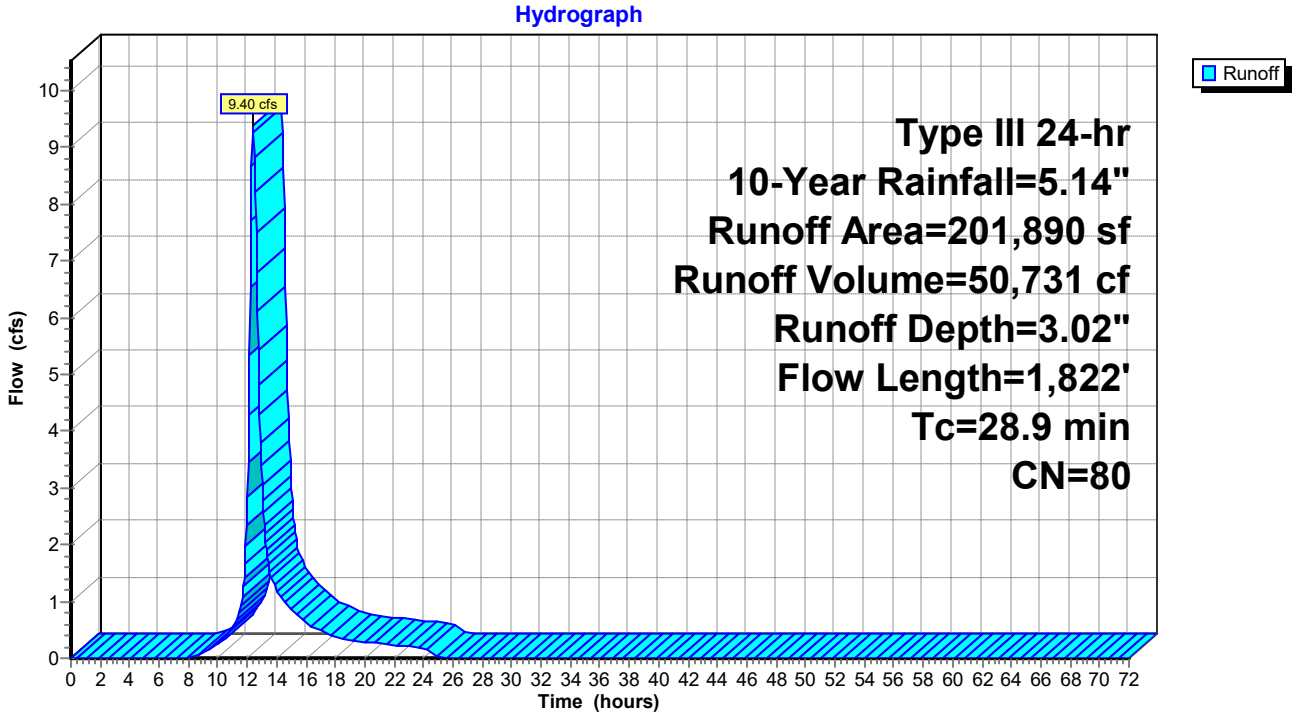
Runoff = 9.40 cfs @ 12.40 hrs, Volume= 50,731 cf, Depth= 3.02"
Routed to Pond 4P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.14"

Area (sf)	CN	Description
192,277	80	Pasture/grassland/range, Good, HSG D
9,482	77	Woods, Good, HSG D
131	98	Unconnected pavement, HSG D
201,890	80	Weighted Average
201,759		99.94% Pervious Area
131		0.06% Impervious Area
131		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	100	0.0558	0.29		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
23.2	1,722	0.0311	1.23		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
28.9	1,822	Total			

Subcatchment NE: North East



Summary for Subcatchment SE: South East

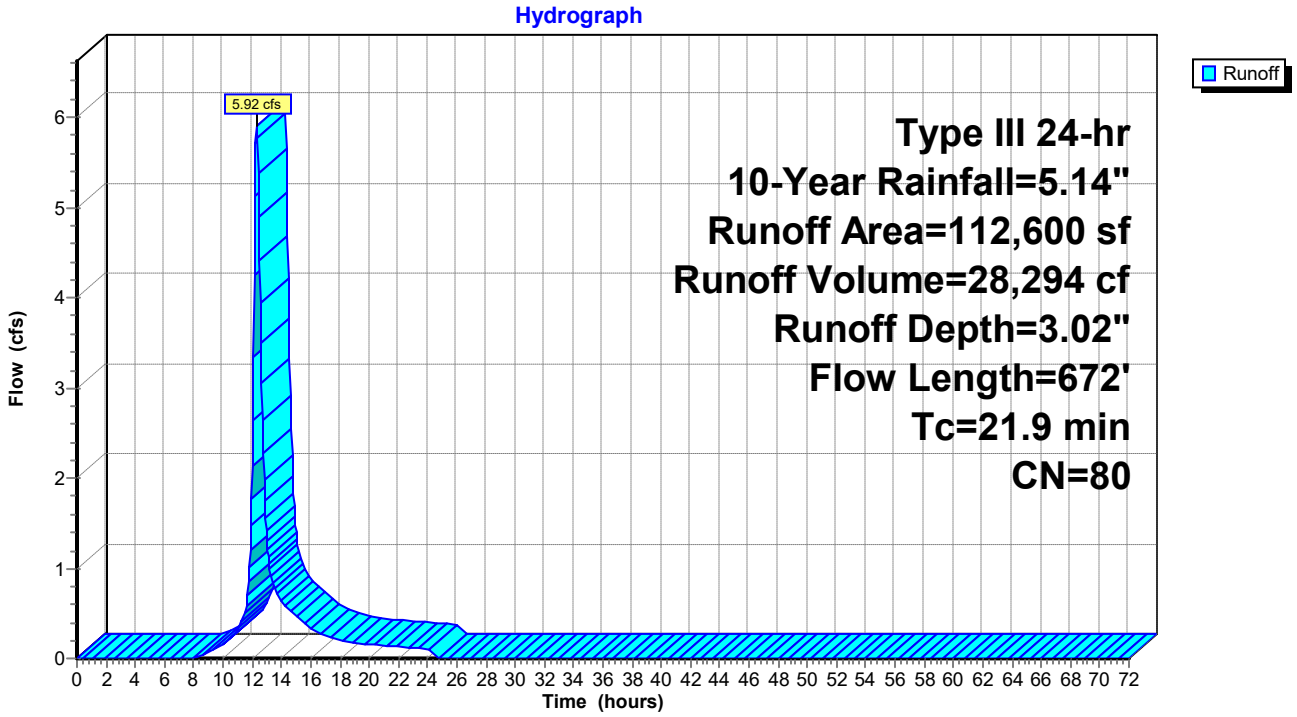
Runoff = 5.92 cfs @ 12.30 hrs, Volume= 28,294 cf, Depth= 3.02"
Routed to Reach 5P : Unknown

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.14"

Area (sf)	CN	Description
110,642	80	Pasture/grassland/range, Good, HSG D
1,536	77	Woods, Good, HSG D
368	96	Gravel surface, HSG D
54	98	Unconnected pavement, HSG D
112,600	80	Weighted Average
112,546		99.95% Pervious Area
54		0.05% Impervious Area
54		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0428	0.11		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.29"
6.1	521	0.0416	1.43		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.2	51	0.0277	3.86	17.37	**Trap/Vee/Rect Channel Flow, CD** Bot.W=4.00' D=0.50' Z= 10.0 '/' Top.W=14.00' n= 0.030 Earth, grassed & winding
21.9	672	Total			

Subcatchment SE: South East



Summary for Subcatchment W: West

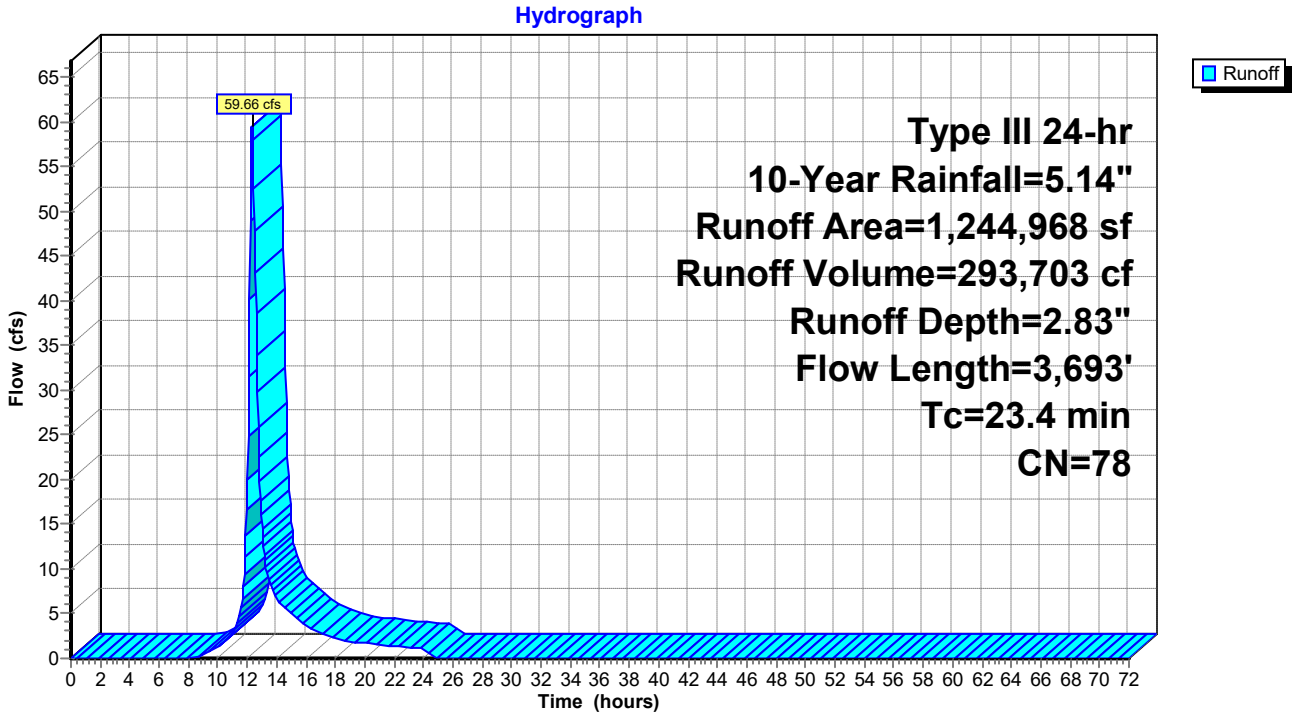
Runoff = 59.66 cfs @ 12.33 hrs, Volume= 293,703 cf, Depth= 2.83"
Routed to Reach DP-W : Watts Stream

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.14"

Area (sf)	CN	Description
236,639	74	Pasture/grassland/range, Good, HSG C
396,169	80	Pasture/grassland/range, Good, HSG D
40,930	70	Woods, Good, HSG C
521,429	77	Woods, Good, HSG D
41,310	96	Gravel surface, HSG C
1,146	96	Gravel surface, HSG D
6,801	98	Unconnected pavement, HSG C
544	98	Unconnected pavement, HSG D
1,244,968	78	Weighted Average
1,237,623		99.41% Pervious Area
7,345		0.59% Impervious Area
7,345		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	15	0.0814	0.09		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.29"
4.8	85	0.0623	0.29		**Sheet Flow, BC** Range n= 0.130 P2= 3.29"
5.9	685	0.0763	1.93		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.1	75	0.0926	10.68	128.14	**Trap/Vee/Rect Channel Flow, DE** Bot.W=4.00' D=1.00' Z= 8.0 '/' Top.W=20.00' n= 0.030 Earth, grassed & winding
1.1	187	0.1510	2.72		**Shallow Concentrated Flow, EF** Short Grass Pasture Kv= 7.0 fps
1.7	174	0.1201	1.73		**Shallow Concentrated Flow, FG** Woodland Kv= 5.0 fps
3.1	214	0.0525	1.15		**Shallow Concentrated Flow, GH** Woodland Kv= 5.0 fps
0.6	73	0.1513	1.94		**Shallow Concentrated Flow, HI** Woodland Kv= 5.0 fps
0.9	49	0.0338	0.92		**Shallow Concentrated Flow, IJ** Woodland Kv= 5.0 fps
2.6	2,136	0.0318	13.70	945.01	**Trap/Vee/Rect Channel Flow, JK** Bot.W=11.00' D=3.00' Z= 4.0 '/' Top.W=35.00' n= 0.030 Earth, grassed & winding
23.4	3,693	Total			

Subcatchment W: West



Summary for Reach 1P: 15" CPP

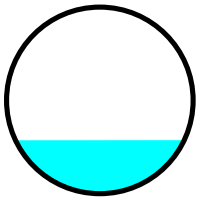
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 69,949 sf, 0.06% Impervious, Inflow Depth = 2.56" for 10-Year event
Inflow = 3.54 cfs @ 12.22 hrs, Volume= 14,942 cf
Outflow = 3.54 cfs @ 12.22 hrs, Volume= 14,942 cf, Atten= 0%, Lag= 0.1 min
Routed to Link 1L : Lag

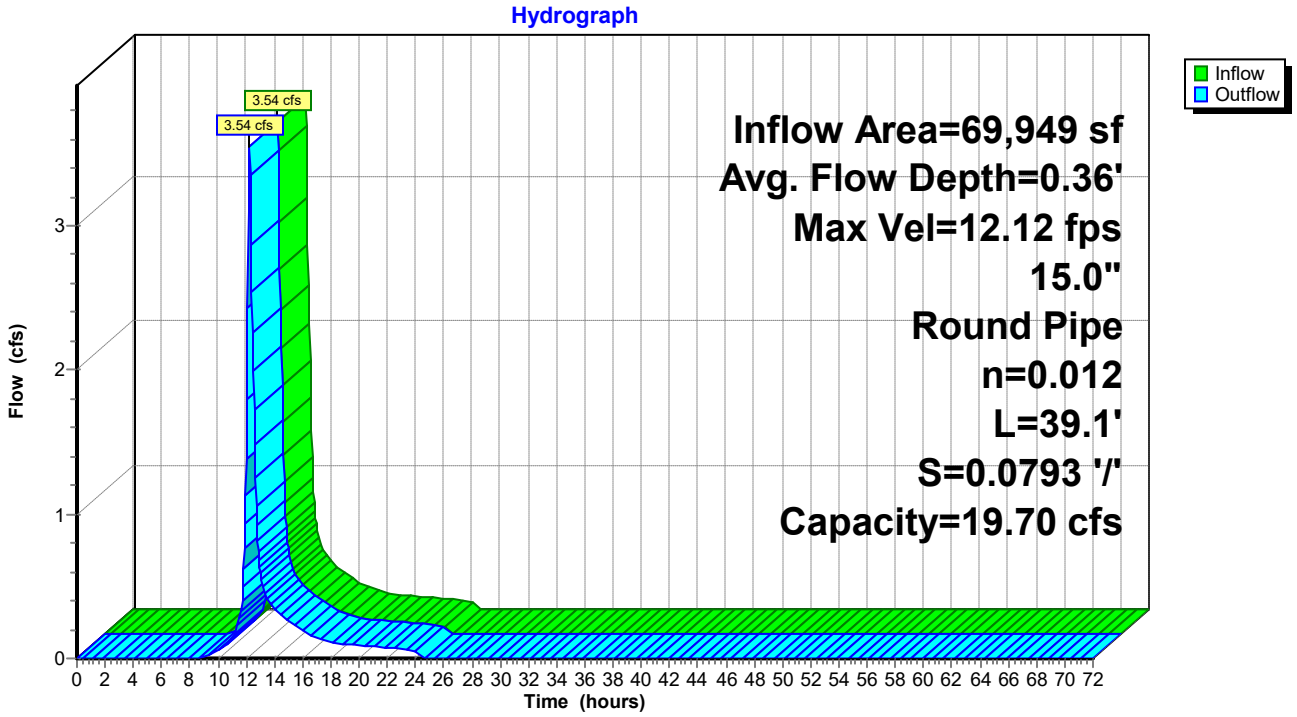
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 12.12 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.71 fps, Avg. Travel Time= 0.1 min

Peak Storage= 11 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.36' , Surface Width= 1.13'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 19.70 cfs

15.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 39.1' Slope= 0.0793 '/'
Inlet Invert= 1,668.60', Outlet Invert= 1,665.50'



Reach 1P: 15" CPP



Summary for Reach 2.5P: New 12" CPP

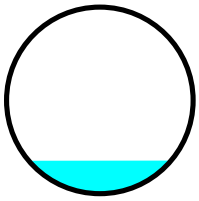
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 8,608 sf, 23.05% Impervious, Inflow Depth = 2.32" for 10-Year event
Inflow = 0.64 cfs @ 12.18 hrs, Volume= 1,666 cf
Outflow = 0.64 cfs @ 12.18 hrs, Volume= 1,669 cf, Atten= 0%, Lag= 0.1 min
Routed to Link 8L : Lag

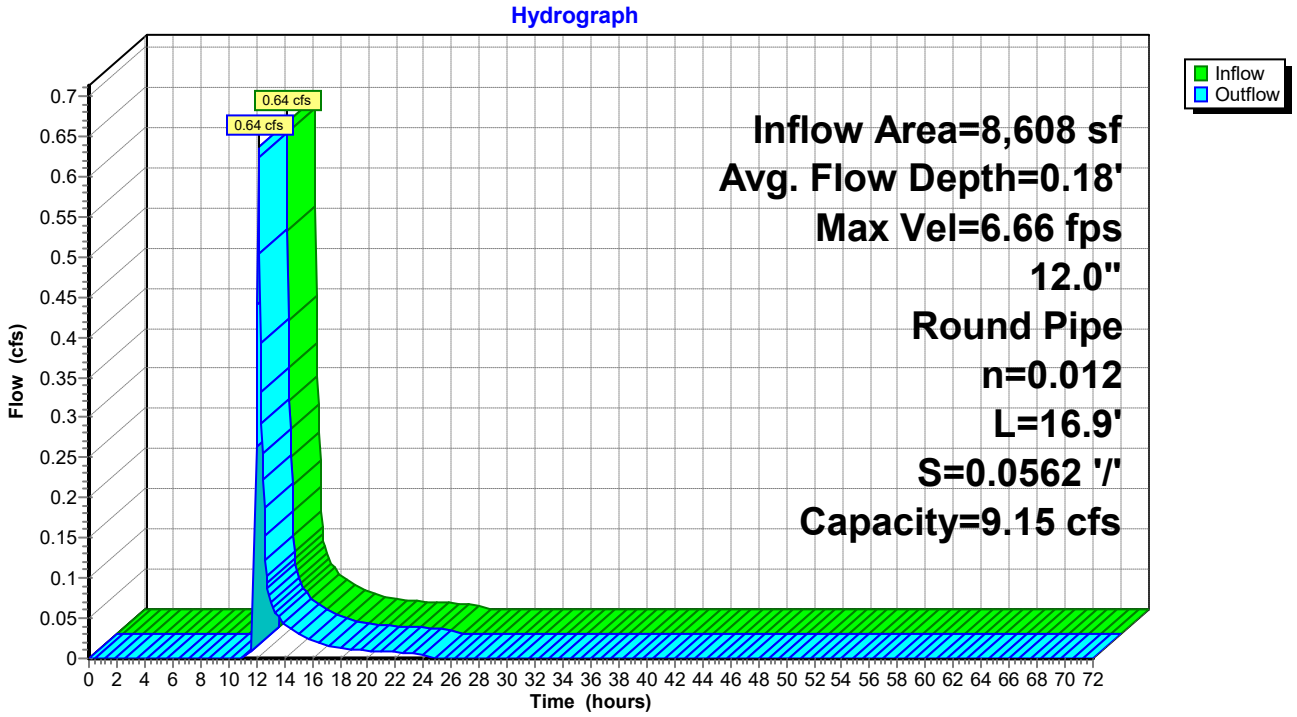
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 6.66 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.41 fps, Avg. Travel Time= 0.1 min

Peak Storage= 2 cf @ 12.18 hrs
Average Depth at Peak Storage= 0.18' , Surface Width= 0.77'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 9.15 cfs

12.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 16.9' Slope= 0.0562 '/'
Inlet Invert= 1,672.13', Outlet Invert= 1,671.18'



Reach 2.5P: New 12" CPP



Summary for Reach 2P: 15" CPP

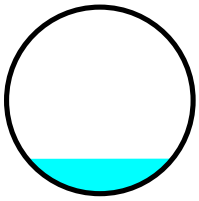
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 21,917 sf, 0.10% Impervious, Inflow Depth = 2.48" for 10-Year event
Inflow = 1.32 cfs @ 12.12 hrs, Volume= 4,523 cf
Outflow = 1.32 cfs @ 12.12 hrs, Volume= 4,523 cf, Atten= 0%, Lag= 0.1 min
Routed to Link 2L : Lag

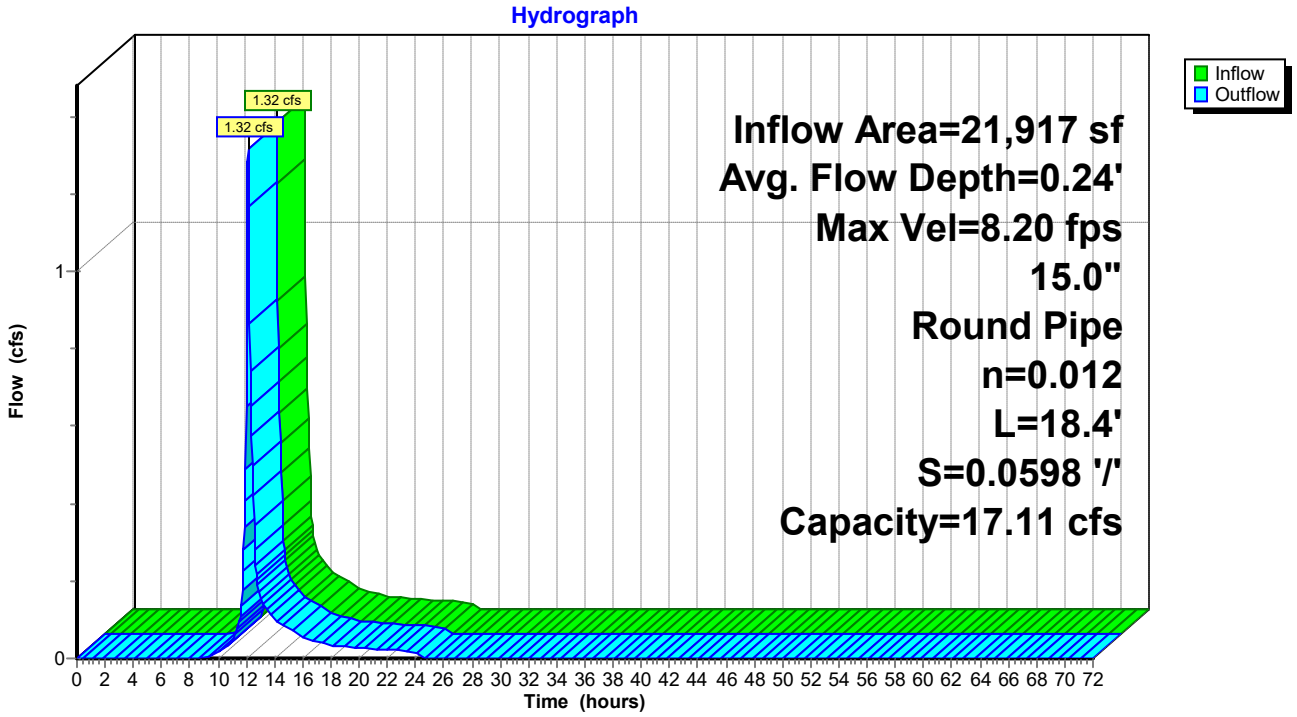
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.20 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 3.05 fps, Avg. Travel Time= 0.1 min

Peak Storage= 3 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.24' , Surface Width= 0.98'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 17.11 cfs

15.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 18.4' Slope= 0.0598 '/'
Inlet Invert= 1,669.70', Outlet Invert= 1,668.60'



Reach 2P: 15" CPP



Summary for Reach 3P: 15" CPP

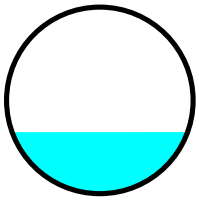
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 53,623 sf, 0.08% Impervious, Inflow Depth = 2.92" for 10-Year event
Inflow = 3.10 cfs @ 12.22 hrs, Volume= 13,060 cf
Outflow = 3.10 cfs @ 12.22 hrs, Volume= 13,060 cf, Atten= 0%, Lag= 0.1 min
Routed to Link FS2 : Filter Strip

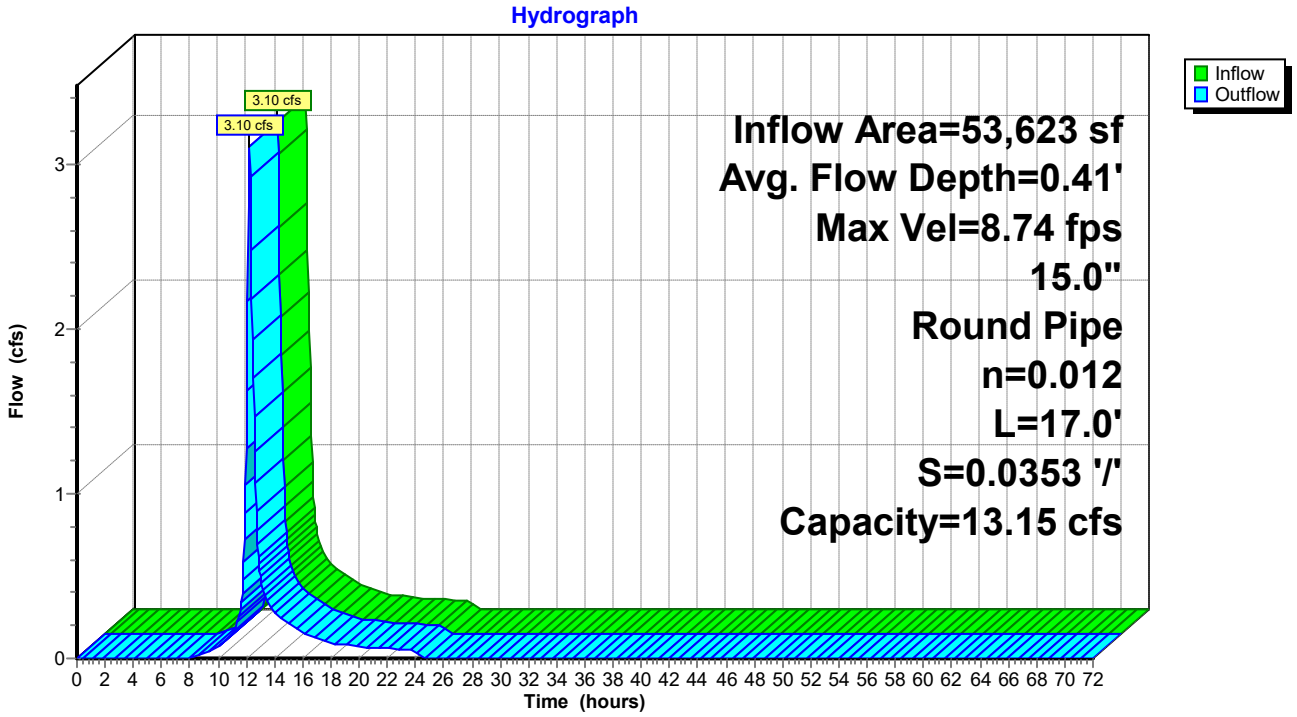
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.74 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 3.32 fps, Avg. Travel Time= 0.1 min

Peak Storage= 6 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.41' , Surface Width= 1.18'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 13.15 cfs

15.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 17.0' Slope= 0.0353 '/'
Inlet Invert= 1,666.50', Outlet Invert= 1,665.90'



Reach 3P: 15" CPP



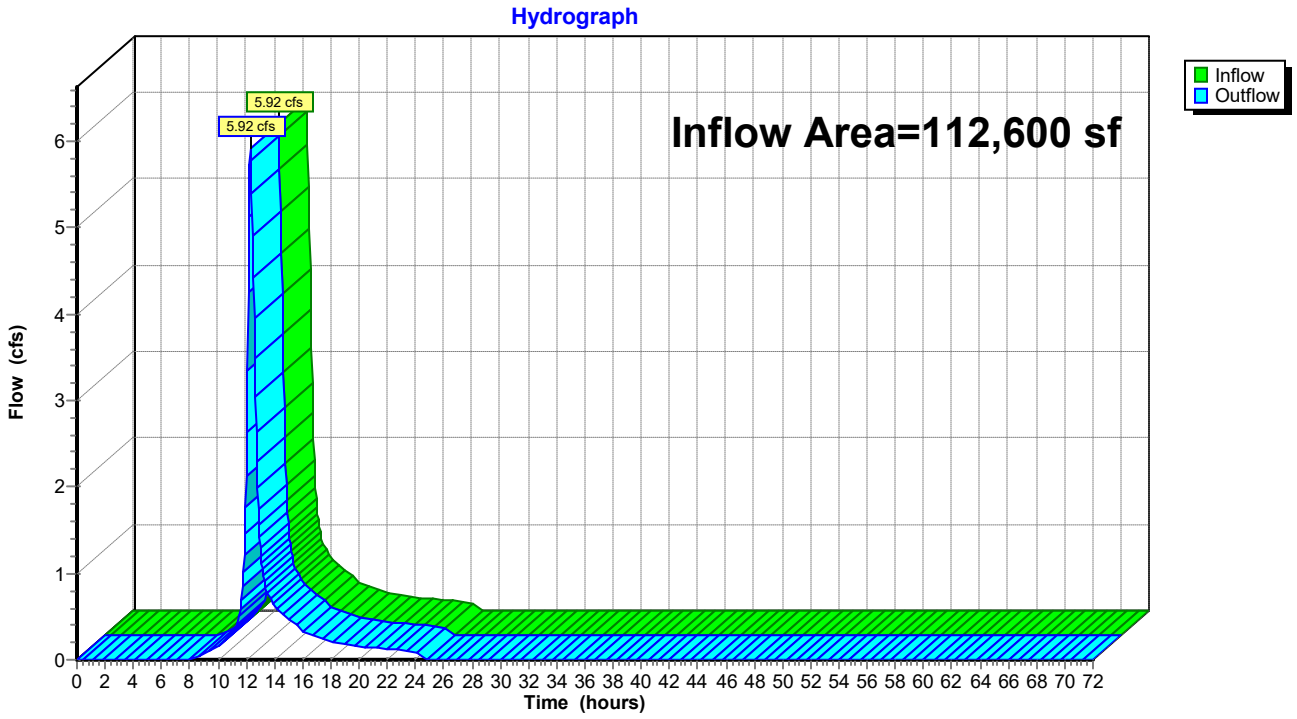
Summary for Reach 5P: Unknown

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 112,600 sf, 0.05% Impervious, Inflow Depth = 3.02" for 10-Year event
Inflow = 5.92 cfs @ 12.30 hrs, Volume= 28,294 cf
Outflow = 5.92 cfs @ 12.30 hrs, Volume= 28,294 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 5L : Lag

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach 5P: Unknown



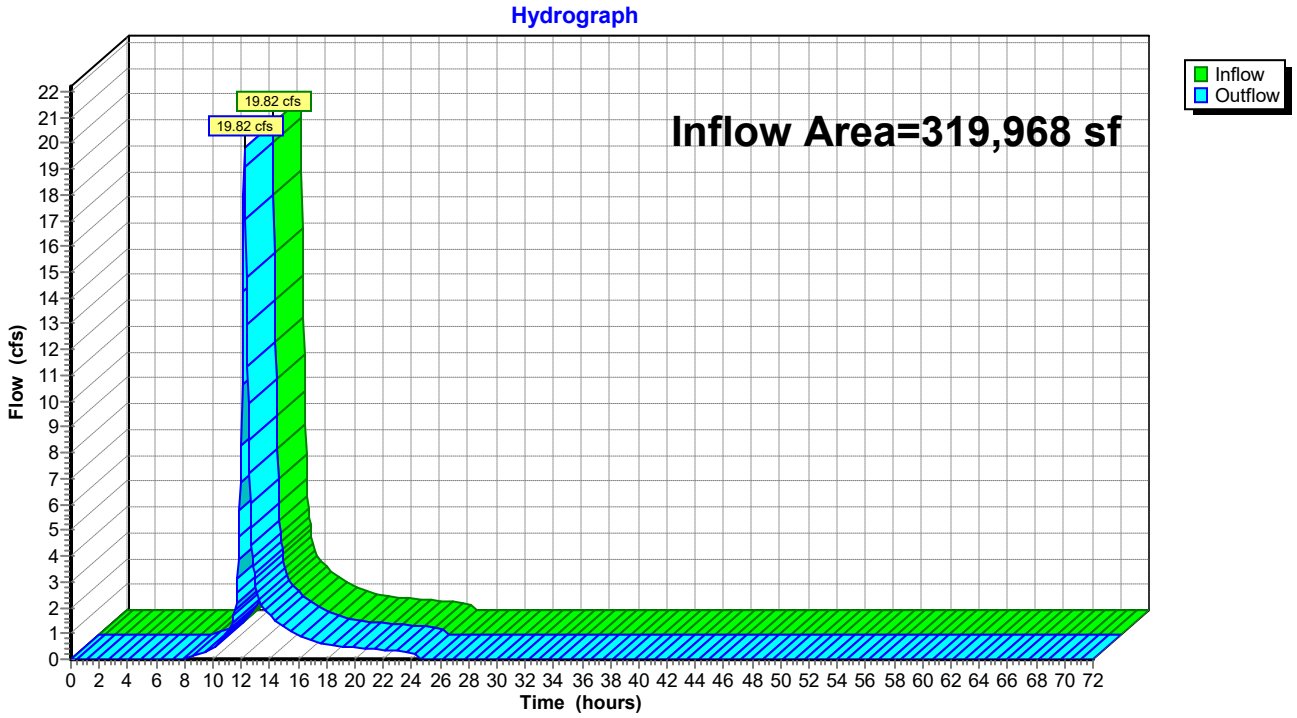
Summary for Reach DP-E: Culvert towards Wades Stream

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 319,968 sf, 0.06% Impervious, Inflow Depth = 3.02" for 10-Year event
Inflow = 19.82 cfs @ 12.21 hrs, Volume= 80,401 cf
Outflow = 19.82 cfs @ 12.21 hrs, Volume= 80,401 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP-E: Culvert towards Wades Stream



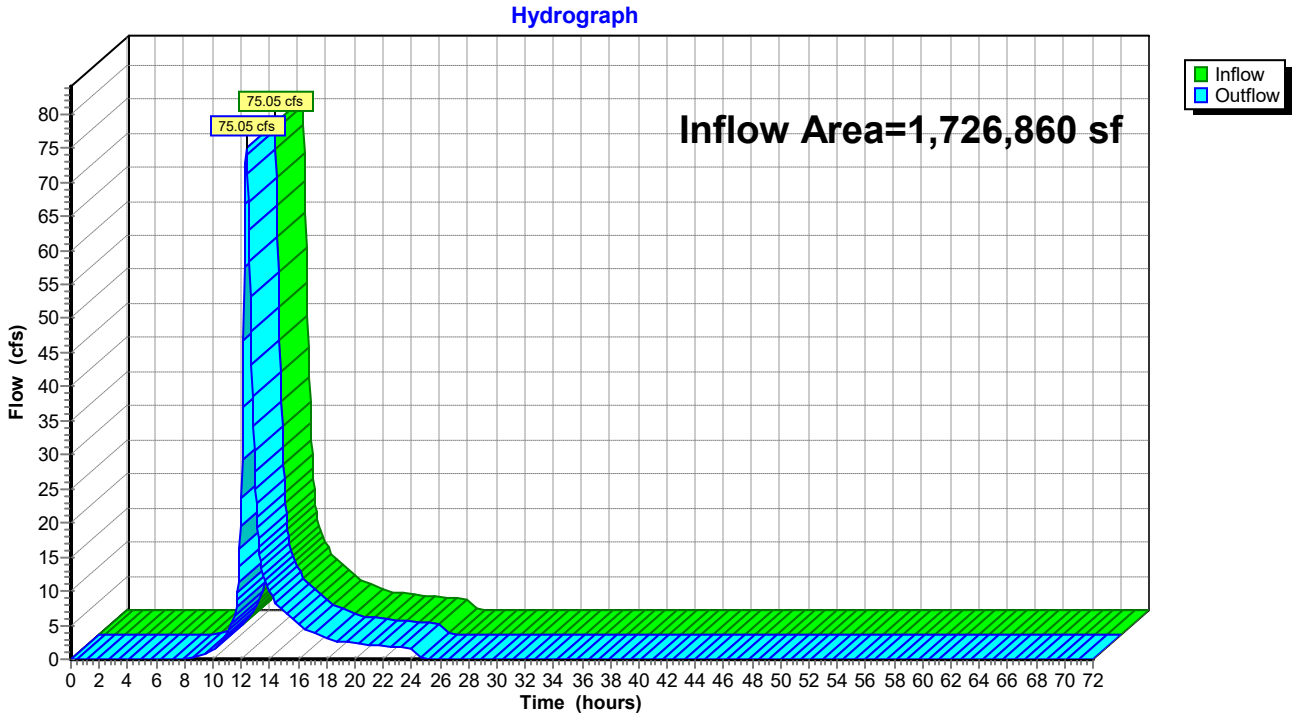
Summary for Reach DP-W: Watts Stream

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,726,860 sf, 0.56% Impervious, Inflow Depth = 2.83" for 10-Year event
Inflow = 75.05 cfs @ 12.36 hrs, Volume= 407,406 cf
Outflow = 75.05 cfs @ 12.36 hrs, Volume= 407,406 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP-W: Watts Stream



Summary for Pond 4P: 15" CPP

Inflow Area = 201,890 sf, 0.06% Impervious, Inflow Depth = 3.02" for 10-Year event
Inflow = 9.40 cfs @ 12.40 hrs, Volume= 50,731 cf
Outflow = 9.39 cfs @ 12.40 hrs, Volume= 50,751 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.39 cfs @ 12.40 hrs, Volume= 50,751 cf
Routed to Link FS3 : Filter Strip

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1,662.70' @ 12.40 hrs Surf.Area= 89 sf Storage= 80 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (841.9 - 841.8)

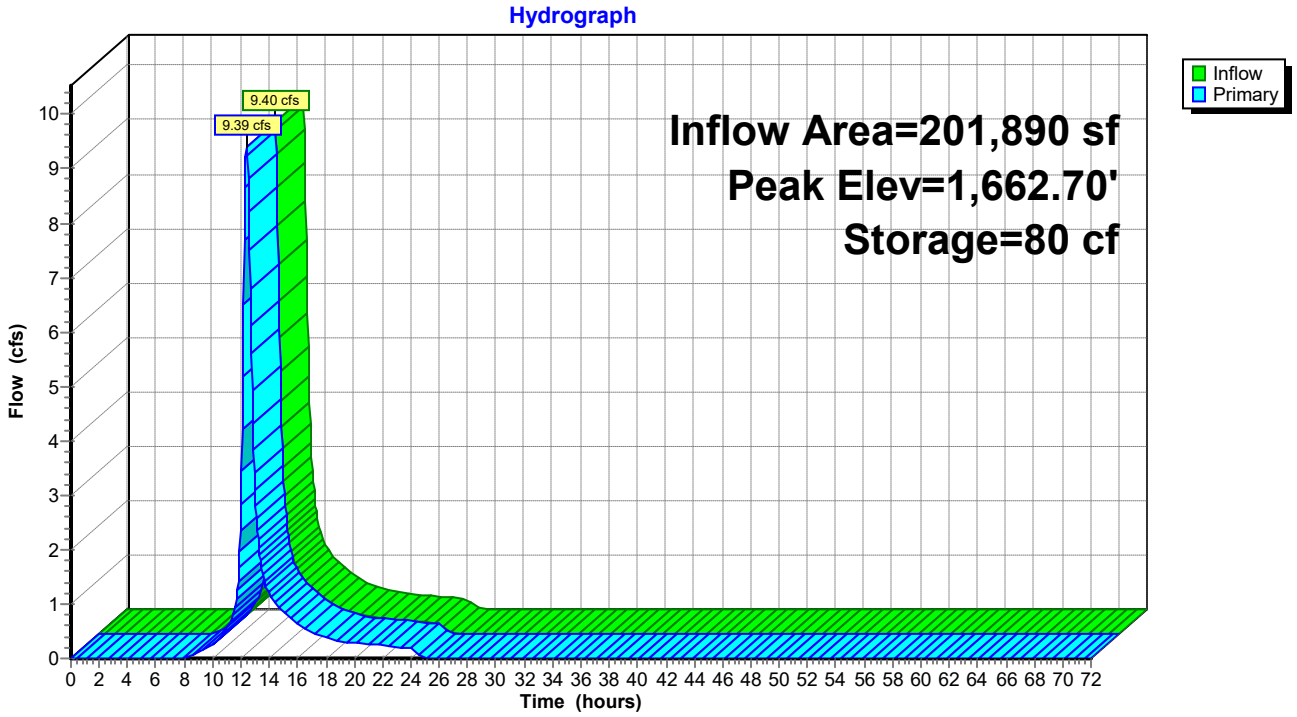
Volume	Invert	Avail.Storage	Storage Description
#1	1,660.30'	490 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
1,660.30	1	3.9	0	0	1
1,663.00	110	67.9	109	109	379
1,664.00	745	151.8	380	490	1,850

Device	Routing	Invert	Outlet Devices
#1	Primary	1,660.30'	**15.0" Round Culvert** L= 16.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1,660.30' / 1,659.80' S= 0.0305 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf
#2	Primary	1,662.50'	**8.0' long + 35.0 '/' SideZ x 13.0' 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) 2.60 2.64 2.70 2.66 2.65 2.66 2.65 2.63

Primary OutFlow Max=9.37 cfs @ 12.40 hrs HW=1,662.70' (Free Discharge)
1=Culvert (Inlet Controls 6.21 cfs @ 5.06 fps)
2=Broad-Crested Rectangular Weir (Weir Controls 3.15 cfs @ 1.05 fps)

Pond 4P: 15" CPP



Summary for Pond IT1: Infiltration

Inflow Area = 8,608 sf, 23.05% Impervious, Inflow Depth = 3.02" for 10-Year event
Inflow = 0.66 cfs @ 12.13 hrs, Volume= 2,163 cf
Outflow = 0.64 cfs @ 12.13 hrs, Volume= 1,987 cf, Atten= 2%, Lag= 0.1 min
Discarded = 0.00 cfs @ 12.13 hrs, Volume= 320 cf
Primary = 0.64 cfs @ 12.13 hrs, Volume= 1,666 cf
Routed to Link 7L : Lag

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1,674.52' @ 12.13 hrs Surf.Area= 438 sf Storage= 377 cf

Plug-Flow detention time= 274.4 min calculated for 1,985 cf (92% of inflow)
Center-of-Mass det. time= 234.9 min (1,057.6 - 822.7)

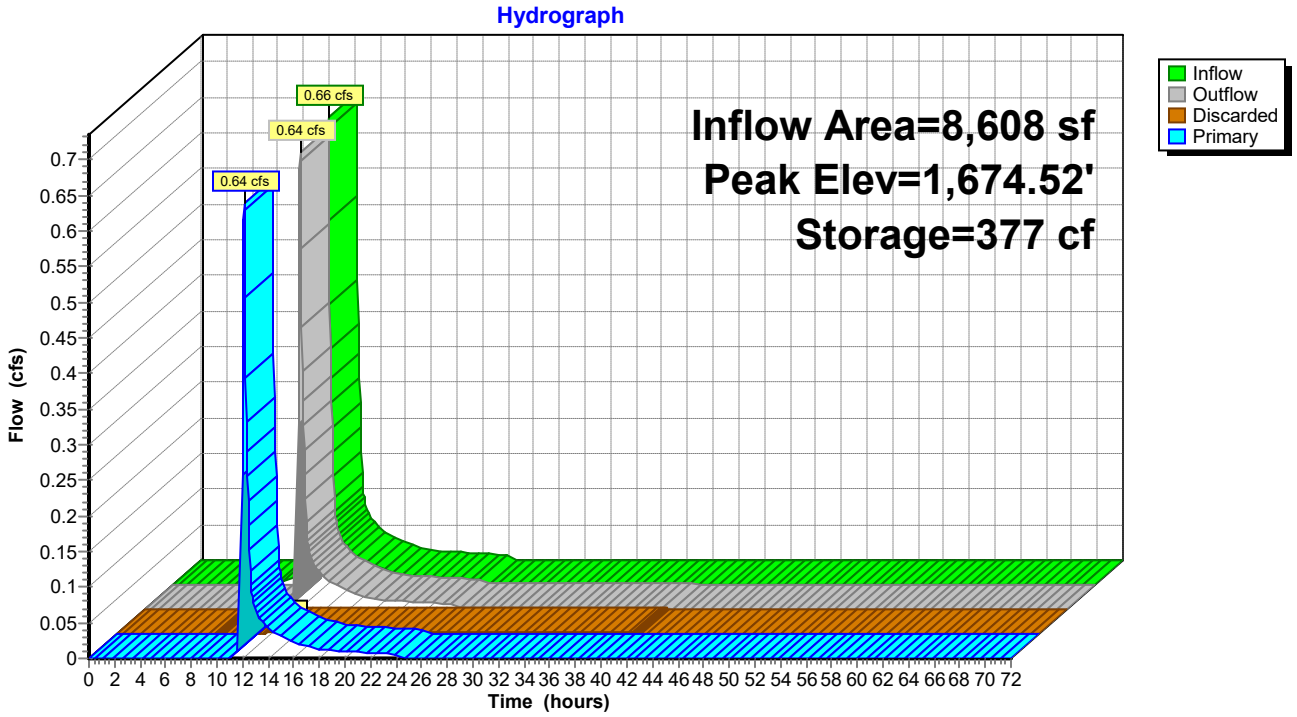
Volume	Invert	Avail.Storage	Storage Description
#1	1,671.00'	263 cf	**3.00'W x 73.00'L x 3.00'H Prismatoid** 657 cf Overall x 40.0% Voids
#2	1,674.00'	219 cf	**3.00'W x 73.00'L x 1.00'H Overflow Storage**
		482 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,671.00'	**0.170 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,654.00'
#2	Primary	1,674.50'	**73.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.00 cfs @ 12.13 hrs HW=1,674.52' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.60 cfs @ 12.13 hrs HW=1,674.52' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.60 cfs @ 0.39 fps)

Pond IT1: Infiltration



Summary for Pond IT2: Infiltration

Inflow Area = 60,319 sf, 0.07% Impervious, Inflow Depth = 3.01" for 10-Year event
Inflow = 3.42 cfs @ 12.24 hrs, Volume= 15,124 cf
Outflow = 3.41 cfs @ 12.24 hrs, Volume= 14,270 cf, Atten= 0%, Lag= 0.1 min
Discarded = 0.01 cfs @ 12.24 hrs, Volume= 961 cf
Primary = 3.40 cfs @ 12.24 hrs, Volume= 13,308 cf
Routed to Link 3L : Lag

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1,664.55' @ 12.24 hrs Surf.Area= 1,200 sf Storage= 1,530 cf

Plug-Flow detention time= 135.6 min calculated for 14,270 cf (94% of inflow)
Center-of-Mass det. time= 105.0 min (935.1 - 830.1)

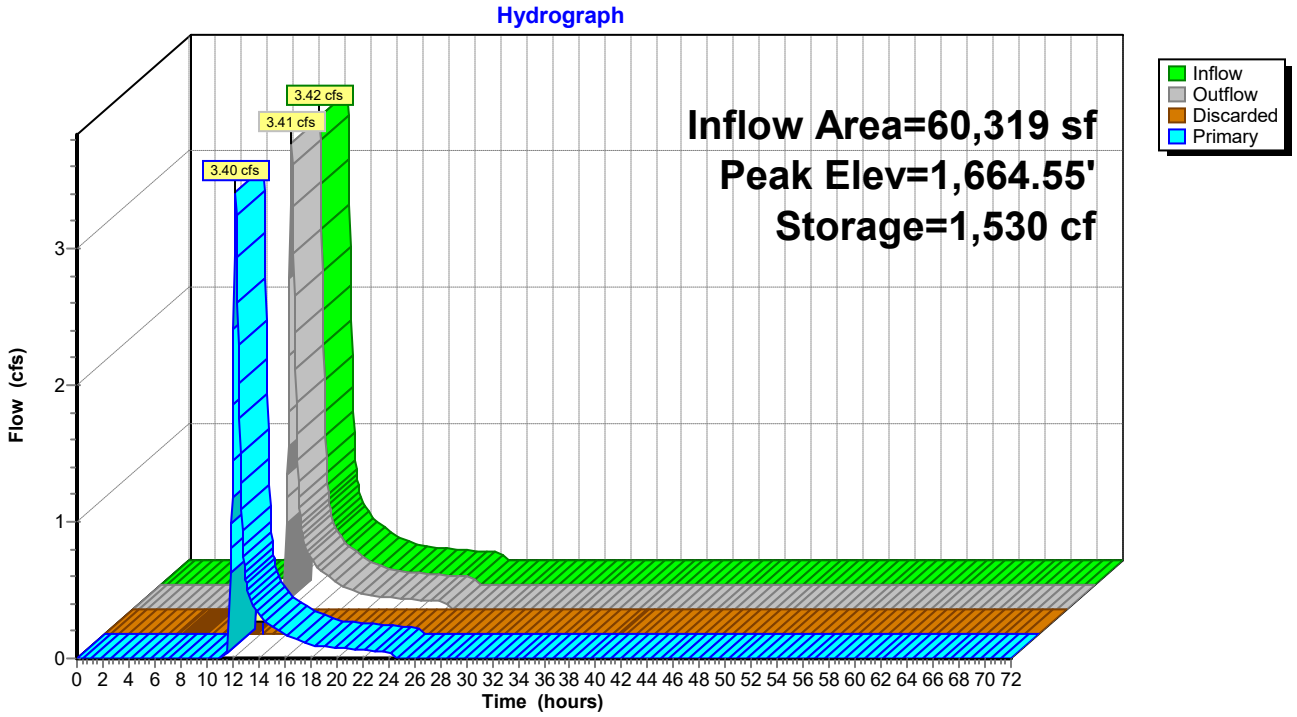
Volume	Invert	Avail.Storage	Storage Description
#1	1,659.00'	1,200 cf	**6.00'W x 100.00'L x 5.00'H Prismatoid** 3,000 cf Overall x 40.0% Voids
#2	1,664.00'	600 cf	**6.00'W x 100.00'L x 1.00'H Overflow Storage**
		1,800 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,659.00'	**0.170 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,644.00'
#2	Primary	1,664.50'	**100.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.01 cfs @ 12.24 hrs HW=1,664.55' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=2.97 cfs @ 12.24 hrs HW=1,664.55' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 2.97 cfs @ 0.60 fps)

Pond IT2: Infiltration



Summary for Pond IT3: Infiltration

Inflow Area = 208,499 sf, 0.06% Impervious, Inflow Depth = 3.04" for 10-Year event
Inflow = 9.56 cfs @ 12.43 hrs, Volume= 52,845 cf
Outflow = 9.54 cfs @ 12.43 hrs, Volume= 51,950 cf, Atten= 0%, Lag= 0.1 min
Discarded = 0.01 cfs @ 12.43 hrs, Volume= 984 cf
Primary = 9.53 cfs @ 12.43 hrs, Volume= 50,967 cf
Routed to Link 4L : Lag

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1,660.61' @ 12.43 hrs Surf.Area= 1,200 sf Storage= 1,564 cf

Plug-Flow detention time= 39.3 min calculated for 51,914 cf (98% of inflow)
Center-of-Mass det. time= 31.1 min (873.1 - 842.0)

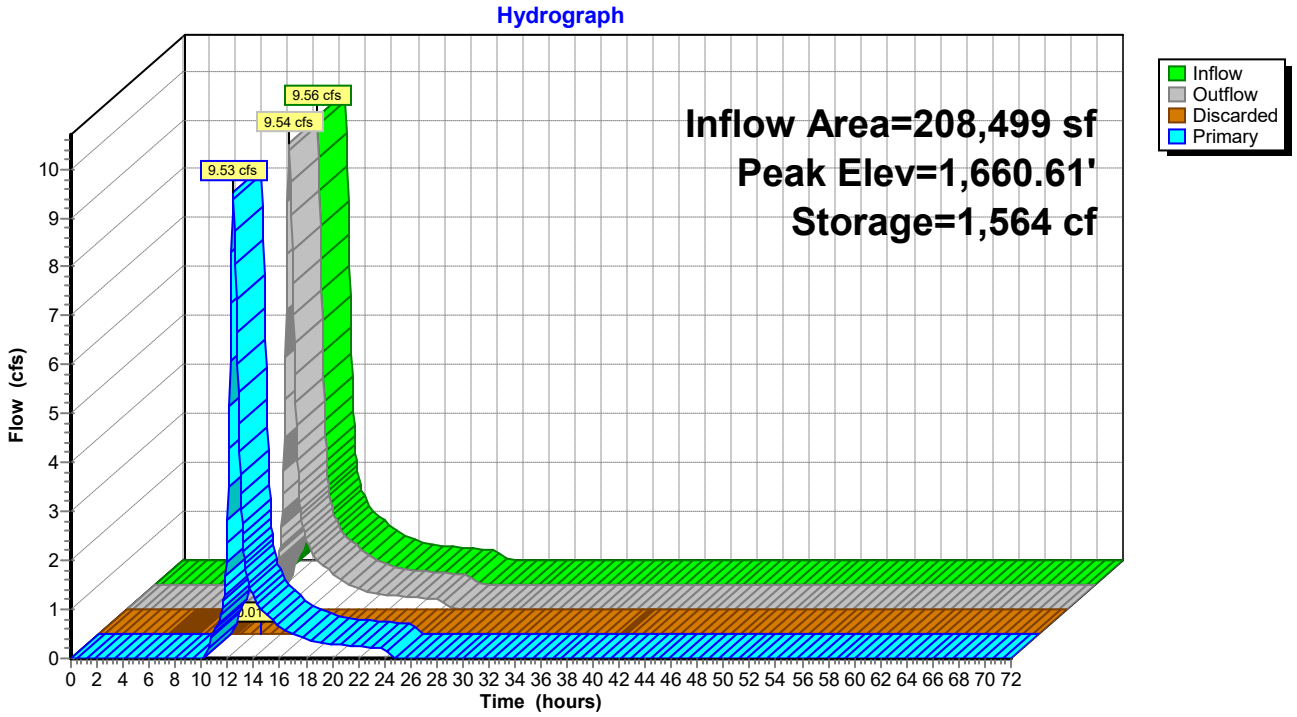
Volume	Invert	Avail.Storage	Storage Description
#1	1,655.00'	1,200 cf	**6.00'W x 100.00'L x 5.00'H Prismatoid** 3,000 cf Overall x 40.0% Voids
#2	1,660.00'	600 cf	**6.00'W x 100.00'L x 1.00'H Overflow Storage**
		1,800 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,655.00'	**0.170 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,640.00'
#2	Primary	1,660.50'	**100.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.01 cfs @ 12.43 hrs HW=1,660.61' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=9.23 cfs @ 12.43 hrs HW=1,660.61' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 9.23 cfs @ 0.87 fps)

Pond IT3: Infiltration

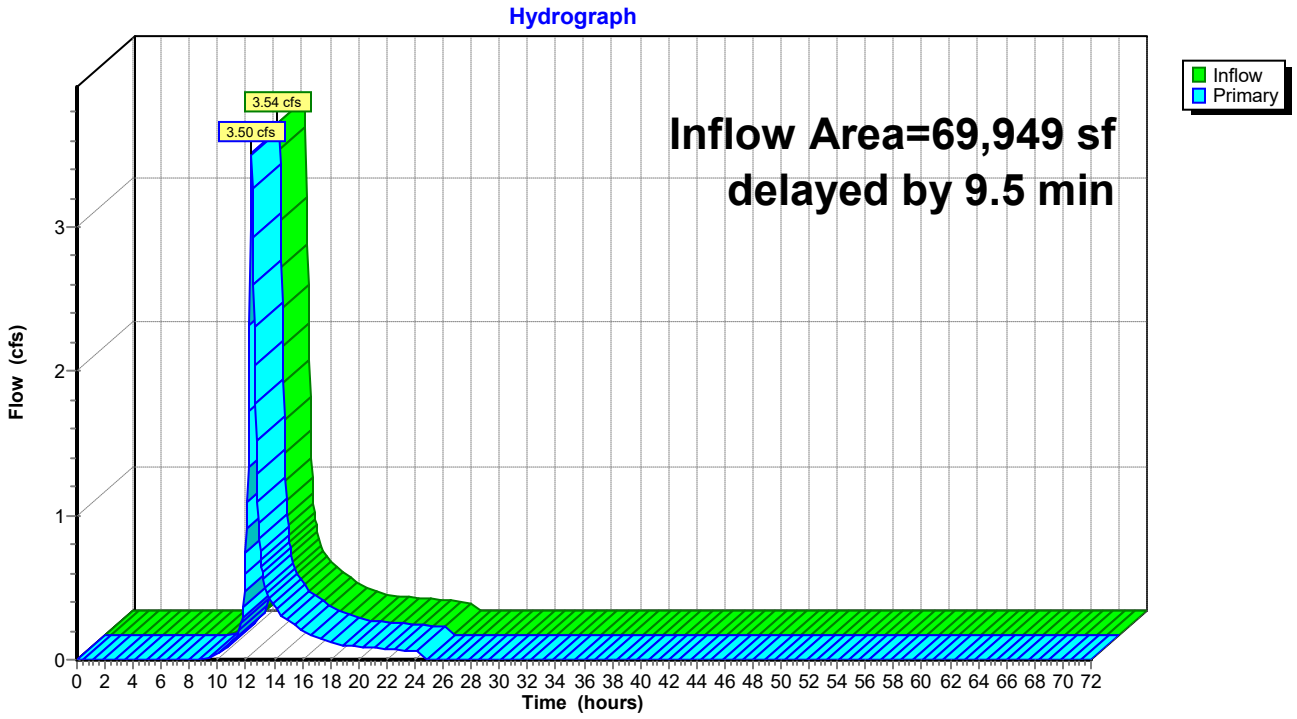


Summary for Link 1L: Lag

Inflow Area = 69,949 sf, 0.06% Impervious, Inflow Depth = 2.56" for 10-Year event
Inflow = 3.54 cfs @ 12.22 hrs, Volume= 14,942 cf
Primary = 3.50 cfs @ 12.39 hrs, Volume= 14,942 cf, Atten= 1%, Lag= 9.7 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 9.5 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: Lag

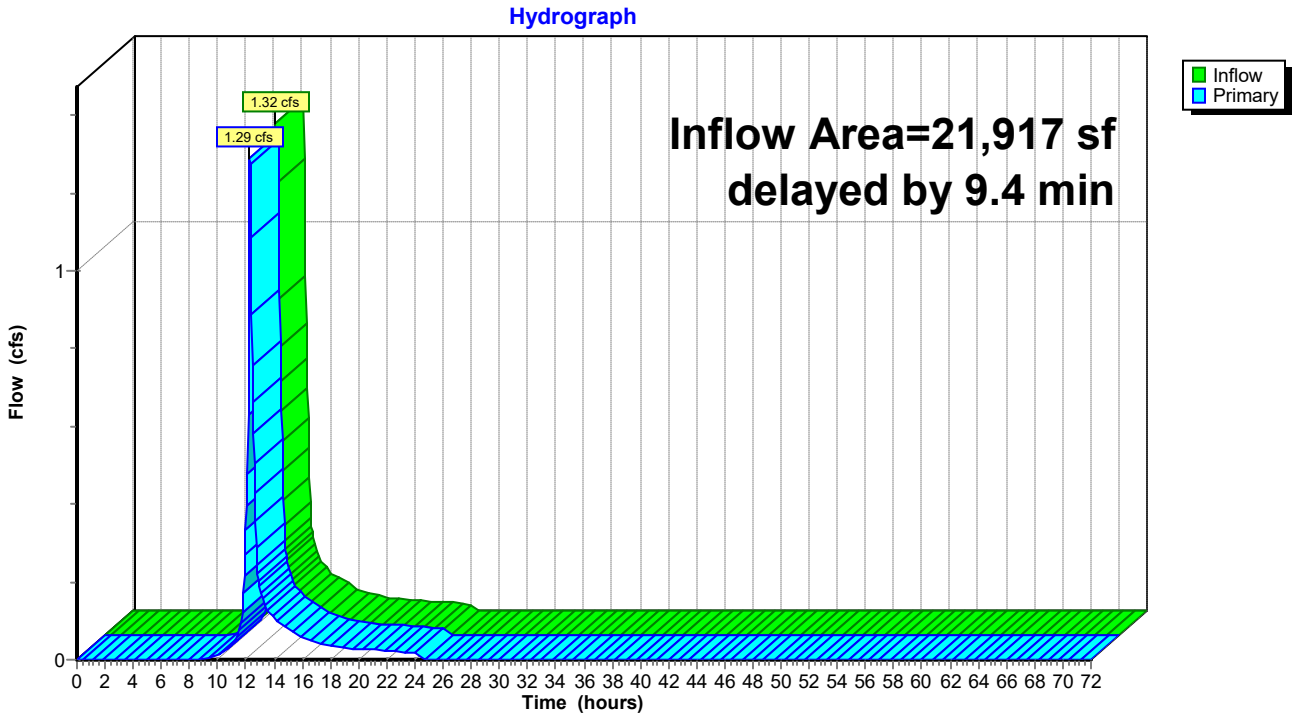


Summary for Link 2L: Lag

Inflow Area = 21,917 sf, 0.10% Impervious, Inflow Depth = 2.48" for 10-Year event
Inflow = 1.32 cfs @ 12.12 hrs, Volume= 4,523 cf
Primary = 1.29 cfs @ 12.28 hrs, Volume= 4,523 cf, Atten= 2%, Lag= 9.5 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 9.4 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 2L: Lag

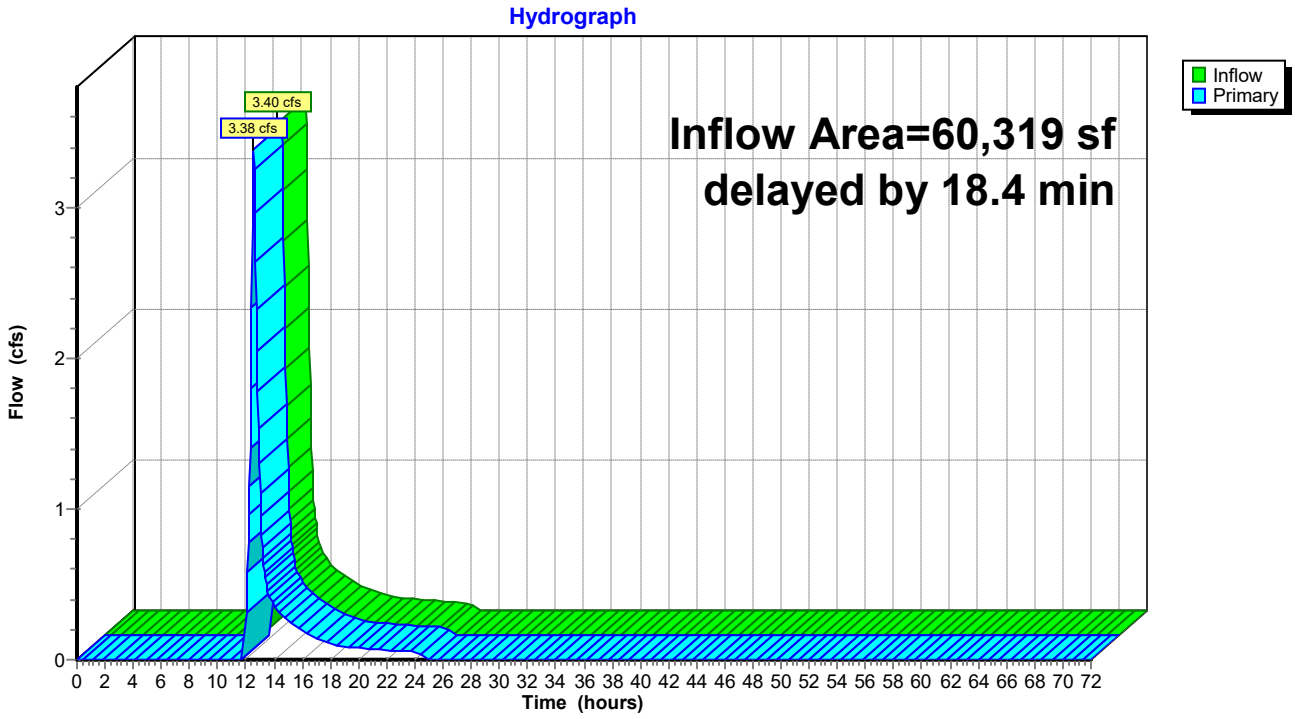


Summary for Link 3L: Lag

Inflow Area = 60,319 sf, 0.07% Impervious, Inflow Depth = 2.65" for 10-Year event
Inflow = 3.40 cfs @ 12.24 hrs, Volume= 13,308 cf
Primary = 3.38 cfs @ 12.55 hrs, Volume= 13,308 cf, Atten= 0%, Lag= 18.4 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 18.4 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 3L: Lag

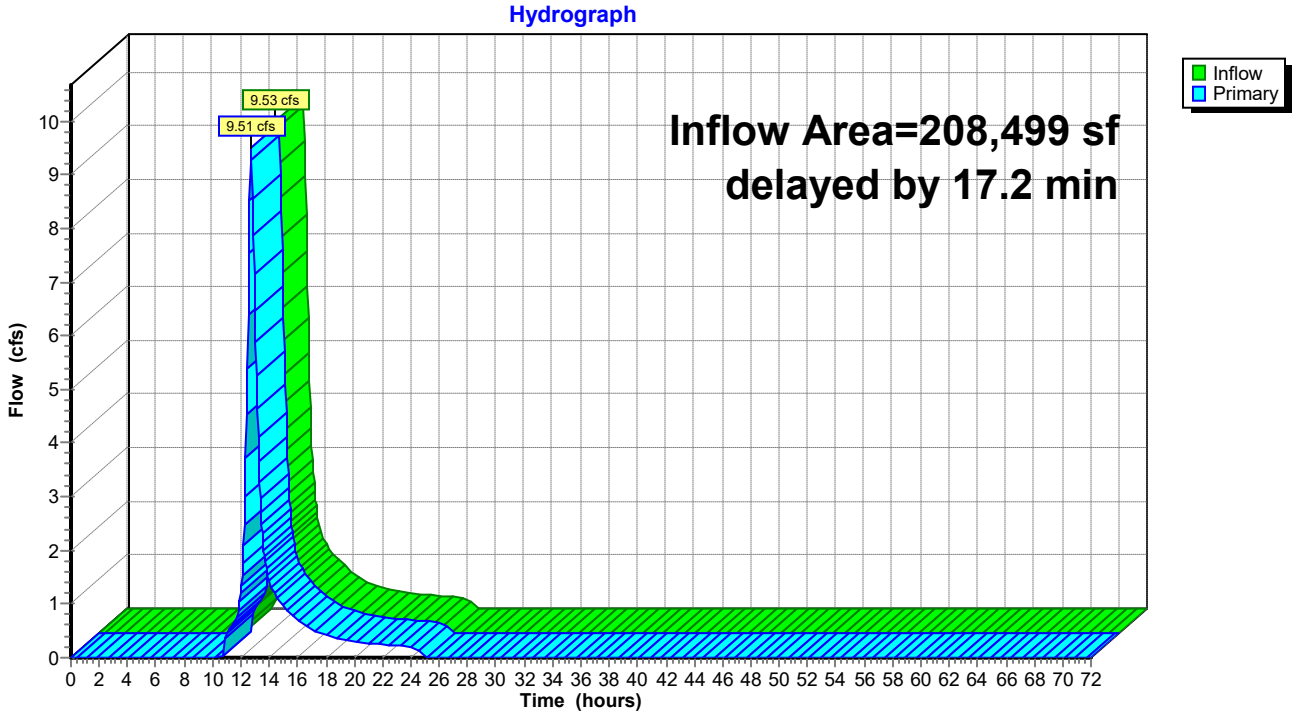


Summary for Link 4L: Lag

Inflow Area = 208,499 sf, 0.06% Impervious, Inflow Depth = 2.93" for 10-Year event
Inflow = 9.53 cfs @ 12.43 hrs, Volume= 50,967 cf
Primary = 9.51 cfs @ 12.72 hrs, Volume= 50,967 cf, Atten= 0%, Lag= 17.3 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 17.2 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 4L: Lag

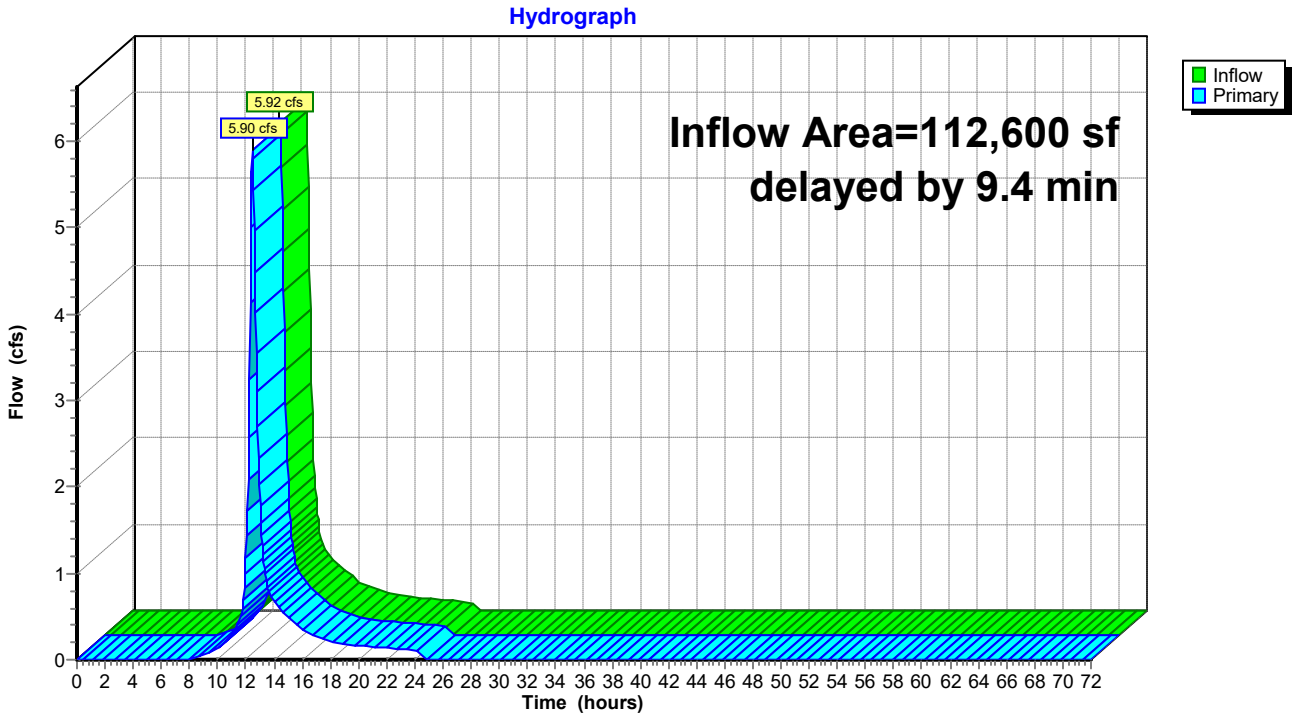


Summary for Link 5L: Lag

Inflow Area = 112,600 sf, 0.05% Impervious, Inflow Depth = 3.02" for 10-Year event
Inflow = 5.92 cfs @ 12.30 hrs, Volume= 28,294 cf
Primary = 5.90 cfs @ 12.46 hrs, Volume= 28,294 cf, Atten= 0%, Lag= 9.4 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 9.4 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 5L: Lag

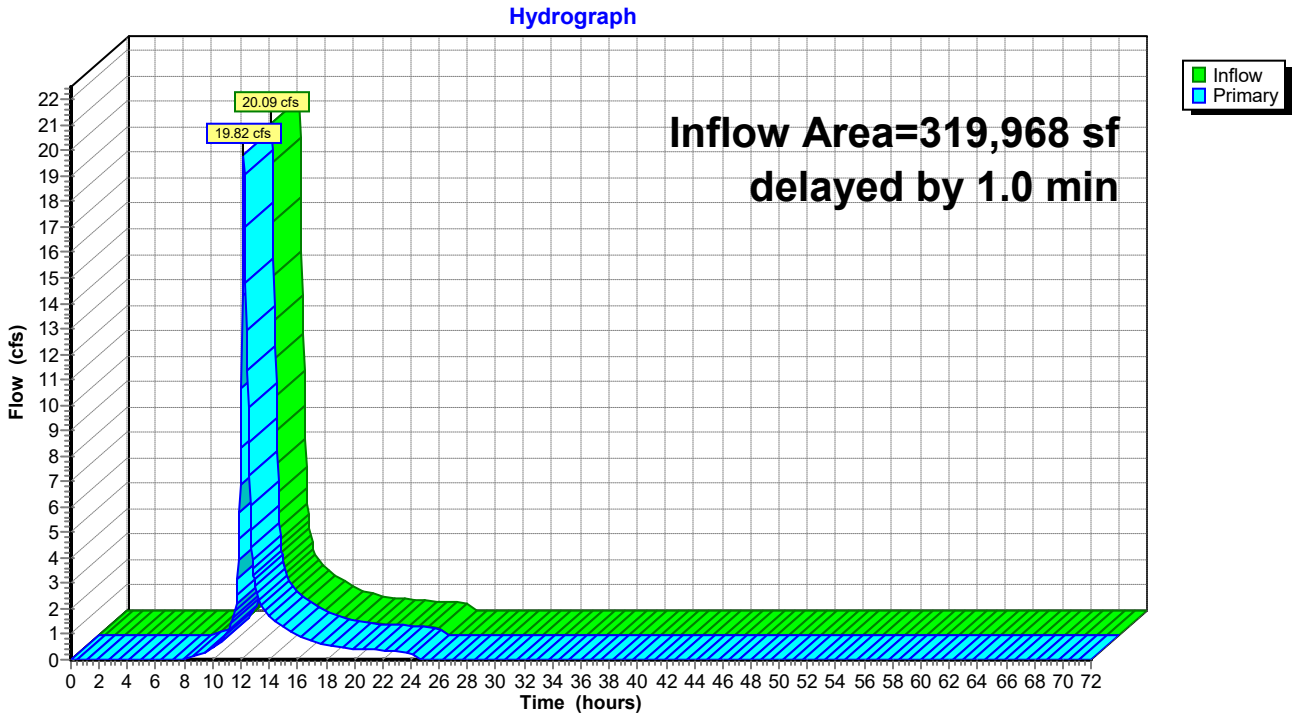


Summary for Link 6L: Lag

Inflow Area = 319,968 sf, 0.06% Impervious, Inflow Depth = 3.02" for 10-Year event
Inflow = 20.09 cfs @ 12.19 hrs, Volume= 80,401 cf
Primary = 19.82 cfs @ 12.21 hrs, Volume= 80,401 cf, Atten= 1%, Lag= 1.0 min
Routed to Reach DP-E : Culvert towards Wades Stream

Primary outflow = Inflow delayed by 1.0 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 6L: Lag

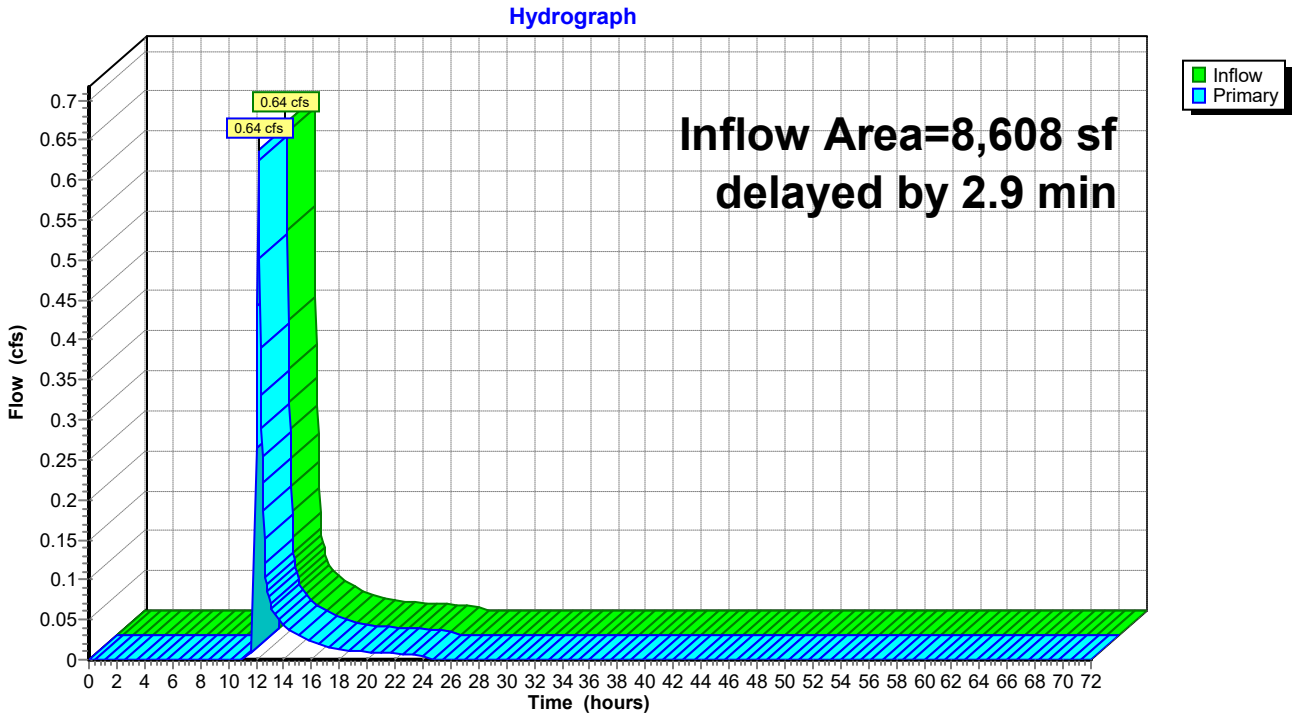


Summary for Link 7L: Lag

Inflow Area = 8,608 sf, 23.05% Impervious, Inflow Depth = 2.32" for 10-Year event
Inflow = 0.64 cfs @ 12.13 hrs, Volume= 1,666 cf
Primary = 0.64 cfs @ 12.18 hrs, Volume= 1,666 cf, Atten= 0%, Lag= 2.9 min
Routed to Reach 2.5P : New 12" CPP

Primary outflow = Inflow delayed by 2.9 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 7L: Lag

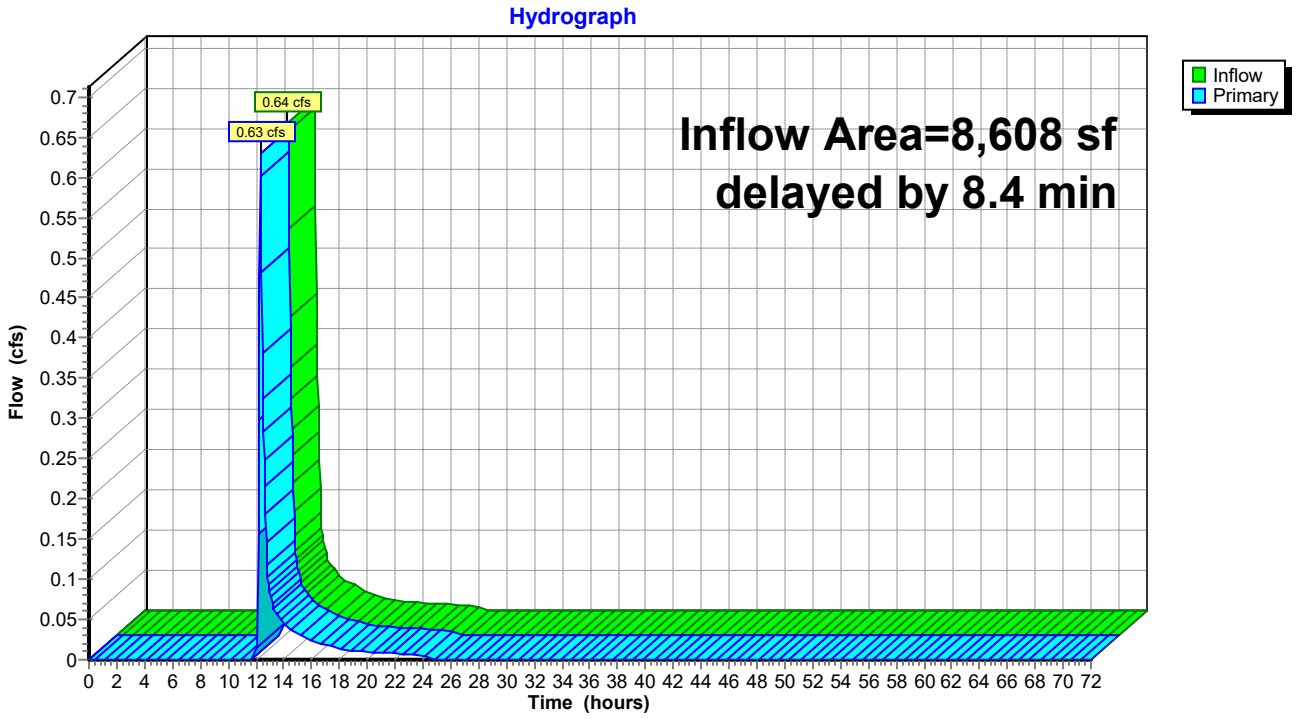


Summary for Link 8L: Lag

Inflow Area = 8,608 sf, 23.05% Impervious, Inflow Depth = 2.33" for 10-Year event
Inflow = 0.64 cfs @ 12.18 hrs, Volume= 1,669 cf
Primary = 0.63 cfs @ 12.32 hrs, Volume= 1,669 cf, Atten= 1%, Lag= 8.5 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 8.4 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 8L: Lag

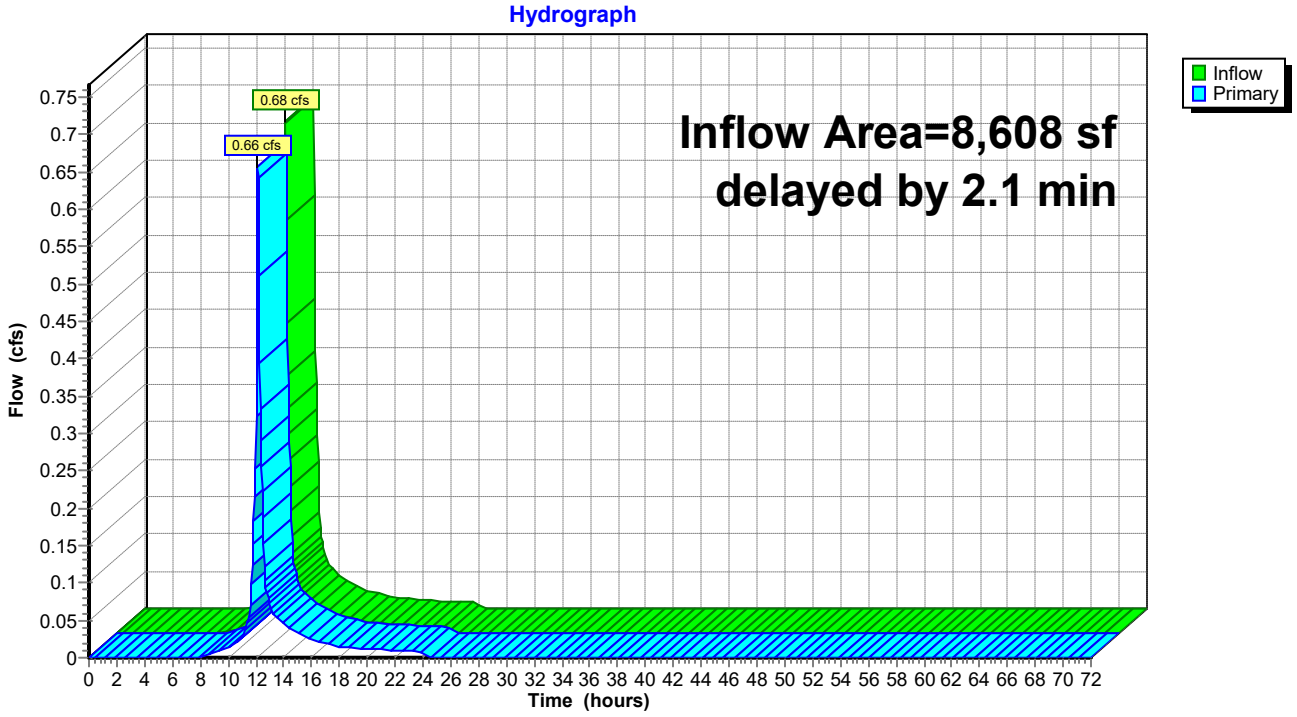


Summary for Link FS1: Filter Strip

Inflow Area = 8,608 sf, 23.05% Impervious, Inflow Depth = 3.02" for 10-Year event
Inflow = 0.68 cfs @ 12.09 hrs, Volume= 2,163 cf
Primary = 0.66 cfs @ 12.13 hrs, Volume= 2,163 cf, Atten= 4%, Lag= 2.1 min
Routed to Pond IT1 : Infiltration

Primary outflow = Inflow delayed by 2.1 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link FS1: Filter Strip

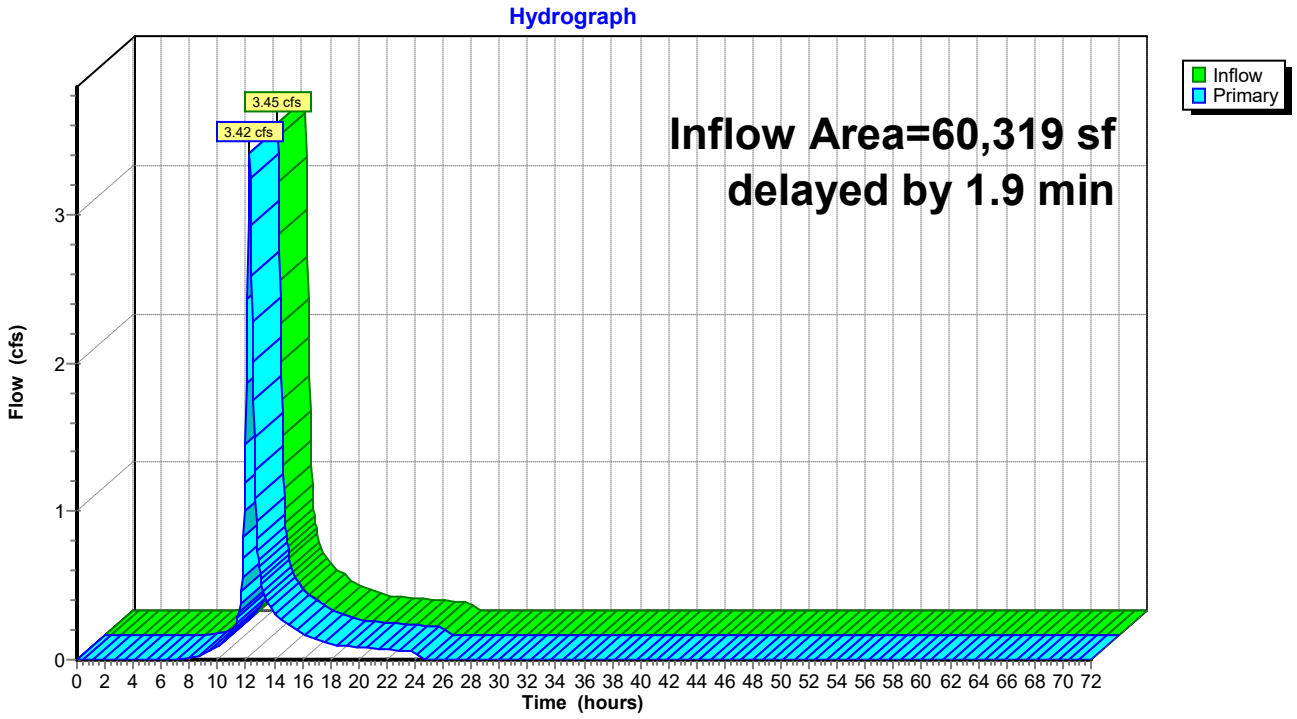


Summary for Link FS2: Filter Strip

Inflow Area = 60,319 sf, 0.07% Impervious, Inflow Depth = 3.01" for 10-Year event
Inflow = 3.45 cfs @ 12.21 hrs, Volume= 15,124 cf
Primary = 3.42 cfs @ 12.24 hrs, Volume= 15,124 cf, Atten= 1%, Lag= 2.0 min
Routed to Pond IT2 : Infiltration

Primary outflow = Inflow delayed by 1.9 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link FS2: Filter Strip

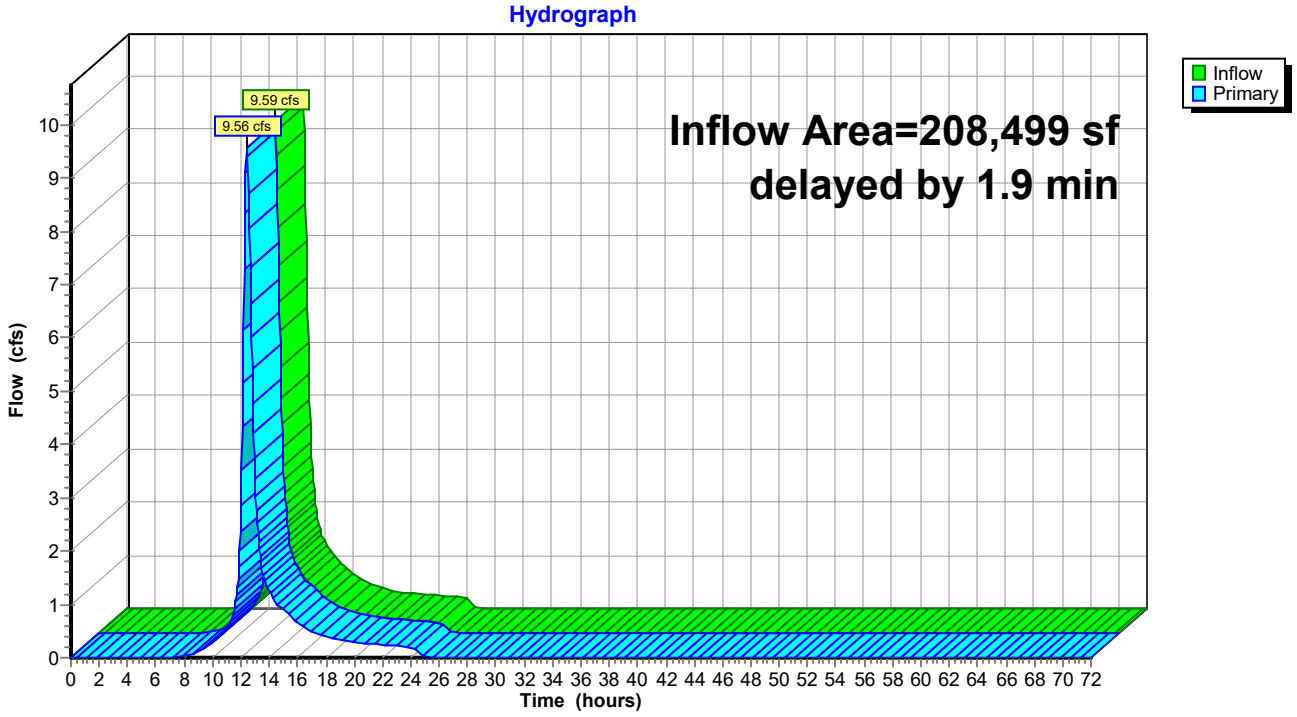


Summary for Link FS3: Filter Strip

Inflow Area = 208,499 sf, 0.06% Impervious, Inflow Depth = 3.04" for 10-Year event
Inflow = 9.59 cfs @ 12.40 hrs, Volume= 52,845 cf
Primary = 9.56 cfs @ 12.43 hrs, Volume= 52,845 cf, Atten= 0%, Lag= 1.9 min
Routed to Pond IT3 : Infiltration

Primary outflow = Inflow delayed by 1.9 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link FS3: Filter Strip



Summary for Subcatchment IT1-S: Trench 1 Subcat

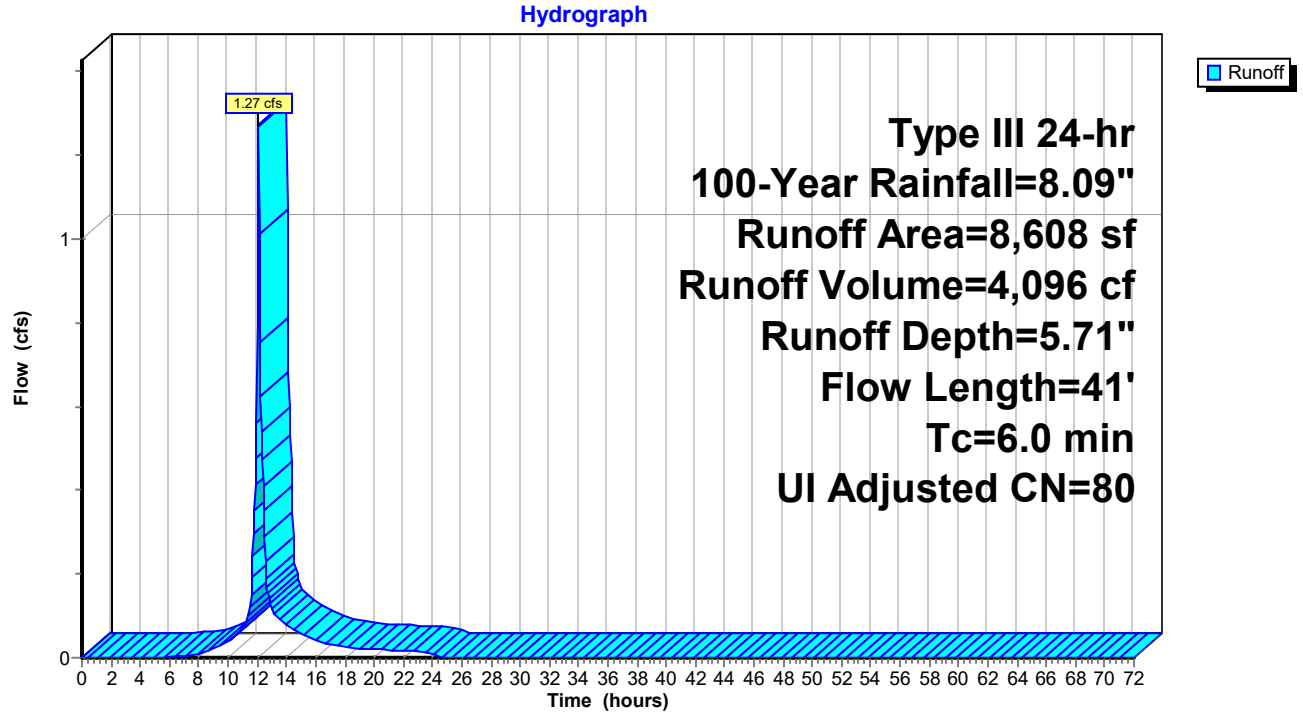
Runoff = 1.27 cfs @ 12.09 hrs, Volume= 4,096 cf, Depth= 5.71"
Routed to Link FS1 : Filter Strip

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.09"

Area (sf)	CN	Adj	Description
5,679	74		Pasture/grassland/range, Good, HSG C
219	98		Water Surface, 0% imp, HSG C
726	96		Gravel surface, HSG C
1,984	98		Unconnected pavement, HSG C
8,608	82	80	Weighted Average, UI Adjusted
6,624			76.95% Pervious Area
1,984			23.05% Impervious Area
1,984			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	25	0.0780	0.25		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
0.5	16	0.0049	0.55		**Sheet Flow, BC** Smooth surfaces n= 0.011 P2= 3.29"
2.1	41	Total, Increased to minimum Tc = 6.0 min			

Subcatchment IT1-S: Trench 1 Subcat



Summary for Subcatchment IT2-S: Trench 2 Subcat

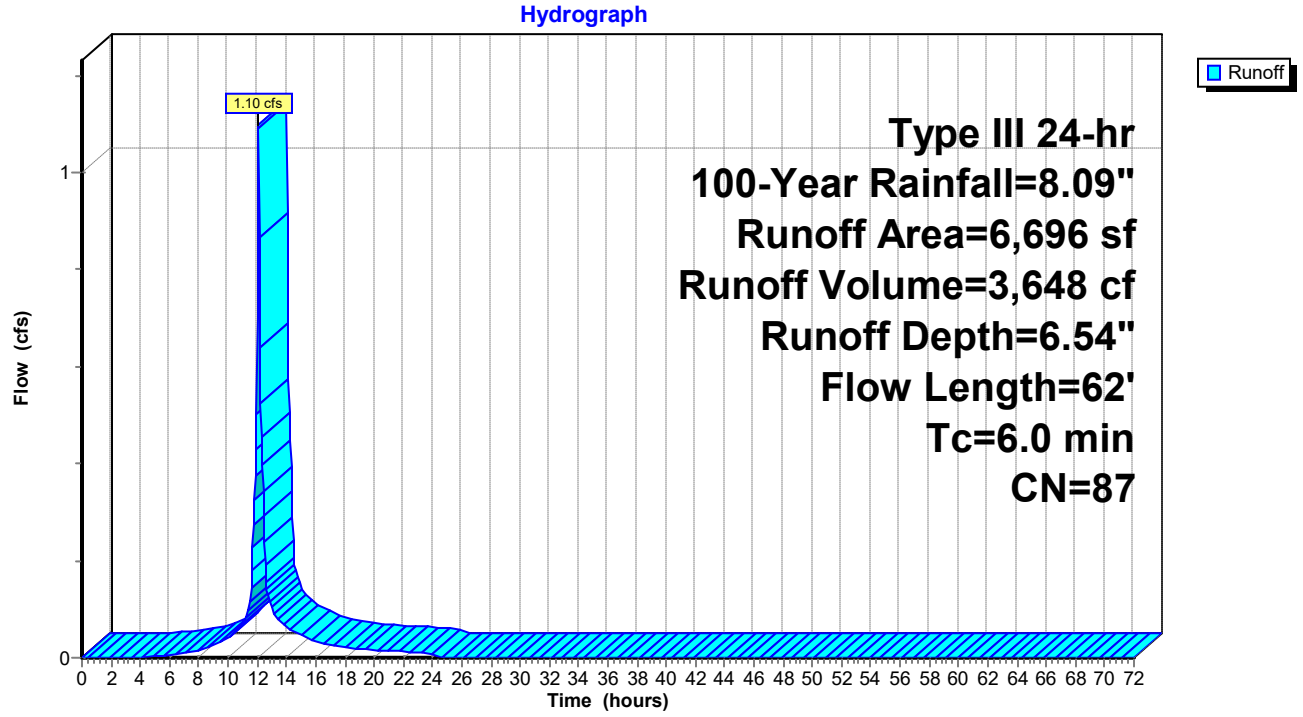
Runoff = 1.10 cfs @ 12.09 hrs, Volume= 3,648 cf, Depth= 6.54"
Routed to Link FS2 : Filter Strip

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.09"

Area (sf)	CN	Description
3,881	80	Pasture/grassland/range, Good, HSG D
2,212	96	Gravel surface, HSG D
600	98	Water Surface, 0% imp, HSG D
3	98	Unconnected pavement, HSG D
6,696	87	Weighted Average
6,693		99.96% Pervious Area
3		0.04% Impervious Area
3		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	11	0.0521	0.18		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
0.5	51	0.0456	1.70		**Sheet Flow, BC** Smooth surfaces n= 0.011 P2= 3.29"
1.5	62	Total, Increased to minimum Tc = 6.0 min			

Subcatchment IT2-S: Trench 2 Subcat



Summary for Subcatchment IT3-S: Trench 3 Subcat

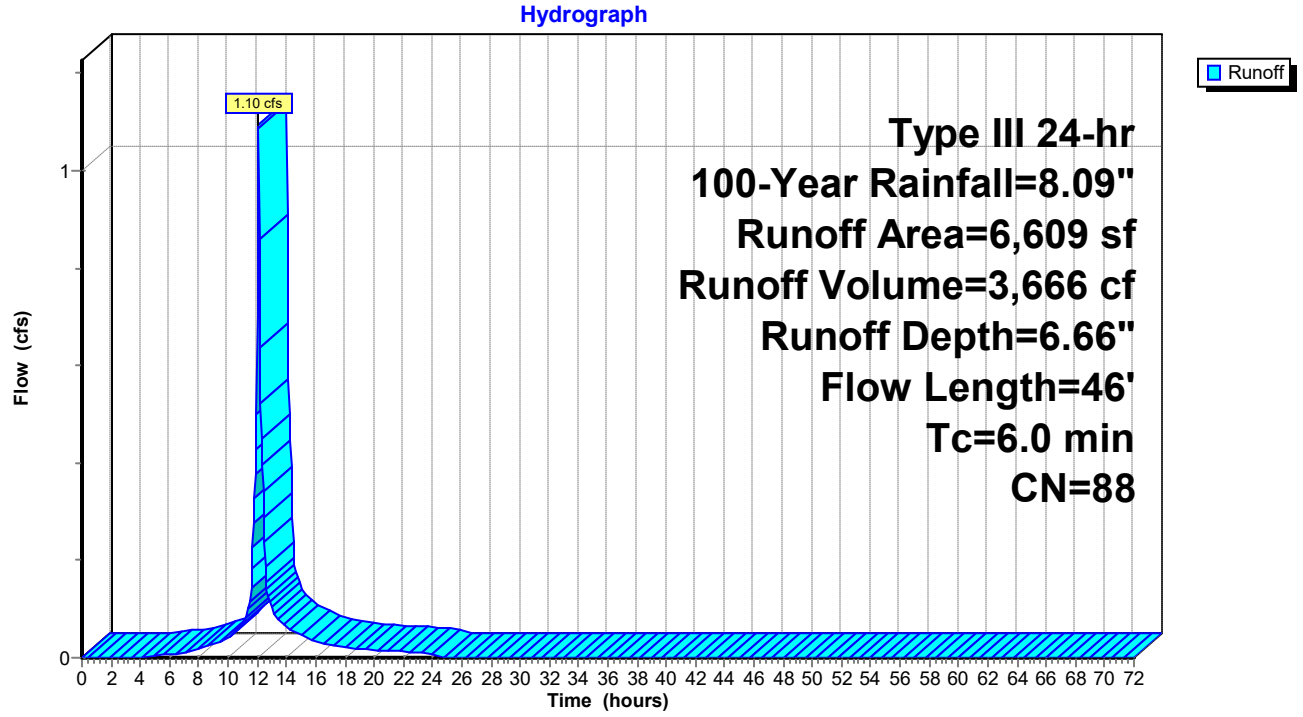
Runoff = 1.10 cfs @ 12.09 hrs, Volume= 3,666 cf, Depth= 6.66"
Routed to Link FS3 : Filter Strip

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.09"

Area (sf)	CN	Description
3,539	80	Pasture/grassland/range, Good, HSG D
2,466	96	Gravel surface, HSG D
600	98	Water Surface, 0% imp, HSG D
4	98	Unconnected pavement, HSG D
6,609	88	Weighted Average
6,605		99.94% Pervious Area
4		0.06% Impervious Area
4		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	9	0.0226	0.13		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
0.4	37	0.0506	1.66		**Sheet Flow, BC** Smooth surfaces n= 0.011 P2= 3.29"
1.6	46	Total, Increased to minimum Tc = 6.0 min			

Subcatchment IT3-S: Trench 3 Subcat



Summary for Subcatchment M: Middle

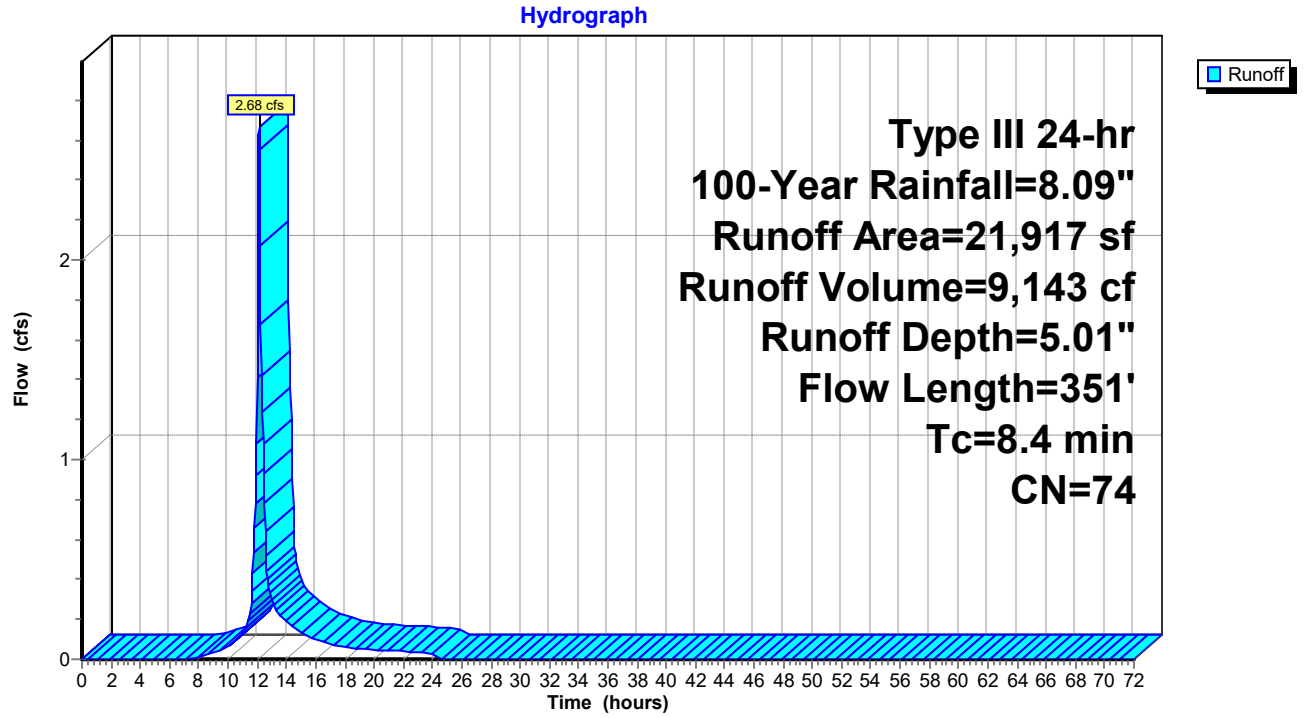
Runoff = 2.68 cfs @ 12.12 hrs, Volume= 9,143 cf, Depth= 5.01"
Routed to Reach 2P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.09"

Area (sf)	CN	Description
21,742	74	Pasture/grassland/range, Good, HSG C
152	96	Gravel surface, HSG C
23	98	Unconnected pavement, HSG C
21,917	74	Weighted Average
21,894		99.90% Pervious Area
23		0.10% Impervious Area
23		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	95	0.0626	0.30		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
2.3	214	0.0510	1.58		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.9	42	0.0126	0.79		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
8.4	351	Total			

Subcatchment M: Middle



Summary for Subcatchment ME: Middle East

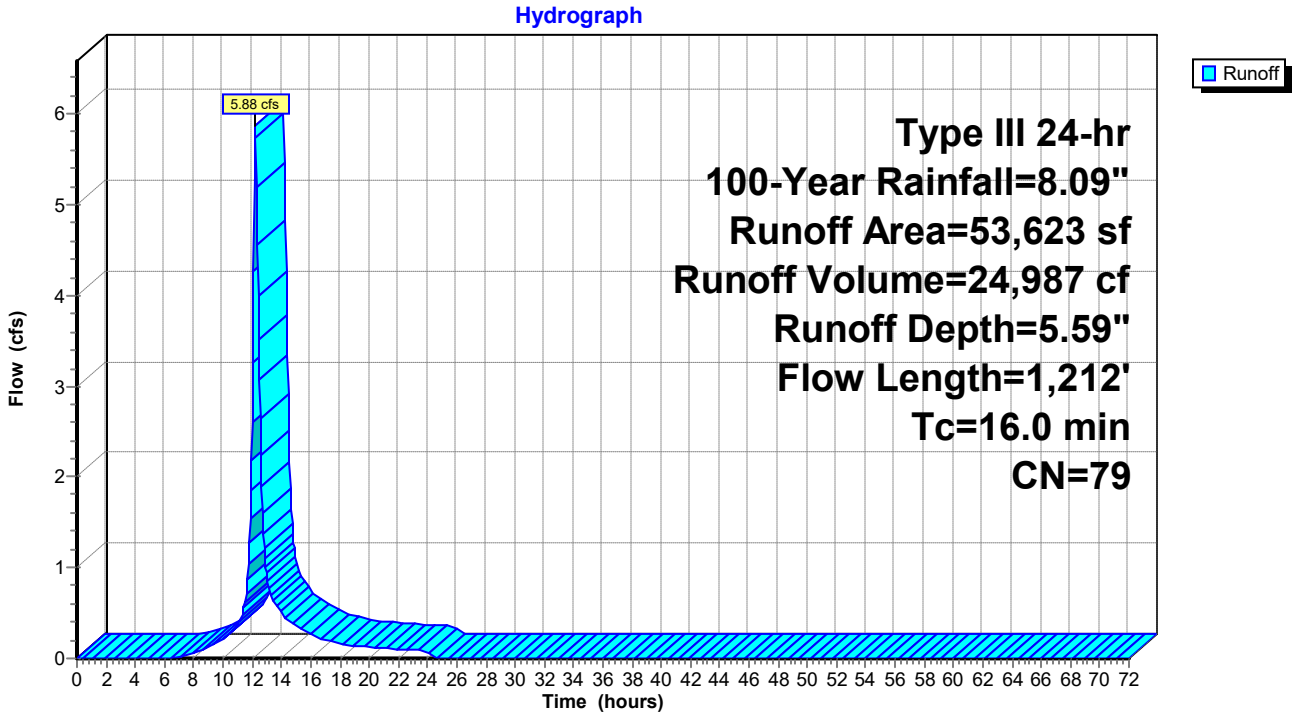
Runoff = 5.88 cfs @ 12.22 hrs, Volume= 24,987 cf, Depth= 5.59"
Routed to Reach 3P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.09"

Area (sf)	CN	Description
11,328	74	Pasture/grassland/range, Good, HSG C
41,933	80	Pasture/grassland/range, Good, HSG D
82	96	Gravel surface, HSG C
239	96	Gravel surface, HSG D
8	98	Unconnected pavement, HSG C
33	98	Unconnected pavement, HSG D
53,623	79	Weighted Average
53,582		99.92% Pervious Area
41		0.08% Impervious Area
41		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	100	0.0678	0.32		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
7.1	708	0.0566	1.67		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
1.5	140	0.0508	1.58		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.4	116	0.0409	5.12	11.51	**Trap/Vee/Rect Channel Flow, DE** Bot.W=3.00' D=0.50' Z= 3.0 '/' Top.W=6.00' n= 0.030 Earth, grassed & winding
0.0	5	0.0154	2.00		**Shallow Concentrated Flow, EF** Unpaved Kv= 16.1 fps
1.0	98	0.0528	1.61		**Shallow Concentrated Flow, FG** Short Grass Pasture Kv= 7.0 fps
0.7	45	0.0258	1.12		**Shallow Concentrated Flow, GH** Short Grass Pasture Kv= 7.0 fps
16.0	1,212	Total			

Subcatchment ME: Middle East



Summary for Subcatchment MW: Middle West

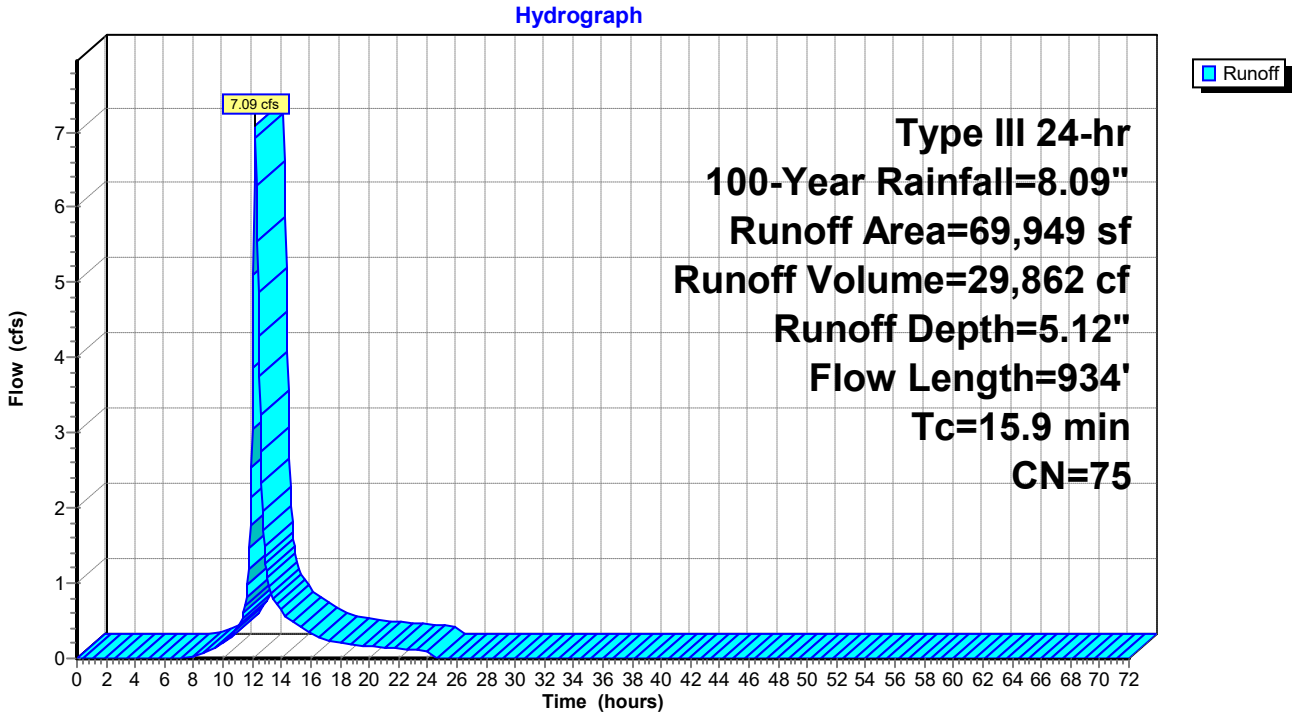
Runoff = 7.09 cfs @ 12.22 hrs, Volume= 29,862 cf, Depth= 5.12"
Routed to Reach 1P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.09"

Area (sf)	CN	Description
54,713	74	Pasture/grassland/range, Good, HSG C
15,194	80	Pasture/grassland/range, Good, HSG D
29	98	Unconnected pavement, HSG C
13	98	Unconnected pavement, HSG D
69,949	75	Weighted Average
69,907		99.94% Pervious Area
42		0.06% Impervious Area
42		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	100	0.0582	0.30		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
6.2	695	0.0716	1.87		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
4.1	139	0.0066	0.57		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
15.9	934	Total			

Subcatchment MW: Middle West



Summary for Subcatchment N: North

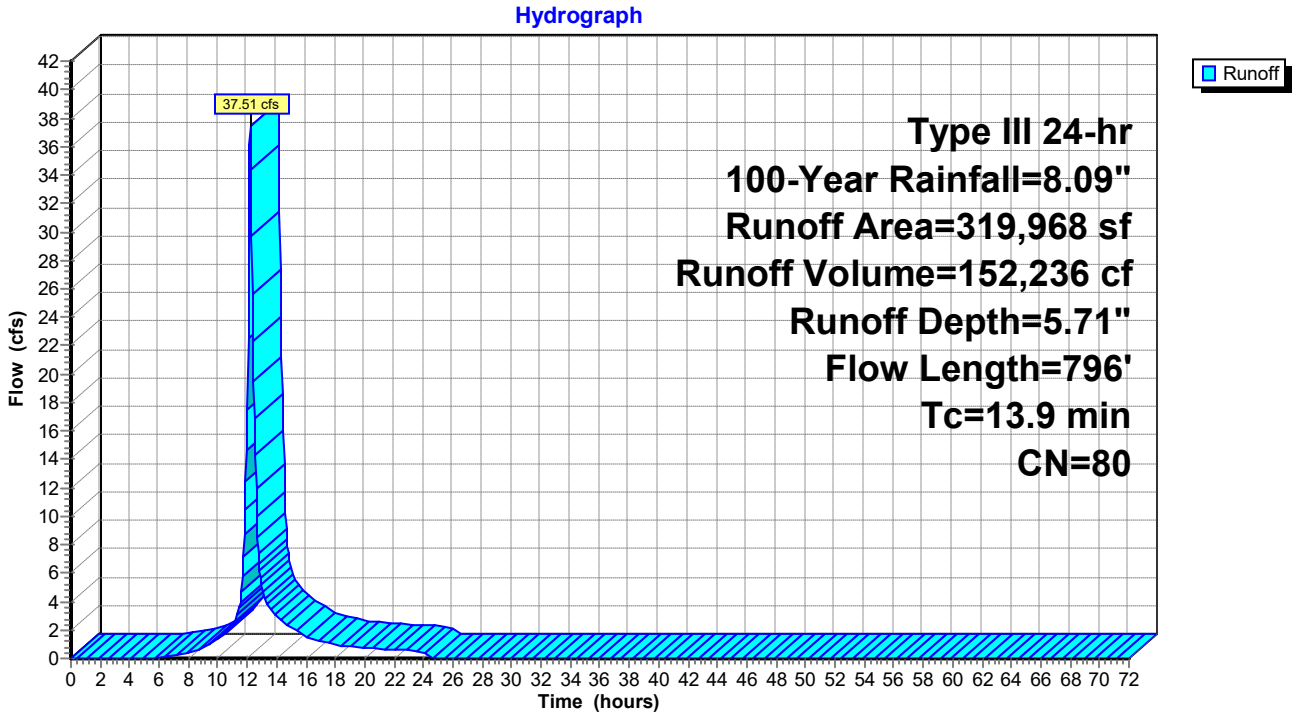
Runoff = 37.51 cfs @ 12.19 hrs, Volume= 152,236 cf, Depth= 5.71"
Routed to Link 6L : Lag

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.09"

Area (sf)	CN	Description
290,514	80	Pasture/grassland/range, Good, HSG D
29,255	77	Woods, Good, HSG D
199	98	Unconnected pavement, HSG D
319,968	80	Weighted Average
319,769		99.94% Pervious Area
199		0.06% Impervious Area
199		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	15	0.0850	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.29"
4.7	85	0.0656	0.30		**Sheet Flow, BC** Range n= 0.130 P2= 3.29"
6.5	689	0.0643	1.78		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.1	7	0.0590	1.21		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
13.9	796	Total			

Subcatchment N: North



Summary for Subcatchment NE: North East

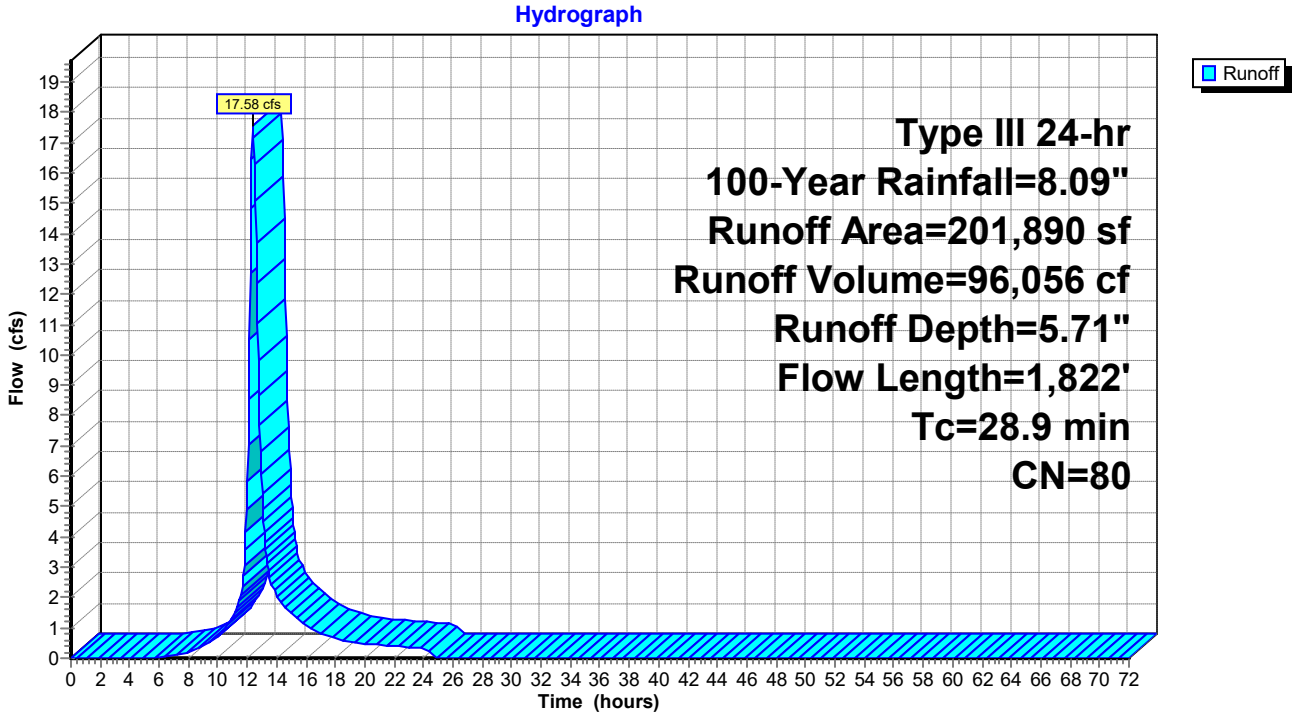
Runoff = 17.58 cfs @ 12.39 hrs, Volume= 96,056 cf, Depth= 5.71"
Routed to Pond 4P : 15" CPP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.09"

Area (sf)	CN	Description
192,277	80	Pasture/grassland/range, Good, HSG D
9,482	77	Woods, Good, HSG D
131	98	Unconnected pavement, HSG D
201,890	80	Weighted Average
201,759		99.94% Pervious Area
131		0.06% Impervious Area
131		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	100	0.0558	0.29		**Sheet Flow, AB** Range n= 0.130 P2= 3.29"
23.2	1,722	0.0311	1.23		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
28.9	1,822	Total			

Subcatchment NE: North East



Summary for Subcatchment SE: South East

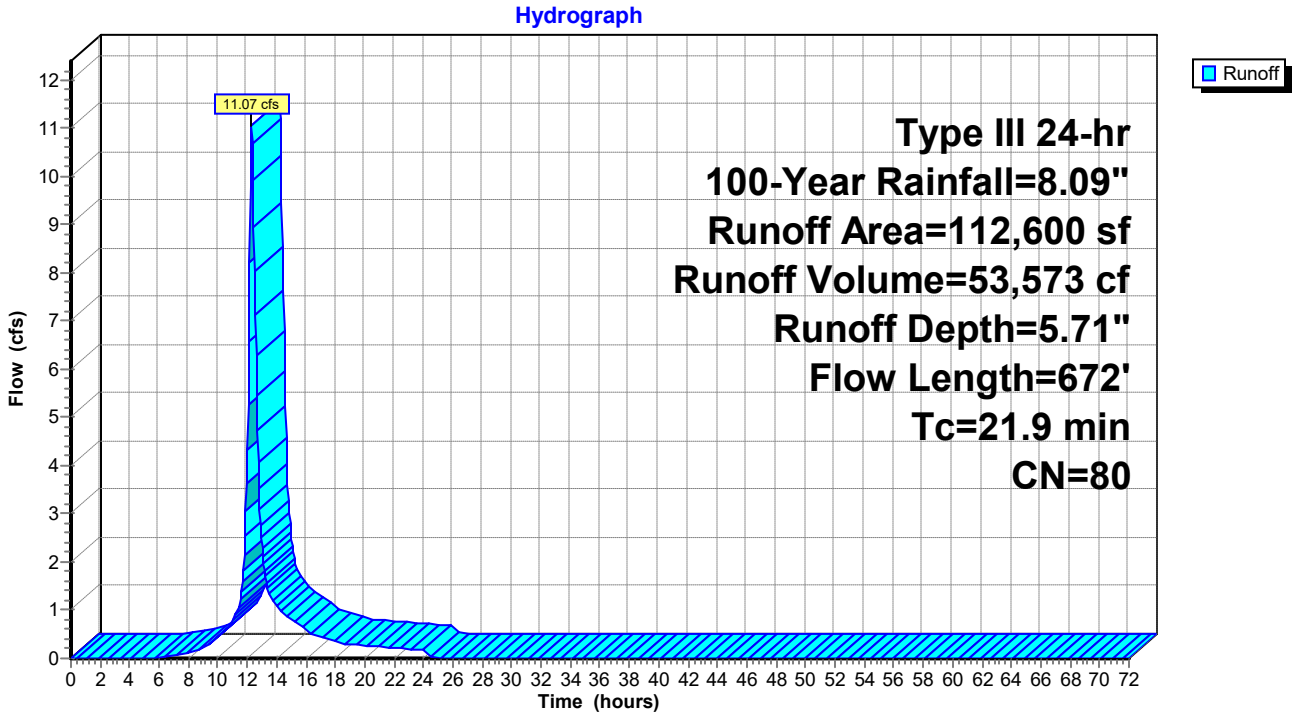
Runoff = 11.07 cfs @ 12.30 hrs, Volume= 53,573 cf, Depth= 5.71"
Routed to Reach 5P : Unknown

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.09"

Area (sf)	CN	Description
110,642	80	Pasture/grassland/range, Good, HSG D
1,536	77	Woods, Good, HSG D
368	96	Gravel surface, HSG D
54	98	Unconnected pavement, HSG D
112,600	80	Weighted Average
112,546		99.95% Pervious Area
54		0.05% Impervious Area
54		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0428	0.11		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.29"
6.1	521	0.0416	1.43		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.2	51	0.0277	3.86	17.37	**Trap/Vee/Rect Channel Flow, CD** Bot.W=4.00' D=0.50' Z= 10.0 '/' Top.W=14.00' n= 0.030 Earth, grassed & winding
21.9	672	Total			

Subcatchment SE: South East



Summary for Subcatchment W: West

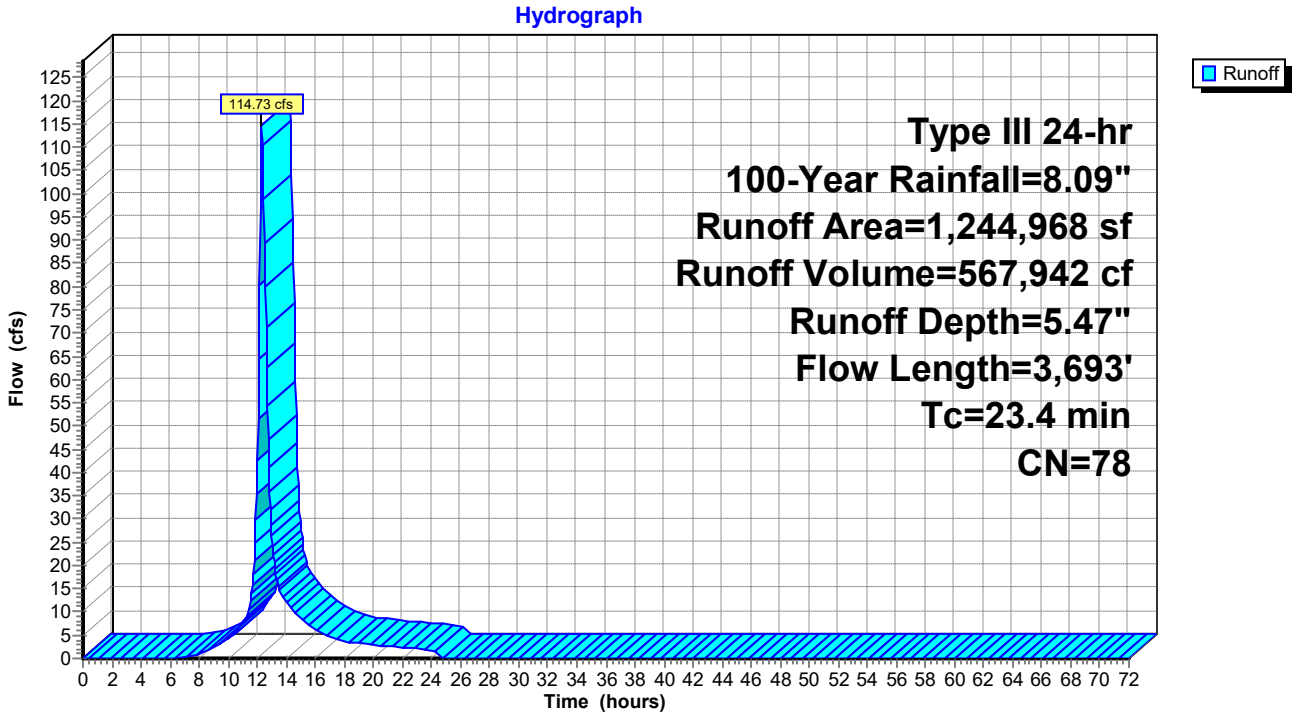
Runoff = 114.73 cfs @ 12.32 hrs, Volume= 567,942 cf, Depth= 5.47"
Routed to Reach DP-W : Watts Stream

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.09"

Area (sf)	CN	Description
236,639	74	Pasture/grassland/range, Good, HSG C
396,169	80	Pasture/grassland/range, Good, HSG D
40,930	70	Woods, Good, HSG C
521,429	77	Woods, Good, HSG D
41,310	96	Gravel surface, HSG C
1,146	96	Gravel surface, HSG D
6,801	98	Unconnected pavement, HSG C
544	98	Unconnected pavement, HSG D
1,244,968	78	Weighted Average
1,237,623		99.41% Pervious Area
7,345		0.59% Impervious Area
7,345		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	15	0.0814	0.09		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.29"
4.8	85	0.0623	0.29		**Sheet Flow, BC** Range n= 0.130 P2= 3.29"
5.9	685	0.0763	1.93		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.1	75	0.0926	10.68	128.14	**Trap/Vee/Rect Channel Flow, DE** Bot.W=4.00' D=1.00' Z= 8.0 '/' Top.W=20.00' n= 0.030 Earth, grassed & winding
1.1	187	0.1510	2.72		**Shallow Concentrated Flow, EF** Short Grass Pasture Kv= 7.0 fps
1.7	174	0.1201	1.73		**Shallow Concentrated Flow, FG** Woodland Kv= 5.0 fps
3.1	214	0.0525	1.15		**Shallow Concentrated Flow, GH** Woodland Kv= 5.0 fps
0.6	73	0.1513	1.94		**Shallow Concentrated Flow, HI** Woodland Kv= 5.0 fps
0.9	49	0.0338	0.92		**Shallow Concentrated Flow, IJ** Woodland Kv= 5.0 fps
2.6	2,136	0.0318	13.70	945.01	**Trap/Vee/Rect Channel Flow, JK** Bot.W=11.00' D=3.00' Z= 4.0 '/' Top.W=35.00' n= 0.030 Earth, grassed & winding
23.4	3,693	Total			

Subcatchment W: West



Summary for Reach 1P: 15" CPP

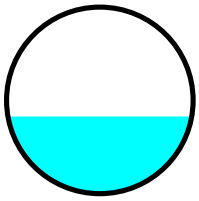
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 69,949 sf, 0.06% Impervious, Inflow Depth = 5.12" for 100-Year event
Inflow = 7.09 cfs @ 12.22 hrs, Volume= 29,862 cf
Outflow = 7.09 cfs @ 12.22 hrs, Volume= 29,862 cf, Atten= 0%, Lag= 0.1 min
Routed to Link 1L : Lag

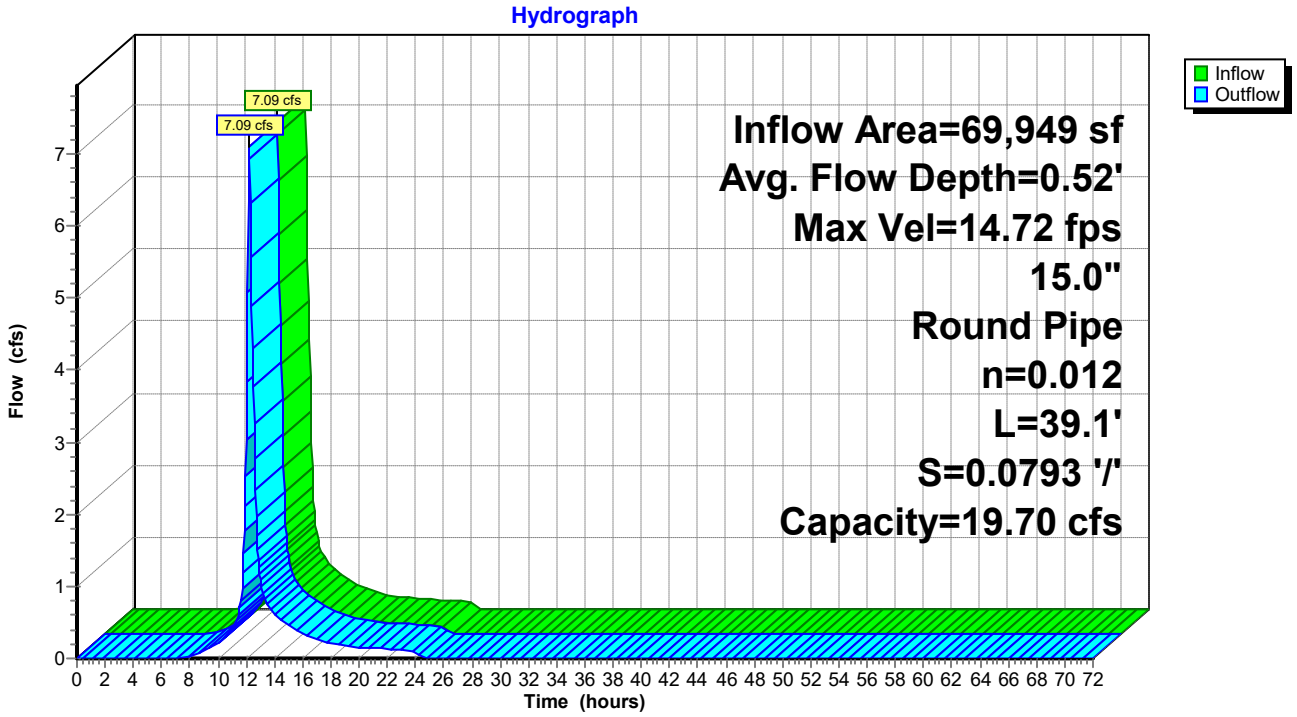
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 14.72 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 5.50 fps, Avg. Travel Time= 0.1 min

Peak Storage= 19 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.52' , Surface Width= 1.23'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 19.70 cfs

15.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 39.1' Slope= 0.0793 '/'
Inlet Invert= 1,668.60', Outlet Invert= 1,665.50'



Reach 1P: 15" CPP



Summary for Reach 2.5P: New 12" CPP

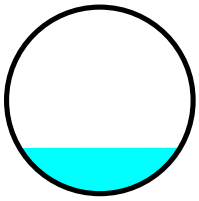
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 8,608 sf, 23.05% Impervious, Inflow Depth = 5.05" for 100-Year event
Inflow = 1.22 cfs @ 12.17 hrs, Volume= 3,619 cf
Outflow = 1.22 cfs @ 12.17 hrs, Volume= 3,621 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 8L : Lag

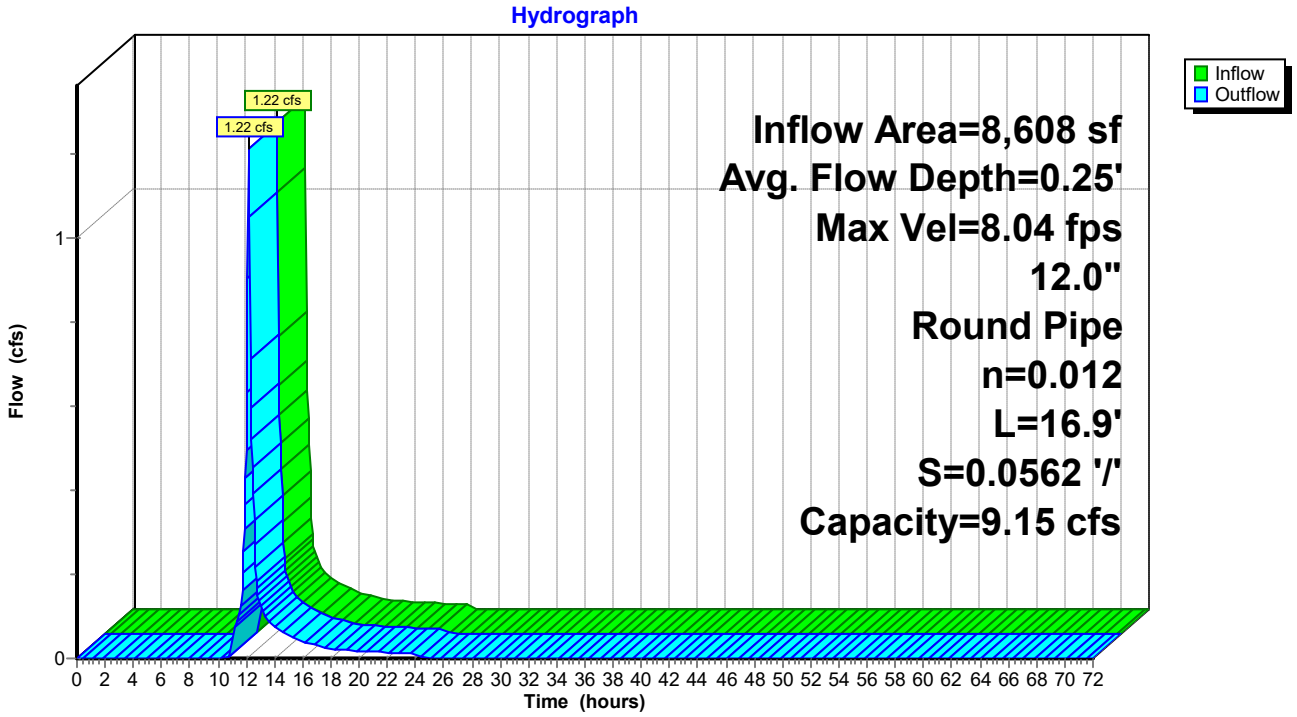
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 8.04 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.97 fps, Avg. Travel Time= 0.1 min

Peak Storage= 3 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.25' , Surface Width= 0.86'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 9.15 cfs

12.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 16.9' Slope= 0.0562 '/'
Inlet Invert= 1,672.13', Outlet Invert= 1,671.18'



Reach 2.5P: New 12" CPP



Summary for Reach 2P: 15" CPP

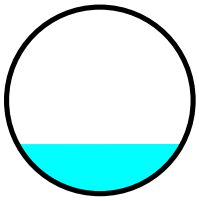
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 21,917 sf, 0.10% Impervious, Inflow Depth = 5.01" for 100-Year event
Inflow = 2.68 cfs @ 12.12 hrs, Volume= 9,143 cf
Outflow = 2.67 cfs @ 12.12 hrs, Volume= 9,143 cf, Atten= 0%, Lag= 0.1 min
Routed to Link 2L : Lag

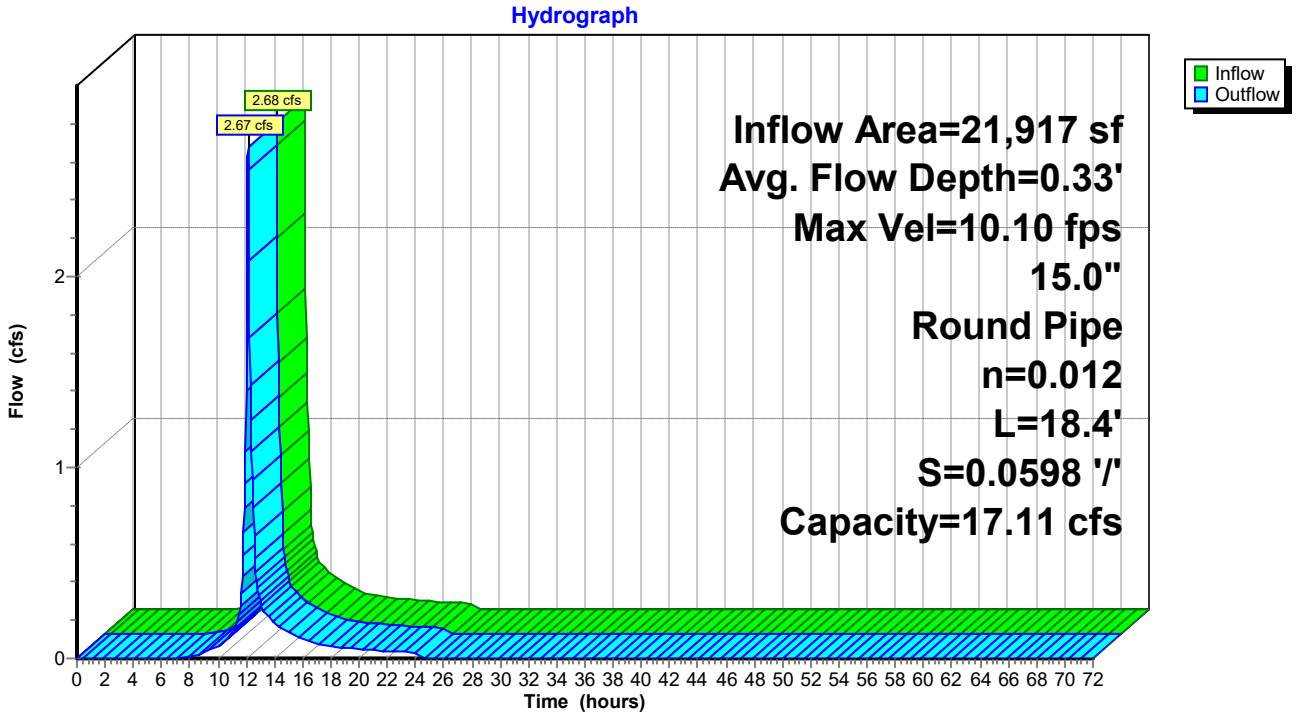
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 10.10 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 3.57 fps, Avg. Travel Time= 0.1 min

Peak Storage= 5 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.33' , Surface Width= 1.11'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 17.11 cfs

15.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 18.4' Slope= 0.0598 '/'
Inlet Invert= 1,669.70', Outlet Invert= 1,668.60'



Reach 2P: 15" CPP



Summary for Reach 3P: 15" CPP

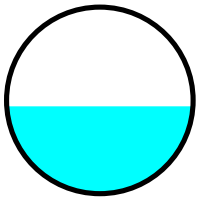
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 53,623 sf, 0.08% Impervious, Inflow Depth = 5.59" for 100-Year event
Inflow = 5.88 cfs @ 12.22 hrs, Volume= 24,987 cf
Outflow = 5.88 cfs @ 12.22 hrs, Volume= 24,987 cf, Atten= 0%, Lag= 0.0 min
Routed to Link FS2 : Filter Strip

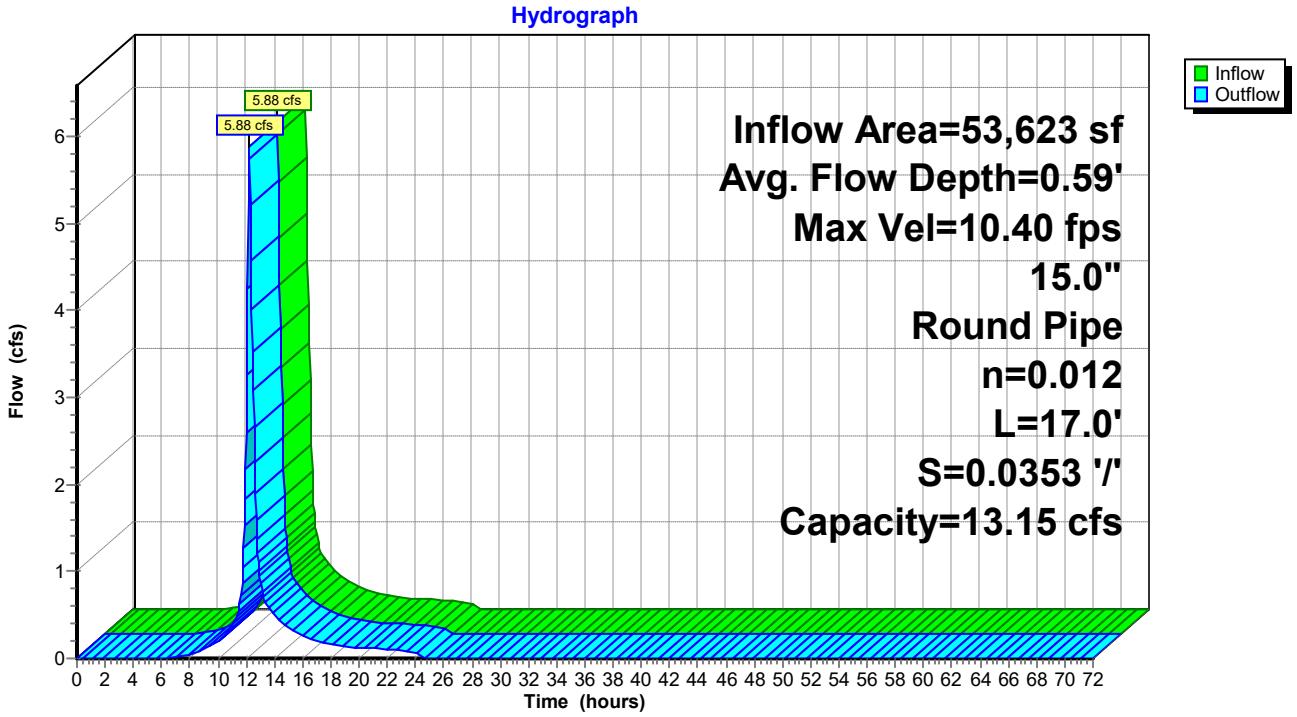
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 10.40 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 3.83 fps, Avg. Travel Time= 0.1 min

Peak Storage= 10 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.59' , Surface Width= 1.25'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 13.15 cfs

15.0" Round Pipe
n= 0.012 Corrugated PP, smooth interior
Length= 17.0' Slope= 0.0353 '/'
Inlet Invert= 1,666.50', Outlet Invert= 1,665.90'



Reach 3P: 15" CPP



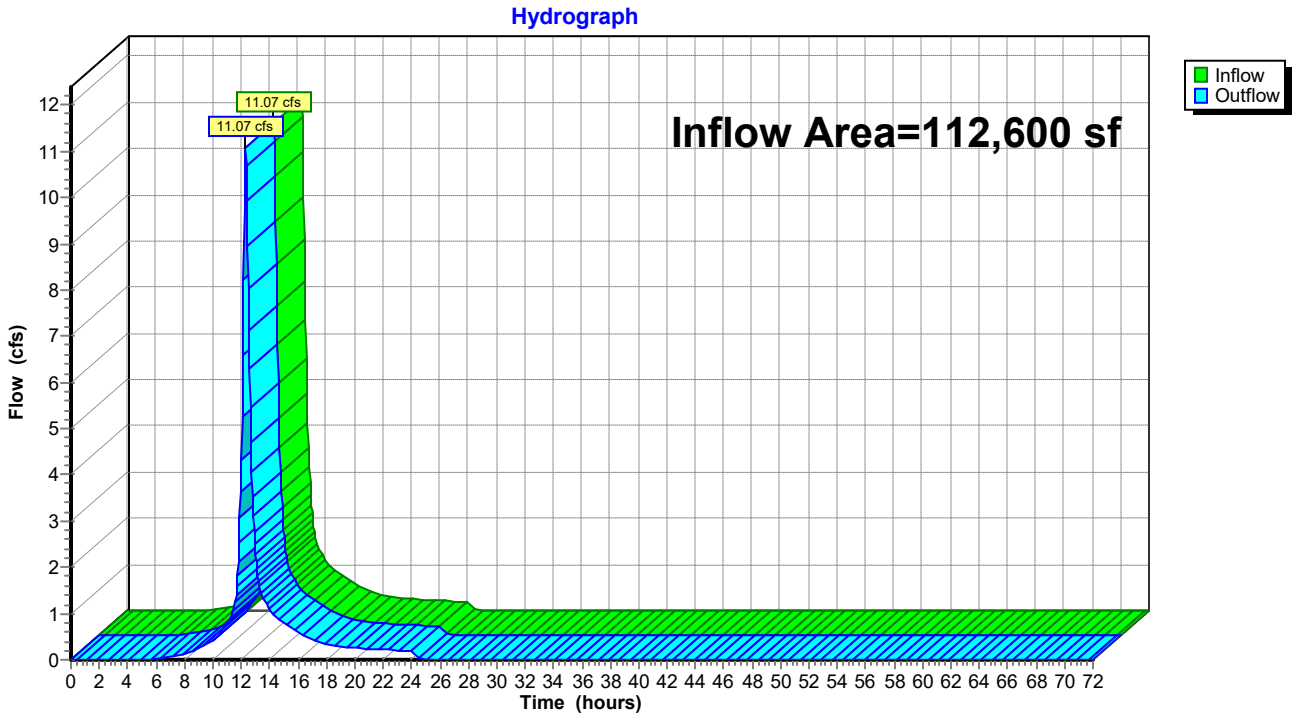
Summary for Reach 5P: Unknown

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 112,600 sf, 0.05% Impervious, Inflow Depth = 5.71" for 100-Year event
Inflow = 11.07 cfs @ 12.30 hrs, Volume= 53,573 cf
Outflow = 11.07 cfs @ 12.30 hrs, Volume= 53,573 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 5L : Lag

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach 5P: Unknown



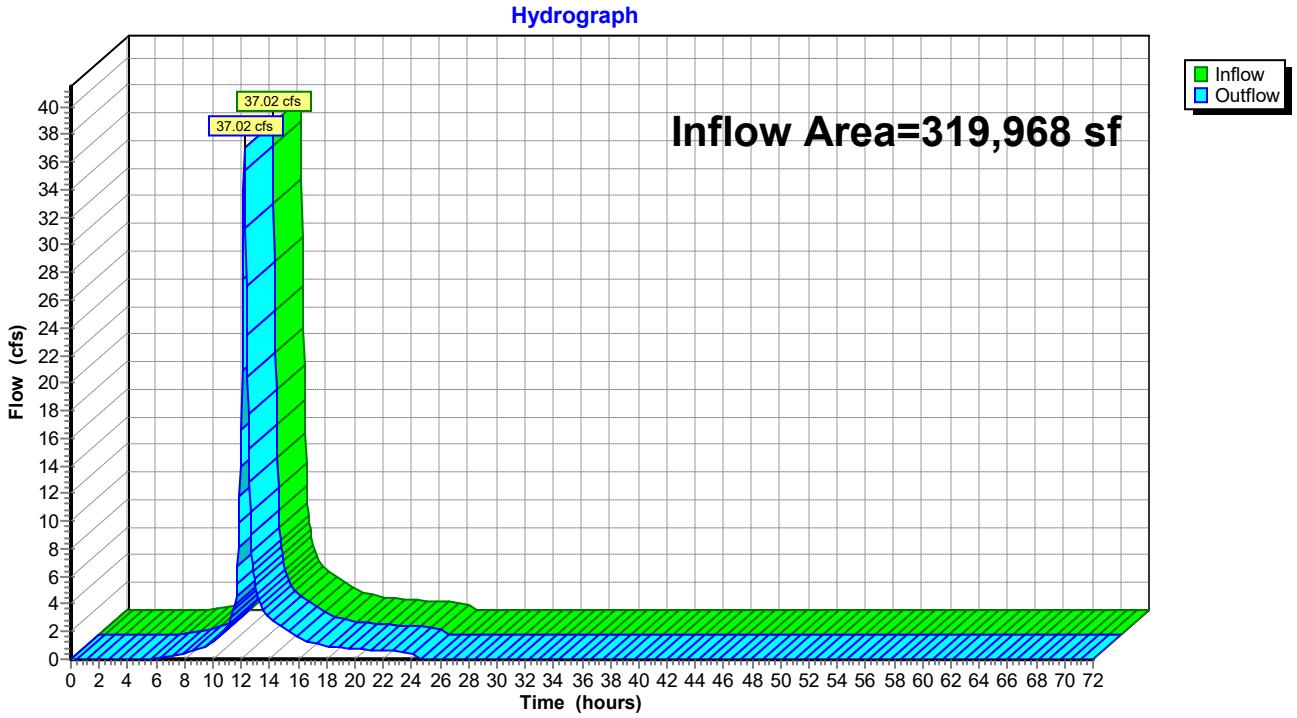
Summary for Reach DP-E: Culvert towards Wades Stream

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 319,968 sf, 0.06% Impervious, Inflow Depth = 5.71" for 100-Year event
Inflow = 37.02 cfs @ 12.21 hrs, Volume= 152,236 cf
Outflow = 37.02 cfs @ 12.21 hrs, Volume= 152,236 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP-E: Culvert towards Wades Stream



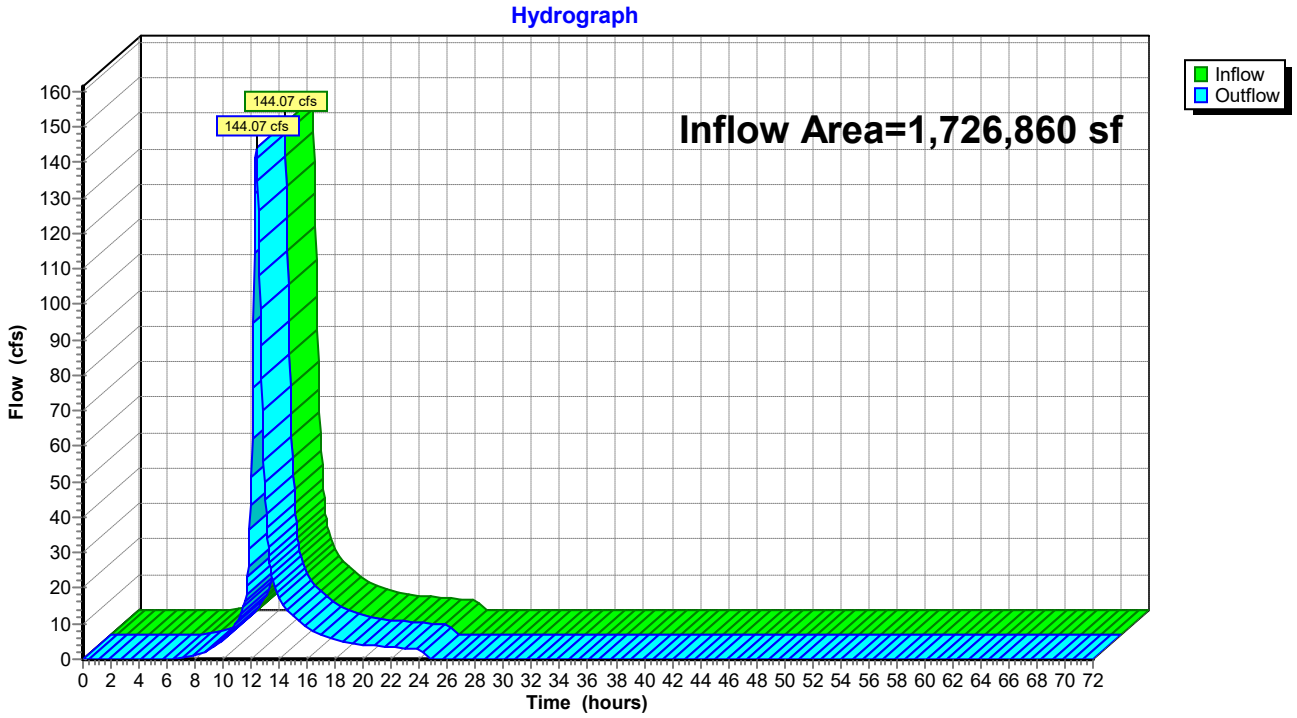
Summary for Reach DP-W: Watts Stream

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,726,860 sf, 0.56% Impervious, Inflow Depth = 5.48" for 100-Year event
Inflow = 144.07 cfs @ 12.35 hrs, Volume= 788,882 cf
Outflow = 144.07 cfs @ 12.35 hrs, Volume= 788,882 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP-W: Watts Stream



Summary for Pond 4P: 15" CPP

Inflow Area = 201,890 sf, 0.06% Impervious, Inflow Depth = 5.71" for 100-Year event
Inflow = 17.58 cfs @ 12.39 hrs, Volume= 96,056 cf
Outflow = 17.58 cfs @ 12.39 hrs, Volume= 96,101 cf, Atten= 0%, Lag= 0.0 min
Primary = 17.58 cfs @ 12.39 hrs, Volume= 96,101 cf
Routed to Link FS3 : Filter Strip

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1,662.87' @ 12.39 hrs Surf.Area= 101 sf Storage= 96 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (823.7 - 823.7)

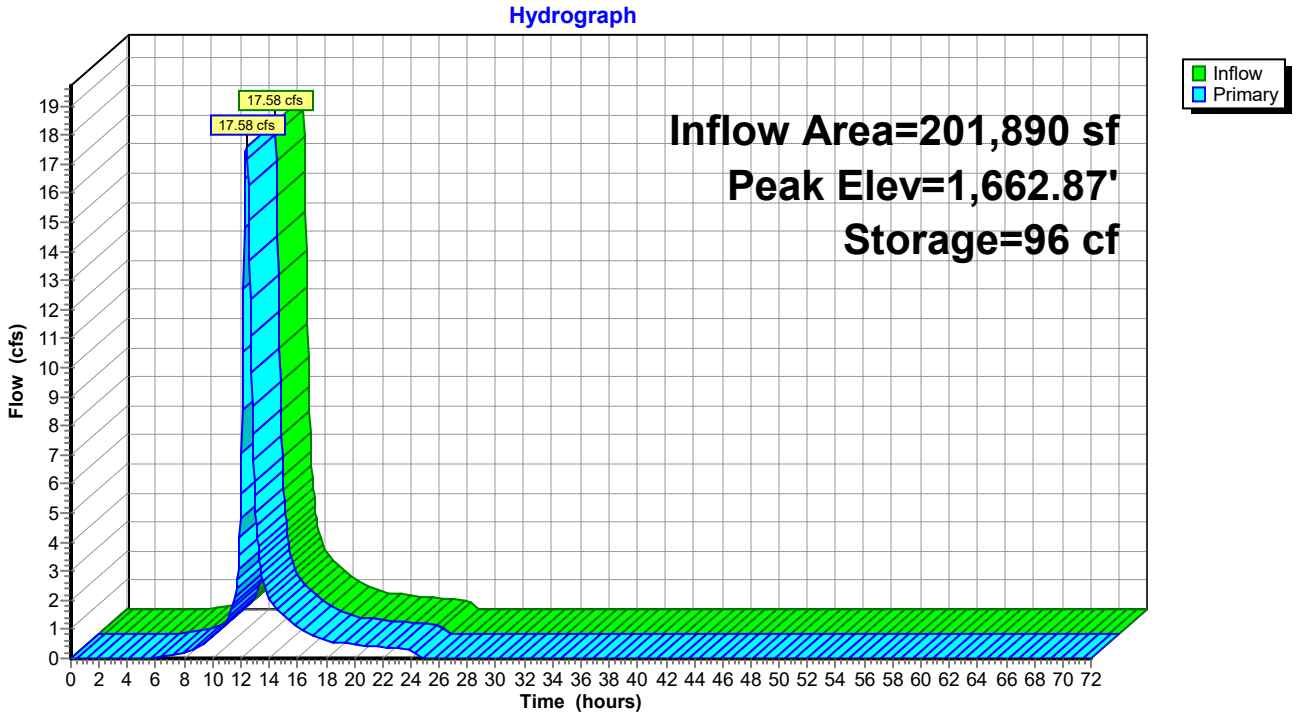
Volume	Invert	Avail.Storage	Storage Description
#1	1,660.30'	490 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
1,660.30	1	3.9	0	0	1
1,663.00	110	67.9	109	109	379
1,664.00	745	151.8	380	490	1,850

Device	Routing	Invert	Outlet Devices
#1	Primary	1,660.30'	**15.0" Round Culvert** L= 16.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1,660.30' / 1,659.80' S= 0.0305 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf
#2	Primary	1,662.50'	**8.0' long + 35.0 '/' SideZ x 13.0' 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) 2.60 2.64 2.70 2.66 2.65 2.66 2.65 2.63

Primary OutFlow Max=17.50 cfs @ 12.39 hrs HW=1,662.87' (Free Discharge)
1=Culvert (Inlet Controls 6.51 cfs @ 5.30 fps)
2=Broad-Crested Rectangular Weir (Weir Controls 11.00 cfs @ 1.41 fps)

Pond 4P: 15" CPP



Summary for Pond IT1: Infiltration

Inflow Area = 8,608 sf, 23.05% Impervious, Inflow Depth = 5.71" for 100-Year event
Inflow = 1.23 cfs @ 12.12 hrs, Volume= 4,096 cf
Outflow = 1.22 cfs @ 12.12 hrs, Volume= 3,951 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 12.12 hrs, Volume= 332 cf
Primary = 1.22 cfs @ 12.12 hrs, Volume= 3,619 cf
Routed to Link 7L : Lag

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1,674.53' @ 12.12 hrs Surf.Area= 438 sf Storage= 379 cf

Plug-Flow detention time= 145.4 min calculated for 3,951 cf (96% of inflow)
Center-of-Mass det. time= 124.9 min (929.5 - 804.6)

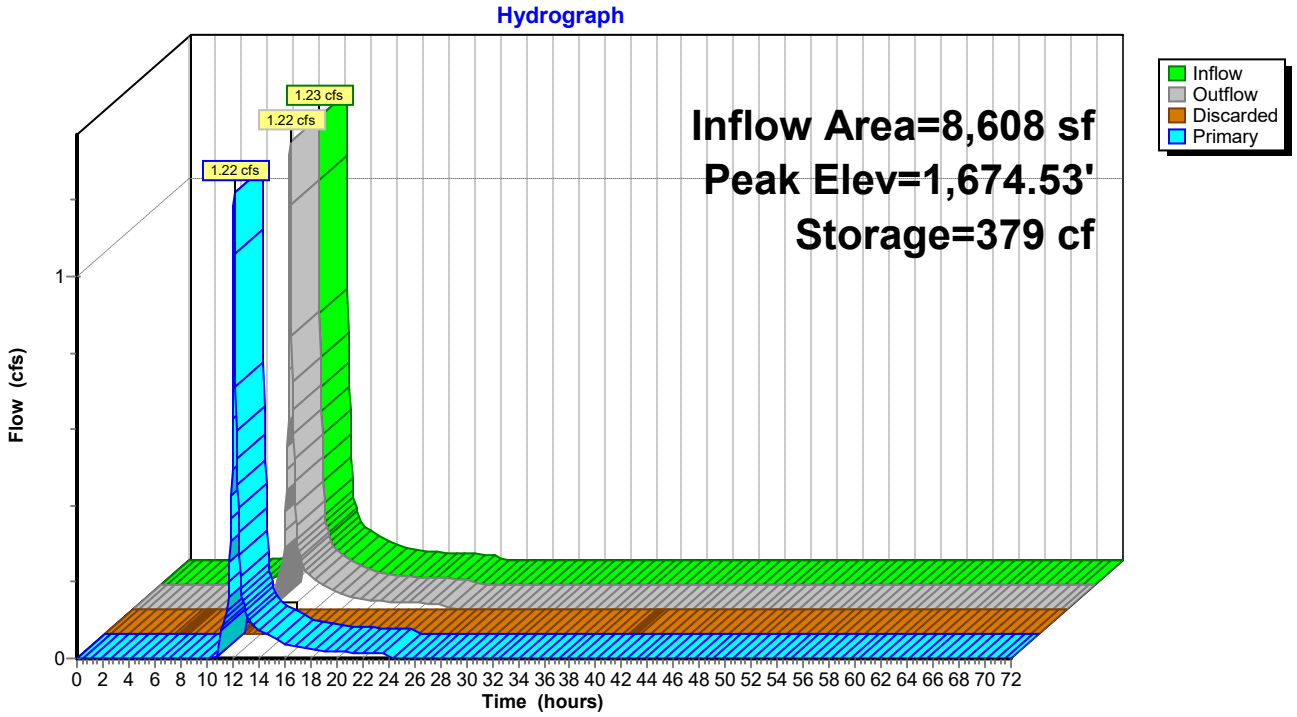
Volume	Invert	Avail.Storage	Storage Description
#1	1,671.00'	263 cf	**3.00'W x 73.00'L x 3.00'H Prismatoid** 657 cf Overall x 40.0% Voids
#2	1,674.00'	219 cf	**3.00'W x 73.00'L x 1.00'H Overflow Storage**
		482 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,671.00'	**0.170 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,654.00'
#2	Primary	1,674.50'	**73.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.00 cfs @ 12.12 hrs HW=1,674.53' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=1.06 cfs @ 12.12 hrs HW=1,674.53' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 1.06 cfs @ 0.47 fps)

Pond IT1: Infiltration



Summary for Pond IT2: Infiltration

Inflow Area = 60,319 sf, 0.07% Impervious, Inflow Depth = 5.70" for 100-Year event
Inflow = 6.41 cfs @ 12.24 hrs, Volume= 28,635 cf
Outflow = 6.39 cfs @ 12.24 hrs, Volume= 27,823 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.01 cfs @ 12.24 hrs, Volume= 997 cf
Primary = 6.39 cfs @ 12.24 hrs, Volume= 26,825 cf
Routed to Link 3L : Lag

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1,664.58' @ 12.24 hrs Surf.Area= 1,200 sf Storage= 1,549 cf

Plug-Flow detention time= 73.4 min calculated for 27,803 cf (97% of inflow)
Center-of-Mass det. time= 58.7 min (870.9 - 812.3)

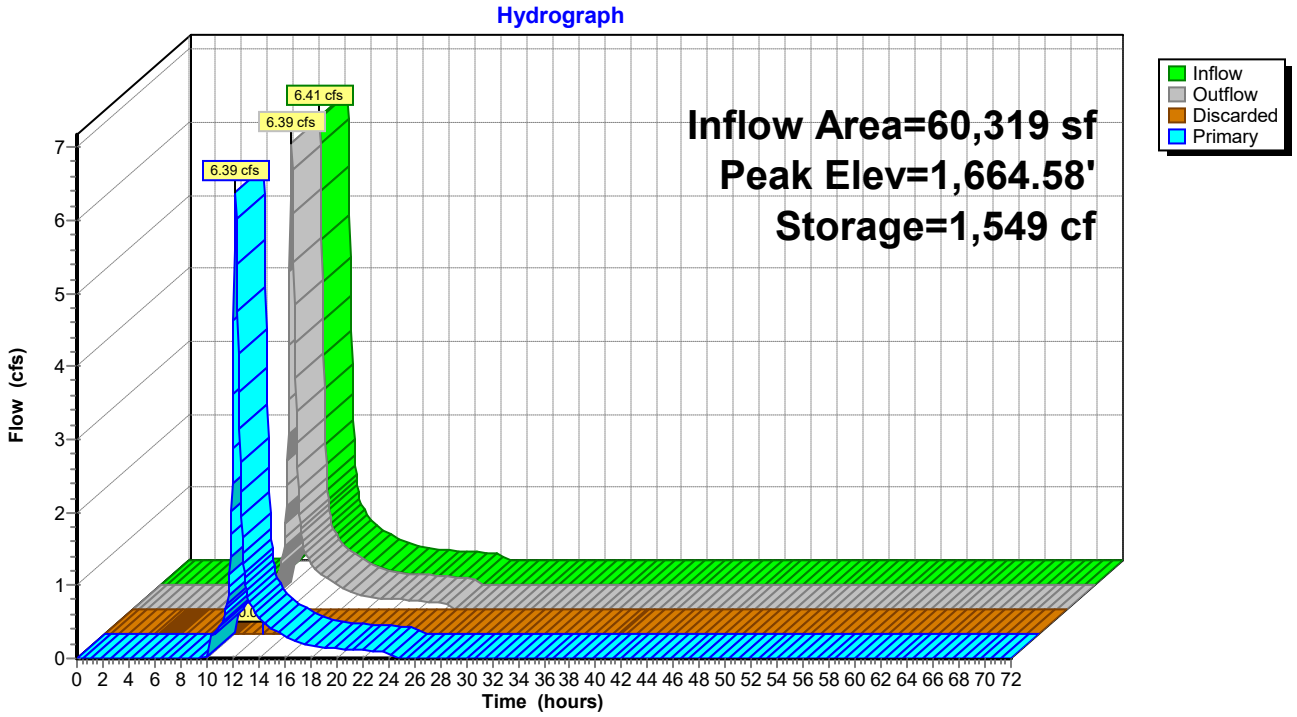
Volume	Invert	Avail.Storage	Storage Description
#1	1,659.00'	1,200 cf	**6.00'W x 100.00'L x 5.00'H Prismatoid** 3,000 cf Overall x 40.0% Voids
#2	1,664.00'	600 cf	**6.00'W x 100.00'L x 1.00'H Overflow Storage**
		1,800 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,659.00'	**0.170 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,644.00'
#2	Primary	1,664.50'	**100.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.01 cfs @ 12.24 hrs HW=1,664.58' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=6.31 cfs @ 12.24 hrs HW=1,664.58' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 6.31 cfs @ 0.77 fps)

Pond IT2: Infiltration



Summary for Pond IT3: Infiltration

Inflow Area = 208,499 sf, 0.06% Impervious, Inflow Depth = 5.74" for 100-Year event
Inflow = 17.88 cfs @ 12.42 hrs, Volume= 99,766 cf
Outflow = 17.86 cfs @ 12.42 hrs, Volume= 98,938 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.01 cfs @ 12.42 hrs, Volume= 1,022 cf
Primary = 17.85 cfs @ 12.42 hrs, Volume= 97,915 cf
Routed to Link 4L : Lag

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1,660.66' @ 12.42 hrs Surf.Area= 1,200 sf Storage= 1,598 cf

Plug-Flow detention time= 21.1 min calculated for 98,869 cf (99% of inflow)
Center-of-Mass det. time= 17.8 min (841.9 - 824.1)

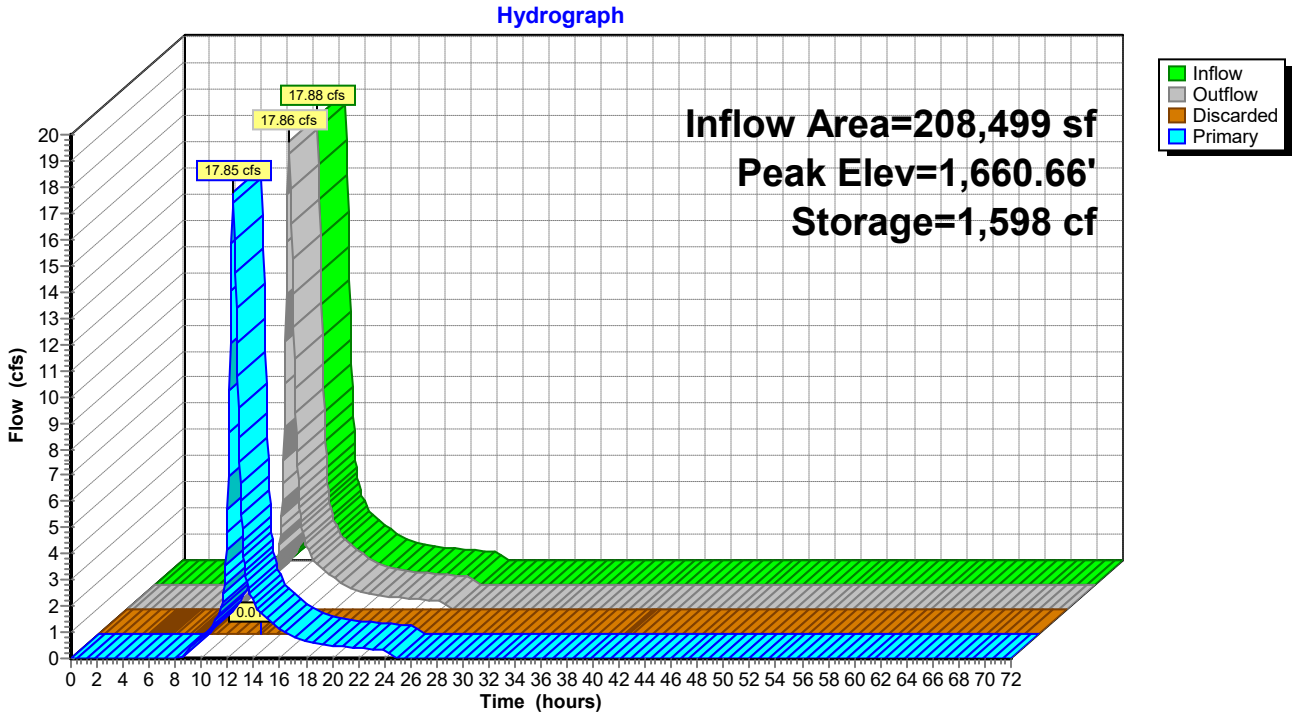
Volume	Invert	Avail.Storage	Storage Description
#1	1,655.00'	1,200 cf	**6.00'W x 100.00'L x 5.00'H Prismatoid** 3,000 cf Overall x 40.0% Voids
#2	1,660.00'	600 cf	**6.00'W x 100.00'L x 1.00'H Overflow Storage**
		1,800 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,655.00'	**0.170 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,640.00'
#2	Primary	1,660.50'	**100.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.01 cfs @ 12.42 hrs HW=1,660.66' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=17.56 cfs @ 12.42 hrs HW=1,660.66' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 17.56 cfs @ 1.08 fps)

Pond IT3: Infiltration

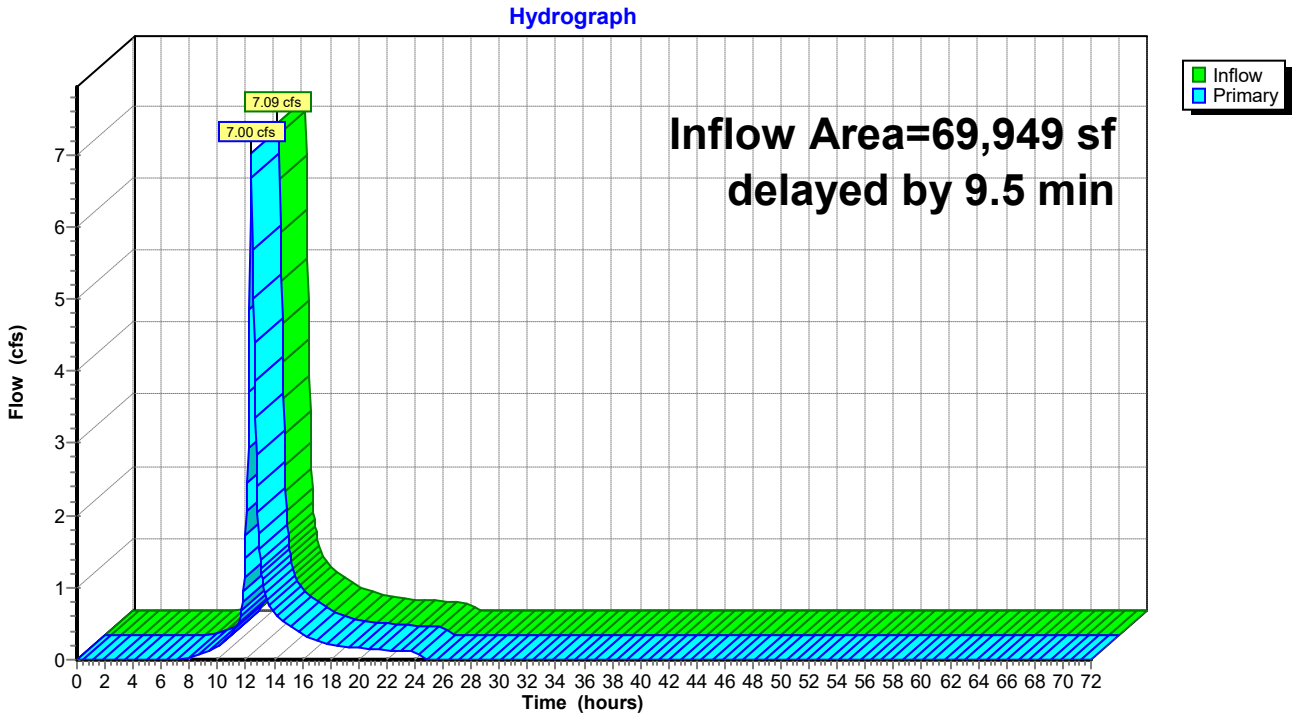


Summary for Link 1L: Lag

Inflow Area = 69,949 sf, 0.06% Impervious, Inflow Depth = 5.12" for 100-Year event
Inflow = 7.09 cfs @ 12.22 hrs, Volume= 29,862 cf
Primary = 7.00 cfs @ 12.38 hrs, Volume= 29,862 cf, Atten= 1%, Lag= 9.5 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 9.5 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: Lag

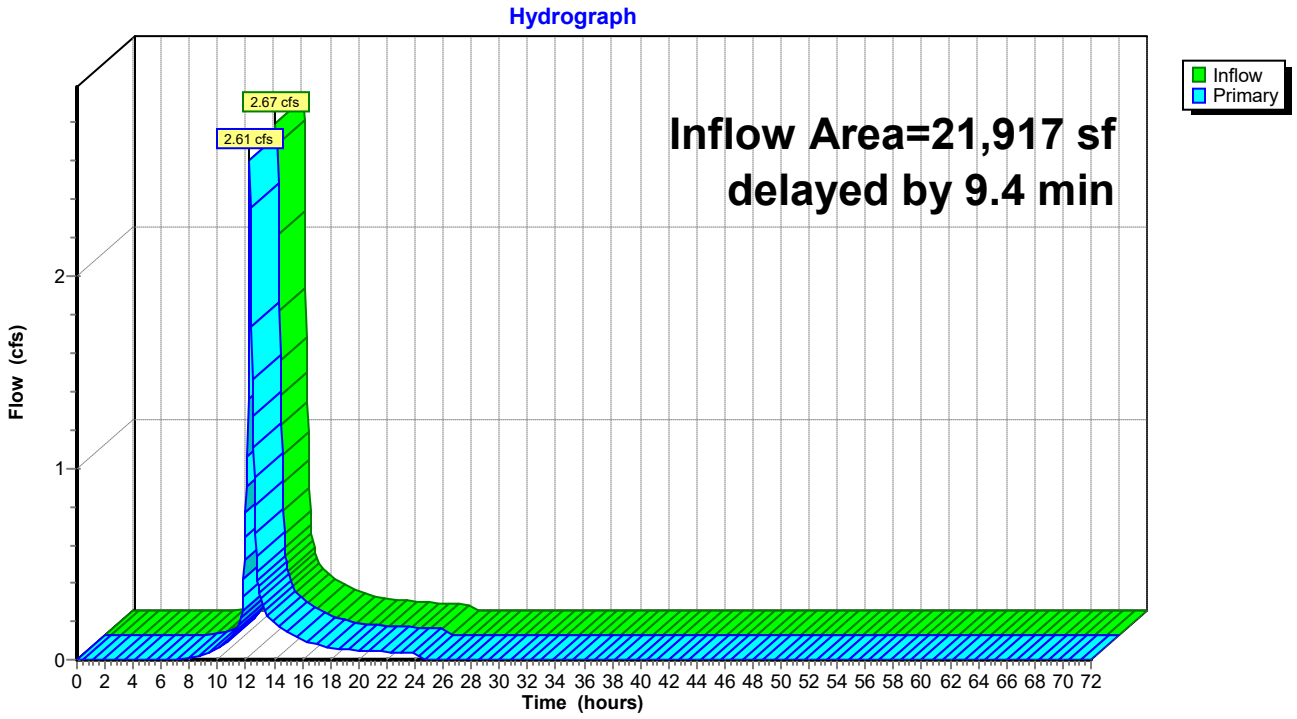


Summary for Link 2L: Lag

Inflow Area = 21,917 sf, 0.10% Impervious, Inflow Depth = 5.01" for 100-Year event
Inflow = 2.67 cfs @ 12.12 hrs, Volume= 9,143 cf
Primary = 2.61 cfs @ 12.28 hrs, Volume= 9,143 cf, Atten= 2%, Lag= 9.4 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 9.4 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 2L: Lag

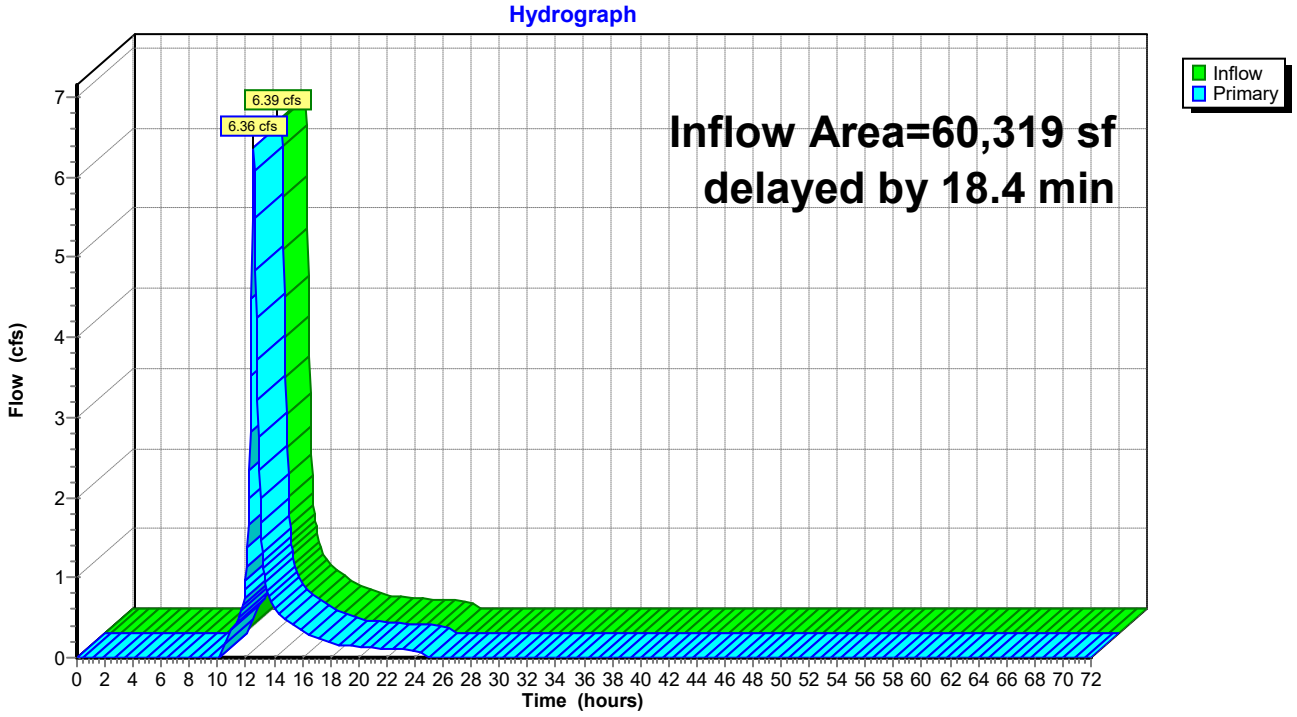


Summary for Link 3L: Lag

Inflow Area = 60,319 sf, 0.07% Impervious, Inflow Depth = 5.34" for 100-Year event
Inflow = 6.39 cfs @ 12.24 hrs, Volume= 26,825 cf
Primary = 6.36 cfs @ 12.55 hrs, Volume= 26,825 cf, Atten= 0%, Lag= 18.4 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 18.4 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 3L: Lag

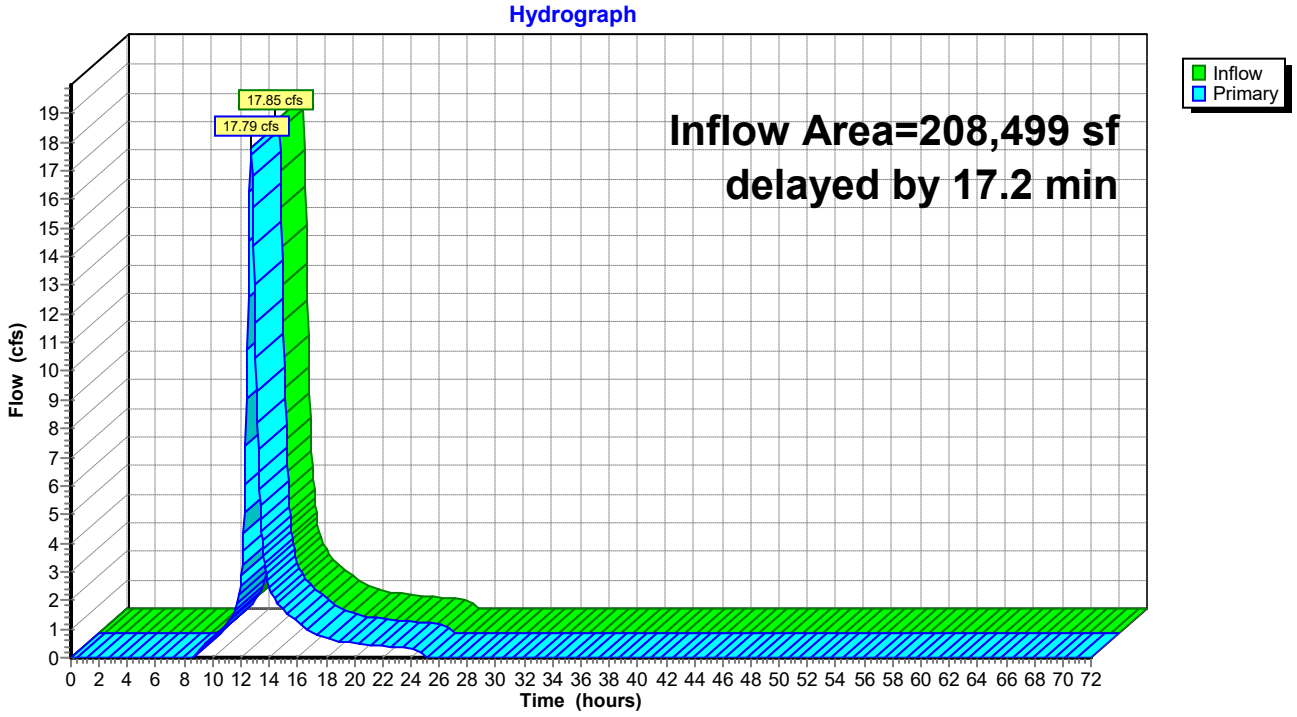


Summary for Link 4L: Lag

Inflow Area = 208,499 sf, 0.06% Impervious, Inflow Depth = 5.64" for 100-Year event
Inflow = 17.85 cfs @ 12.42 hrs, Volume= 97,915 cf
Primary = 17.79 cfs @ 12.71 hrs, Volume= 97,915 cf, Atten= 0%, Lag= 17.3 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 17.2 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 4L: Lag

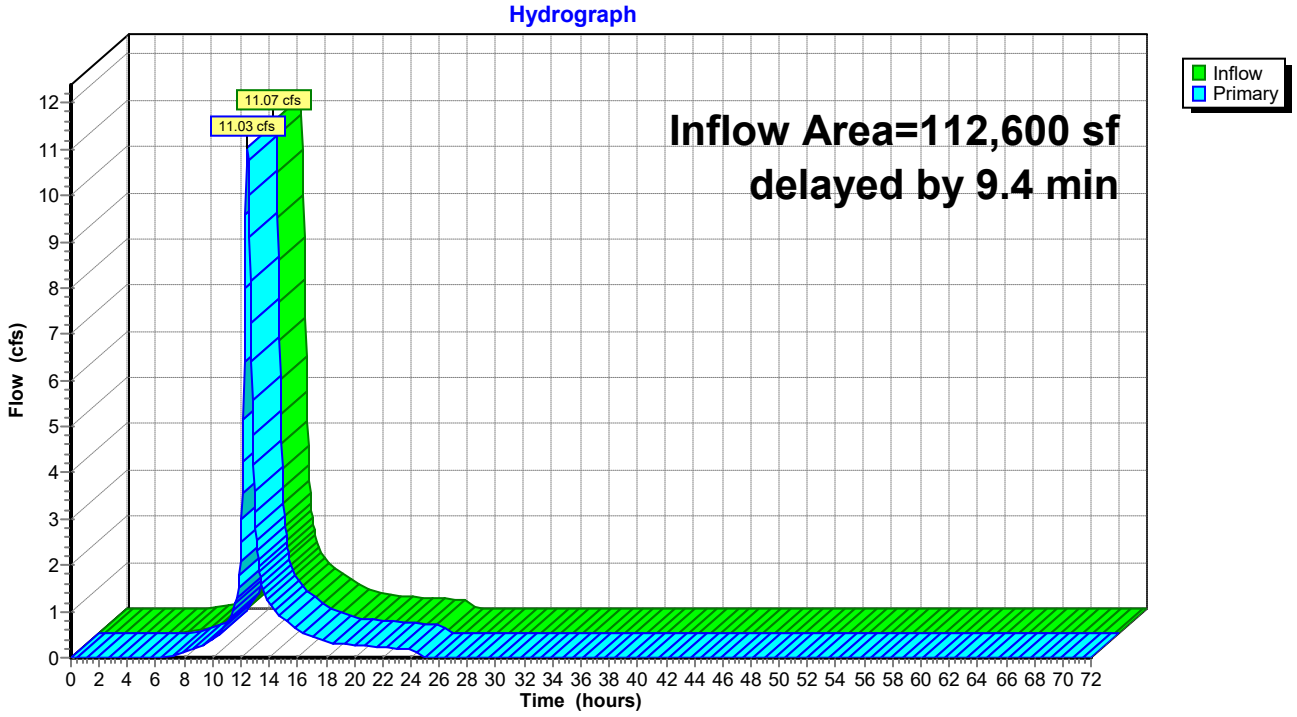


Summary for Link 5L: Lag

Inflow Area = 112,600 sf, 0.05% Impervious, Inflow Depth = 5.71" for 100-Year event
Inflow = 11.07 cfs @ 12.30 hrs, Volume= 53,573 cf
Primary = 11.03 cfs @ 12.45 hrs, Volume= 53,573 cf, Atten= 0%, Lag= 9.4 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 9.4 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 5L: Lag

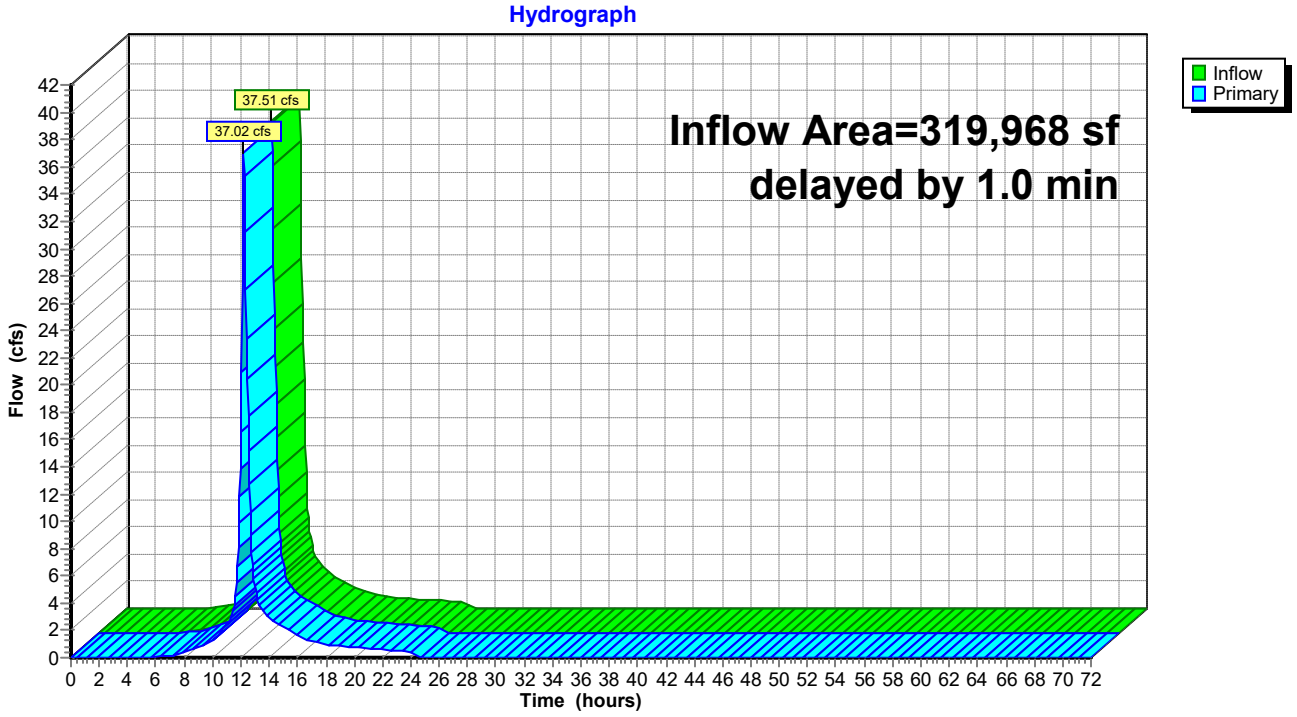


Summary for Link 6L: Lag

Inflow Area = 319,968 sf, 0.06% Impervious, Inflow Depth = 5.71" for 100-Year event
Inflow = 37.51 cfs @ 12.19 hrs, Volume= 152,236 cf
Primary = 37.02 cfs @ 12.21 hrs, Volume= 152,236 cf, Atten= 1%, Lag= 1.0 min
Routed to Reach DP-E : Culvert towards Wades Stream

Primary outflow = Inflow delayed by 1.0 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 6L: Lag

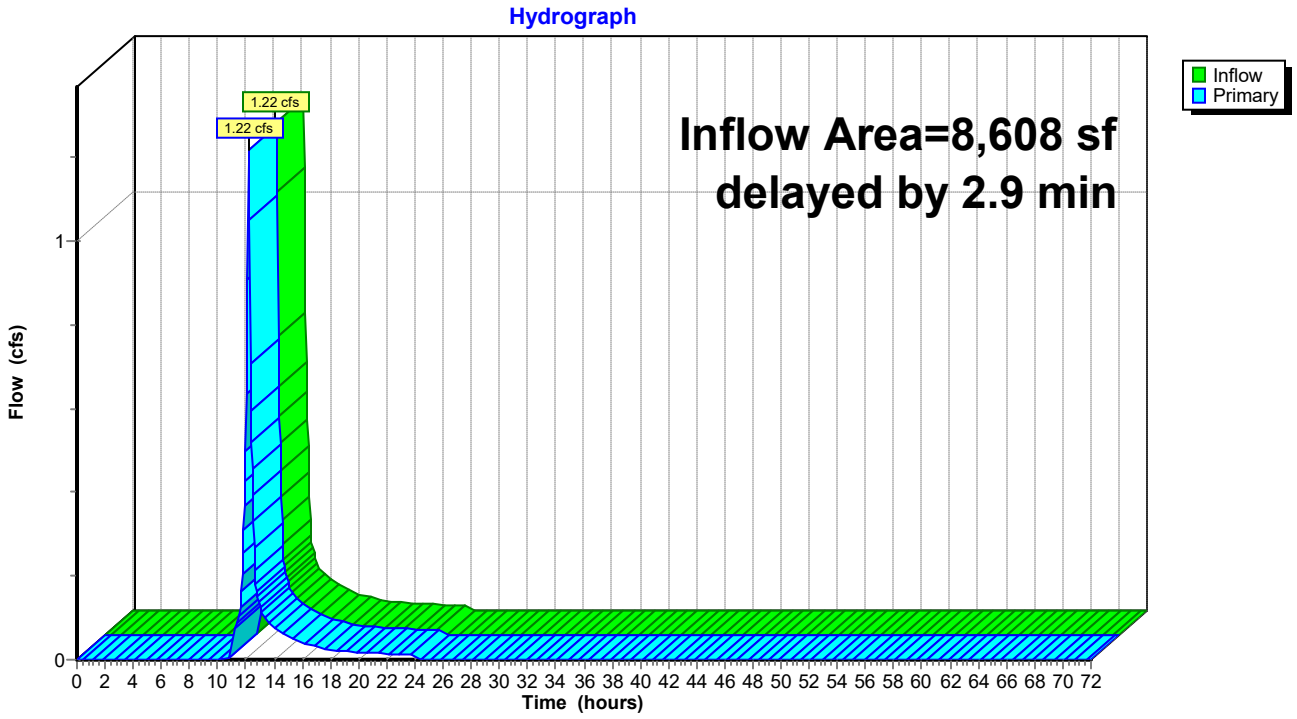


Summary for Link 7L: Lag

Inflow Area = 8,608 sf, 23.05% Impervious, Inflow Depth = 5.05" for 100-Year event
Inflow = 1.22 cfs @ 12.12 hrs, Volume= 3,619 cf
Primary = 1.22 cfs @ 12.17 hrs, Volume= 3,619 cf, Atten= 0%, Lag= 2.9 min
Routed to Reach 2.5P : New 12" CPP

Primary outflow = Inflow delayed by 2.9 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 7L: Lag

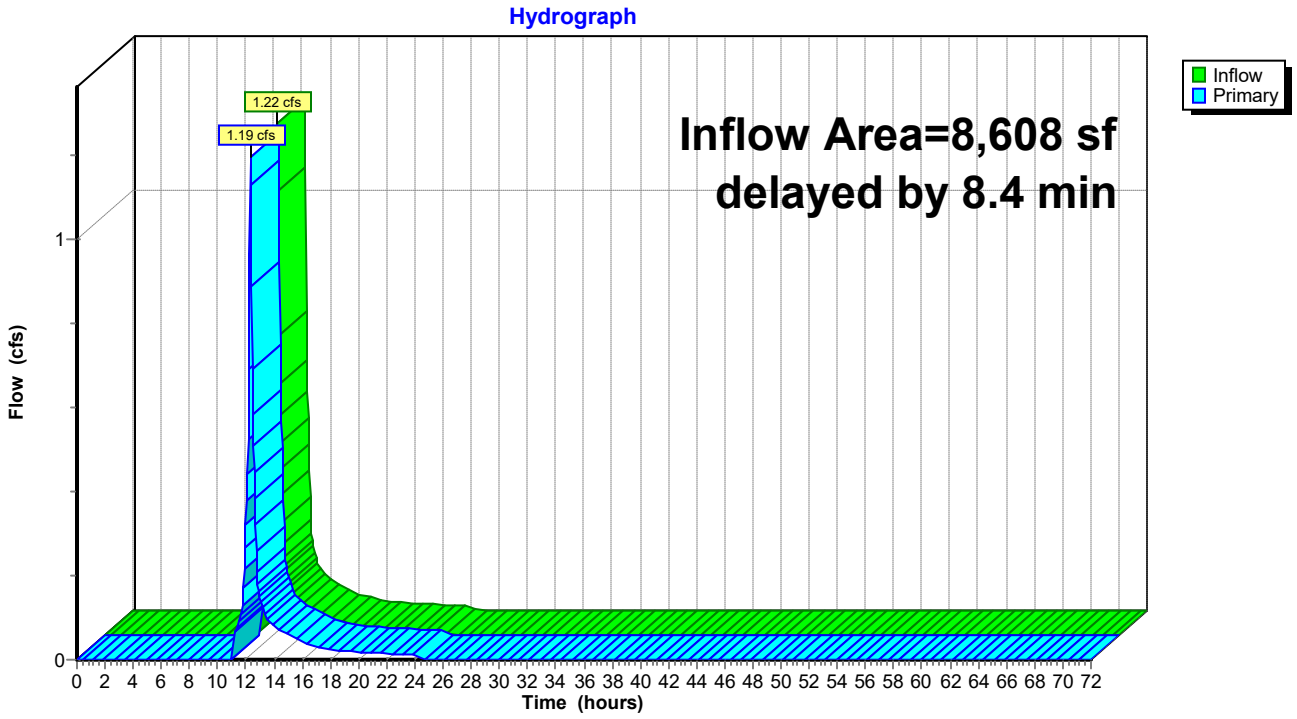


Summary for Link 8L: Lag

Inflow Area = 8,608 sf, 23.05% Impervious, Inflow Depth = 5.05" for 100-Year event
Inflow = 1.22 cfs @ 12.17 hrs, Volume= 3,621 cf
Primary = 1.19 cfs @ 12.32 hrs, Volume= 3,621 cf, Atten= 2%, Lag= 8.5 min
Routed to Reach DP-W : Watts Stream

Primary outflow = Inflow delayed by 8.4 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 8L: Lag

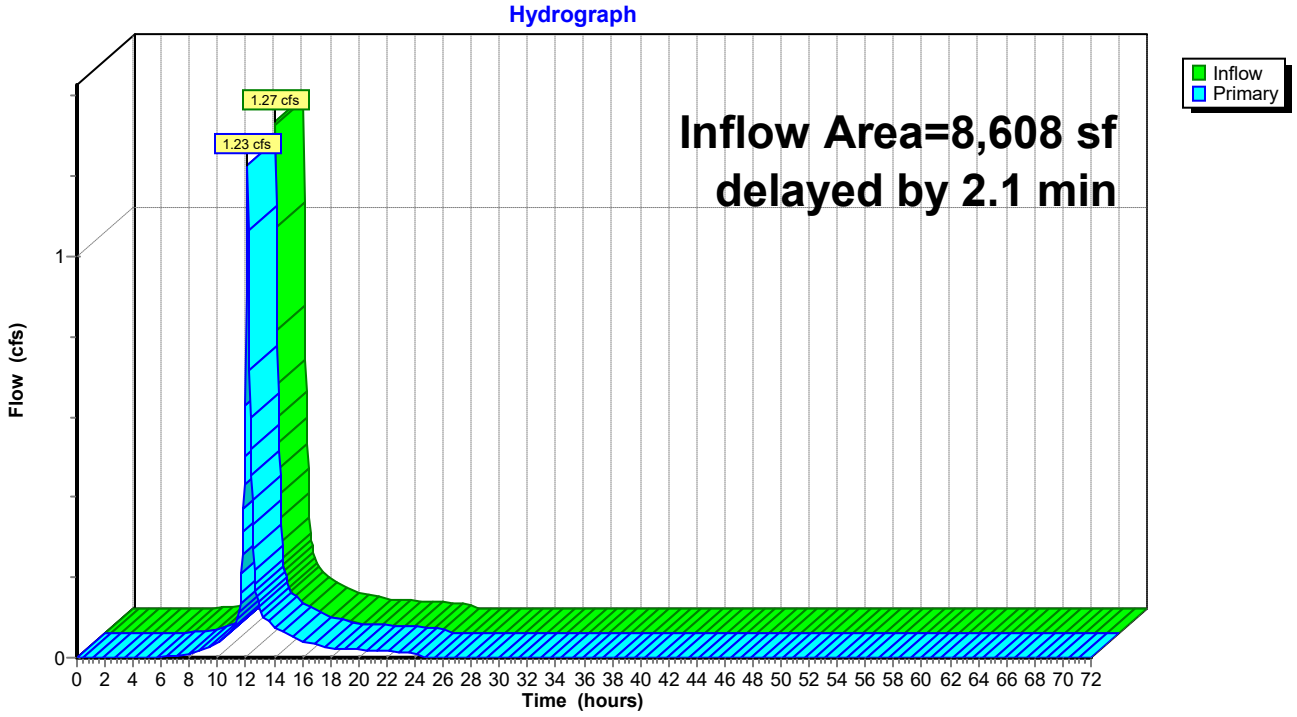


Summary for Link FS1: Filter Strip

Inflow Area = 8,608 sf, 23.05% Impervious, Inflow Depth = 5.71" for 100-Year event
Inflow = 1.27 cfs @ 12.09 hrs, Volume= 4,096 cf
Primary = 1.23 cfs @ 12.12 hrs, Volume= 4,096 cf, Atten= 4%, Lag= 2.1 min
Routed to Pond IT1 : Infiltration

Primary outflow = Inflow delayed by 2.1 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link FS1: Filter Strip

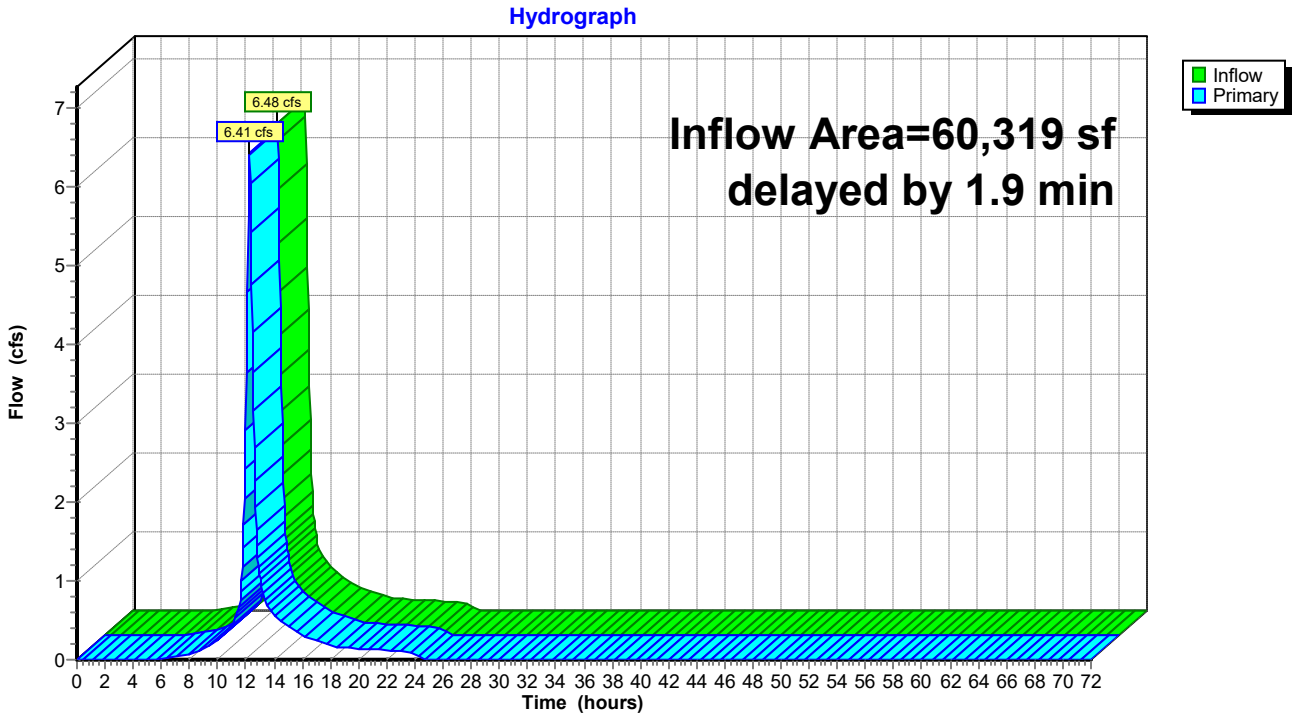


Summary for Link FS2: Filter Strip

Inflow Area = 60,319 sf, 0.07% Impervious, Inflow Depth = 5.70" for 100-Year event
Inflow = 6.48 cfs @ 12.21 hrs, Volume= 28,635 cf
Primary = 6.41 cfs @ 12.24 hrs, Volume= 28,635 cf, Atten= 1%, Lag= 2.0 min
Routed to Pond IT2 : Infiltration

Primary outflow = Inflow delayed by 1.9 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link FS2: Filter Strip

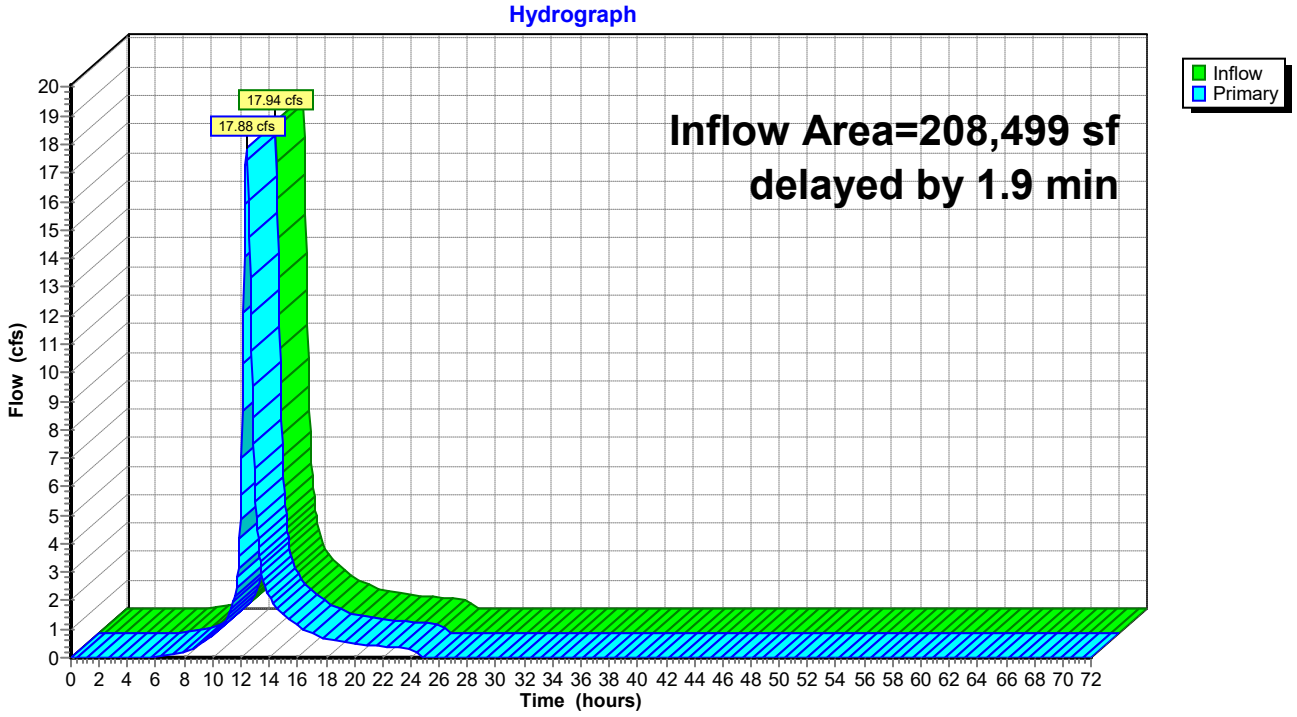


Summary for Link FS3: Filter Strip

Inflow Area = 208,499 sf, 0.06% Impervious, Inflow Depth = 5.74" for 100-Year event
Inflow = 17.94 cfs @ 12.39 hrs, Volume= 99,766 cf
Primary = 17.88 cfs @ 12.42 hrs, Volume= 99,766 cf, Atten= 0%, Lag= 2.0 min
Routed to Pond IT3 : Infiltration

Primary outflow = Inflow delayed by 1.9 min, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link FS3: Filter Strip



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