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April 30, 2024

DELIVERED BY E-MAIL

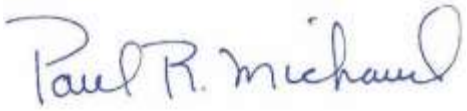
Melanie Bachman
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **PETITION NO. 1609** – TRITEC Americas, LLC notice of election to waive exclusion from Connecticut Siting Council jurisdiction, pursuant to Connecticut General Statutes §16-50k(e), and petition for a declaratory ruling, pursuant to Connecticut General Statutes §4-176 and §16-50k, for the proposed construction, maintenance and operation of a 0.999-megawatt AC solar photovoltaic electric generating facility located at 250 Carter Street, Manchester, Connecticut, and associated electrical interconnection. **Petitioner Pre-Filed Written Testimony.**

Dear Attorney Bachman:

On behalf of TRITEC Americas, LLC ("Petitioner"), please accept the enclosed pre-filed written testimonies. The list of exhibits and designated joint presenters for the public comment session have not changed since Petitioner's Pre-Hearing Submission on April 10, 2024; however, Petitioner replaced Davis Jolley, Vice President of Operations, TRITEC Americas, LLC with Howie Reed, Chief Operating Officer, TRITEC Americas, LLC. Mr. Reed's pre-filed written testimony addresses the same subject matter as that Davis Jolley was initially anticipated to address. Please feel free to contact me if you have any questions.

Very sincerely yours,



Paul R. Michaud

cc: Service List dated April 30, 2024

PREFILED WRITTEN TESTIMONY OF
HOWIE REED
TRITEC AMERICAS, LLC

A. INTRODUCTION

Q. Please state your name, title, and business address.

A. Howie Reed, Chief Operation Officer, 888 Prospect Street, Suite 200, La Jolla, California, 92037.

Q. Please describe your current responsibilities and professional experience.

A. I have spent the last decade designing and implementing best-in-class commercial and residential solar sales and project management platforms, including integrated CRM lead generation platforms, allowing for optimized customer acquisition and project management efficiencies. As a solar industry veteran, I have developed and sourced a commercial solar project pipeline of over two gigawatts. My background includes over 20 years of strategic business experience and extensive clean energy industry knowledge. I am responsible for managing Petitioner's sales and operations teams and overseeing and managing our channel partner relationships.

Q. What has been your involvement in the proposed Project?

A. I am Petitioner's Chief Operating Officer and responsible for the proposed Project's operational success.

Q. What is the purpose of your pre-filed written testimony?

A. The purpose of my pre-filed written testimony is to provide a high-level summary of:

1. TRITEC AMERICAS, LLC
2. CONNECTICUT SOLAR POLICY AND INCENTIVE PROGRAMS
3. CONNECTICUT'S CLEAN ENERGY GOALS
4. NRES AUCTION
5. PROJECT BENEFITS

6. PROJECT SITE SELECTION
7. PROJECT SITE ANALYSIS

B. PROJECT SPECIFIC TESTIMONY

1. TRITEC AMERICAS, LLC

Q. Please describe TRITEC Americas, LLC.

A. TRITEC Americas, LLC ("Petitioner"), based in San Diego, California, is the North American affiliate of TRITEC Group AG, a global solar services company headquartered in Basel, Switzerland. With a rich history of 30 years, TRITEC Group has been a frontrunner in the PV industry. Operating in over fifteen European countries, South Africa, Chile, Brazil, and North America, TRITEC Group excels in three primary lines of business operations: Solar PV product distribution, specialty PV product manufacturing, and a PV project development, integration, and finance division. The TRITEC Group has successfully deployed more than 1.2 GW of solar projects. As a leading provider of solar PV project development, financing, and asset management services for the commercial and industrial (C&I) solar market throughout the Americas, Petitioner has a proven record. Through its PowerNow® Commercial & Industrial Solar Finance Program, Petitioner develops, finances, owns, and operates photovoltaic solar systems, which generate clean, predictable, affordable, renewable energy for its customers. Since 2012, Petitioner has deployed over 250 MW of solar for various projects. With a pipeline exceeding 525 MW of quality and viable projects, Petitioner is one of the largest C&I solar project developers and financiers in the Americas and now in Connecticut.

Q. Is Petitioner actively developing clean energy projects in Connecticut?

A. Yes. To date, Petitioner has over thirty solar projects constructed, under construction, under contract, and in the predevelopment pipeline in Connecticut. For example, Petitioner installed four solar projects under the State's Zero Emission Renewable Energy Credit (ZREC) that also provide Virtual Net Metering payments to the City of Bristol. Petitioner plans to invest over $200 million in the state for clean energy projects.

2. CONNECTICUT SOLAR POLICY AND INCENTIVE PROGRAMS

Q. Is Connecticut promoting clean energy projects in the state?

A. Yes. In 2022, Connecticut codified Public Act 22-5 into law, a significant step towards reducing greenhouse gas emission levels in electricity supplied to the state's electric customers to zero percent by 2040. Connecticut also passed Public Act 22-14 in 2022 to expand the state's renewable energy programs. These legislative approvals underscore Connecticut's commitment to promoting clean energy projects and mitigating the impacts of the climate crisis by decarbonizing our electric sector and expanding existing renewable energy programs.

Q. What are some of the specific programs in Connecticut promoting clean energy development?

A. Connecticut's passing of Public Act 22-14 expands the Non-Residential Renewable Energy Solutions ("NRES") and Shared Clean Energy Facility ("SCEF") Programs, increasing their respective annual megawatt capacities from 50 to 100 megawatts and from 25 to 50 megawatts. The law also increased the project's maximum size from 2.0 MW to 5.0 MW and provided more significant benefits for environmental justice communities and low-to-moderate-income customers.

3. CONNECTICUT'S CLEAN ENERGY GOALS

Q. Is Connecticut meeting its clean energy development goals?

A. No. Unfortunately, the number of solar installations in Connecticut is declining, and the state is not on pace to meet the 2040 mandate. According to a recent report by the Solar Energy Industries Association ("SEIA") and Wood Mackenzie, Connecticut was ranked 22nd in 2021, 29th in 2022, and 34th in 2023 when comparing annual solar installations to other states. *See* SEIA and Wood Mackenzie, Solar Market Insight: Executive Summary: Report 2023 Year in Review SEIA, p. 9-10, March 2024.

4. NRES AUCTION

Q. Did Petitioner submit the proposed Project in the NRES auction?

A. Yes. Petitioner submitted the proposed Project bid in Eversource's February 2024 NRES auction. The auction results have not been officially released, but all indications show that the proposed Project has been selected for a 20-year Tariff contract with the utility.

5. PROJECT BENEFITS

Q. What are the benefits of the proposed Project?

A. Over the 20-year lifespan of the proposed Project, it will produce about 40,997,000 kWh of clean, carbon-free energy generation for the state. The proposed Project would produce an average of 18,162 metric tons of CO2e *less* than a natural gas power plant. This reduction of CO2e is equal to over 20 million pounds of coal, 4,000 gas-powered vehicles, and preserving almost 22,000 acres of US forests. Also, the solar electric generating system and the new grid interconnection upgrades will help increase electric grid resiliency in the proposed Project area by reducing stress on the distribution system. The proposed Project is a distributed generation facility that helps spread generation across the grid, thereby reducing the amount of electricity needed to move across the distribution lines. For example, the Manchester 3A substation will receive electricity from the proposed Project (5 miles away). In contrast, the next closest generation facility in the electric utility sector is the Rainbow Hydroelectric Plant (19 miles away). See U.S. Energy Information Administration, "Electricity Data Browser" (last visited April 18, 2024). This reduction in electricity movement reduces energy losses, delays infrastructure upgrades, and extends distribution lines and overall electric grid lifespans, saving money on maintenance, operating, and electricity costs.

6. PROJECT SITE SELECTION

Q. Why did Petitioner select the site for the proposed Project?

A. The site was selected because it is about 41.1 acres, but the proposed Project will only disturb about 7.8 acres of the total property, thus leaving the vast majority of the property untouched, including the existing walking trail traversing it. In addition, the site was selected due to its proximity to sufficient grid interconnection capacity, which is not true of most sites. Petitioner has no plans to add additional solar capacity at the site.

7. PROJECT SITE ANALYSIS

Q. Did Petitioner perform a review and analysis of the proposed Project site?

A. Yes. Petitioner retained the services of several experienced expert consultants to review and analyze the site's suitability for the proposed Project under the rules and regulations of the Siting Council and Department of Energy and Environmental Protection's ("DEEP") General (stormwater runoff) Permit. The consultants and their areas of analysis are as follows:

i. Solli Engineering – This expert consulting firm analyzed Air Quality, Soils, Geology, and Topography, Water Supply Areas and Water Quality, Stormwater Management and Erosion and Sediment Control, Land Use, Cultural Resources, Visual Impacts, Scenic and Recreational Areas and Community Facilities, Solar System Noise, and FAA Review. Solli's pre-filed written testimony has been provided to the Siting Council.

ii. William Kenny Associates—This expert consulting firm conducted an Ecological Inventory and Assessment, including Wetland and Watercourse Delineation and Ecological Impact Analysis. WKA's pre-filed written testimony has been provided to the Siting Council.

iii. Horton Electrical Services—This expert consultant and EPC contractor analyzed the Project Construction Process, Safety and Security, Construction and Project Operation Noise, Solar Panel Cleaning, Groundwater Contamination, Project Operation

and Maintenance Process, and Project Decommissioning Process. Horton's pre-filed written testimony has been provided to the Siting Council.

Q. Did Petitioner's expert consultants reach any conclusions concerning their respective proposed Project site analysis?

A. Yes. As supported and explained in their pre-filed written testimony, they all concluded that the proposed Project would not create any substantial adverse environmental effects and should be approved by the Siting Council.

C. CONCLUSION

Q. Does this conclude your pre-filed written testimony?

A. Yes.

PREFILED JOINT WRITTEN TESTIMONY OF
KEVIN SOLLI, ERIC LABATTE, AND CAMERON HENDRY
SOLLI ENGINEERING LLC
PANEL

A. INTRODUCTION

Q. Please state your names, titles, and business addresses.

A. Kevin Solli, PE, Principal, Eric LaBatte, Director of Operations, and Cameron Hendry, Assistant Project Manager, all at 501 Main Street, Suite 2A, Monroe, CT 06468.

Q. Please describe your respective responsibilities and professional experiences.

A. Kevin Solli is the Owner and President of Solli Engineering. Mr. Solli has over 20 years of experience specializing in civil engineering, site development, transportation and traffic analysis and value engineering.

A. Eric LaBatte is the Director of Operations for Solli Engineering. Mr. LaBatte has over twenty-three years of experience in site development, civil and telecom engineering.

A. Cameron Hendry is an Assistant Project Manager at Solli Engineering. Mr. Hendry has over eighteen years of experience in site development engineering, from preliminary concept planning through full site design and final permitting. Mr. Hendry has been a design engineer for multiple solar development projects within the State of Connecticut which have been built or are currently in construction.

Q. Do Kevin Solli, Eric LaBatte, and Cameron Hendry have resumes demonstrating their skills and experience?

A. Yes. Our respective resumes are shown in Exhibit A.

Q. What are your respective involvements in the proposed Project?

A. Kevin Solli. I am the Engineer of Record for the Project.

A. Eric LaBatte. I am the Project Manager and the Design Reviewer for the Project.

A. Cameron Hendry. I am the Assistant Project Manager and the Design Engineer for the Project.

Q. What is the purpose of your joint written testimony?

A. Our written testimony addresses the existing environmental conditions and potential project effects on environmental and community resources as detailed in the Environmental Assessment submitted with the Petition for Declaratory Ruling and the construction and operation of the Project. Specifically, we will address the following topics:

1. Air Quality.
2. Soils, Geology, and Topography.
3. Water Supply Areas and Water Quality.
4. Stormwater Management and Erosion and Sediment Control.
5. Land Use.
6. Cultural Resources.
7. Visual Impacts.
8. Scenic and Recreational Areas and Community Facilities.
9. Solar System Noise.
10. FAA Review.

B. <u>PROJECT SPECIFIC WRITTEN TESTIMONY</u>

1. AIR QUALITY.

Q. Please describe your air quality analysis and any potential air quality impacts of the proposed Project.

A. An air quality analysis was not needed or performed for the Project. The nature of solar energy producing facilities results in a condition where no air emissions are generated

during the operations of the facility. Therefore, the Project will have no adverse effect on air quality and will not require an air-related permit.

It should be noted that during construction, temporary mobile source emissions may occur due to the presence of construction vehicles and equipment. Any of these potential air emissions that occur during the construction of the Project would be de minimis, and these emissions will be mitigated using measures such as limited idling times of equipment, regular maintenance of all vehicles and equipment, and watering/spraying of vehicles and equipment to minimize dust and particulate releases. Additionally, all on-site and off-road equipment will meet the latest standards for diesel emissions as prescribed by the United States Environmental Protection Agency.

Q. Will the proposed Project meet or exceed the air quality standards of the State of Connecticut?

A. Yes.

2. SOILS, GEOLOGY, AND TOPOGRAPHY.

Q. Please explain your analysis and results of the soils, geology, and topography impacts from the proposed Project.

A. A geotechnical investigation was performed by Solli Engineering in March 2024. The investigation included the observation and documentation of twelve (12) test pits that were excavated to a depts between seven (7) and ten (10) feet below existing grades. The general subsurface profile observed across the site consists of approximately six (6) inches of topsoil; six (6) to twenty-four (24) inches of subsoil (fine to course sand with some silt, trace fine gravel and trace roots); and five (5) to nine (9) feet of natural granular soil (fine to medium sand with some silt, fine to coarse gravel and trace cobbles). Groundwater was encountered between three (3) to nine (9) feet below existing grades.

The Project area's topography gradually slopes between 7%-9% from the east property line of the Site to the west. There are four (4) wetland areas located on the site. One (1) wetland

is located in the southwest corner of the site, two (2) wetlands are located on the west side of the site and one (1) wetland bisects the north end of the site and runs somewhat parallel to Carter Street.

3. WATER SUPPLY AREAS AND WATER QUALITY.

Q. Please explain your analysis and results regarding the proposed Project's impacts to public water supplies and quality.

A. Based on the CT Department of Health Public Water Supply Map, there do not appear to be any wells downstream of the proposed solar facility. Vibrations from the installation of racking posts are not anticipated to cause any sedimentation release and should result in no disruption to well water flow and water quality. The Petitioner shall follow the guidelines of the Soil Erosion and Sediment Control Plan for this Project, which will minimize the potential impacts to the groundwater and surface water quality for the Site and its surrounding areas.

The Site is not located within a mapped Public Drinking Supply Watershed nor are any surface water features mapped as CT DEEP Cold Water Habitat Sites. The nearest drinking water watershed is 560 feet east of the Site. The western portion of the property, outside of the Project area, falls within a Service Areas of Community Public Water Systems, that being the Manchester Water Department.

4. STORMWATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL.

Q. Please provide your analysis and results on the proposed Project's stormwater management and erosion and sediment control plans.

A. The Project has been designed in accordance with the 2024 Connecticut Stormwater Quality Manual; the 2024 Connecticut Guidelines for Soil Erosion and Sediment Control; the Connecticut General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities (General Permit), effective December 31, 2020;

and the Connecticut Department of Energy & Environmental Protection (CT DEEP) Appendix I, Stormwater Management at Solar Array Construction Projects (Appendix I). The design addresses three primary concerns: the management of peak stormwater flows, water quality volume treatment, and soil and sedimentation controls (SESC) throughout the construction period.

Perimeter Soil Erosion and Sediment Controls (SESC's) include (but are not limited to) temporary silt fencing surrounding the perimeter of the development area with a reinforced double line of silt fencing along the western limit of disturbance, where the site currently pitches toward, to prevent sediment from migrating downslope. An anti-tracking pad is proposed at the construction entrance to Carter Street to prevent sediment from being tracked into Carter Street and erosion control blankets are proposed along areas of steep grading to temporarily stabilize slopes until vegetation establishes. These control measures will be installed at the start of construction, during phase one, before the site is fully grubbed and roughly graded. Phase one includes areas of both clearing and grubbing and areas of tree clearing. The main area of the proposed solar field is not proposed to be cleared, grubbed, and graded until phase two. Additionally, during phase one, silt fencing with wings is proposed internally along the western limit of phase two clearing, grubbing, and grading for extra internal protection. During phase one, the proposed stormwater basin, and swales, are proposed to be graded and utilized throughout construction as a temporary sediment trap. The temporary sediment trap acts as an internal area to store sediment-laden stormwater runoff and allow for particulates to settle and stormwater to potentially recharge into underlying soils. A Faircloth skimmer is proposed to be installed in the temporary sediment basin until the conclusion of construction to help facilitate this. These control measures have been provided to maximize protection to wetlands and watercourses. The monitoring and maintenance of all control measures are required to ensure efficacy throughout all phases of construction.

The above referenced sediment trap in the western portion of the Project area will be converted to a permanent stormwater basin during Phase II of the Project. The stormwater basin has been designed to provide adequate storage of the water quality volume.

Stormwater flowing to the basins will follow grass-lined swales with stone check dams along the northern and western sides of the proposed solar array. The swales and basin will also assist in reducing pollutants. The basin will outlet to the west via an outlet control structure and subsurface pipe. Due to the potential of groundwater, no infiltration was assumed in the calculations however it is likely that there will be infiltration over time. The implementation and maintenance of these practices will protect stormwater quality and will ensure that post-construction peak discharge rates of stormwater runoff from the project site will be substantially less than the pre-development rates for the 2-year, 10-year, 25-year, 50-year and 100-year storm events per the table below:

Peak Flow (cfs)			
Storm Event	**Total Drainage Areas**		**Percent Reduction in Peak Flow**
	EDA	**PDA**	
2-Year	12.91	4.09	68.3%
10-Year	28.42	12.13	57.3%
25-Year	38.73	15.96	58.8%
50-Year	46.54	18.56	60.1%
100-Year	55.09	27.44	50.2%

With the incorporation of the protective measures outlined above, the Project is not anticipated to result in an adverse impact to water quality or downstream properties.

5. LAND USE.

Q. Please describe the changes to land use that would result from the proposed Project.

A. The proposed Project will result in the clearing of approximately 7.8-acres of existing wooded area. All disturbed areas will be treated with a pollinator seed mix which will result in a meadow-type ground cover. The only proposed grading within the Project area is associated with the proposed access drive, stormwater basins and associated grass-lined swales.

6. CULTURAL RESOURCES.

Q. Please provide your analysis regarding the Phase 1A Reconnaissance Survey of the proposed Project Site.

A. Archaeological Consulting Services LLC (ACS) performed a Phase 1A cultural resources assessment survey at the site. Their report discloses that a property National Register of Historic Places does not exist within the Site. Background research indicates a low sensitivity for potential prehistoric cultural resources. The low scores in general can be attributed to very rocky soil contexts and great horizontal and vertical distances to the nearest major water source. The State Historic Preservation Office (SPHO) issued a letter on March 22, 2024, stating that no historic properties will be affected by the Project therefore no additional studies are required.

7. VISUAL IMPACTS.

Q. Please explain your analysis regarding potential visibility of the proposed Project.

A. The solar trackers will be a maximum of 6' off finished grade within the solar panel facility. All disturbed areas will be contained within a 7' chain link fence. Trees constituting the existing tree line will be preserved outside of the Project's limit of disturbance and maintained to the best of the Petitioner's ability. Neighbors in the vicinity of the subject property are not anticipated to view the solar panel facility due to existing tree coverage and additional vegetative buffers, which include American Holly and Eastern Red-Cedar trees, proposed on the eastern side of the Project area.

The solar panel products are designed in such a way that they absorb light and thus are not highly reflective. Because the proposed solar panels have tracking features, the panels will not reflect in one direction for extended durations.

8. SCENIC AND RECREATIONAL AREAS AND COMMUNITY FACILITIES.

Q. Please describe your analysis of the proposed Project's impact on scenic and recreational areas and community facilities.

A. No state road or local road will be affected physically or impaired visually by the Project. There is a hiking trail that runs through the privately-owned Host Parcel approximately 100-200 feet from the Project area. We don't anticipate the proposed Project to be visible due to dense forest cover and the natural topography, or at worst, slightly visible during the winter months. The Charter Oak Greenway is a protected hiking trail located approximately one-half mile north of the property. The closest open space is located at Yules Park, approximately 1,500 feet southwest of the property.

9. SOLAR SYSTEM NOISE

Q. Please provide your analysis of the proposed Project's audible impacts.

A. When construction ceases, noise from the Project will be minimal. The primary source of noise will be generated by inverters which will emit 61 decibels measured at one meter from the inverter, during daylight operational hours. Noise levels will effectively be reduced to zero during nighttime hours when the array is not in operation. The collective operational noise level of the inverters and transformer at the nearest property boundary is anticipated to be 35.8 decibels during the day, which is the midpoint of the approximate sound level of a quiet library (40 decibels) and a whisper (30 decibels). This noise level meets applicable CT DEEP Noise Standards.

10. FAA REVIEW

Q. Please explain the results of the proposed Project's glare analysis.

A. Information regarding the Project was submitted to the Federal Aviation Administration (FAA) for review. The FAA reviewed multiple sample points to determine whether a potential hazard exists for air navigation. Upon review, the FAA issued a Determination of

No Hazard to Air Navigation for the Project. A glare analysis was not requested by the FAA and therefore was not performed.

C. INTERROGATORY SPECIFIC TESTIMONY

Q. As of the date of this submission, did you respond to any interrogatories for the proposed Project from any parties?

A. Yes, Petitioner received interrogatories from the Siting Council. These interrogatories and responses are attached in Exhibit B.

D. PUBLIC COMMENT SPECIFIC TESTIMONY

Q. Are you aware of any public comments or comments from any parties for the proposed Project?

A. Yes.

Q. Did any of the public comments touch upon your analysis for the proposed Project?

A. Yes. Twenty-seven residents, two state representatives, the Town of Bolton, and the Town of Manchester submitted comments. Only one of the 27 residents abuts the proposed Project Site.

Q. Please summarize the nature of these public comments.

A. The topics addressed in the public comments included:

1. Tree Clearing – Concerns regarding tree clearing and potential impacts on core forests.
2. Potential Wildlife Impacts – Concerns about land clearing and potential impacts to wildlife.
3. Stormwater Runoff – Potential stormwater runoff impacts from the proposed Project.
4. Noise – Concerns about potential noise from proposed Project equipment.
5. Gas Pipeline – Worries about potential fires resulting from the proposed Project, particularly with the gas pipeline located on the Host Parcel, to the west of the Project area.

6. Wetland Impacts – Potential impacts to wetlands located on the Host Parcel.

7. Use of Chemicals, Herbicides, and/or Pesticides – Concerns regarding the potential use and/or leakage of chemicals, herbicides, or pesticides on the proposed Project Site.

8. Potential Impacts to Trail – Concerns regarding potential impacts to the portion of the hiking trail located on the privately-owned Host Parcel.

9. Proposed Project Visibility – Concerns involving the potential visibility and aesthetics of the proposed Project located in a residential zone.

10. Electrical and Magnetic Frequencies (EMFs) – Concerns about the electrocution of humans and wildlife and that EMFs could induce electrical currents in nearby metal pipelines, such as the gas pipeline located on the Host Parcel.

Q. Do you have any comments regarding these public comments?

A. Yes.

Q. Please explain.

A. 1. Tree Clearing – Solli retained the services of William Kenny Associates to perform this analysis. Please refer to their pre-filed written testimony.

2. Potential Wildlife Impacts – Solli retained the services of William Kenny Associates to perform this analysis. Please refer to their pre-filed written testimony.

3. Stormwater Runoff – Stormwater management is discussed in this pre-filed written testimony under Section 4 of "Project Specific Testimony" explained above.

4. Noise – Noise is discussed in this pre-filed written testimony under Section 9 "Project Specific Testimony" explained above.

5. Gas Pipeline – The Project limit of disturbance is located approximately 130 feet east of the gas pipeline. The proposed Project is not anticipated to have any impact to the pipeline due to the distance between site improvements and the pipeline itself.

6. Wetland Impacts – Solli retained the services of William Kenny Associates to perform this analysis. Please refer to their pre-filed written testimony.

7. Use of Chemicals, Herbicides, and/or Pesticides – Please refer to the pre-filed written testimony of William Kenny Associates for further details.

8. Potential Impacts to Trail – There is a hiking trail that runs through the privately-owned Host Parcel that is approximately 100-200 feet from the Project area. It is anticipated that the Project may be visible during winter months from small portions of the trail that run across the privately-owned Host Parcel. We don't anticipate the proposed Project will be visible from the trail during the summer months due to the natural topography and 100-200 feet of wooded area that separates the trail from the Project.

9. Proposed Project Visibility – Proposed Project Visibility is discussed in this pre-filed written testimony under Section 7 of "Project Specific Testimony" explained above.

10. Electrical and Magnetic Frequencies (EMFs) – Please refer to the pre-filed written testimony submitted by Davis Jolley.

Q. Did the Petitioner receive any comments from the Town of Manchester?

A. Yes. The topics included:

1. Tree Clearing – Concerns regarding tree clearing, impacts to core forest, the creation of a new habitat edge the alters wildlife elements and changes tree growth habits and plant species, and the impacts to a forest that could become an old-growth forest.

2. Agricultural Activities – Questions regarding who taps the trees and who uses the sap.

3. Pollinator Habitat – Concerned that the proposed seed mix is not a native mix including an exceptional variety of pollinator-friendly species and that mowing and herbicide impacts to pollinators.

4. Potential Wetland Impacts – Concerns regarding impacts to wetlands on the proposed Project Site.

5. Potential Wildlife Impacts – Worried that the perimeter fence will create an obstacle for wildlife and potential impacts to the Box Turtle and Northen Long Eared Bat.

6. Vegetation Buffer – Concerned that the vegetation buffer is deciduous and might not provide adequate visual buffering year-round and that an evergreen tree buffer would not be tall enough to prevent visibility of the proposed Project Site.

7. Noise – Concerns about the noise resulting from the proposed Project Site.

8. Potential Impacts to the Trail – Asked for a demonstration that the proposed Project would not impact the portion of the trail located on the privately-owned Host Parcel.

9. Potential Impacts to Groundwater – Concerned about potential impacts to groundwater from the proposed Project.

10. Emergency Action Plan – Asked for an emergency action plan to mitigate run-off from the proposed Project for downslope properties. The Town also expressed concerns about mediation plans for any potential fires occurring on the proposed Project Site.

11. Location of Access Road – Asked for details regarding the gravel access road and that the access road be installed in accordance with the Town's Public Improvement Standards.

12. Decommissioning Process – Asked for an inventory of pre-existing conditions before TRITEC commences construction and for the proposed basin to become a habitat for Box Turtles upon the proposed Project's decommissioning. The Town also expressed concerns regarding long-term maintenance to restore the proposed Project Site to its pre-existing conditions.

13. Civil Drawing Set – Asked that the civil plan drawing set include the addresses of abutting parcels, the 50' drainage and sanitary easement located on 161 Amanda Drive, the 20' access easement on 177 Amanda Drive, the trail, and the gas easement. The Town also asked TRITEC to consider an access easement for the trail.

14. Operations & Maintenance Plan – Asked TRITEC to revise the Operations and Maintenance (O&M) Plan to reflect feedback from the Department of Energy and Environmental Protection ("DEEP") regarding potential impacts to Box Turtles and the latest DEEP Guidelines. Also, the Town asked TRITEC to clearly post O&M information at the proposed Project Site for future maintenance contractors. The Town also asked TRITEC to review the parking and turnaround area to ensure there's enough room for O&M contractors to prevent parking along Carter Street.

15. Stormwater Management Report – The Town asked TRITEC for the proposed Project's Stormwater Management Report to adhere to the Town's Public Improvement Standards Section 3.06: Storm Drainage Systems. Additionally, the Town asked TRITEC to conduct a percolation test at the proposed basin area and note the depth of any encountered groundwater and/or mottling. The Town also asked why the proposed Project is not designed to discharge towards the wetlands. Finally, the Town asked whether there is adequate access around the top of the basin for maintenance.

16. Erosion Control Plans – Confirmation that the Erosion Control Plan reflects the latest State guidelines.

17. Location of Proposed Project in Residential Zone – The Town expressed concern about the proposed Project's location in a residential zone

Q. Do you have any comments regarding these public comments?

A. Yes.

Q. Please explain.

A. 1. Tree Clearing – Solli retained the services of William Kenny Associates to perform this analysis. Please refer to their pre-filed written testimony.

2. Agricultural Activities – Solli is aware that there are agricultural activities being conducted on the proposed Site. Please refer to the pre-filed written testimony of Horton Electric for further details.

3. Pollinator Habitat – Solli retained the services of William Kenny Associates to perform this analysis. Please refer to their pre-filed written testimony.

4. Potential Wetland Impacts – Solli retained the services of William Kenny Associates to perform this analysis. Please refer to their pre-filed written testimony.

5. Potential Wildlife Impacts – Solli retained the services of William Kenny Associates to perform this analysis. Please refer to their pre-filed written testimony.

6. Vegetation Buffer – The proposed vegetation buffer along the eastern edge of the Project area consists of a mix of American Holly (evergreen) and Eastern Red-Cedar (evergreen) trees that will be approximately 7'-8' tall at the time of installation. This mix of trees was selected to enhance the wooded area that will remain between the residences to the east of the Project area and the Project itself. In good conditions, American Hollys will typically mature to be 15'-30' in height and 10'-20' in width. Eastern Red Cedars will typically mature to be 30'-50' in height and 10'-20' in width.

7. Noise – Noise is discussed in this pre-filed written testimony in Section 9 of "Project Specific Testimony" explained above.

8. Potential Impacts to Trail – There is a hiking trail that runs through the privately-owned Host Parcel that is approximately 100-200 feet from the Project area. It is anticipated that the Project may be visible during winter months from small portions of the trail that run

across the privately-owned Host Parcel. We don't anticipate the proposed Project will be visible from the trail during the summer months due to the natural topography and 100-200 feet of wooded area that separates the trail from the Project.

9. Potential Impacts to Groundwater – Based on the CT Department of Health Public Water Supply Map, there do not appear to be any wells downstream of the proposed solar facility. Vibrations from the installation of racking posts are not anticipated to cause any sedimentation release and should result in no disruption to well water flow and water quality. The Petitioner shall follow the guidelines of the Soil Erosion and Sediment Control Plan for this Project, which will minimize the potential impacts to the groundwater and surface water quality for the Site and its surrounding areas.

The Site is not located within a mapped Public Drinking Supply Watershed nor are any surface water features mapped as CT DEEP Cold Water Habitat Sites. The nearest drinking water watershed is 560 feet east of the Site. The western portion of the property, outside of the Project area, falls within a Service Areas of Community Public Water Systems, that being the Manchester Water Department.

10. Emergency Action Plan – It is unclear what the Town is requesting in the form of an emergency action plan to mitigate run-off from the proposed Project for downslope properties as the results of the stormwater analysis performed show that the post-construction peak discharge rates of stormwater runoff from the Project development will be substantially less (greater than a 50% decrease) than the pre-development peak discharge rates for the 2-year, 10-year, 25-year, 50-year and 100-year storm events. As currently designed, the proposed Project exceeds the requirements set forth in the 2024 Connecticut Stormwater Quality Manual; the 2024 Connecticut Guidelines for Soil Erosion and Sediment Control; the Connecticut General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities (General Permit), effective December 31, 2020; and the Connecticut Department of Energy & Environmental Protection (CT DEEP) Appendix I, Stormwater Management at Solar Array Construction Projects (Appendix I).

Please refer to the pre-filed written testimony of Warren Horton regarding mitigation measures for potential fires at the proposed Project Site.

11. Location of Access Road – A detail for the proposed access road has been added to the plans submitted with the interrogatory responses. A bituminous concrete driveway apron has been added to the plans at the intersection with Carter Street in accordance with the Town of Manchester specifications. The Town of Manchester Driveway Apron detail has been added to the plans.

12. Decommissioning Process – Please see the pre-filed written testimonies of William Kenny Associates and Warren Horton.

13. Civil Drawing Set – Plan 2.10 – Overall Site Plan, has the addresses for all abutting properties and depicts the gas easement. The 50' drainage and sanitary easement located on 161 Amanda Drive and the 20' access easement on 177 Amanda Drive have not been depicted due to the fact that these easements are not located on the Project site.

14. Operations & Maintenance Plan – Please refer to the pre-filed written testimonies of William Kenny Associates and Warren Horton.

15. Stormwater Management Report – The stormwater management basin has been modified to meet the Town of Manchester regulations, providing 0.5-feet of freeboard from the 100-year water surface elevation and the emergency spillway and 1.5-feet of freeboard from the 100-year water surface elevation and the top of the basin berm. The bottom of the basin has been modified to have a minimum 1% slope towards the outlet control structure. The primary outlet pipe has been sized to have sufficient capacity to convey the 100-year storm event. Infiltration tests have been performed within the area of the basin and an average infiltration rate of 0.9 in/hr was observed, however the stormwater basin has been designed without taking any infiltration into account. It is anticipated that water below the low-flow orifice in the outlet control structure will infiltrate into the ground. The outlet pipe from the basin discharges towards the wetlands located to the west of the basin.

Maintenance access to the basin is provided from the proposed access drive west along the proposed fence line to the basin. Solli submitted the revised Stormwater Management Report with Petitioner's response to Siting Council interrogatories.

16. Erosion Control Plans – Solli developed the erosion control plans in accordance with the 2024 Connecticut Soil Erosion and Sediment Control Guidelines.

17. Location of Proposed Project in Residential Zone – Please refer to the pre-filed written testimony of Davis Jolley.

E. CONCLUSION

Q. Based on your analyses and your pre-filed written testimony addressing the existing environmental conditions and potential Project effects on environmental and community resources as detailed in the Environmental Assessment submitted with the Petition for Declaratory Ruling and the construction and operation of the Project, addressing Air Quality, Soils, Geology, and Topography, Water Supply Areas and Water Quality, Stormwater Management and Erosion and Sediment Control, Land Use, Cultural Resources, Visual Impacts, Scenic and Recreational Areas and Community Facilities, Solar System Noise, and FAA Review, is it your expert opinion that the proposed Project will not create any substantial adverse environmental effects and should be approved by the Siting Council?

A. Yes.

PREFILED JOINT WRITTEN TESTIMONY OF
BILL KENNY, ALEXANDER WOJTKOWIAK, JACKSON SMITH
WILLIAM KENNY ASSOCIATES (WKA)
PANEL

A. INTRODUCTION

Q. Please state your names, titles, and business addresses.

A. Bill Kenny, Ecologist / Wetland & Soil Scientist / Professional Landscape Architect, Alexander Wojtkowiak, Project Manager & Soil Scientist, and Jackson Smith, Ecologist, all at 1899 Bronson Rd, Fairfield, CT 06824.

Q. Please describe your respective responsibilities and professional experiences.

A. Bill Kenny: Managing member with more than 35 years of professional experience conducting ecological assessments and restorations and related local, state and federal permitting for a wide range of project types and sites throughout CT and beyond.

A. Alexander Wojtkowiak: Project Manager & Soil Scientist per CGS §22a-38 with five years' experience at WKA. Responsible for managing Ecological Service operations at WKA. Professional experience in wetland and watercourse delineation, classification, and functional assessment analysis, second-order soil surveying, biological/ecological inventories and assessments, local, state, and federal report and permitting, and construction site monitoring.

A. Jackson Smith: Ecologist with one year of experience at WKA. Responsible for assisting with various ecological services at WKA.

Q. Do Bill Kenny, Alexander Wojtkowiak, and Jackson Smith have resumes demonstrating their skills and experience?

A. Yes. Our respective resumes are shown in Exhibit A.

Q. What are your respective involvements in the proposed Project?

A. Bill Kenny: I provided high level Project management providing guidance and direction and assuring quality standards. I also conducted a site investigation and reviewed Project methods and results.

A. Alexander Wojtkowiak: I personally oversee the Project deliverables to the team, reviewing the portions of the *Environmental Assessment* pertaining to the ecological impacts of the Petition for Declaratory Ruling. I am also the team lead on all site work enacted by WKA for the proposed Project.

A. Jackson Smith: I assisted with Project Site work and other Project deliverables under the supervision of Alexander Wojtkowiak and Bill Kenny.

Q. What is the purpose of your pre-filed joint written testimony?

A. Our testimony addresses the Project ecological inventory and assessment, including the wetland and watercourse delineation and the ecological impact analysis as detailed in the *Environmental Assessment* submitted with the Petition for Declaratory Ruling.

Q. Please describe your wetland delineation and impact analysis and results for the proposed Project.

A. Wetlands and watercourses at the property where the proposed Project Site is located were identified and field delineated according to state and federal definitions, and assessed by WKA on July 26 and 27, 2023. United States Army Corps of Engineers (USACE) Wetland Determination Data Forms were compiled by WKA on September 19, 2023 for portions of one wetland and watercourse system proposed to be impacted by the Project. Four wetland and watercourse systems are present. These include a small perennial stream that extends and flows east to west throughout the northern portion of the property with bordering woodland wetlands, intermittent watercourses extending and flowing east to west in the northwestern and central-western portions of the property with bordering woodland wetlands, and a woodland wetland in the southwestern portion of the property. The system for which USACE Wetland Determination Data Forms were

compiled is the small stream and bordering woodland wetland system in the northern portion of the property.

WKA was responsible for drafting the responses to the following sections of the *Environmental Assessment*: 2.2.3 Stormwater Management Plan, 3.2 Water Resources, 3.2.1 Wetlands And Watercourses, 3.2.2 Wetland Impacts, 3.2.3 Floodplain Areas, 3.3 Water Quality, 3.3.1 Groundwater, 3.3.2 Surface Water, 3.4 Habitat & Wildlife, 3.4.1 Habitat Types, 3.4.2 Core Forest Determination, 3.4.3 Wildlife, 3.5 Rare Species, 3.5.1 Natural Diversity Data Base, and 3.5.2 USFWS Consultation. Following the completion of the Project, the wetlands and watercourses on the property will exist and continue to function substantially as they do today. Disturbance to a wetland and watercourse is unavoidable and is limited to the piping of a short segment of the small stream to allow for the construction of an access road to the Project. The crossing is designed to allow for the primary function of the stream (surface water conveyance) to continue.

C. INTERROGATORY SPECIFIC TESTIMONY

Q. As of the date of this submission, did you respond to any interrogatories for the proposed Project from any parties?

A. Yes, Petitioner received interrogatories from the Siting Council. These interrogatories and responses are attached in Exhibit B.

D. PUBLIC COMMENT SPECIFIC TESTIMONY

Q. Are you aware of any public comments or comments from any parties for the proposed Project?

A. Yes.

Q. Did any of the public comments touch upon your analysis for the proposed Project?

A. Yes. Twenty-seven residents, two state representatives, the Town of Bolton, and the Town of Manchester submitted comments. Only one of the 27 residents abuts the proposed Project Site.

Q. Please summarize the nature of the public comments that touch upon your analysis.

A. The topics addressed in the public comments included:

1. Tree Clearing – Concerns regarding tree clearing and potential impacts on core forests.

2. Potential Wildlife Impacts – Concerns about land clearing and potential impacts to wildlife.

3. Stormwater Runoff – Potential stormwater runoff impacts from the proposed Project.

4. Noise – Concerns about potential noise from proposed Project equipment.

5. Wetland Impacts – Potential impacts to wetlands located on the Host Parcel.

6. Use of Chemicals, Herbicides, and/or Pesticides – Concerns regarding the potential use and/or leakage of chemicals, herbicides, or pesticides on the proposed Project Site.

Q. Do you have any comments regarding these public comments?

A. Yes.

Q. Please explain.

A. 1. Tree Clearing – Approximately seven acres of Core Forest according to the CT DEEP *2020 Connecticut Forest Plan Priority Areas Map* is proposed to be cleared for the Project. However, the *Forestland Habitat Impact Map*, recommended by the CT DEEP in their *Permit Information For Solar Projects an Environmental Permitting Fact Sheet*, indicates that no forestland habitat impacts would result from the proposed Project. Nonetheless, with regard to determining which of these resources should be used to assess impacts to Core Forests, tree clearing will occur to develop the Project. As stated in § 3.4.1 Habitat Types Red Oak-Sugar Maple Transition Forest of the *Environmental Assessment*, "the southeastern portion of the property appears to have been in agricultural land in 1934" and was abandoned in the late 1900's. This southeastern portion of the property generally overlaps with the area of proposed development. As mentioned in the *Environmental Assessment*, and as observed through site investigations, in the

southeastern portion of the Site, many trees have fallen, creating many canopy gaps that have allowed for the growth of a dense shrub layer that consists of native spicebush and invasive Japanese barberry as well as herbaceous plants such as native wood nettle, and invasive garlic mustard. Invasive oriental bittersweet vines are also prevalent within this portion of the forest and ensnare standing deadwood and remaining trees. This portion of the overall Red Oak-Sugar Maple Transition Forest is a more disturbed and invasive vegetation-dominated portion of the overall forest than throughout the remainder of the property. Trees present are young and of low density relative to other forest onsite. As such, the Project design minimizes the quantity and quality of trees to be removed. The primary impact remains that the clearing of vegetation within this area will result in greater runoff potential, which has been addressed in the Project's *Stormwater Management Report*. The area will be revegetated with a native grassland following Project completion, which will provide additional habitat value to wildlife species within this area, specifically, potentially present state listed-species such as eastern box turtles, that use these habitats during various stages of their lives.

2. Potential Wildlife Impacts – The potential impacts to wildlife from land clearing stem from anthropogenic disturbances during construction. During the Project's construction, noise, light pollution and other anthropogenic activities may temporarily disrupt or displace wildlife. However, any wildlife disrupted or displaced during the short construction period (approximately 4-8 months), are expected to naturally move to adjacent forested habitat such as the 2,500-acres of forest to the southwest of the Project site.

The primary concern with land clearing for the Project stems from the potential for incidental take of the state-listed specie, the eastern box turtle. The eastern box turtle is active and most detectable between April 1 and November 1 of the year. Outside of this time period, the turtles enter a state of brumation in shallow burrows in the upland soil that are practically undetectable. As such, during the turtle's active season, the site will be secured, preventing the ingress of any additional turtles. Before any land clearing occurs in the site, with the assistance of a qualified herpetologist, turtles within the site will be located as best as possible and removed from the area. While land clearing and grading occurs, as given in § 3.5.1 Natural Diversity Data Base of the *Environmental Assessment*, measures required by the CT DEEP will be followed by all parties responsible to ensure that no incidental take of this state-listed specie of special concern occurs during the Project's development.

3. Stormwater Runoff – According to Solli Engineering, the Project's engineers, the Project's *Stormwater Management Report* provided as *Exhibit C* to the Council indicates that the Project will result in 11,115 square feet or 0.25-acres of impervious/gravel surfaces. This is an increase from undeveloped existing conditions. As such, stormwater management features were designed in accordance with the *Connecticut Stormwater Quality Manual* (Effective Date: March 30, 2024) and other applicable state and federal regulations as referenced in the Introduction of the *Stormwater Management Report*. It is

the conclusion of the Project engineer from following all applicable state and federal regulations, that the designed stormwater management measures as shown on the *Civil Plan Set* and referenced in the *Stormwater Management Report*, will ensure that post-development peak discharges of stormwater runoff to waters of the State of Connecticut will be less than pre-development peak discharges for the 2-, 10-, 25-, 50-, and 100-year storm events. Please refer to the pre-filed written testimony submitted Solli Engineering for additional information regarding stormwater runoff.

4. Noise – As stated for Potential Wildlife Impacts, the Project will result in noise pollution during construction from the use of machinery and other related equipment. As stated in § 3.12 Noise of the *Environmental Assessment*, noise from the construction of a solar panel facility is exempted under Connecticut regulations for the control of noise. As further stated in the document *Petitioner Responses to Interrogatories from Council*, dated April 23, 2024, Exhibit C, *Revised Sections of the Environmental Assessment;* it is expected, during construction, the highest levels of noise will be approximately 88 decibels at source. At the end of Project construction, noise levels will be minimal. The max noise levels omitted during operational hours of the facility will be 35.8 decibels from the nearest property boundary. This is compliant with CT DEEP Noise Standards, and the Project will not result in any noise outside of operational hours.

5. Wetland Impacts – The proposed Project will result in the unavoidable disturbance of approximately 1,100 square feet of inland wetland and watercourse. This is to construct an access drive from Carter Street to the proposed developable portion of the property. To allow for the drive and for maintaining the primary function of the wetland and watercourse (surface water conveyance), a short segment of a stream will be piped. The stream extends and flows east to west along the northern property boundary. The proposed area of impact includes the narrowest onsite segment of the system, where the system includes steep confined banks. Adverse impacts associated with the construction of this crossing will be minimized to the greatest extent practicable using stream-crossing best management practices. Work within the stream is proposed during low-flow conditions and water handling measures to pump and divert upstream water around the construction area are proposed to be implemented to protect downstream areas. The crossing is a proposed 42-inch diameter, high-density polyethylene pipe embedded 12 inches into the stream substrate. The crossing follows the primary goals of the Army Corps of Engineers Stream Crossing Best-Management Practices with regard to pipe sizing, slope and substrate.

6. Use of Chemicals, Herbicides, and/or Pesticides – The use of chemicals, herbicides, and/or pesticides with the Project is limited to herbicides proposed to manage vegetation at the Project site. No other chemicals, including pesticides, are proposed to be used with the proposed Project. The solar modules chosen to be used for the Project have a sealed back sheet to prevent the leaching of chemicals from the modules. The panels themselves would be the only other source of chemical substances at the Project site. The use of herbicide can be omitted from the *Operations and Maintenance (O&M) Plan* for

managing the proposed grassland habitat within and surrounding the solar array field post-construction if need be. Please refer to the pre-filed written testimony of Warren Horton for additional information.

Q. Did you receive any comments from the Town of Manchester that touch upon your analysis?

A. Yes. The topics included:

1. Tree Clearing – Concerns regarding tree clearing, impacts to core forest, the creation of a new habitat edge the alters wildlife elements and changes tree growth habits and plant species, and the impacts to a forest that could become an old-growth forest.

2. Pollinator Habitat – Concerned that the proposed seed mix is not a native mix including an exceptional variety of pollinator-friendly species and that mowing and herbicide impacts to pollinators

3. Potential Wetland Impacts – Concerns regarding impacts to wetlands on the proposed Project Site.

4. Potential Wildlife Impacts – Worried that the perimeter fence will create an obstacle for wildlife and potential impacts to the Box Turtle and Northen Long Eared Bat

5. Noise – Concerns about the noise resulting from the proposed Project Site.

6. Potential Impacts to Groundwater – Concerned about potential impacts to groundwater from the proposed Project.

7. Decommissioning Process – Asked for an inventory of pre-existing conditions before TRITEC commences construction and for the proposed basin to become a habitat for Box Turtles upon the proposed Project's decommissioning. The Town also expressed concerns regarding long-term maintenance to restore the proposed Project Site to its pre-existing conditions.

8. Operations & Maintenance Plan – Asked TRITEC to revise the Operations and Maintenance (O&M) Plan to reflect feedback from the Department of Energy and Environmental Protection ("DEEP") regarding potential impacts to Box Turtles and the latest DEEP Guidelines. Also, the Town asked TRITEC to clearly post O&M information at the proposed Project Site for future maintenance contractors. The Town also asked TRITEC to review the parking and turnaround area to ensure there's enough room for O&M contractors to prevent parking along Carter Street.

Q. Do you have any comments regarding these public comments?

A. Yes.

Q. Please explain.

A. 1. Tree Clearing – Approximately seven acres of Core Forest according to the CT DEEP *2020 Connecticut Forest Plan Priority Areas Map* is proposed to be cleared for the Project. However, the *Forestland Habitat Impact Map*, recommended by the CT DEEP in their *Permit Information For Solar Projects an Environmental Permitting Fact Sheet*, indicates that no forestland habitat impacts would result from the proposed Project. Nonetheless, with regard to determining which of these resources should be used to assess impacts to Core Forests, tree clearing will occur to develop the Project. As stated in § 3.4.1 Habitat Types Red Oak-Sugar Maple Transition Forest of the *Environmental Assessment*, "the southeastern portion of the property appears to have been in agricultural land in 1934" and was abandoned in the late 1900's. This southeastern portion of the property generally overlaps with the area of proposed development. As mentioned in the *Environmental Assessment*, and as observed through site investigations, in the southeastern portion of the Site, many trees have fallen, creating many canopy gaps that have allowed for the growth of a dense shrub layer that consists of native spicebush and invasive Japanese barberry as well as herbaceous plants such as native wood nettle, and invasive garlic mustard. Invasive oriental bittersweet vines are also prevalent within this portion of the forest and ensnare standing deadwood and remaining trees. This portion of the overall Red Oak-Sugar Maple Transition Forest is a more disturbed and invasive vegetation-dominated portion of the overall forest than throughout the remainder of the property. Trees present are young and low density relative to other forest onsite. As such, the Project design minimizes the quantity and quality of trees to be removed. The primary impact remains that the clearing of vegetation within this area will result in greater runoff potential, which has been addressed in the Project's *Stormwater Management Report*. The area will be revegetated with a native grassland following Project completion, as such there will be a creation of new forest edge habitat. This addition of edge habitat will provide a similar habitat as that currently present within the gas line corridor. Due to the routine vegetation management that will be needed within the Project area to limit the growth of shrubs and trees that could potentially shade out the panels, there will be changes to tree growth habitats. However, following the decommission of the proposed Project, over time, the area will naturally succeed back to a woodland.

We do not believe that these forest clearing activities are impacting a forest that could become an old growth forest. According to the CT DEEP old growth forests are those which have never been directly affected by intensive human land use. As can be seen through historic aerial photographs, a majority of the Project area was cleared and farmed during the 1900's, an intensive human land use. The majority of the forest proposed to be cleared could be classified as a second-growth young forest, while the majority of forest proposed to remain could be classified as a second-growth maturing forest.

2. Pollinator Habitat – The seed mix proposed to revegetate the Project site following completion includes ERNMX-147 "Fuzz & Buzz Mix" for final stabilization of the solar array and ERNMX-610 "Northeast Solar Pollinator Buffer Mix" for areas outside the fence line and non-array areas. "New England Erosion Control/Restoration No Mow Mix" is proposed for the stormwater basin. In comparing the percentage of native vegetation within the seed mixes (save for the mix used for the stormwater basin), approximately 40 percent of the species in ERNMX-147 are native and 100 percent of the species in ERNMX-610 are native. Approximately 95 percent of the species within ERNMX-147 are pollinator-friendly species and 100 percent of the species within ERNMX-610 are pollinator-friendly. It is our professional opinion, that the seed mixes proposed will add a diversity of groundcover species at the site and property and provide additional pollinator benefits to the species currently present at the property and additional species that may colonize the site. Groundcovers under existing conditions are low in diversity and primarily dominated by fern species which only provide pollinator benefits in regard to cover and shelter for insects. The proposed seed mixes will benefit the diversity and abundance of insect species and therefore benefit other wildlife like avian species.

According to the *Operations and Maintenance (O&M) Plan* provided as *Exhibit D*, vegetation maintenance of the re-vegetated areas will consist of "mow, clear, and/or apply herbicides or pre-emergent (where allowed by applicable laws and regulations) to manage site vegetation." The application of herbicides can be omitted from the *Operations and Maintenance (O&M) Plan.*

3. Potential Wetland Impacts – The proposed Project will result in the unavoidable disturbance of approximately 1,100 square feet of inland wetland and watercourse. This is to construct an access drive from Carter Street to the proposed developable portion of the property. To allow for the drive and for maintaining the primary function of the wetland and watercourse (surface water conveyance), a short segment of the steam will be piped. The stream extends and flows east to west along the northern property boundary. The proposed area of impact includes the narrowest onsite segment of the system, where the system includes relatively steep confined banks. Adverse impacts associated with the construction of this crossing will be minimized to the greatest extent practicable using stream-crossing best management practices. Work within the stream is proposed during low-flow conditions and water handling measures to pump and divert upstream water around the construction area are proposed to be implemented to protect downstream areas. The crossing is a proposed 42-inch diameter, high-density polyethylene pipe embedded 12 inches into the stream substrate. The crossing follows the primary goals of the Army Corps of Engineers Stream Crossing Best-Management Practices with regard to pipe sizing, slope and substrate.

4. Potential Wildlife Impacts – To satisfy the state requirement of enclosing the facility with fencing, wildlife-friendly fencing will be used. This fencing, with a six-inch gap at the bottom, will allow a vast majority of wildlife to freely enter and exit the proposed

Grassland at any location. As such, a majority of wildlife species will not be affected by the fencing. The largest of Connecticut's wildlife species, such as the American black bear or white-tailed deer will be deterred by the fencing. While these species will lose out on the opportunity to bed or forage within the proposed Grassland, the proposed Project has nearly 2,500 acres of nearby forest for these species' use. As such, the sufficient quantity of quality habitat nearby to the Project Site can be used by these species to satisfy their need for foraging, bedding or travel.

In regard to the state-listed eastern box turtle, the Project's fencing will not exclude the eastern box turtles from the proposed grassland of the solar array. The primary concern with land clearing during construction stems from the potential for incidental take of the state-listed species, the eastern box turtle. The eastern box turtle is active between April 1 and November 1 of the year, and during this time period, all ground disturbance work will be conducted in accordance with pre-construction, construction, and post construction measures required by the CT DEEP to protect these detectable turtles. These measures are outlined in § 3.5.1 Natural Diversity Data Base of the *Environmental Assessment*. The Project's groundwork will not begin during the turtle's dormant season as the turtles will be in a state of brumation in shallow undetectable burrows and would be unable to escape construction machinery due to being dormant.

In regard to the state-listed northern long-eared bat (NLEB), the CT DEEP did not identify the NLEB as having the potential to be present at the subject property. This is noted within the NDDB Assessment Letter. Additionally, according to the CT DEEP, no known hibernacula of the NLEB are present within the Town of Manchester. The nearest known NLEB hibernacula is located in the town of East Granby, 16 miles northwest of the site, and the nearest known summer roost site is located in the town of Salem, approximately 17.5 miles southeast of the site.

5. Noise – The Project will result in noise pollution during construction from the use of machinery and other related equipment. As stated in § 3.12 Noise of the *Environmental Assessment*, noise from the construction of the solar panel facility is exempted under Connecticut regulations for the control of noise. As further stated in the document *Petitioner Responses to Interrogatories from Council*, dated April 23, 2024, Exhibit C, *Revised Sections of the Environmental Assessment;* it is expected, during construction, the highest levels of noise will be approximately 88 decibels at source. At the end of Project construction, noise levels will be minimal. The max noise levels omitted during operational hours of the facility will be 35.8 decibels from the nearest property boundary. This is compliant with CT DEEP Noise Standards and the Project will not result in any noise outside of operational hours.

6. Potential Impacts to Groundwater – The unconfined, regional, and perennial groundwater at the Project Site is well below the Project construction activities and, as such, this groundwater will not be affected by them or the Project. Some of the shallow, perched, and intermittent ground water at the property will be managed by the Project's stormwater management system. This shallow, perched, and intermittent groundwater is

present due to the onsite soils and glacial till deposits that include a relatively impervious hardpan that begins two to three feet below the ground surface. Intermittent shallow subsurface groundwater flows, primarily driven by seasonal and precipitation events, move atop the hardpan and are the primary reason for the onsite seepage areas. The proposed Project will allow existing east to west flows of perched, intermittent, shallow subsurface ground water to continue through the proposed field before being captured by the proposed drainage swale. The drainage swale will convey this water to a proposed basin where it will be discharged to the west. Perched, intermittent, shallow subsurface groundwater flows west of the Project site will be reduced in the south and increased in the north.

7. Decommissioning Process –As outlined in sections 3.2.1 and 3.4.1 of the *Environmental Assessment,* each habitat was assessed for its abundance and diversity of existing native and non-native flora. Within the environmental assessment, existing conditions of the site are noted in regard to vegetation density, canopy coverage, existing structures, wetland locations, wildlife species observed, and natural drainage patterns. Following decommission of the site, the grassland area will not be maintained. As such, over time, the proposed native vegetated grassland will succeed into scrub shrub habitat and eventually into forested habitat. WKA recommends that after decommission the stormwater basin be filled to match the surrounding landscape. For several years after decommission the area will provide herbaceous vegetation in nearly full sunlight with soft sandy soils for box turtle egg laying habitat. Please refer to the pre-filed written testimony of Warren Horton for additional information.

8. Operations & Maintenance Plan – WKA will assist Petitioner where necessary to revise the Operations and Maintenance (O&M) Plan to reflect feedback from the CT DEEP. Please refer to the pre-filed written testimony of Warren Horton for additional information.

E. TESTIMONY CONCLUSION

Q. Based on your analyses and your pre-filed written testimony addressing ecological inventory and assessment, including the wetland and watercourse delineation and the ecological impact analysis as detailed in the *Environmental Assessment* submitted with the Petition for Declaratory Ruling, is it your expert opinion that the proposed Project will not create any substantial adverse environmental effects and should be approved by the Siting Council?

A. Yes.

PREFILED WRITTEN TESTIMONY OF
WARREN HORTON
HORTON ELECTRICAL SERVICES LLC

A. INTRODUCTION

Q. Please state your name, title, and business address.

A. Warren A Horton, President 97 River Road, Canton Ct.

Q. Please describe your responsibilities and professional experiences.

A. We are the construction services for the Electrical, Civil and Solar Array installation. We have been in business since 1977 in Connecticut and performing Ground Mount solar array installations for 9 years.

Q. Do you have a resume demonstrating your skills and experience?

A. Yes, my resume is shown in Exhibit A.

Q. What has been your involvement with the project?

A. We have assisted the development team in best practice methods of installation of the proposed Ground Mount Array at this site.

Q. What is the purpose of your pre-filed written testimony?

A. I will discuss the following:

1. PROJECT CONSTRUCTION PROCESS
2. SAFETY AND SECURITY
3. CONSTRUCTION AND PROJECT OPERATION NOISE
4. SOLAR PANEL CLEANING
5. GROUNDWATER CONTAMINATION
6. PROJECT OPERATION AND MAINTENANCE PROCESS
7. PROJECT DECOMMISSIONING PROCESS

B. PROJECT SPECIFIC TESTIMONY

1. PROJECT CONSTRUCTION PROCESS

Q. Please describe the construction process for the proposed Project.

A. The general construction sequence will be as follows: First, there is Site Preparation, which involves installing erosion control measures that will improve the access road to the site from the road. Wooded areas will be cleared, necessary grading will be conducted, and temporary stormwater and erosion control measures will be installed. Second, there is Major Equipment Delivery, which means racking and panel deliveries will be made during site preparation. Third is Racking Installation, where racks will be installed starting at the northern portion of the array and working south. Fourth, there is Panel installation after the racking, also working north to south. Fifth, there is Balance of System (BOS), which involves trenching, wiring, and installing inverters, transformers, and fencing. Last is Interconnection, which begins after site preparation and will be completed parallel to the array construction.

Q. What is the construction timeline for the proposed Project?

A. Overall, the construction at the site will take 6-9 months, excluding winter downtime. The site preparation work will occur in the first 2-3 months primarily, and this will include any light grading and preparation of erosion and stormwater control features, improvements to the access road, and readying of pads for the inverters and transformers. The remainder of the construction time will be taken with the installation of the racks, panels, wiring, transformers, and inverters. The permanent security fence will be completed at the end of the construction phase.

Q. Will the proposed Project construction process adversely affect the surrounding area?

A. No.

Q. Please explain.

A. Project construction will be conducted about 213 feet away from the nearest residence and enclosed by existing wooded areas. The following measures will be implemented to minimize construction impacts: First, stormwater and erosion control measures will be implemented in accordance with State of Connecticut requirements to fully mitigate construction impacts on stormwater drainage and erosion around the site. These stormwater and erosion control measures will be maintained during the operation of the Facility. Second, noise impacts will be minimal due to the physical distance of the site from residential receptors. Third, the project will comply with standard work hours. Fourth, traffic will be minimized by grouping and consolidating major equipment deliveries (panels, racks, inverters). Fifth, measures will be taken to minimize mud tracking from construction vehicles onto Carter Street. Sixth, vehicle traffic will be minimized as much as possible for equipment and construction vehicles. Seventh, all personnel vehicles will be parked at the project site in areas not occupied by the solar facility. Eighth, all construction activities will be timed and sequenced to allow for the implementation of mitigative and protective measures required for sensitive environmental areas and protected species that are found or presumed to be potentially present. This mitigation could include seasonal restrictions on tree clearing and other site work, along with other actions during the work to avoid or mitigate impacts to certain species.

2. SAFETY AND SECURITY

Q. Please describe the safety and security measures to be deployed at the proposed Site.

A. The solar array will be surrounded by a 7-foot high chain link security fence, and there will be one locked gated entrance to the Facility. All electrical equipment is fully enclosed and locked. Upon completion of the proposed Project, we will work with the local fire department and introduce them to the proposed Project to address any contingencies at the proposed Site.

Q. Will the proposed Project pose any dangers to the surrounding area?

A. No.

Q. Please explain.

A. The proposed Project meets or exceeds all requirement of the National Electrical Code to keep the public safe from electricity. We are required to install a 7' fence and placards, warning the public of the hazard. No hazards exist outside of the fenced area.

Q. Will the proposed Project pose any hazard to local aviation?

A. No.

Q. Please explain.

A. Solli Engineering submitted information regarding the Project to the Federal Aviation Administration (FAA) for review. The FAA reviewed multiple sample points to determine whether a potential hazard exists for air navigation. Upon review, the FAA issued a Determination of No Hazard to Air Navigation for the Project.

3. CONSTRUCTION AND PROJECT OPERATION NOISE

Q. Will the proposed Project construction result in noise to surrounding residents?

A. Yes, but minimal.

Q. How will construction noise be minimized?

A. Hours of construction will be limited to Monday-Friday between 7am and 3:30pm.

Q. Will the proposed Project operation make noise?

A. Yes, but only minimal.

Q. Please explain.

A. The invertors proposed for this project produce the lowest level of noise available for this application.

Q. Was a noise study conducted?

A. No, because the anticipated noise levels are well below the industry standard and meet applicable CT DEEP Noise Standards. However, the proposed Project's civil engineers analyzed the noise impacts of the proposed Project and determined that the loudest noise levels during project operation will be approximately 61 decibels measured at one meter from the inverter and about 35.8 decibels, both during daylight operational hours.

Q. Will the noise impact any surrounding residences?

A. No.

Q. Please explain.

A. The estimated noise level during project operation at the nearest property boundary would be 35.8 decibels during operating, daytime hours and reduced to

zero during nighttime hours. This noise level meets applicable CT Noise Standards, and according to the National Hearing Conservation Association, is roughly equivalent to a quiet library.

4. SOLAR PANEL CLEANING

Q. Will the solar panels need cleaning?

A. No.

Q. Please explain.

A. The vast weather changes in New England do not warrant washing of solar panels.

5. GROUNDWATER CONTAMINATION

Q. Will water runoff from the solar panels contaminate groundwater at the site?

A. No.

Q. Please explain.

A. The equipment used in the construction of the solar array does not generate contaminants, the rain fall that comes in contact with any and all components of the solar array are only contaminated by the pollutants it has picked up as its fall to earth.

Q. Will the construction process, including the installation of equipment, contaminate groundwater at the site?

A. No.

Q. Please explain.

A. The construction process is monitored and regulated by the Connecticut Department of Energy and Environmental Protection ("DEEP"). There are protocols to be followed to ensure stormwater is handled on the construction site, and that the process of installation does not create any risk of contamination to ground water.

6. PROJECT OPERATION AND MAINTENANCE PROCESS

Q. Please describe the operation and maintenance process for the project.

A. Operation of the system requires minimal on-site assistance from staff because equipment is monitored through remote monitoring equipment. Maintenance is performed quarterly and does not require heavy equipment. Normal maintenance is mowing and weed control with mowers and weedwhackers. The solar array is inspected for optimal operation and corrective action is taken as needed.

Q. Will the operation and maintenance process pose any dangers or risks to the surrounding area?

A. No.

Q. Please explain.

A. The quarterly mowing is of no impact to the grounds or surrounding area. We do not use any chemical treatment in our process of maintenance.

7. PROJECT DECOMMISSIONING PROCESS

Q. Please describe the decommissioning process for the proposed Project.

A. The facility will be restored to a field, and all components of the solar array and supporting infrastructure will be removed and recycled. Any disturbance to the area will be graded and seeded.

Q. Will the decommissioning process pose any dangers or risks to the surrounding area?

A. No.

Q. Please explain.

A. The process of removing the array is contained to within the fence line, therefore there is no danger or risk to the surrounding area.

Q. Will Horton Electrical Services, LLC adhere to, and abide by, all relevant codes, standards, and requirements, including but not limited to the Connecticut State Building Code, National Electrical Code, and the Best Management Practices for Electric and Magnetic Fields, throughout the lifecycle of the project, from construction through decommissioning?

A. Yes. EMI (Electro-magnetic Interference) does not pose any risks from solar arrays, the AC equipment operates at 60hz which is an industry standard for electrical equipment even within a household. Solar panels do not emit EMI, and the associated equipment within operation of a solar array operate well below industry standards of monitoring and mitigating EMI.

C. INTERROGATORY SPECIFIC TESTIMONY

Q. As of the date of this submission, did you respond to any interrogatories for the proposed Project from any parties?

A. Yes, Petitioner received interrogatories from the Siting Council. These interrogatories and responses are attached Exhibit A.

D. PUBLIC COMMENT SPECIFIC TESTIMONY

Q. Are you aware of any public comments or comments from any parties for the proposed Project?

A. Yes. Twenty-seven residents, two state representatives, the Town of Bolton, and the Town of Manchester submitted comments. Only one of the 27 residents abuts the proposed Project Site.

Q. Did any of the public comments touch upon your analysis for the proposed Project?

A. Yes.

Q. Please summarize the nature of these public comments that touch upon your analysis.

A. The topics addressed in the public comments included the potential use of chemicals, herbicides, and/or pesticides.

Q. Do you have any comments regarding these public comments?

A. Yes.

Q. Please explain.

A. No chemicals or pesticides will be used in the construction, operation, or maintenance of the proposed Project. The panels were tested and deemed non-hazardous material. The transformers manufactured today use mineral oil, but mineral oil presents no danger to the environment and is biodegradable. Herbicides are listed in the Operations & Maintenance Plan Petitioner submitted to Council with its Petition as potentially being used where allowed by applicable laws and regulations to manage Site vegetation, but Petitioner can remove this from the Operations and Maintenance Plan. Please refer to the pre-filed written testimony of William Kenny Associates for additional information.

Q. Did you receive any comments from the Town of Manchester that touch upon your analysis?

A. Yes. The topics included:

1. Agricultural Activities – Questions regarding who taps the trees and who uses the sap.

2. Emergency Action Plan – Asked for an emergency action plan to mitigate run-off from the proposed Project for downslope properties. The Town also expressed concerns about mediation plans for any potential fires occurring on the proposed Project Site.

3. Operations & Maintenance Plan – Asked TRITEC to revise the Operations and Maintenance (O&M) Plan to reflect feedback from the Department of Energy and Environmental Protection ("DEEP") regarding potential impacts to Box Turtles and the latest DEEP Guidelines. Also, the Town asked TRITEC to clearly post O&M information at the proposed Project Site for future maintenance contractors. The Town also asked TRITEC to review the parking and turnaround area to ensure there's enough room for O&M contractors to prevent parking along Carter Street.

Q. Do you have any comments regarding these public comments?

A. Yes.

Q. Please explain.

A. 1. Agricultural Activities – Horton Electric has experience constructing and maintaining multiple agrivoltaic solar projects, including those with grazing animals, apiaries, and crop production. The proposed Project is a commercially operating maple syrup farm with tapped maple trees throughout the proposed Project Site and Host Parcel. Any maple tree taps impacted by the proposed construction will be relocated on the Host Parcel. These agricultural activities will continue throughout the proposed Project's lifespan, and Horton Electric is aware that Petitioner is actively pursuing the potential addition of agricultural activities in the Project Size to fully utilize the space.

2. Emergency Action Plan – In the event of a fire or emergency, the proposed Project will be able to be shut down by emergency responders via a physical disconnect switch that will be appropriately labeled under the requirements of the National Electric Code. Upon completion of the proposed Project, Horton Electric will work with the local fire department and introduce them to the proposed Project to address any contingencies at the proposed Site.

Most fire departments are advised not to put water on a solar system fire. Water can be used to keep adjacent equipment cool if significant heat is generated and is of concern. If water happens to come in contact with the solar panels, there is no evidence that it becomes a hazardous material. The submitted TCLP report reflects that the solar panels are not hazardous materials.

Please see the pre-filed written testimony of Solli Engineering for information regarding stormwater run-off mitigation.

3. Operations & Maintenance Plan – The Operations and Maintenance Plan can be revised to reflect feedback from DEEP. Horton Electric will maintain the proposed Project, has significant experience maintaining solar projects like the proposed Project, and is fully aware of the necessary Operations & Maintenance requirements. Additionally, the proposed Site will have enough parking and turnaround area to ensure there's no need for operating and maintenance staff to park along Carter Street. Please see the pre-filed written testimony of William Kenny Associates for additional information.

E. CONCLUSION

Q. Based on your analyses and your pre-filed written testimony addressing Project Construction Process, Safety and Security, Construction and Project Operation Noise, Solar Panel Cleaning, Groundwater Contamination, Project Operation and Maintenance Process, and Project Decommissioning Process, is it your expert opinion that the proposed Project will not create any substantial adverse environmental effects and should be approved by the Siting Council?

A. Yes.

EXHIBIT A

Expert Witness Resumes

Contact

hwreed@hotmail.com

www.linkedin.com/in/howiereed (LinkedIn)
tritec-americas.com (Company)

Top Skills

Lead Generation
Marketing Strategy
Salesforce.com

Languages

Spanish

Certifications

Paul Harris Fellow
Sales Analytics Certification
SS-105: PV Technical Sales & Marketing Certificate

Howie Reed

Chief Operating Officer at TRITEC Americas
San Diego County, California, United States

Summary

For over a decade, Howie has led solar operations at a strategic management level, developing best in class industry practices, while delivering innovative solutions to the needs of both end customers and construction and investor partners. A solar industry veteran, Howie has developed and sourced a commercial solar project pipeline of over 2 GW. Howie's background includes over 20 years of strategic business experience and extensive clean energy industry knowledge. Howie received his bachelor’s degree in marketing and international business from Silicon Valley’s prestigious Santa Clara University.

Howie is an accomplished, driven solar industry veteran with proven success in management, sales, marketing and operations with 20 years of sales, marketing and operational management experience establishing, implementing and leading strategies and initiatives to reach and exceed corporate goals. Howie has extensive experience and knowledge in the solar finance and renewable energy industries. He is a multifaceted, intelligent and poised leader with the knowledge and skills to drive growth in any project. Core professional competencies include:

-Operational Management
-Sales Management
-Renewables
-Solar Financing
-Business Strategy Development
-Marketing and Operational Initiatives
-Team Leadership
-New Business Development
-Lead Generation Program Creation/Enhancement
-Call Center Management
-Training and Development

Experience

TRITEC Americas, LLC
Chief Operating Officer
October 2015 - Present (8 years 7 months)
Greater San Diego Area

- Direct all aspects of TRITEC Americas operations including project development, financing, project management, operational systems, marketing and sales
- Expand industry relationships and incorporate new channel partners to increase project development and financing opportunities for TRITEC Americas
- Designed and implemented an efficient and agile CRM and project management architecture for the constantly evolving needs of the solar industry
- Continuously evaluate and maneuver systems' processes to create procedural efficiencies and cost savings
- Position systems as a key driver to scaling solar project pipeline growth
- Deploy best practices in targeted system module design creating a customizable, user specific experience
- Charged with management and realization of web based tools integration and automation within TRITEC Americas' systems
- Create process efficiencies in due diligence collection and reporting, minimizing approval timelines and allowing for greater project approval processing capacity

Howie Reed Consulting
Principal
January 2012 - Present (12 years 4 months)

- Develop first class sales, marketing and operations solutions to small and medium sized businesses allowing them to focus on their core competencies while I help grow their business
- Specialization in development direction and strategic leadership, overseeing the creation, implementation and growth of client's business initiatives
- Train and motivate sales teams to drive company's sales goals and hit quota targets
- Create and implement integrated sales organizational management tools and processes
- Provide clients with marketing and sales leadership, business and organizational development, lead generation, brand identity and positioning,

copywriting and editing, media buying, social media and search engine optimization
- Create cutting edge video campaigns, premier websites and other impactful marketing collateral

EE Renewable Energy
Senior Vice President of Operations
May 2013 - September 2015 (2 years 5 months)
Greater San Diego Area

- Developed an operational roadmap utilizing software management best practices to build a best in class sales and project management platform
- Established and expanded industry relationships with contractors, suppliers and integrators to further company's sales efforts and drive target revenue goals
- Implemented a mission critical operational focus driven by key performance metrics maximizing process efficiency
- Built multiple clean energy finance quoting engines for different business lines allowing for real time proposal, financing agreement and executive reporting creation
- Drove user experience for customers, sales representatives and stakeholders through www.EqualEarthCorp.com and Equal Earth's fully integrated CRM platform
- Led and managed the implementation of solar photovoltaic, LED lighting and energy efficiency projects through a structured framework allowing for both scalability and streamlined execution
- Designed and executed operational core competencies including due diligence approval processes, rebate processing, billing and customer service
- Constructed and put into practice an in depth training program for all Equal Earth partners driving the company's short term and long term goals and vision

OneRoof Energy, Inc.
Director of Lead Generation
February 2010 - May 2013 (3 years 4 months)

-One of OneRoof Energy's first employees and key contributor to the fast growing start up's growth and market position
-Responsible for referral program, developing lead generation affiliates into strong sources of revenue through signed leases with strong gross margins
-Manage Vertical Account Representatives to identify and sign target key accounts within certain verticals to drive lead generation

-Create and implement long term partner adoption and sales growth plan to hit and surpass company's sales and revenue goals
-Train, educate and ready all affiliates, partners and employees in solar, OneRoof Energy strategy, vision and market positioning to drive sales
-Laid the groundwork for our marketing operations, delivering an in-depth marketing plan integrating all marketing, advertising and public relations campaigns from search engine to direct mail to social media, as well as video development
-Oversaw the development of OneRoofEnergy.com, creating a site that enabled customer and partner education as well as drove new customer acquisition through our lead generation portal
-Built out original sales and operations process flow from start to finish, fully integrating into SalesForce

Red Sun Marketing
Partner, VP Sales & Strategic Partnerships
March 2009 - January 2012 (2 years 11 months)

-Co-founded Red Sun Marketing to provide marketing solutions to small to medium sized businesses
-Responsible for development direction and strategic leadership, overseeing the creation, implementation and growth of hundreds of thousands of dollars worth of marketing campaigns
-Provided clients with marketing and sales leadership, business and organizational development, lead generation, brand identity and positioning, copywriting and editing, media buying, social media and search engine optimization
-Created cutting edge video campaigns, premier websites and other impactful marketing collateral from direct mail pieces to brochures
-Developed RedSunMarketing.com to serve as the face of the company online and act as a lead generation portal

Perfspot.com
Vice President – Marketing & International Operations
January 2007 - March 2009 (2 years 3 months)

-Transformed PerfSpot.com from an English language only site to an international online community that currently boasts 51 distinct languages from all over the globe
-Drove company growth to such an extent that our business unit, PerfSpot.com was acknowledged in Forbes as "Fastest Growing Social Network" in 2008

-Analyzed and targeted possible high growth markets in order to increase the acquisition of new PerfSpot.com users
-Worked directly with CTO on website design to ensure seamless integration for all language formats
-In charge of overseeing all areas of the translation project from market research to hiring and managing qualified translators
-Ensured the timeliness and quality of work of over 100 translators and proofreaders through meeting weekly output goals
-Responsible for budget development and management

Alansis Media
Vice President of Sales
March 2004 - March 2009 (5 years 1 month)

-Provided strategic leadership for the development of over 70 Alansis employees, maximizing productivity and sales revenue
-Grew annual sales to over $11 million from $3 million
-Developed and evaluated new product ideas and pilot programs that led to over $4 million in new sales in the first year alone
-Transformed one of our business units, PerfSpot.com from an English language only site to an international online community that reached 51 distinct languages from all over the globe
-Drove company growth to such an extent that our business unit, PerfSpot.com was acknowledged in Forbes as “Fastest Growing Social Network” in 2008
-Responsible for strategic hires and partnerships to drive sales
-Oversaw $5 million budget for all marketing activities from international marketing contracts to new business development programs
-Created and managed live transfer division which became the leading revenue source for the company going from 0% to over 84% of our annual sales revenue
-Drove sales and productivity of over 30 Alansis account managers as well as over 60 in-house call center employees in addition to 400+ contracted international call center employees
-Authored highly effective call center sales scripts and installed a productivity based bonus program to maximize revenue and minimize costs

Univision Radio
Account Executive
2002 - 2004 (2 years)

-Developed and sold multimedia marketing campaigns incorporating on-air, online and event marketing

-Outpaced sales goals by 450% in first year, leading staff in new customer acquisition
-Created marketing plans and promotional strategies based on client needs and budgets
-Researched competitive positioning and incorporated branding, direct response marketing and creative strategy into complete marketing plans for various industries
-Formed strategic partnerships and alliances with influential business and community leaders driving strong sales partnerships

Education

Santa Clara University - Leavey School of Business

BS, Marketing, International Business · (1997 - 2001)

La Jolla Country Day School

· (1994 - 1997)

KEVIN SOLLI

P.E, PTOE, CRRP, CPESC, CDP, LEED AP BD+C

Owner & Manager

Years of Experience:
21

Years with Firm:
Founded Solli Engineering LLC in May, 2012

Education:
B.S. Civil Engineering,
Rensselaer Polytechnic Institute

Professional Accreditations:

- Professional Engineer: CT, DE, FL, ME, MD, MA, MI, NH, NJ, NY, NC, OH, OR, PA, RI, VT, VA
- Professional Traffic Operations Engineering
- Envirocert: Certified Professional Erosion & Sediment Control
- LEED Accredited Professional: USGBC
- Certified Design, Development & Construction Professional ICSC

SOLLI ENGINEERING

Mr. Solli has over twenty-one (21) years of civil engineering experience specializing in civil engineering, site development, transportation and traffic engineering. He has been responsible for the engineering design and preparation of contract documents for a wide variety of projects. He has served as both Project Engineer and Project Manager for site development and transportation infrastructure projects for a variety of private clients. Project Engineer responsibilities for land development engineering projects include the preparation of conceptual site plans, feasibility studies, comprehensive due diligence investigations, detailed site design drawings, comprehensive soil erosion and sediment control plans, stormwater management analysis and reports, stormwater pollution prevention control plans, septic design, and extensive local, state and federal permitting. Project Engineer responsibilities for transportation engineering projects have included the preparation of parking studies, traffic impact studies, traffic signal design, and detailed roadway design. Project Management responsibilities have included coordination of multi-disciplined teams of engineers in the execution of projects from the due diligence/planning stage through approvals and construction.

REPRESENTATIVE PROJECTS:

ShopRite, Town of Greenburgh, New York - Serving as Engineer of Record for the site design and construction of a 75,711 square-foot supermarket store with a 10,765 square foot retail store attached, and a separate 3,000 square-foot retail store with associated parking, drainage and utilities; while maintaining the existing Taco Bell restaurant at the northwest portion of the property. Highway design included off-site improvements to 1,100 linear feet of Route 9A along the property frontage including geometry, lane striping, as well as sidewalk, pedestrian and substantial utility relocation to both existing aboveground and underground utilities. Roadway design included widening of Old Country Road to provide additional storage length to the exclusive turn lane.

Traffic engineering services included traffic signal design for the site driveway and adjacent intersection to accommodate the reconfigured intersection in coordination with the upgrade of the traffic signal at Old Country Road under a state roadway project, corresponding traffic impact study, traffic data collection, trip generation assessment, intersection operational analysis, safety analysis, recommended safety and operational improvements, signing and striping, and a comprehensive traffic impact report for the ten signalized intersections within the study area. Traffic signal design was also provided for the project site driveway with Saw Mill River Road which includes replacement of signal poles, span wire and signal heads, implementation of video detection, and upgrades to pedestrian accommodations.

Holyoke Landing, Holyoke, Massachusetts – The project known as Holyoke Landing is a 10.32-acre undeveloped parcel which proposes the construction of a multi-tenant shopping center with two outparcels. Traffic Signal design included modifying the existing signal at the site driveway intersection and upgrade the existing pedestrian equipment. This signal also includes SynchroGreen capabilities. Traffic Engineering services included conducting a comprehensive traffic impact study including 6 intersections, traffic data collection, trip generation assessment, intersection operational analysis, safety analysis, recommended safety and operational improvements, signing and striping, maintenance and protection of traffic. Local and MassDOT approvals were secured for the proposed traffic signal modifications and construction administration services are being provided for the duration of construction.

Shelter Ridge, Shelton, Connecticut - The project proposes the development of 121.24 acres with a 1,294,100 square foot mixed-use development consisting of commercial retailers, restaurants, an assisted living facility, professional office, medical office, and luxury

KEVIN SOLLI

P.E, PTOE, CRRP, CPESC, CDP, LEED AP BD+C

Owner & Manager

Years of Experience:
21

Years with Firm:
Founded Solli Engineering LLC in May, 2012

Education:
B.S. Civil Engineering,
Rensselaer Polytechnic Institute

Professional Accreditations:

- Professional Engineer: CT, DE, FL, ME, MD, MA, MI, NH, NJ, NY, NC, OH, OR, PA, RI, VT, VA
- Professional Traffic Operations Engineering
- Envirocert: Certified Professional Erosion & Sediment Control
- LEED Accredited Professional: USGBC
- Certified Design, Development & Construction Professional ICSC

SOLLI ENGINEERING

REPRESENTATIVE PROJECTS CONTINUED:

rental residences. Mr. Solli served as the engineer of record responsible for all project aspects including the preparation of the comprehensive traffic impact study for 17 study area intersections and proposed conceptual roadway improvements plans at 5 study area intersections. Project services also included in permitting services associated with the preparation of the Step 1 application under the OSTA major traffic generation certificate process.

Towne Line Plaza, Monroe, Connecticut – The project includes the development of an existing site totaling approximately 6.968 acres. The development proposes the construction of a 4,276 square foot convenience store with a gas station component and coffee shop with drive through, a restaurant of approximately 4,950 square feet, a mixed-use retail building of approximately 17,500 square feet, and a medical office of approximately 10,000 square feet. The proposed development includes a 38 foot wide main driveway with new traffic signal control along Monroe Turnpike in Monroe, Connecticut. Mr. Solli serves as the engineer of record responsible for all project aspects for the site design, traffic engineering, and permitting services for this project. Responsibilities include the preparation of detailed site design drawings which required comprehensive layout, grading & drainage, erosion and sediment control measures, and utility design, preparation of the off-site improvement roadway design plans, traffic impact study, and traffic signal warrant analysis and design though the OSTA MTG certificate permit and encroachment permit process.

75 Church Hill Road, Newtown, Connecticut – The project includes the development of a 2.034 acre parcel with a mixed-use development consisting of 12,237 square feet of total building area, a coffee shop drive-thru and a detached ATM kiosk location. Mr. Solli serves as the engineer of record for the site design, traffic engineering, and permitting services provided for this project. Responsibilities included the preparation of detailed site design drawings which required comprehensive layout, grading and drainage, erosion and sediment control measures, and utility design. The project development included the relocation of a portion of a brook (Tom Brook), to increase greater separation of from environmental contaminants and prevent mobility of the plume through the brook. Mr. Solli also serves as the engineer of record responsible for the design of the off-site improvement plans for roadway widening in coordination with ConnDOT project # 096-192. Traffic engineering services include the preparation of off-site improvement plans, traffic control signal plans, intersection operations analysis utilizing Synchro software, traffic impact study preparation and extensive coordination with ConnDOT through permitting and construction.

Contact

labattican@gmail.com

www.linkedin.com/in/eric-labatte-082751b (LinkedIn)

Top Skills

Civil Engineering
Construction
Stormwater Management

Eric Labatte

Director of Operations - Solli Engineering
Greater Hartford

Experience

Solli Engineering
Director of Operations
September 2023 - Present (8 months)
Monroe, Connecticut, United States

ALL-POINTS TECHNOLOGY CORPORATION, P.C
Department Manager - Engineering
March 2019 - August 2023 (4 years 6 months)

All-Points Technology Corporation
Project Manager
September 2013 - March 2019 (5 years 7 months)
Connecticut

Freeman Companies, LLC
Project Manager
May 2010 - September 2013 (3 years 5 months)

BL Companies
Project Manager
June 2000 - April 2010 (9 years 11 months)

Education

Syracuse University
BS, Civil Engineering · (1995 - 2000)

PROJECT ROLE
Assistant Project Manager

EDUCATION
Bachelor of Science in Engineering, Northeastern University, Boston, MA, 2006

WORK EXPERIENCE

Solli Engineering, LLC - Assistant Project Manager	August 2023 - Present
All-Points Technology Corporation – Project Engineer	March 2015 – August 2023
BL Companies – Project Engineer	February 2013 – March 2015
Freeman Companies – Staff Engineer	May 2010 – February 2013
BL Companies – Staff Engineer	June 2006 – May 2010

Resume
Cameron Hendry

SUMMARY OF QUALIFICATIONS

Cameron S. Hendry has over 18 years of experience in civil engineering including transportation engineering in all phases of site/civil project development from preliminary sketch phase through design and final permitting. Proficient in computer-aided design, he has extensive experience in every aspect of civil engineering design for development sites, including hydrologic and hydraulic analysis, site layout, grading, utility design, stormwater management, sediment and erosion control and permitting with local and state agencies. Mr. Hendry also has experience in highway design, including roadway layout, grading, and hydraulic/drainage design for the State of Connecticut Department of Transportation. He also has experience in sedimentation and erosion control inspections, land surveying, construction stake-out, land planning, zoning investigation and permit procurement in the State of Connecticut.

RELEVANT EXPERIENCE

Solar Facility, Suffield, Connecticut

Served as Project Engineer responsible for the development of 0.99 megawatt AC solar facility in Watertown, Connecticut. Specific tasks under this contract involved site layout, drainage design, site grading, sedimentation and erosion control design and permitting with the Connecticut Siting Counsil.

Solar Facility, Montville, Connecticut

Served as Project Engineer responsible for the development of 0.99 megawatt AC solar facility in Watertown, Connecticut. Specific tasks under this contract involved site layout, drainage design, site grading, sedimentation and erosion control design and permitting with the Connecticut Siting Counsil.

Solar Facility, Watertown, Connecticut

Served as Project Engineer responsible for the development of 2 megawatt AC solar facility in Watertown, Connecticut. Specific tasks under this contract involved site layout, drainage design, site grading, sedimentation and erosion control design and permitting with the Connecticut Siting Counsil.

Solar Facility, Uncasville, Connecticut

Served as Project Engineer responsible for the development of 1.99 megawatt AC solar facility in Watertown, Connecticut. Specific tasks under this contract involved site layout, drainage design, site grading, sedimentation and erosion control design and permitting with the Connecticut Siting Counsil.

Solar Facility, Old Lyme, Connecticut

Served as Sedimentation and Erosion Control Inspector responsible for the inspection of Sedimentation and Erosion Controls during construction and post-construction for a solar facility in Old Lyme, Connecticut.

Reconstruction of Powder Mill Road and Indian Hill Road, Canton, Connecticut

Served as Project Hydraulics Engineer for the hydrologic and hydraulic design services for the reconstruction of Powder Mill Road and Indian Hill Road in Canton, Connecticut. Responsibilities include design of the proposed storm drainage systems, design of the proposed culverts, as well as providing full design plans.

Culvert Replacement on Bunker Hill Road and Hansen Road, Canton, Connecticut
Served as Project Hydraulics Engineer for the hydrologic and hydraulic design services for the replacement of a culvert on Bunker Hill Road and the replacement of a culvert on Hansen Road in Canton, Connecticut. Responsibilities include design of the proposed culverts, as well as providing full design plans.

Reconstruction of Pepper Street, Monroe, Connecticut
Served as Project Hydraulics Engineer for the hydrologic and hydraulic design services for the replacement of a culvert over West Branch Pequonnock River on Pepper Street, near the intersection of Pepper Street and Jockey Hollow Road, in Monroe, Connecticut. The culvert replacement is part of a larger project which involves the reconstruction of approximately 4,500 linear feet of Pepper Street from Grant Road to Cambridge Drive. Responsibilities include the submission of a hydrologic analysis report, and a hydraulic analysis report, as well as full design plans.

Old Main Street Bridge Replacement, Rocky Hill, Connecticut
Served as Project Hydraulics Engineer for the hydrologic and hydraulic design services for the replacement of a bridge over Goff Brook on Old Main Street, near the Rocky Hill/Wethersfield Town line in Rocky Hill, Connecticut. Responsibilities include the submission of a hydrologic analysis report, a hydraulic analysis report, a scour analysis report and a floodway analysis report as well as full design plans.

Constitution Natural Gas Pipeline, Brooklyn Township, Pennsylvania to Wright, New York
Served as Project Hydraulics Engineer for the drainage and erosion control design services for the installation of the 124 mile Natural Gas transmission line from Brooklyn Township, Pennsylvania to Wright, New York. Responsibilities included providing project design for all required sediment barriers and waterbody crossings along the entire pipeline and the design of approximately 70 permanent access roads.

Consultant Liaison Engineering Services for the State and Federal Local Bridge Program, Connecticut Department of Transportation
Served as Project Hydraulics Engineer for the hydrologic and hydraulic design services for 23 bridges under the Connecticut State CLE Program. Responsibilities included the submission of 23 hydrologic analysis reports, 23 hydraulic analysis reports, 13 scour analysis reports and 7 floodway analysis reports.

Polamer Precision, Pinnacle Business Park, New Britain, Connecticut
Served as Project Manager/Project Engineer responsible for managing the civil project team, budget and design for a 140,000 square foot manufacturing facility in New Britain, Connecticut. Specific tasks under this contract involved site layout, drainage design, utility layout, coordination with the City of New Britain, permitting, planning and project management.

William L. Kenny
PWS, PLA

Mr. William L. Kenny has more than 30 years of experience in site and environmental assessments, planning, and construction. Mr. Kenny is a Professional Landscape Architect, Certified Professional Wetland Scientist, and a Soil Scientist.

Education

University of Massachusetts, 1993-1995. Postgraduate studies in soil science.

Yale University, MEM, 1992. Master of Environmental Management. Concentration and thesis work in ecosystem ecology, hydrology, and restoration.

University of Connecticut, BS, 1987. Bachelor of Science Degree in Landscape Design.

Representative Work Experience

Site Planning and Landscape Architecture

Mr. Kenny has more than 30 years of experience with site planning and landscape architectural projects either as the primary designer and project manager, a collaborating design professional, or construction contractor. Mr. Kenny has design and management experience with all project phases: from master planning and conceptual design to construction and bid document preparation and construction observation.

Wetland Delineation, Assessment, and Impact Mitigation

Mr. Kenny has extensive experience with tidal and inland wetland and watercourse delineation, assessment, and impact mitigation projects and obtaining related regulatory approvals as a project scientist and manager. Project work has included approval and construction documents for residential, commercial, recreational, and institutional developments. Specific tasks Mr. Kenny has completed include: (1) wetland delineations and functional assessments in Connecticut and New York in accordance with federal, state, and local requirements; (2) development planning and design consultation to minimize wetland impacts; (3) impact assessments and wetland construction mitigation designs; and (4) hydrologic evaluations for inland and tidal wetland restoration and creation projects.

Water Resource Management

Mr. Kenny has a wide range of experience with water resource management projects and attaining related development approvals and permits as a project manager and scientist. Project work has included stormwater pollution prevention plan preparation in accordance with New York City, New York State, and Connecticut requirements; stormwater treatment Best Management Practices design; stormwater pollutant loading and BMP effectiveness modeling; groundwater modeling for subsurface sanitary disposal systems, and erosion and sediment control plan preparation for residential, commercial,

recreational, and institutional developments.

Ecological Inventories and Impact Assessments

Mr. Kenny has broad experience with preparing ecological inventories and impact assessments and attaining related development approvals and permits as a project manager and scientist. Project work included Environmental Impact Statement (EIS) preparation to fulfill New York State requirements. Specific management or technical responsibilities included mapping and assessing existing conditions and potential impacts to bedrock and surficial geology, soils, vegetative communities, wetlands, surface and groundwater bodies, and wildlife and their habitat.

Regulatory Agency Consulting

Mr. Kenny has been retained by Connecticut municipalities to conduct analyses and prepare reports regarding inland wetlands and watercourses permit applications to be heard by local agencies. This work includes the review of wetland boundary delineations.

Public Speaking

CT Audubon – Recurring annual lecture since 2015 regarding native plants and communities.
Yale University – Lecturer regarding sustainable and ecological landscape design.
UConn – Advanced Master Gardener Program – Lecturer regarding innovative strategies for wetland restoration and management.
CT ASLA – Lecturer regarding innovative strategies for wetland restoration and management.
Connecticut Association of Conservation & Inland Wetlands Commissions - Lecturer regarding innovative strategies for wetland restoration and management.
New York Botanical Garden – Lecturer regarding innovative strategies for wetland restoration and management.

Professional Training

OSHA 24-hour HAZWOPER Training
Organic Land Care
CT DEP Master Wildlife Conservationist Program
Pond Management
Wetland Construction
Wetland Functional Assessment Techniques
Urban Stormwater Management Practices
Erosion and Sediment Control
Soil Sciences
Computer Aided Drafting

Publications

Kenny, W.L. 1995. The West River salt marsh: past and present. In *Proceedings of the West River Symposium*, ed. By E. McDiarmid, P.K. Barten, and C.J. Genshlea, 33-40. New Haven, CT: Center for Coastal and Watershed Systems, Yale School of Forestry and Environmental Studies.

Barten, P.K. and W.L. Kenny, 1997, The hydrologic structure and function of the West River marsh. In *Bulletin Number 100, Restoration of an Urban Salt Marsh: An Interdisciplinary Approach*, Bulletin Number 100, vol. ed. by D.G. Casagrande and bul. series ed. by J. A. Miller and J. Cappock, 103-122. New Haven, Connecticut: Yale School of Forestry and Environmental Studies.

Contributing graduate student author to:
Bormann, F.H., D. Balmori, and G.T. Geballe, 1993. *Redesigning the American lawn: a search for environmental harmony*. Yale University Press, New Haven and London.

Professional Affiliations and Registrations

Flood & Erosion Control Board, Fairfield, Connecticut (Member 2011- 2015)
Shellfish Commission, Fairfield, Connecticut (Member 1995 -2006, Chairman 1996 - 2005)
Connecticut Association of Wetland Scientist (Member 1999-present, Secretary 2001 - 2010)
Society of Soil Scientist of Southern New England (Associate Member 1995-2004, Professional Member 2004 -present)
Society of Wetland Scientists (Member 2001-present)
Certified Professional Wetland Scientist (#1372), Society of Wetland Scientists (2003-present)
Professional registration, Landscape Architecture
#664, State of Connecticut (1990-present)
#001869, State of New York (2003-present)
American Society of Landscape Architects (Member 2001-2010, 2013-present)
Ecological Society of America (Member 2020-2021)
Northeast Organic Farming Association (2004-present)
Certified Organic Land Care Professional (2005-present)

Alexander D. Wojtkowiak
Project Manager
Soil Scientist

WILLIAM KENNY ASSOCIATES
LANDSCAPE ARCHITECTURE ▪ ECOLOGICAL SERVICES

Mr. Alexander D. Wojtkowiak has over four years of experience serving as an environmental professional in the land development sector. Specializing as a wetland scientist and ecologist, he has consulted clients of a variety of projects throughout various development phases and assisted in helping them obtain the regulatory agency approvals needed for their ventures.

Education

B.S. Natural Resource Science *Environmental Science & Management*,
University of Rhode Island, Kingston, R.I., 2018.

Representative Work Experience

William Kenny Associates LLC, Fairfield, CT — July 15, 2019 – Present
Soil Scientist — July 15, 2019 – April 6, 2023
Project Manager — April 7, 2023 – Present

Wetland and Watercourse Delineations, Functional Assessments and Soil Surveys
Experienced in conducting inland and tidal wetland and watercourse delineations in Connecticut and New York according to various local, state and federal regulations.
Experienced in conducting second order soil surveys of project sites per the principles and practices noted in the USDA *Soil Survey Manual* (2017).
Experienced in assessing the functional capacity of wetlands and watercourses and comparing impacts to such systems pre- and post- site development per the hydrogeomorphic classification system established by Normandeau Associates, Inc., *A Rapid Procedure for Assessing Wetland Functional Capacity* (1998) as well as the evaluation methods described in the USACE *Highway Methodology Workbook Supplement* (2015).

Ecological Inventories and Assessments
Experienced in conducting ecological inventories and assessments of vegetative communities, wildlife, and their associated habitats. Assessments evaluate the developmental impacts to these resources and means to mitigate these impacts, both direct and indirect, in the short- and long-term.
Experienced in conducting vernal pool assessments per the Connecticut Association of Wetland Scientists' Vernal Pool Monitoring Program protocol and evaluations of these critical habitats based on *Best Development Practices Conserving Pool-Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States* (2002).

Local, State, and Federal Permitting
Experienced in report preparation for, and permit application to, a variety of local, state and federal regulatory agencies for a variety of land use projects. Reports detail existing and proposed ecological conditions at project sites, the impacts to natural resources, and the means to mitigate intentional and inadvertent impacts to these resources such as

vegetative communities, wildlife and their associated habitats, listed species and critical habitats, wetlands, surface and groundwater resources, and soils and surficial geology.

Site Monitoring of Soil Erosion and Sediment Control Plans
Experienced in the routine monitoring of various construction projects as they relate to maintaining permit compliance with local and state guidelines. Projects are monitored to remain in compliance with approved plans and the standard practices described within the 2002 CT Guidelines for Soil Erosion and Sediment Controls and 2004 CT Stormwater Quality Manual.

Professional Certifications and Training

OSHA 40-hour HAZWOPER
OSHA 10-hour Construction & General Industry

Professional Affiliations and Registrations

Soil Science Society of America (Member 2019 - present)
Society of Soil Scientists of Southern New England (Basic Member 2019 - present)
Society of Wetland Scientists New England Chapter (Member 2020 - present)
Connecticut Association of Wetland Scientists (Associate Member 2020 - present)
Soil and Water Conservation Society Southern New England Chapter (Member 2022 - present)
Ecological Society of America (Member 2022 - present)
Connecticut Botanical Society (Member 2022 - present)

Jackson S. Smith
Ecologist

Experience assisting with numerous environmental services, including delineating inland and coastal wetland and watercourse boundaries, assessing the quality and functionality of various coastal and inland ecosystems, evaluating the potential biological and environmental impacts of proposed projects, and monitoring soil erosion and sediment control measures during project construction. During undergraduate studies, research experience included studying the overwintering habits of migratory birds, field testing behavioral responses of shrews and red squirrels, developed a study to determine how various northern New England landscape uses affect survival rates of the endangered Blanding Turtle. Attended several workshops and seminars hosted by the Soil Scientists of Southern New England (SSSNE) and the Connecticut Association of Wetland Scientists (CAWS).

Education

B.S. Wildlife Ecology, *Wildlife Science and Management*
University of Maine, Orono, ME, 2023.

Representative Project Experience

Wetland Delineation

Acted as a project ecologist to assist with tidal and wetland and watercourse delineations in Connecticut and New York. Completed delineation in accordance with federal, state and local standards. Developed abilities to complete pre-investigation desktop analysis, identify field indicators (i.e., soil, hydrology, obligate wetland vegetation) and record as well as defend wetland boundary determinations.

Wetland Assessment and Impact Mitigation

Experience assessing the impacts of proposed projects on the surrounding ecosystem. Project work includes assisting with. Completed functional assessments of tidal and inland wetlands in Connecticut and New York in accordance with federal, state, and local standards; (2) impact assessments for coastal and inland projects; (3) environmental assessments for large-scale (60-180 acre) solar array development projects.

Reports

Assisted with attaining approval and construction documents for residential, commercial, recreational, and intuitional developments via co-authoring various reports to local, state, and federal agencies/authorities. Reports include but are not limited to:

- Ecological Assessment Reports: inventoried onsite vegetation, wildlife and wetlands to produce a comprehensive ecological assessment detailing existing ecological conditions and assessing potential impacts to onsite wildlife, habitats and vernal pools under proposed conditions. Projects include various land use categories such as warehouse development, multi-building residential development, solar array development, and other various commercial or intuitional developments.
- Wetland Impact Assessment Report: Assessed wetland functions and values under current and proposed site conditions. Produced reports determining potential adverse or beneficial effects to wetlands or watercourses. Determinations made based upon

proposed measures to protect wetlands from direct and indirect short-term adverse impacts such as soil and sedimentation or temporary wetland disturbance, as well as direct and indirect long-term adverse impacts such as stormwater runoff changes or deliberate wetland disturbance/elimination.

- Coastal Action Management Plan: Identified and assessed current coastal resources, evaluated and recommended management techniques to prevent adverse impacts to these resources.

Site Monitoring of Soil Erosion and Sediment Control Plans

Experience assisting with various local (town) site monitoring inspections and reports for residential and intuitional projects regarding the efficacy of soil erosion and sediment control measures outlined within civil engineering plan sets associated with, and in conjunction with conditions outlined in permits obtained via local inland wetland, conservation, and environmental protection departments/agencies/ commissions. Understanding of soil erosion and sediment control measures (based on 2002 & 2024 CT Guidelines for Soil Erosion and Sediment Controls) and temporary stormwater management measures (based on 2004 & 2024 CT Stormwater Quality Manual).

Site Monitoring of Wetland Mitigation/Restoration Plans

Experience assisting with various site monitoring inspections and reports for residential and commercial projects regarding the efficacy of approved wetland mitigation and restoration plans. Determinations made on proper property invasive vegetation control/removal, property planting locations and success of plantings. Provided additional recommendations to property owners for continued success mitigation and restoration areas.

Professional Affiliations and Registrations

Society of Wetland Scientists New England Chapter (Member 2024 – present)
Connecticut Association of Wetland Scientists (Associate Member 2024 – present)
Connecticut Botanical Society (Member 2024 – present)

Contact

www.linkedin.com/in/warren-horton-b7b4611 (LinkedIn)

Top Skills

Manufacturing
Product Development
Strategic Planning

Certifications

Electrical Unlimited Contractor
OSHA-30
OSHA Subpart P 29 CFR Trenching & Excavations
Electrical Journeymens License

Warren Horton

President/Member at Horton Electrical Services, LLC
Canton, Connecticut, United States

Summary

My electrical carrier started in in February of 1994 as an electrical apprentice. In 1998 I graduated IEC of New England with High Honors, obtaining my Journeymens license two weeks after graduation.
From 1998-2002 i worked as leed foreman and project manger.in late 2002 i moved into the office full time and became the Vice President, In 2008 I became the President/ CEO until December of 2013.
In January of 2104 we established Horton Electrical Services and i am currently the President.

Experience

Horton Electrical Services, LLC
President/Member
January 2014 - Present (10 years 4 months)
97 River Canton, Ct 06019

Manage the day to day operations of the company, Strategic Planning, Estimating and Financial overseeing

Arthur A Horton Inc
President & CEO
February 1994 - December 2013 (19 years 11 months)
97 River Road Canton, CT. 06019

Manage the day to day operations of the Project Management, Service, Estimating and Finacial aspects of the company.
Strategic Consulting, including business plan & sales strategy development.

Education

IEC New England
Electrical Journneymens License, Electrical/Electronics Equipment Installation and Repair, General · (1995 - 1998)

Fryeburg academy

General Studies · (1986 - 1987)

Oliver Wolcott Regional Vocational Technical Sch

Electrician/Drafting · (1984 - 1985)

EXHIBIT B

Petitioner Interrogatory Responses to Siting Council

MLG | MICHAUD
RENEWABLE ENERGY LAW IS OUR BUSINESS LAWGROUP

PAUL R. MICHAUD
Managing Attorney / Principal
515 Centerpoint Drive, Suite 503
Middletown, CT 06457
Direct Telephone: (860) 338-3728
Email: pmichaud@michaud.law
Web: www.michaud.law

April 23, 2024

DELIVERED BY E-MAIL AND HAND DELIVERY

Melanie Bachman
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **PETITION NO. 1609** – TRITEC Americas, LLC notice of election to waive exclusion from Connecticut Siting Council jurisdiction, pursuant to Connecticut General Statutes §16-50k(e), and petition for a declaratory ruling, pursuant to Connecticut General Statutes §4-176 and §16-50k, for the proposed construction, maintenance and operation of a 0.999-megawatt AC solar photovoltaic electric generating facility located at 250 Carter Street, Manchester, Connecticut, and associated electrical interconnection. **Petitioner Responses to Interrogatories from Council**.

Dear Attorney Bachman:

On behalf of TRITEC Americas, LLC ("Petitioner"), please accept the enclosed responses to the interrogatories provided by the Connecticut Siting Council ("Council") on April 2, 2024. The Petitioner submits an original and fifteen hard copies of all necessary documents. Please feel free to contact me if you have any questions.

Very sincerely yours,

Paul R. Michaud

Paul R. Michaud

cc: Service List dated January 26, 2024
John F. Sullivan, Attorney for the Town of Manchester
Raymond Welnicki
Rachel and Dana Schnabel
Rosemary Carroll (MARSD)

Petition No. 1609

TRITEC Americas, LLC
250 Carter Street, Manchester, Connecticut

Interrogatories
April 2, 2024

NOTICE

1. Has TRITEC received any comments since the Petition was submitted to the Council? If yes, summarize the comments and how these comments were addressed.

   Response:

   Yes. On February 21, 2024, the Town of Manchester Public and Zoning Commission independently conducted a public comment session to collect comments from the Town residents regarding the proposed Project. The Town of Manchester submitted these comments directly to the Siting Council. In addition, twenty-seven Manchester residents, the Town of Bolton, State Representatives Jason Doucette and Steve Wir, the Manchester Legislative Delegation, and the Manchester Planning and Zoning Commission submitted comments to the Council. A table summarizing the comments is attached (See "Exhibit A: Summary of Public Comments"), and Petitioner will address these comments in their pre-written filed testimony.

2. Referencing Petition p. 3, which Town officials were present at the November 14, 2023, video conference? What specific comments did the Town have concerning the proposed project?

   Response:

   Manchester's Town Manager, Steve Stephanou, Director of Planning and Economic Development, Gary Anderson, and Director of Public Works, Tim Bockus, attended the video conference. They asked questions regarding tree clearing, wetland impacts, noise, rights-of-way, and potential opportunities for public participation in the petition process.

3. Referencing Petition p. 3, how many abutting property owners and residents attended the November 16, 2023, video conference?

   Response:

   Four abutters attended the video conference.

PROJECT DEVELOPMENT

4. Referencing Petition p. 4,
    a. by what mechanism would the energy from the proposed facility provide electricity only to the Town of Manchester?

Response:

Page 4 of the Petition does not state that the proposed Project would provide electricity only to the Town of Manchester. The Petition states that the proposed Project would benefit the Town of Manchester by producing "clean, carbon-free energy for the electric grid, thus reducing the Town's reliance on fossil fuels and helping to decrease greenhouse gas emissions and combat climate change," and the proposed Project, "would allow the Town to help meet Connecticut's law to achieve 100% carbon-free generation by 2040." *See* Petition No. 1609, Petition Narrative, 4 (1/24/24).

The proposed Project would help the State and Town reduce fossil fuel reliance and achieve 100% carbon-free generation by replacing electricity from fossil fuels with solar energy. Petitioner sells the solar energy to Eversource, which distributes it to Connecticut residents, including those in Manchester.

    a. would the proposed facility produce energy 24/7? If not, how would the proposed facility provide a stable electricity supply for the electric grid?

Response:

No. The proposed Project would not produce energy 24/7. It would provide a stable electricity supply for the electric grid during the daytime.

    b. what substantial grid improvements would occur near the proposed facility?

Response:

The proposed Project improves the electrical grid by reducing stress on the distribution system. The proposed Project is a distributed generation facility that helps spread generation across the grid, thereby reducing the amount of electricity needed to move across the distribution lines. For example, the Manchester 3A substation will receive electricity from the proposed Project (5 miles away). In contrast, the next closest generation facility in the electric utility sector is the Rainbow Hydroelectric Plant (19 miles away). *See* U.S. Energy Information Administration, "Electricity Data Browser" (last visited April 18, 2024). This reduction in electricity movement reduces energy losses, delays infrastructure upgrades, and extends distribution lines and overall electric grid lifespans, saving money on maintenance, operating, and electricity costs.

5. Referencing Petition p. 5,
    a. describe how the westward sloping topography benefits the site layout.

Response:

The westward sloping topography allows the proposed Project Site to be constructed with minimal impact on the natural grades.

b. describe how the absence of biological and hydrological conflicts was determined.

Response:

Petitioner worked with numerous consults, experts, and state and federal agencies to complete the Environmental Assessment and determine that there are no biological or hydrological conflicts if the proposed Project were to move forward, and that any potential biological or hydrological impacts found on the proposed Site could be mitigated through the appropriate measures.

c. describe how the site will be "preserved."

Response:

The proposed Project Site would only disturb 7.8 acres of the 41.08-acre Host Parcel, preserving 33.8 acres (over 80%).

6. What alternative site locations were examined, if any?

Response:

Petitioner analyzed multiple site locations in proximity of the proposed Project Site, but none were feasible due to issues including, but not limited to, interconnection, wetlands, and proximity to housing developments. Petitioner selected the proposed Site because it is a large, isolated parcel (approximately 41.08 acres) surrounded by trees. Petitioner will use only approximately 7.8 acres (about 19%) of the entire Host Parcel. The remaining 33.8 acres (over 80%) will remain intact.

7. Referencing Petition p. 6, identify all permits necessary for construction and operation and which entity will hold the permit(s).

Response:

The proposed Project will require a General Stormwater Permit from DEEP, building and electrical permits from the Town of Manchester, and a utility interconnection agreement and easement with Eversource Energy. Petitioner will hold all permits.

8. Referring to Petition p. 11, when will the project be bid into the NRES Program? Would the total capacity of the facility be supplied to the NRES Program? If the project were to be bid into the program and selected, what distressed municipalities would benefit from the project?

Response:

Petitioner submitted the proposed Project into the NRES Program auction held in February 2024. The total capacity of the proposed Project would be supplied to the NRES Program. The distressed municipalities benefiting from the proposed Project would be the Town of Plymouth and the City of Meriden.

9. If the facility is not selected in the NRES Program, would TRITEC withdraw this Petition?

   Response:

   No. Petitioner would resubmit the proposed Project in the NRES Program, sell electricity wholesale under Eversource Rate 980, or pursue another revenue mechanism.

10. If the facility operates beyond the terms of the NRES Agreement, will TRITEC decommission the facility or seek other revenue mechanisms for the power produced by the facility?

    Response:

    This will depend on the market conditions.

11. If TRITEC transfers the facility to another entity, would TRITEC provide the Council with a written agreement as to the entity responsible for any outstanding conditions of the Declaratory Ruling and quarterly assessment charges under CGS §16-50v(b)(2) that may be associated with this facility, including contact information for the individual acting on behalf of the transferee?

    Response:

    Yes. Petitioner would provide the Council with a written agreement.

PROPOSED SITE

12. Submit a map depicting the boundaries of the solar facility site and the boundaries of the host parcel(s). Under Regulations of Connecticut State Agencies (RCSA) §16-50j-2a(29), **"Site"** means a contiguous parcel of property with specified boundaries, including, but not limited to, the leased area, right-of-way, access, and easements on which a facility and associated equipment is located, shall be located, or is proposed to be located.

    Response:

    Please refer to the "Overall Site Plan" (Sheet 2.10 in Exhibit B) for the map depicting the boundaries of the proposed Project and the host parcel.

13. What is the length of the lease agreement with the property owner? Describe options for a lease extension, if any.

    Response:

    The lease agreement will be 21 years long, with options to extend for two one-year periods and two five-year periods.

14. In the lease agreement with the property owner, are there any provisions related to decommissioning or Site restoration at the end of the project's useful life? If so, please describe and/or provide any such provisions.

    Response:

    Yes. The lease includes the following provisions:

    > **<u>Decommissioning</u>. At the termination or expiration of the Lease, whether as to the entire Property or only as to part, the Lessee shall cease commercial operation of the Solar Energy Project on the Property or the part as to which the Lease has terminated or expired. Lessee shall, as soon as practicable after that and at its sole cost and expense, remove all above-ground and below-ground Solar Energy Projects, excluding the portion of foundations that are below a depth of two feet below grade from the natural surface of the Property or of the portion as to which this Lease was terminated, infrastructure and underground conduit that cannot be removed without damage to the Property, and dispose of such removed components per applicable law (the "Decommissioning Obligations"). Lessee shall leave the Property in substantially the same condition as before the Effective Date (except for removing trees and foliage permitted hereunder) and shall restore the soil surface to a condition reasonably similar to its original condition, reasonable wear and tear, and casualty excepted. The lessee shall post a decommissioning performance bond to secure the performance of its obligations under Section 13.13. The provisions of this section shall not affect any continuing rights or obligations that under the terms of this Lease survive the Term or any termination or expiration of this Lease. The provisions of this section shall survive any termination or expiration of this Lease.**

15. Does the lease agreement with the property owner contain provisions for agricultural co-uses at the site? If yes, describe the co-uses.

    Response:

    Yes. The lease agreement specifies that the Host Parcel will continue to be used for commercial maple syrup processes.

16. If agricultural co-uses are implemented at the site, who would be responsible for responding to concerns and/or complaints related to these agricultural co-uses? How would contact information be provided?

    Response:

    All concerns and/or complaints about these agricultural co-uses can be directed to Petitioner's legal counsel, Michaud Law Group, LLC.

17. Referencing Petition p. 12, how does the property owner access the host parcel to conduct maple sugaring activities? Is there existing access off Carter Street and through the wetlands to the interior of the host parcel?

Response:

The farmer accesses the proposed Project Site by parking in the pull-off area along Carter Street and walks onto the Host Parcel to tap the maple trees and collect the sap. The maple sugaring takes place off-site at Rosson Maple Farm.

18. Referencing Petition Appendix D, a site layout different from the currently proposed site layout is shown in Figure 1, Sheet SP-1. What were the reasons for the re-design of the site? Did the revised layout result in a reduced capacity?

Response:

Figure 1 in Appendix D is a previous iteration of the potential site plan that evolved to minimize the proposed Project's capacity and the overall impact on the site.

ENERGY OUTPUT

19. Referencing Petition p. 9, what electrical loss assumptions have been factored into the facility's output?

Response:

The annual loss of 0.5% per year is the median solar panel degradation rate. This degradation rate is industry-standard.

20. Was a shade study conducted? Would shading from adjacent forested areas interfere with energy production at the site?

Response:

No shade study was conducted; however, the adjacent forested areas will not interfere with energy production at the site due to the proposed Project's location and the heights of the adjacent trees.

PROPOSED FACILITY AND ASSOCIATED EQUIPMENT

21. Referencing Petition Exhibit G, p. 2,
    a. to what approximate depth would the tracker support posts be driven into the ground?

Response:

The approximate depth of the embedment will be 9' to 12'.

b. How many tracker unit motors will be installed?

Response:

Petitioner would install approximately 25 – 30 tracker unit motors.

c. what is the lifespan of the tracker motors?

Response:

The expected life span is thirty years.

d. How are the tracker motors powered?

Response:

Tracker motors are powered by a low-voltage auxiliary panel located at the equipment pad.

e. at what height above grade are the tracker motors located?

Response:

Tracker motors are an integral portion of the racking system and are the same height as the slew beams (approximately 5' above grade).

22. What are the approximate dimensions of the transformer and switchgear installed on the concrete pad adjacent to the proposed access drive? What equipment and approximate dimensions would be installed on the adjacent small concrete pad?

Response:

The proposed Project Site requires one electrical pad and one transformer vault. The pad will be 10' by 20', and the transformer vault will be 6' x 7'.

23. Referencing Petition Exhibit G, p. 2, are the eight inverters mounted on concrete pads or posts?

Response:

The proposed inverters will be mounted on posts.

24. Petition Appendix E contains specification sheets for two different solar panels. Which solar panels would be installed at the site? What solar panel output was used to calculate the generation capacity of the proposed facility?

Response:

The panels to be installed at the proposed Project Site will be the Trina-Solar Vertex TSM-DEG19C.20 models.

25. Referencing Petition p. 8, define “premium modules.”

Response:

The module manufacturers use the term “premium modules" to grade and warranty the equipment.

26. Why are string inverters proposed rather than a single, centralized inverter?

Response:

String inverters were the basis of the design for maximum efficiency and longevity of the proposed Project. They allow for continued operation of the array without disruption during routine maintenance.

ELECTRICAL INTERCONNECTION

27. Referencing Petition p. 7, has the Eversource System Impact Study been completed? What was the result?

Response:

The Eversource System Impact Study is still underway, but Eversource did provide draft results for the study. Pending any changes to the final System Impact Study results, the proposed Project can connect to the Manchester 3A substation via the 23kV 3A03 feeder and new three-phase service consisting of a recloser and primary meter.

28. Are any off-site upgrades required for the electrical distribution system?

Response:

Based on the draft System Impact Study results, the proposed Project would not cause any voltage or thermal loading issues during minimum and maximum loading when operating at 100% power factor. Additionally, the proposed Project would not result in any tap changes on the substation transformers or cause flicker, or rapid voltage change violations. Therefore, the only required upgrades are a new three-phase service consisting of a primary meter and recloser.

29. Does the interconnection require a review from ISO-NE?

Response:

No.

30. Will the interconnection provide energy to a substation? If yes, which one?

Response:

Yes. Substation, “3A Manchester.”

31. Referencing Petition Site Plan 2.11, six proposed utility poles are shown; however, five are described in Petition Exhibit G, p. 3. Clarify.

Response:

Five utility poles are required: three Eversource-owned poles and two customer-owned poles. The plans have been revised accordingly and are attached herein. See "Exhibit B: Revised Civil Plan Drawing Set."

32. Referencing Petition Site Plan 2.11, what equipment would be installed on each utility pole? Can the number of poles be reduced by consolidating equipment?

Response:

The electric distribution company owns and operates the equipment on the utility poles. This equipment will consist of a manual disconnect switch (GOAB), a recloser, and a primary meter. This is the minimum amount based on the system design and Utility requirements.

33. Referencing Petition Exhibit G, pp. 3-4, it states that Eversource does not pad-mount their equipment. Explain.

Response:

Eversource Energy dictates the exact details of the interconnection and equipment. Typically, Eversource does not pad-mount its equipment for solar projects; therefore, pole-mount equipment is shown on the Site Plans.

PUBLIC SAFETY

34. Referencing Petition p. 11, how does the project comply with industry Best Management Practices for Electric and Magnetic Fields?

Response:

Petitioner is unaware of any best management practices for electric and magnetic fields at solar facilities like those in the proposed project. The Council's "Best Management Practices for Electric and Magnetic Fields" addresses "engineering practices for proposed electric transmission lines with a design capacity of 69kV or more," the proposed Project will interconnect to a distribution line with a design capacity of 23kV. See Connecticut Siting Council, "Best Management Practices for Electric and Magnetic Fields" (Feb. 20, 2014) 2.

35. Would training be provided for local emergency responders regarding site operation and safety in the event of a fire or other emergency at the site?

Response:

Training can be provided to local emergency responders in the facility's operation.

36. Can emergency personnel operate manual facility shut-off switches? If yes, in what location(s)?

    Response:

    Yes. There are multiple means of isolating and shutting off the facility's power. The first is the manual disconnect switch located on the Utility pole. The second is the automatic means on the second utility pole, and the third is the main breaker at the equipment pad.

37. In the event of a brush or electrical fire, how are potential electric hazards that could be encountered by emergency response personnel mitigated? What media and/or specialized equipment would be necessary to extinguish a solar panel/electrical component fire?

    Response:

    In the event of a fire or emergency, the proposed Project will be able to be shut down by emergency responders via a physical disconnect switch that will be appropriately labeled under the requirements of the National Electric Code. Petitioner is unaware of any specific media and/or specialized equipment needed to extinguish a fire within the proposed Project. Generally speaking, electrical fires are allowed to burn out, with water being used only in the surrounding areas to prevent the spread of any fire beyond the affected area.

38. What is the distance of the nearest municipal fire hydrant to the proposed facility? What alternative water sources are available to the fire department? How would water be brought to the site in a fire?

    Response:

    The nearest municipal fire hydrant is located on the corner of Carter Street and Amanda Drive, approximately 0.25 miles northwest of the proposed Site entrance. The local fire department determines what water source to use and how to bring water to a fire. Upon completion of the proposed Project, Petitioner will work with the local fire department and introduce them to the proposed Project to address any contingencies at the proposed Site.

39. Would firewater or other runoff from a solar panel/electrical fire be considered hazardous and require cleanup by a hazardous materials response contractor?

    Response:

    Most fire departments are advised not to put water on a solar system fire. Water can be used to keep adjacent equipment cool if significant heat is generated and is of concern. If water happens to come in contact with the solar panels, there is no evidence that it becomes a hazardous material. The submitted TCLP report reflects that the solar panels are not hazardous materials.

40. How would the fire be contained if a brush or electrical fire occurred at the proposed facility? What protections are in place to ensure a fire does not impact the host parcel's natural gas pipelines within the easement?

    Response:

    In the event of a fire or emergency, the proposed Project will be able to be shut down by emergency responders via a physical disconnect switch that will be appropriately labeled under the requirements of the National Electric Code. Petitioner is unaware of any specific media and/or specialized equipment needed to extinguish a fire within the proposed Project. Generally speaking, electrical fires are allowed to burn themselves out, with water being used only in the surrounding areas to prevent the spread of any fire beyond the affected area.

41. Provide an Emergency Response Plan for the proposed facility.

    Response:

    Petitioner respectfully requests that the Council submit an Emergency Response Plan, a condition in the Council's Final Decision because the final design of the proposed Project depends on several factors, including any potential changes made by the Council or DEEP through their respective permitting processes.

42. Referencing Petition p. 9, does the transformer have a containment system and/or a low oil level alarm in the event of an insulating mineral oil leak? Can the SCADA system detect an insulating mineral oil leak? Is the mineral oil biodegradable?

    Response:

    No. Transformers manufactured today use mineral oil. Mineral oil presents no danger to the environment and is biodegradable. SCADA cannot sense a leak of fluid.

43. Would installing racking posts affect well water quality from construction impacts, such as vibrations and well water sedimentation?

    Response:

    Based on the CT Department of Health Public Water Supply Map, there do not appear to be any wells downstream of the proposed solar facility. Vibrations from the installation of racking posts are not anticipated to cause any sedimentation release and should result in no disruption to well water flow and water quality. The contractor shall follow the guidelines of the Soil Erosion and Sediment Control Plan for this project, which will minimize the potential impacts on the groundwater and surface water quality for the proposed Site and its surrounding areas.

44. What is the noise profile of the selected transformer?

    Response:

    The specific transformer model for the proposed Project will be based on availability during construction. Per NEMA TR-1, the average decibel rating for a self-cooled, two-

winding 1,500-2,000 kVA transformer, which is anticipated for the proposed Project, will produce a noise level of 61 dB at a distance of 1 meter. This data has been used in the sound-level calculations submitted in conjunction with these responses to interrogatories. See "Exhibit C: Revised Sections of Environmental Assessment."

45. Referencing Petition Exhibit G, p. 19, submit a detailed sound level calculation worksheet or a sound study that accounts for noise levels from the proposed eight inverters and transformers at the nearest abutting property line.

Response:

Sound level calculations have been submitted in conjunction with these responses to interrogatories. See "Exhibit C: Revised Sections of Environmental Assessment."

ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

46. Referencing Petition p. 4, what specific CT DEEP and US Army Corps of Engineers requirements will be followed?

Response:

The CT DEEP 2024 Connecticut Soil Erosion and Sediment Control Guidelines, 2024 Connecticut Stormwater Quality Manual, CT DEEP Inland Fisheries Division Stream Crossing guidelines, and US Army Corps of Engineers requirements for stream crossing have been followed in the design of the proposed stream crossing. Since the drainage area at the proposed stream crossing is less than 1 square mile (0.017 square miles), the proposed culvert has been designed to pass the 50-year flood frequency per US Army Corps of Engineers requirements. The 100-year flood frequency was verified to confirm that flood waters will not overtop the proposed access drive.

47. Referencing Petition Site Plan 2.31, Note 1, is the preliminary design of the Project at least 50 percent complete? If not, would construction comply with the *Connecticut Soil Erosion and Sediment Control Guidelines* and *Connecticut Stormwater Quality Manual*, effective March 30, 2024?

Response:

Design and construction will comply with the 2024 Connecticut Soil Erosion and Sediment Control Guidelines and the 2024 Connecticut Stormwater Quality Manual. The notes on the plans have been updated and are attached herein. See "Exhibit B: Revised Civil Plan Drawing Set."

48. Referencing Petition Exhibit G, p. 12, describe the Stream Crossing Best Management Practices to be employed at the site.

Response:

The CT DEEP 2024 Connecticut Soil Erosion and Sediment Control Guidelines, 2024 Connecticut Stormwater Quality Manual, CT DEEP Inland Fisheries Division Stream Crossing guidelines, and US Army Corps of Engineers requirements for stream crossing

have been followed in the design of the proposed stream crossing. Since the drainage area at the proposed stream crossing is less than 1 square mile (0.017 square miles), the proposed culvert has been designed to pass the 50-year flood frequency per US Army Corps of Engineers requirements. The 100-year flood frequency was verified to confirm that flood waters will not overtop the proposed access drive. The proposed culvert is designed with 12 inches of embedment within the streambed to provide a natural bottom substrate within the culvert. The proposed culvert matches the gradient and alignment of the existing stream, and the length of the culvert has been kept as short as possible based on the surrounding topography.

49. Referencing Petition Exhibit G, p. 12, does the proposed 42-inch diameter high-density polyethylene pipe conform to the DEEP Inland Fisheries Division Stream Crossing Guidelines? Explain.

    Response:

    The proposed 42-inch diameter HDPE pipe stream crossing design conforms to the DEEP Inland Fisheries Division Stream Crossing Guidelines.

50. Can an open bottom culvert be installed at the proposed stream crossing?

    Response:

    An open-bottom culvert was considered during the design process. Ultimately, the 42-inch pipe was proposed as it conforms to CT DEEP and US Army Corps of Engineers requirements for stream crossings and is more cost-effective.

51. Referencing Petition Exhibit G, p. 12, how was it determined the primary function of the stream is solely water conveyance? What other attributes were assessed?

    Response:

    Water conveyance was not determined to be the "sole" function of the steam as the stream also supports geomorphic, physiochemical, and biologic functions. Exhibit G, Page 12, states that the "main function and value" of the stream is water conveyance. This determination was made as the system is confined to a defined sloping channel instead of a depression or flat. Water conveyance functions support many other subsequent functions, such as transporting sediment to create streambeds, influencing channel shape and size, regulating temperature and oxygen levels, and supporting aquatic and riparian organisms. The assessment and conclusions are based on the 2012 USEPA and USFWS publication titled Function-Based Framework for Stream Assessment & Restoration Projects.

52. Do wildlife and plant species typically use wetlands and watercourses as travel corridors? If yes, how will the proposed stream crossing affect movement?

    Response:

    As seen by tracks and game trails during site investigations, wildlife species use the wetland and watercourse system as a travel corridor. The proposed crossing will not adversely affect wildlife species traveling parallel within the stream or perpendicular across the stream. The proposed crossing is large enough to allow small mammals and herpetofauna to travel

through the opening and continue their parallel course. Large mammals traveling parallel through the stream will likely have to exit the streambed and walk around the crossing before reentering the stream. However, large mammals will expend less energy completing this task than small mammals or herpetofauna would. As such, they are minorly inconvenienced rather than adversely affected. Perpendicular travel across the stream will be improved. Existing game trials indicate that wildlife frequently crosses the stream. However, they must climb down and up the stream bank to do so. The proposed crossing will create an easier path of travel.

53. Referencing Petition Site Plan 3.01—Fence Detail, can the bottom of the perimeter fence fabric be raised to six inches above grade to allow for small wildlife movement?

    Response:

    The details have been revised accordingly to provide a six-inch gap for small wildlife movement and are attached herein. See "Exhibit B: Revised Civil Plan Drawing Set."

54. What agricultural activities are contemplated for the site, if any?

    Response:

    Currently, agricultural activities include tapping maple trees for sap and syrup production. Petitioner intends to increase and expand agricultural activities while developing the proposed Project and is analyzing all agricultural opportunities.

55. Referencing Petition p. 5, it states the project site does not contain prime farmland soils; however, Petition Exhibit G, p. 18, states it contains some prime farmland soils. Clarify.

    Response:

    Per the Prime Farmland Map, Figure 8 in Appendix A, no prime farmland areas are within the proposed Project Area. Approximately 4.1 acres within the proposed Project Area are considered "farmland of statewide importance." Petition Exhibit G, p. 18, has been revised accordingly. See "Exhibit C: Revised Sections of Environmental Assessment."

56. Has the Phase IA Cultural Resources Assessment Survey been submitted to the State Historic Preservation Office for comment? If yes, provide a copy of their response, if available.

    Response:

    A copy of the SHPO response letter is included herein. See "Exhibit D: SHPO Response Letter."

57. Has TRITEC applied for a General Permit for the Discharge of Stormwater and Dewatering Wastewater from Construction Activities to DEEP? If yes, what is the status of such a permit?

    Response:

    The CTDEEP Stormwater General Permit application is intended to include "construction-ready" site plans, but the Petitioner has not yet submitted it. The Petitioner intends to apply

for this permit soon and will submit proof of approval to the Council as a precondition to beginning construction of the proposed Project.

58. The U.S. Fish and Wildlife Service's Information, Planning, and Conservation System (IPaC) review documentation appears incomplete. For example, the Project Questionnaire portion of the review has no information. Explain.

Response:

The U.S. Fish and Wildlife Service's IPaC review documentation has been correctly filed and is complete. While filing the IPaC, the only federally listed species noted as having the potential to occur in the project area was the Northern Long long-eared bat (NLEB). Following the protocol of the IPaC review, we utilized the NLEB Rangewide Determination Key (DKey). As no additional federally listed species were potentially present, using the Consultation Package Builder (CPB) was unnecessary. All questions prompted while filing the DKey were answered accurately based on the proposed Project's impact, and the complete returned determination was submitted with the application. See "Exhibit E: USFWS Correspondence."

59. Referencing Petition Exhibit G, p. 10, quantify the acreage of a small core forest that would remain after construction.

Response:

After the proposed project is completed, approximately 18.30 acres of the 24.03 acres of small core forest will remain.

60. Referencing Petition Exhibit H, identify the addresses of the properties with visible residences in Photos 7 East, 8 East, 9 East, 10 East, 19, and 21 East.

Response:

In photos 7 East, 8 East, 9 East, and 19 East, the visible properties are 274 and 262 Blue Ridge Drive. In photos 10 East, the visible properties are 274, 262, 252, and 238 Blue Ridge Drive. In photos 21 East, the visible properties are 274, 262, and 252 Blue Ridge Drive.

FACILITY CONSTRUCTION

61. Will blasting be required to construct the site? If not, how will bedrock be removed if encountered?

Response:

No. Bedrock was encountered during the geotechnical field investigation; therefore, blasting is not anticipated to construct the proposed Project.

62. Referencing Petition Exhibit G, p. 11, where will the 3,500 cubic yards of material be disposed of? What would this material be composed of? What is the total estimate of cut and fill?

Response:

Revisions were made to the stormwater management design based on the Town of Manchester's comments as well as the results of the geotechnical investigation. The design now requires approximately 1,250 cubic yards of material to be imported into the site. Most of the material is required to construct the Stormwater Management Basin's berm and the access drive over the proposed stream crossing. See "Exhibit F: Revised Stormwater Management Report."

FACILITY MAINTENANCE/DECOMMISSIONING

63. Under what circumstances would pesticides and/or herbicides be used at the site? What specific precautions are taken to use these products to prevent effects on water quality and human health?

Response:

Petitioner does not use pesticides or herbicides on any of their solar arrays in Connecticut.

64. What cleaning agents would be used for panel washing? How often would panels be cleaned?

Response:

Petitioner does not currently see the need for panel washing in Connecticut due to rain and snow. If the issue did present itself, Petitioner would follow the manufacturer's requirements to use a nontoxic soap, like Dawn, and water solution.

EXHIBIT A

Summary of Public Comments

Summary of Public Comments

Thirty-two parties submitted public comments to Siting Council regarding Petition No. 1609. The parties consisted of twenty-seven Manchester residents (one abutter and twenty-six non-abutters), two State Representatives, the Town of Bolton, The Manchester Legislative Delegation, and the Manchester Planning and Zoning Commission. The comments addressed the following topics:

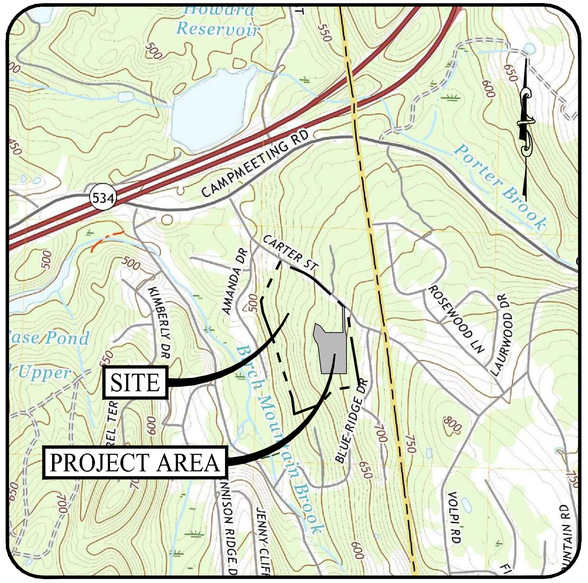
# of Comments	Topic
43	Tree Clearing
42	Wildlife
26	Stormwater Runoff
25	Noise
22	Property Values
21	Gas Pipeline
18	Fire
17	Wetland Impacts
11	Use of chemicals/herbicides/pesticides
10	Shensipit Trail
10	Visibility
10	Located in residential zone

EXHIBIT B

Revised Civil Plan Drawing Set

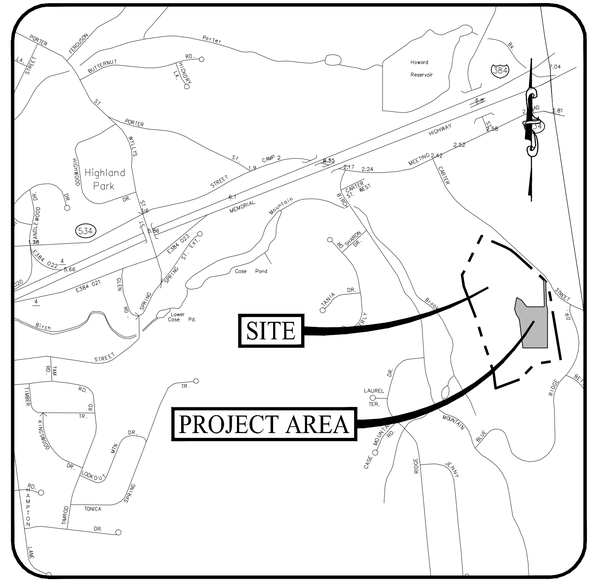
PROPOSED 0.99 MW SOLAR PHOTOVOLTAIC ARRAY

250 CARTER STREET
MANCHESTER, CONNECTICUT



USGS MAP

SCALE: 1" = 1,000'



LOCATION MAP

SCALE: 1" = 1,000'

PREPARED FOR:

TRITEC AMERICAS

888 PROSPECT STREET, SUITE 200
LA JOLLA, CALIFORNIA

PREPARED BY:

SOLLI ENGINEERING

501 MAIN STREET, MONROE, CONNECTICUT 06468
11 VANDERBILT AVENUE, NORWOOD, MASSACHUSETTS 02062
993 FARMINGTON AVENUE. WEST HARTFORD, CONNECTICUT 06107

DRAWING LIST

SHEET #	SHEET NAME	PLAN DATE	LATEST REVISION
0.00	COVER SHEET	01/15/24	04/19/24
-	PROPERTY & TOPOGRAPHIC SURVEY MAP	10/20/23	N/A
2.10	OVERALL SITE LAYOUT PLAN	01/15/24	04/19/24
2.11	SITE LAYOUT PLAN	01/15/24	04/19/24
2.21	GRADING AND DRAINAGE PLAN	01/15/24	04/19/24
2.31	SOIL EROSION & SEDIMENT CONTROL PLAN - PHASE 1	01/15/24	04/19/24
2.32	SOIL EROSION & SEDIMENT CONTROL PLAN - PHASE 2	01/15/24	04/19/24
2.41	SOIL EROSION & SEDIMENT CONTROL NOTES & DETAILS	01/15/24	04/19/24
3.01	CONSTRUCTION DETAILS	01/15/24	04/19/24
3.02	CONSTRUCTION DETAILS	01/15/24	04/19/24
3.02	ENVIRONMENTAL NOTES & DETAILS	01/15/24	04/19/24

STATE OF CONNECTICUT · KEVIN M. SOLLI · 25759 · LICENSED PROFESSIONAL ENGINEER

OWNER

WELLS JACOBSON TRUST
MARGARET JACOBSON TRUST
143 BOULDER ROAD
MANCHESTER, CONNECTICUT 06040

APPLICANT

TRITEC AMERICAS, LLC
888 PROSPECT STREET, SUITE 200
LA JOLLA, CALIFORNIA 92307

PROPERTY INFORMATION

ADDRESS: 250 CARTER STREET, MANCHESTER, CONNECTICUT
MAP-BLOCK-LOT: 154-970-250
ZONE: RR
AREA: ±41.08 AC
BOOK/PAGE: 3397/0065

SOIL SCIENTIST

WILLIAM KENNY, CPWS, PLA, ASLA
WILLIAM KENNY ASSOCIATES
195 TUNXIS HILL CUTOFF SOUTH
FAIRFIELD, CT 06825
(203) 366-0588

ENGINEER OF RECORD

KEVIN SOLLI, P.E., CPESC, LEED AP BD+C
LICENSE NO. 25759
SOLLI ENGINEERING, LLC
501 MAIN STREET
MONROE, CONNECTICUT 06468
(203) 880-5455

ELECTRICAL ENGINEER

PURE POWER ENGINEERING, INC.
111 RIVER STREET, SUITE 1110
HOBOKEN, NJ 07030
(201) 687-9975

LANDSCAPE ARCHITECT

MARY BLACKBURN, P.L.A.,
LICENSE CT NO. 1499
SOLLI ENGINEERING, LLC
501 MAIN STREET
MONROE, CONNECTICUT 06468
(203) 880-5455

SURVEYOR OF RECORD

STEPHAN M. GIUDICE, L.S. LICENSE NO. 70145
HARRY E. COLE & SON
876 SOUTH MAIN STREET
P.O. BOX 44
PLANTSVILLE, CT 06479
(203) 630-1406

Rev. #:	Date	Description
1	04/19/24	CSC INTERROGATORIES

Project:
PROPOSED SOLAR PHOTOVOLTAIC ARRAY
250 CARTER STREET
MANCHESTER, CONNECTICUT

Sheet Title: COVER SHEET

Sheet #: 0.00

LEGEND

- = Existing utility pole
- = Existing light pole
- = Existing fire hydrant
- = Existing water valve
- = Existing gas valve
- = Existing underground pipe
- = Existing edge of pavement
- = Existing bituminous concrete lip curb
- = Existing well
- = Existing catch basin
- = Existing drainage manhole
- = Existing sanitary manhole
- = Existing utility box
- = Existing contour
- x000.0 = Existing spot elevation
- = Existing iron pin
- = Existing drill hole
- = Existing monument

SURVEY NOTES:

1. This map has been prepared pursuant to the Regulation of Connecticut State Agencies Sections 20-300b-1 through 20-300b-20 and the "Standards for Surveys and Maps in the State of Connecticut" as adopted by the Connecticut Association of Land Surveyors, Inc. on September 26, 1996.

2. Type of survey performed: Property & Topographic Survey

3. Boundary determination category: Resurvey

4. Class of accuracy:
   Horizontal: A-2
   Vertical: T-2

5. The intent of this map is to depict or note the position of boundaries with respect to: (A) locations of all boundary monumentation found or set; (B) Apparent improvements and features, including as a minimum: dwellings, barns, garages, sheds, driveways, roadways, surface utilities, visible bodies of water and swimming pools; (C) record easements and visible means of ingress and egress; (D) record and apparent means of ingress and egress; (E) lines of occupation, including as a minimum: fences, walls, hedges and yards; (F) deed restrictions pertaining to the location of buildings or other apparent improvements; (G) unresolved conflicts with record deed descriptions and maps; (H) all apparent boundary encroachments; and (I) monumentation required to be set at all corners created by a deflection angle of not less than 70 degrees between two consecutive courses at an intervals not to exceed 600 feet (180 meters) along the boundaries between said corners, except where natural or man-made monumentation defines or occupies the line.

6. Map References:

a.) "Resubdivision Amanda Drive Prepared for Derekseth Homes, Amanda Drive, Manchester, Connecticut; Scale:1"=100'; Dated: October 26, 1999; Sheet 2 of 19 by Ed Lally and Associates Inc." Filed as Map 1257 at the M.L.R.

b.) "Plot Plan Birch Mountain II Prepared for Mary Catherine Development Company, Manchester, Connecticut; Scale:1"=40'; Dated: 1/30/89 by Design Professionals, Inc." Filed as Book M27, Page 60 at the M.L.R."

c.) "Resubdivision Amanda Drive Prepared for Derekseth Homes, Amanda Drive, Manchester, Connecticut; Scale:1"=100'; Dated: October 26, 1999; Sheet 4 of 19 by Ed Lally and Associates Inc." Filed as Map 1259 at the M.L.R.

d.) "Map of Highland Estates, Birch Mountain Road & Carter Street, Manchester, Connecticut; Scale:1"=50'; Dated: March 23, 1967; Sheet 2 of 3 by Hayden L. Griswold, C.E." Filed as Book M13, Page 48 at the M.L.R."

e.) "Map of Highland Estates, Birch Mountain Road & Carter Street, Manchester, Connecticut; Scale:1"=50'; Dated: March 23, 1967; Sheet 3 of 3 by Hayden L. Griswold, C.E." Filed as Book M9, Page 36 at the M.L.R."

f.) "Boundary Survey Prepared for John Vontell, Existing Boundary and Features, 143 Carter Street, Manchester, Connecticut; Scale:1"=30'; Dated: May 22, 2014 by Rob Hellstrom Land Surveying LLC." Filed as Map 2311 in Drawer 16 at the M.L.R."

g) "Subdivision Plan Prepared for Robert C. Dennison, Carter Street, Manchester, Connecticut; Scale:1"=100'; Dated: 6/20/83; Last Revised: 6-21-1983 by Fuss & O'neill." Filed as Book M22, Page 49 at the M.L.R.

7. Per agreement with property owner no boundary corners were set by this survey unless noted hereon. All monumentation found is depicted or noted hereon.

8. Zone: RR

9. Total area: 1,789,597 Sq. Ft. - 41.08 Acres

10. Owner: Wells Jacobson & Margaret Jacobson

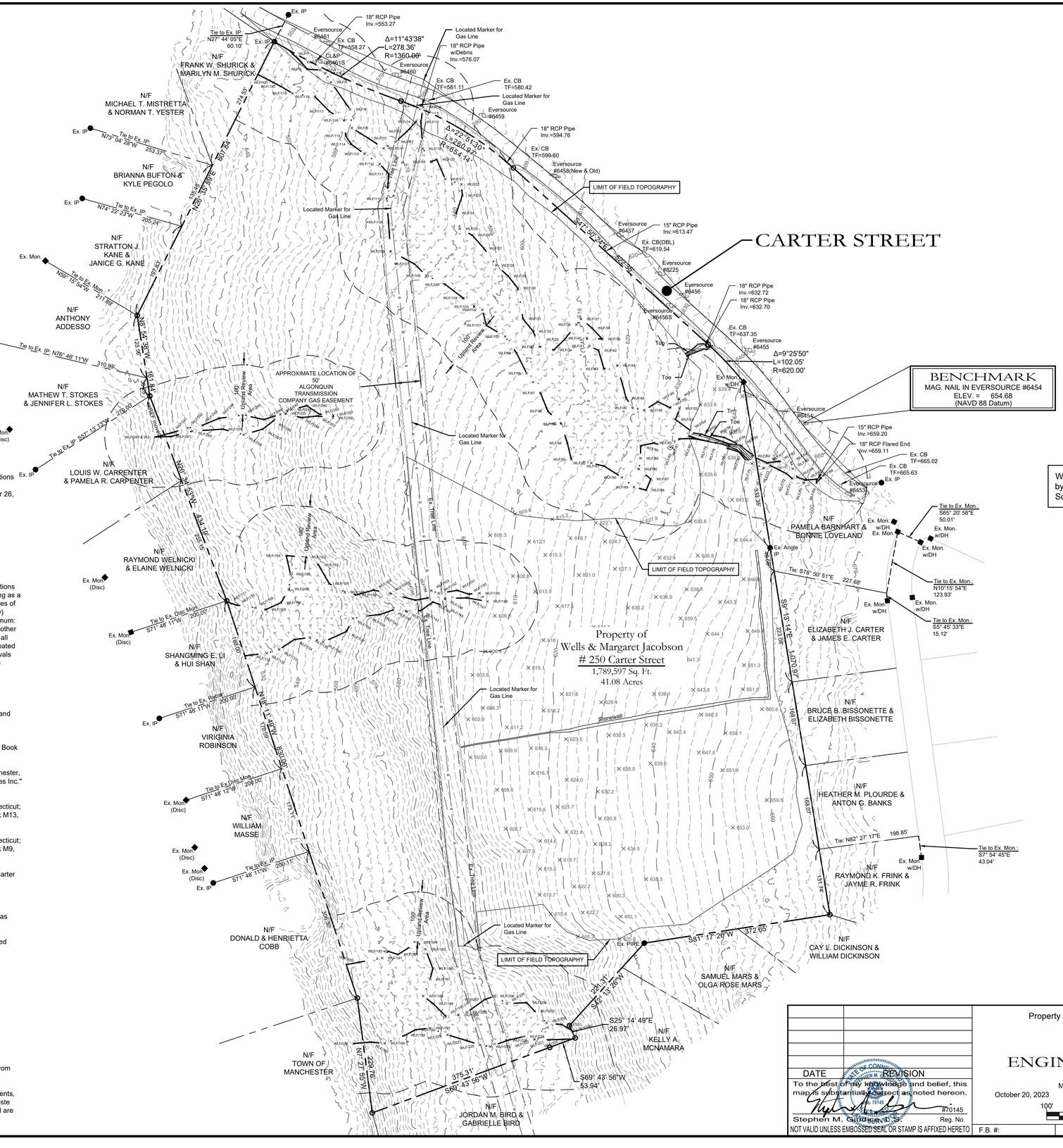
11. Town of Manchester Assessors Map #97 Lot #250

12. Filed in Volume 3397, Page 65 of the Town Clerk's office.

13. Contour interval is two(2) feet.

14. Existing contours generated from field topography. (Implemented with Aerial Topography from UCONN Base)

15. This survey does not include the location of any underground improvements or encroachments, subsurface utility lines or buried debris. Nor does it necessarily reflect the existence of any waste dumps or hazardous materials. The underground items depicted or noted are approximate and are not guaranteed. Notify "CALL BEFORE YOU DIG" 1-800-922-4455 prior to any excavation operations.



DATE	REVISION

To the best of my knowledge and belief, this map is substantially correct as noted hereon.

Stephen M. Gliddon, L.S. #70145 Reg. No.

NOT VALID UNLESS EMBOSSED SEAL OR STAMP IS AFFIXED HERETO

Property & Topographic Survey Map

Prepared For

SOLLI ENGINEERING, LLC

250 Carter Street

Manchester, Connecticut

October 20, 2023 Scale: 1" = 100'

100' 50' 0 50' 100'

F.B. #: PROJECT #: 2379a

cole
HARRY E. COLE & SON
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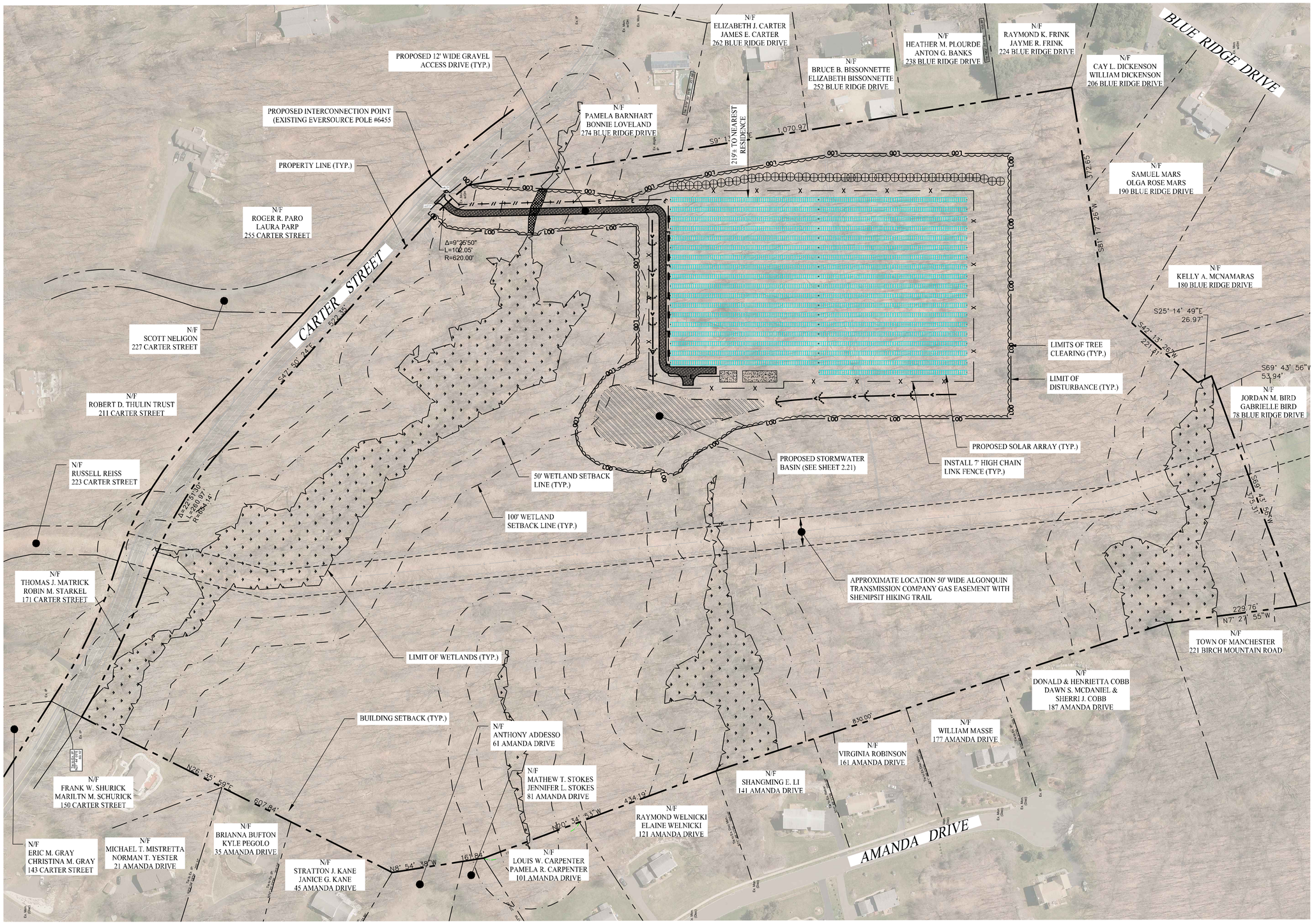
www.hecole.com



LEGEND

- PROPERTY LINE
- LIMIT OF WETLANDS
- UPLAND REVIEW AREA
- STORMWATER BASIN AREA
- 7' TALL CHAIN LINK FENCE
- TRINA 540W SOLAR MODULES
- UTILITY POLE
- OVERHEAD ELECTRIC LINE
- ELECTRIC CONDUIT
- LIMIT OF TREE CLEARING
- LIMIT OF DISTURBANCE
- GRASS LINED SWALE
- GRAVEL ACCESS DRIVE
- CONCRETE EQUIPMENT PAD
- WETLAND DISTURBANCE AREA
- STORMWATER BASIN
- EVERGREEN TREE
- STONE CHECK DAM

Rev. #:	Date	Description
1	04/19/24	CSC INTERROGATORIES

Graphic Scale: 100 0 100 200

SOLLI ENGINEERING
501 Main Street, Monroe, CT 06468 T: (203) 880-5455 F: (203) 880-9695
11 Vanderbilt Ave, Norwood, MA 02062 T: (781) 352-8491 F: (203) 880-9695

Drawn By:	CSH
Checked By:	EEL
Approved By:	KMS
Project #:	23100101
Plan Date:	01/15/24
Scale:	1" = 100'

STATE OF CONNECTICUT · KEVIN M. SOLLI · 25759 · REGISTERED PROFESSIONAL ENGINEER

Kevin Solli, P.E.
CT 25759

Project:

PROPOSED SOLAR PHOTOVOLTAIC ARRAY

250 CARTER STREET
MANCHESTER, CONNECTICUT

Sheet Title:	Sheet #:
OVERALL SITE LAYOUT PLAN	2.10

Apr 22, 2024 - 8:36am chendry
X:\SE Files\Project Data\2023\23100101 - 250 Carter Street - Manchester, CT\Cadd Data\23100101-2.10.dwg

PLANTING SCHEDULE

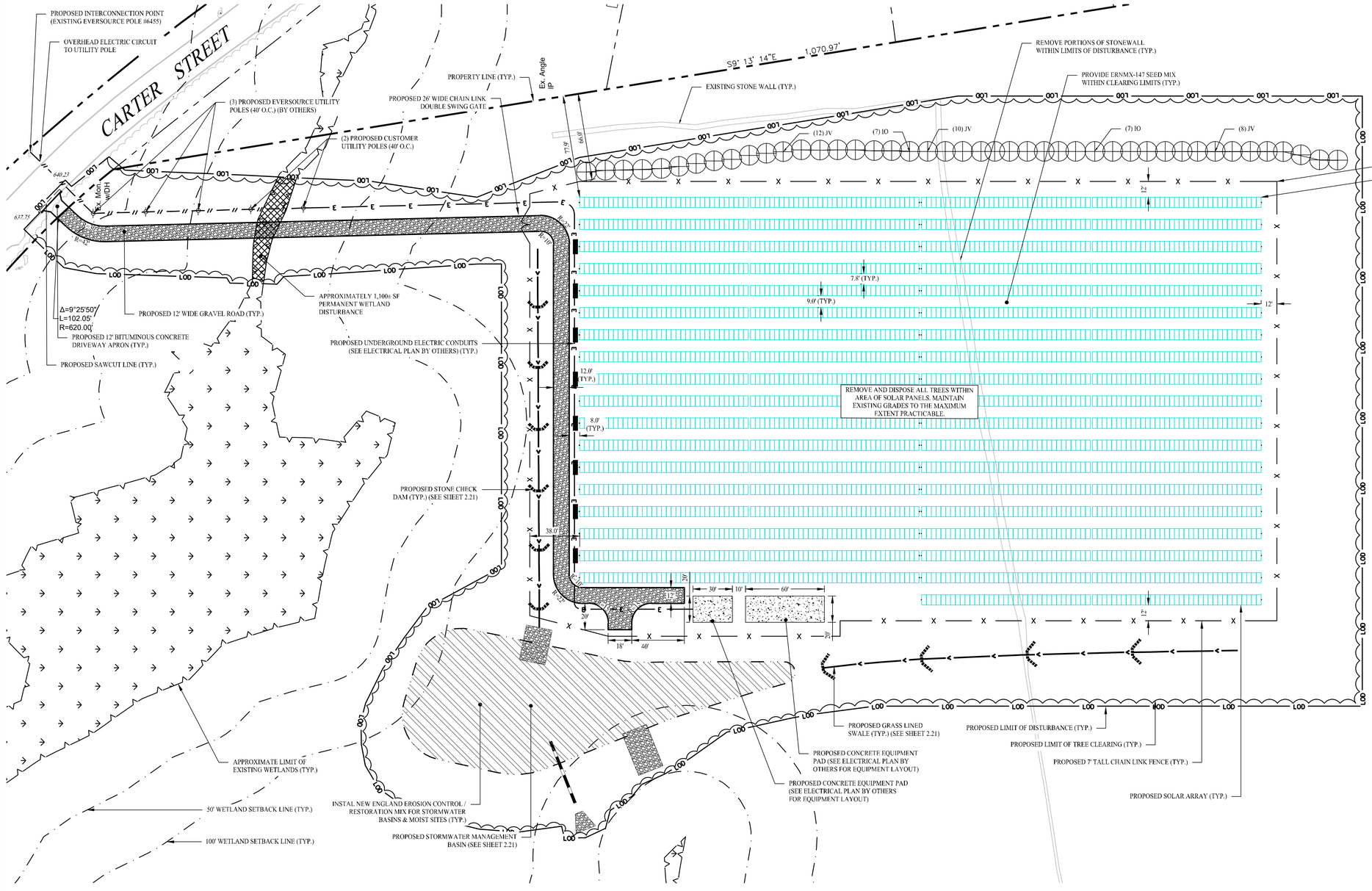
KEY	QTY	BOTANICAL NAME	COMMON NAME	ROOT	SIZE	COMMENTS
TREES						
IO	14	ILEX OPACA	AMERICAN HOLLY	B&B	7-8' HT	FULL, EXTRA HEAVY
JV	30	JUNIPERUS VIRGINIANA	EASTERN RED-CEDAR	B&B	7-8' HT	FULL, EXTRA HEAVY

SOLAR ARRAY SYSTEM INFORMATION

	TOTAL
SIZE DC	1.399 MW
SIZE AC	0.999 MW
INVERTER LOAD RATIO	1.40
MODULE TYPE	TRACKING TRINASOLAR TSM-540-DEG19C.20 (540W)
MODULE QUANTITY	2,590
INVERTER	SUNGROW SG125HV 125KW
INVERTER QUANTITY	8
UTILITY	EVERSOURCE

GENERAL NOTES

1. THESE PLANS ARE FOR PERMITTING PURPOSES ONLY AND ARE NOT FOR CONSTRUCTION. NO CONSTRUCTION OR DEMOLITION SHALL BEGIN UNTIL FINAL APPROVAL OF THIS PLAN IS GRANTED.
2. ALL PROPOSED SITE WORK TO BE COMPLETED IN ACCORDANCE WITH ALL PERMITS, APPROVALS AND CONDITIONS OF APPROVALS ISSUED BY LOCAL, STATE AND/OR FEDERAL REVIEWING AGENCIES.
3. EXISTING BOUNDARY, TOPOGRAPHY AND SITE CONDITIONS INFORMATION TAKEN FROM A PLAN ENTITLED "PROPERTY & TOPOGRAPHIC SURVEY MAP PREPARED FOR SOLLI ENGINEERING, 250 CARTER STREET, MANCHESTER, CONNECTICUT," DATED OCTOBER 20, 2023, SCALE: 1"=100', BY HARRY E. COLE & SONS, 876 SOUTH MAIN STREET, PLANTSVILLE, CT 06479.
4. REFER TO THE EXISTING CONDITIONS MAP FOR THE ENTIRE PROPERTY BOUNDARY AND EXISTING CONDITIONS INFORMATION. THE PLAN HEREON DEPICTS A PORTION OF THE PROPERTY IN WHICH THE SITE WORK IS BEING PROPOSED.
5. THE SUBJECT PARCEL CONSISTS OF A TOTAL AREA OF APPROXIMATELY 41.08± ACRES, LOCATED IN THE RR ZONING DISTRICT IN THE TOWN OF MANCHESTER, CONNECTICUT.
6. WETLAND BOUNDARY DETERMINED AND LOCATED BY FIELD SURVEY BY WILLIAM KENNY ASSOCIATES ON JULY 26 & 27, 2023.
7. THE SITE IS NOT LOCATED WITHIN FEMA DESIGNATED FLOOD HAZARD AREA, AS DEPICTED ON F.I.R.M. MAP NUMBER 09003C0413F, WITH EFFECTIVE DATE SPETEMBER 26, 2008.
8. ALL CONSTRUCTION SHALL COMPLY WITH THE TOWN OF MANCHESTER, CONNECTICUT DEEP, AND CONNECTICUT DEPARTMENT OF TRANSPORTATION STANDARDS AND SPECIFICATIONS IN THE ABOVE REFERENCED INCREASING HIERARCHY. IF SPECIFICATIONS ARE IN CONFLICT, THE MORE STRINGENT SPECIFICATION SHALL APPLY. ALL CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH ALL APPLICABLE OSHA, FEDERAL, STATE AND LOCAL REGULATIONS.
9. PRIOR TO DEMOLITION OR CONSTRUCTION, THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" 72 HOURS BEFORE THE COMMENCEMENT OF WORK AT "(800) 922-4455" AND VERIFY ALL UTILITY AND STORM DRAINAGE SYSTEM LOCATIONS. INFORMATION ON EXISTING UTILITIES AND STORM DRAINAGE SYSTEMS HAS BEEN COMPILED FROM AVAILABLE INFORMATION INCLUDING UTILITY PROVIDER AND MUNICIPAL RECORD MAPS AND/OR FIELD SURVEY AND IS NOT GUARANTEED CORRECT OR COMPLETE. UTILITIES AND STORM DRAINAGE SYSTEMS ARE SHOWN TO ALERT THE CONTRACTOR TO THEIR PRESENCE AND THE CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING ACTUAL LOCATIONS AND ELEVATIONS OF ALL UTILITIES AND STORM DRAINAGE SYSTEMS INCLUDING SERVICES.
10. SHOULD ANY UNCHARTED OR INCORRECTLY CHARTED, EXISTING PIPING OR OTHER UTILITY BE UNCOVERED DURING EXCAVATION, CONSULT THE CIVIL ENGINEER IMMEDIATELY FOR DIRECTIONS BEFORE PROCEEDING FURTHER WITH WORK IN THIS AREA.
11. THE OWNER IS RESPONSIBLE FOR OBTAINING ALL NECESSARY ZONING PERMITS REQUIRED BY GOVERNMENT AGENCIES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL OBTAIN ALL LOCAL AND STATE PERMITS. THE CONTRACTOR SHALL POST ALL BONDS, PAY ALL FEES, PROVIDE PROOF OF INSURANCE AND PROVIDE TRAFFIC CONTROLS NECESSARY FOR THIS PROJECT.
12. THE CONTRACTOR SHALL RESTORE ANY DRAINAGE STRUCTURE, PIPE, UTILITY, PAVEMENT, CURBS, SIDEWALKS, LANDSCAPED AREAS OR SIGNAGE DISTURBED DURING CONSTRUCTION TO THEIR ORIGINAL CONDITION OR BETTER, AS APPROVED BY THE CIVIL ENGINEER OF RECORD. DURING CONSTRUCTION CONTRACTOR IS TO HAVE THE SITE MAINTAINED FREE OF ALL TRASH, LITTER, DEBRIS AND OVERGROWN VEGETATION.
13. THE OWNER SHALL BE RESPONSIBLE FOR MAINTAINING THE SITE FREE OF ALL TRASH, LITTER, DEBRIS AND OVERGROWN VEGETATION THROUGHOUT CONSTRUCTION.
14. ALTERNATIVE METHODS AND PRODUCTS OTHER THAN THOSE SPECIFIED MAY BE USED IF REVIEWED AND APPROVED BY THE OWNER, CIVIL ENGINEER, AND REGULATORY AGENCY PRIOR TO INSTALLATION DURING THE BIDDING PROCESS.



LEGEND

- PROPERTY LINE
- LIMIT OF WETLANDS
- UPLAND REVIEW AREA
- STORMWATER BASIN AREA
- 7' TALL CHAIN LINK FENCE
- TRINA 540W SOLAR MODULES
- UTILITY POLE
- OVERHEAD ELECTRIC LINE
- ELECTRIC CONDUIT
- LIMIT OF TREE CLEARING
- LIMIT OF DISTURBANCE
- GRASS LINED SWALE
- GRAVEL ACCESS DRIVE
- CONCRETE EQUIPMENT PAD
- WETLAND DISTURBANCE AREA
- STORMWATER BASIN
- EVERGREEN TREE

Rev. #:	Date	Description
1	04/19/24	CSC INTERROGATORIES

Graphic Scale: 60 0 60 120

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Drawn By:	AWC
Checked By:	CJB
Approved By:	KMS
Project #:	23100101
Plan Date:	01/15/24
Scale:	1" = 60'

STATE OF CONNECTICUT · KEVIN M. SOLLI · 28759 · LICENSED PROFESSIONAL ENGINEER

Kevin Solli, P.E.
CT 25759

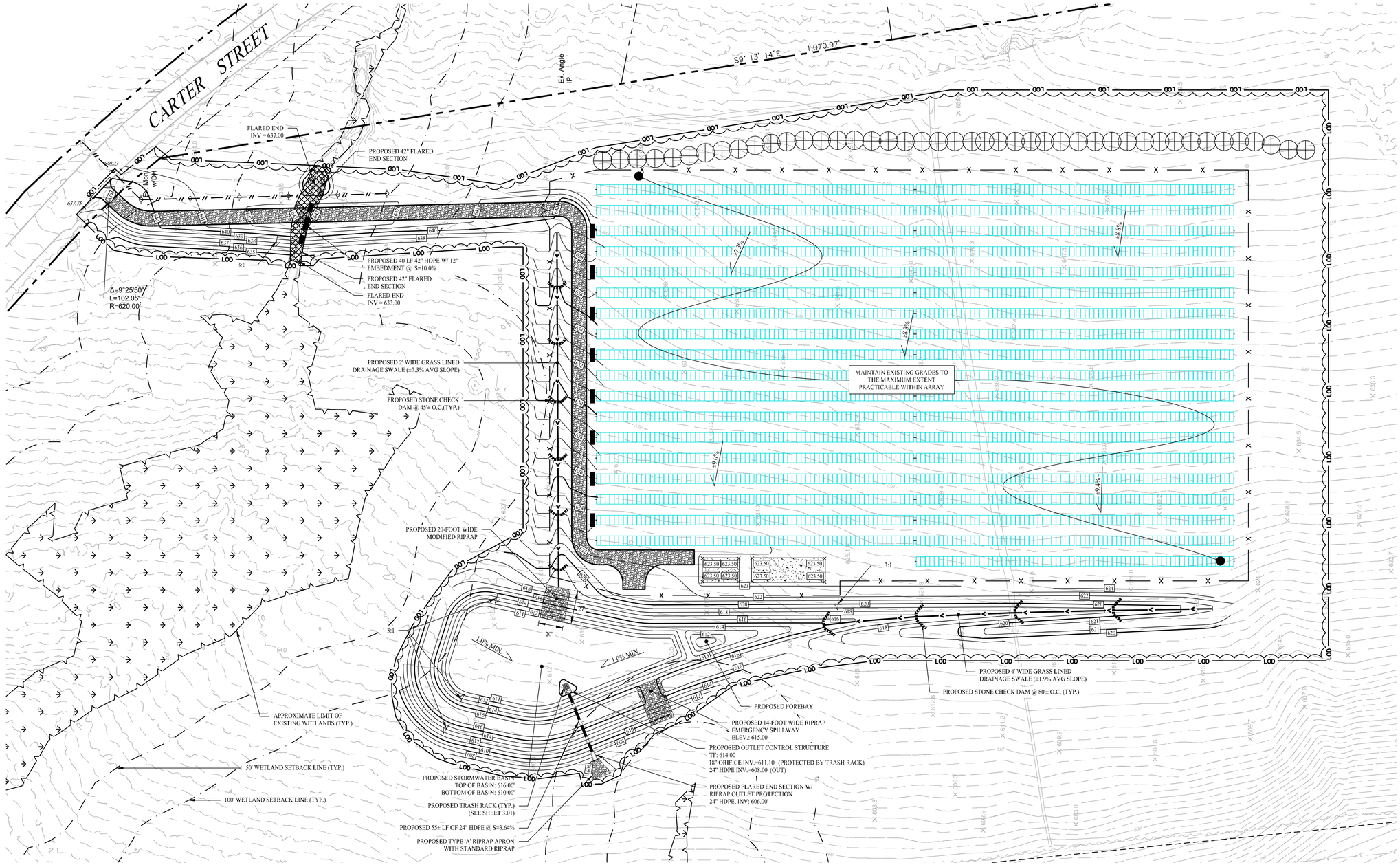
Project:

PROPOSED SOLAR PHOTOVOLTAIC ARRAY

250 CARTER STREET
MANCHESTER, CONNECTICUT

Sheet Title: SITE LAYOUT PLAN

Sheet #: 2.11



GENERAL NOTES

1. REFER TO THE EXISTING CONDITIONS MAP FOR THE ENTIRE PROPERTY BOUNDARY AND EXISTING CONDITIONS INFORMATION. THE PLAN HEREON DEPICTS A PORTION OF THE PROPERTY IN WHICH THE SITE WORK IS BEING PROPOSED.
2. THIS DRAWING IS INTENDED TO DESCRIBE GRADING AND DRAINAGE ONLY. REFER TO SITE PLAN FOR GENERAL INFORMATION, AND DETAIL SHEETS FOR DETAILS.
3. THE CONTRACTOR SHALL PRESERVE EXISTING VEGETATION WHERE POSSIBLE AND/OR AS NOTED ON DRAWINGS. REFER TO EROSION CONTROL PLAN FOR LIMIT OF DISTURBANCE AND EROSION CONTROL NOTES.
4. TOPSOIL SHALL BE STRIPPED AND STOCKPILED ON SITE FOR USE IN FINAL LANDSCAPING.
5. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY CONSTRUCTION PERMITS REQUIRED BY GOVERNMENT AND LOCAL AGENCIES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY CONSTRUCTION PERMITS FROM THE TOWN OF MANCHESTER REQUIRED TO PERFORM ALL WORK, INCLUDING FOR STREET CUTS AND CONNECTIONS TO EXISTING UTILITIES. THE CONTRACTOR SHALL POST ALL BONDS, PAY ALL FEES, PROVIDE PROOF OF INSURANCE AND PROVIDE TRAFFIC CONTROL NECESSARY FOR THIS WORK.
6. ALL DISTURBANCE INCURRED TO TOWN OR STATE PROPERTY DUE TO CONSTRUCTION SHALL BE RESTORED TO ITS PREVIOUS CONDITION OR BETTER, TO THE SATISFACTION OF THE TOWN OF BETHANY AUTHORITY.
7. IF IMPACTED OR CONTAMINATED SOIL IS ENCOUNTERED BY THE CONTRACTOR, THE CONTRACTOR SHALL SUSPEND EXCAVATION WORK OF IMPACTED SOIL AND NOTIFY THE OWNER AND/OR OWNER'S ENVIRONMENTAL CONSULTANT PRIOR TO PROCEEDING WITH FURTHER WORK IN THE IMPACTED SOIL LOCATION UNTIL FURTHER INSTRUCTED BY THE OWNER AND/OR OWNER'S ENVIRONMENTAL CONSULTANT.
8. ALL PIPE LENGTHS ARE HORIZONTAL DISTANCES AND ARE APPROXIMATE.
9. ALL DISTURBED AREAS TO BE RESEEDED WITH ERNMX-147 WITHIN THE ARRAY AREA. ERNMX-610 WILL BE USED OUTSIDE FENCELINE AND IN NON-ARRAY AREAS.

LEGEND

- PROPERTY LINE
- 620 — MAJOR CONTOURS
- 621 — MINOR CONTOURS
- EXISTING MAJOR CONTOURS
- EXISTING MINOR CONTOURS
- 568.85 — PROPOSED SPOT ELEVATION
- 568.85 — EXISTING SPOT ELEVATION
- STORM DRAIN PIPE
- RIP RAP SPILLWAY
- OUTLET CONTROL STRUCTURE
- FLARED END SECTION
- RIPRAP OUTLET PROTECTION
- PERMANENT WETLAND DISTURBANCE AREA

Rev. #	Date	Description
1	04/19/24	CSC INTERROGATORIES

Graphic Scale: 40 0 40 80

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Drawn By:	AWC
Checked By:	CJB
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Plan Date:	01/15/24
Scale:	1" = 40'

STATE OF CONNECTICUT · KEVIN M. SOLLI · 25759 · LICENSED PROFESSIONAL ENGINEER

Kevin Solli, P.E.
CT 25759

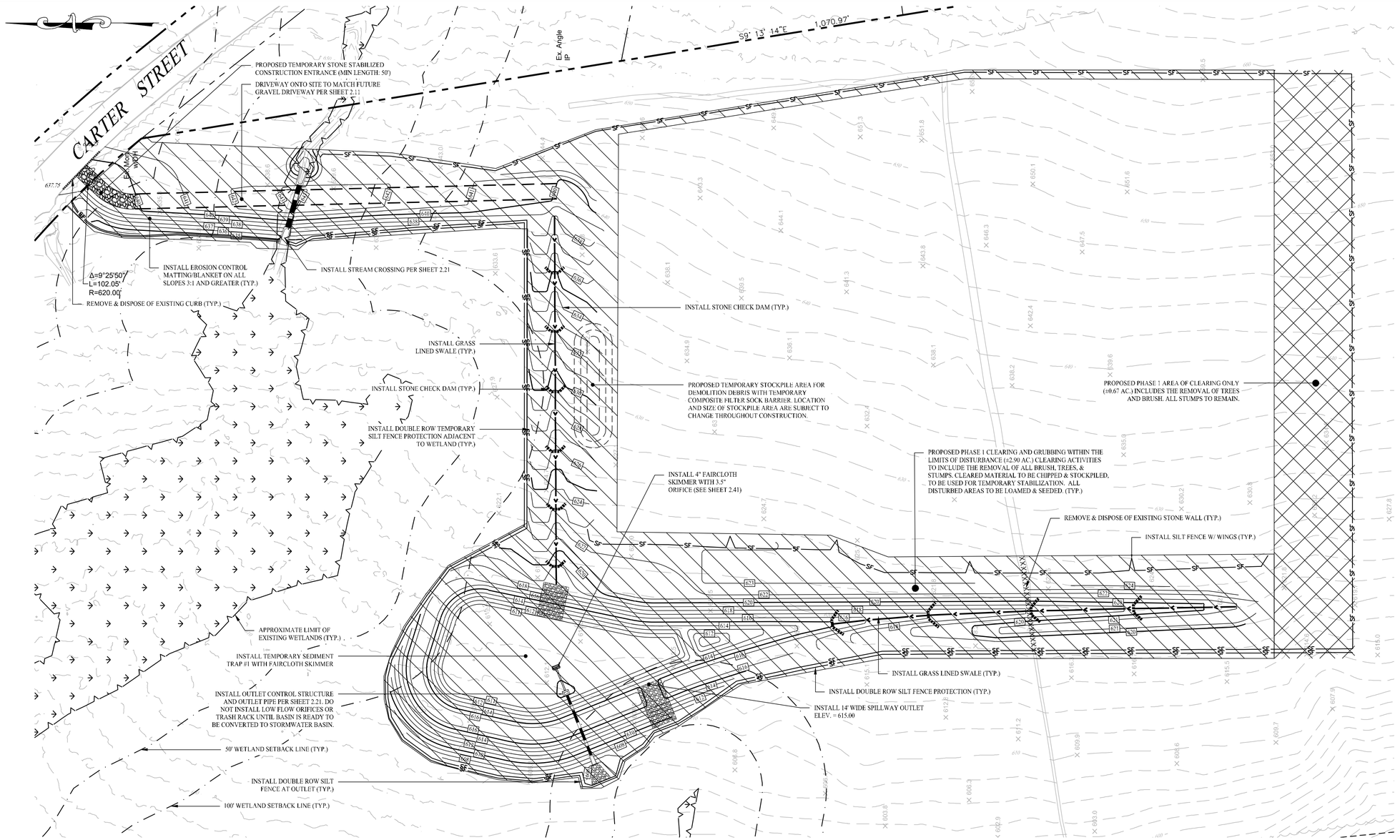
Project:

PROPOSED SOLAR PHOTOVOLTAIC ARRAY

250 CARTER STREET
MANCHESTER, CONNECTICUT

Sheet Title: GRADING & DRAINAGE PLAN

Sheet #: 2.21



LEGEND

- PROPERTY LINE
- RIGHT-OF-WAY LINE
- ADJOINING LOT LINE
- SF — SF — SILT FENCE PROTECTION
- CURB REMOVAL
- XXXXXXXXXXXXXXXXXXXX FENCE / ROCK WALL REMOVAL
- TEMPORARY SEDIMENT TRAP / BASIN
- STONE CHECK DAM
- MATERIAL STOCKPILE AREA
- CONSTRUCTION ENTRANCE
- DIVERSION SWALE/BERM
- EROSION CONTROL MATTING
- PHASE 1 CLEARING AND GRUBBING
- PHASE 1 CLEARING ONLY (STUMPS TO REMAIN)

CONSTRUCTION SEQUENCE (PHASE I)

THE FOLLOWING SUGGESTED SEQUENCE OF CONSTRUCTION ACTIVITIES IS PROJECTED BASED UPON ENGINEERING JUDGEMENT AND BEST MANAGEMENT PRACTICES. THE CONTRACTOR MAY ELECT TO ALTER THE SEQUENCING TO BEST MEET THE CONSTRUCTION SCHEDULE, THE EXISTING SITE ACTIVITIES AND WEATHER CONDITIONS. SHOULD THE CONTRACTOR ALTER THE CONSTRUCTION SEQUENCE OR ANY EROSION AND SEDIMENTATION CONTROL MEASURES THEY SHALL MODIFY THE STORMWATER POLLUTION CONTROL PLAN ("SWPCP") AS REQUIRED BY THE GENERAL PERMIT. MAJOR CHANGES IN SEQUENCING AND/OR METHODS MAY REQUIRE REGULATORY APPROVAL PRIOR TO IMPLEMENTATION.

PHASE 1:

1. THE CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION MEETING, PHYSICALLY FLAG THE LIMITS OF DISTURBANCE IN THE FIELD AS NECESSARY TO FACILITATE THE PRE-CONSTRUCTION MEETING.
2. CONDUCT A PRE-CONSTRUCTION MEETING TO DISCUSS THE PROPOSED WORK AND EROSION AND SEDIMENTATION CONTROL MEASURES. THE MEETING SHOULD BE ATTENDED BY THE OWNER, THE OWNER'S REPRESENTATIVE(S), THE GENERAL CONTRACTOR, DESIGNATED SUB-CONTRACTORS AND THE PERSON, OR PERSONS, RESPONSIBLE FOR THE IMPLEMENTATION, OPERATION, MONITORING AND MAINTENANCE OF THE EROSION AND SEDIMENTATION MEASURES. THE CONSTRUCTION PROCEDURES FOR THE ENTIRE PROJECT SHALL BE REVIEWED AT THIS MEETING.
3. NOTIFY CALL BEFORE YOU DIG AT 811, AS REQUIRED, PRIOR TO THE START OF CONSTRUCTION.
4. REMOVE EXISTING IMPEDIMENTS AS NECESSARY AND PROVIDE MINIMAL DISTURBANCE TO INSTALL THE REQUIRED CONSTRUCTION ENTRANCE.
6. INSTALL STREAM CROSSING & ACCESS DRIVE.
7. INSTALL SILT FENCE / PERIMETER SEC MEASURES AS PROPOSED (CLEAR ONLY THOSE AREAS NECESSARY TO INSTALL SEC MEASURES).
8. PREPARE TEMPORARY PARKING AND STORAGE AREAS. ESTABLISH MATERIAL STOCKPILE AREA AND INSTALL SEC BARRIER SURROUNDING PILE.
9. COMPLETE PHASE 1 CLEARING & GRUBBING FOR INSTALLATION OF SEDIMENT TRAP AND GRASS LINED SWALES PER DESIGN PLANS. STABILIZE OPEN SOILS WITH SPECIFIED SEED MIXES.

SEDIMENT & EROSION CONTROL NOTES

1. THE CONTRACTOR SHALL CONSTRUCT ALL SEDIMENT AND EROSION CONTROLS IN ACCORDANCE WITH THE 2024 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL, LATEST EDITION, IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, AND AS DIRECTED BY THE TOWN OF MANCHESTER, PERMITTEE, AND/OR SWPCP MONITOR. ALL PERIMETER SEDIMENTATION AND EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO THE START OF CLEARING AND GRUBBING AND DEMOLITION OPERATIONS.
2. THESE DRAWINGS ARE ONLY INTENDED TO DESCRIBE THE SEDIMENT AND EROSION CONTROL MEASURES FOR THIS SITE. SEE CONSTRUCTION SEQUENCE FOR ADDITIONAL INFORMATION. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHOWN ON THE EROSION & SEDIMENT CONTROL PLAN ARE SHOWN AS REQUIRED BY THE ENGINEER OF RECORD. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT ALL EROSION CONTROL MEASURES ARE CONFIGURED AND CONSTRUCTED IN A MANNER THAT WILL MINIMIZE EROSION OF SOILS AND PREVENT THE TRANSPORT OF SEDIMENTS AND OTHER POLLUTANTS TO STORM DRAINAGE SYSTEMS AND/OR WATERCOURSES. ACTUAL SITE CONDITIONS OR SEASONAL AND CLIMATIC CONDITIONS MAY WARRANT ADDITIONAL CONTROLS OR CONFIGURATIONS, AS REQUIRED, AND AS DIRECTED BY THE PERMITTEE AND/OR SWPCP MONITOR. REFER TO SITE PLAN FOR GENERAL INFORMATION AND OTHER CONTRACT PLANS FOR APPROPRIATE INFORMATION.
3. A BOND OR LETTER OF CREDIT MAY BE REQUIRED TO BE POSTED WITH THE GOVERNING AUTHORITY FOR THE EROSION CONTROL INSTALLATION AND MAINTENANCE.
4. THE CONTRACTOR SHALL APPLY THE MINIMUM EROSION & SEDIMENT CONTROL MEASURES SHOWN ON THE PLAN IN CONJUNCTION WITH CONSTRUCTION SEQUENCING, SUCH THAT ALL ACTIVE WORK ZONES ARE PROTECTED. ADDITIONAL AND/OR ALTERNATIVE SEDIMENT AND EROSION CONTROL MEASURES MAY BE INSTALLED DURING THE CONSTRUCTION PERIOD IF FOUND NECESSARY BY THE CONTRACTOR, OWNER, ENGINEER OF RECORD, MUNICIPAL OFFICIALS, OR ANY GOVERNING AGENCY. THE CONTRACTOR SHALL CONTACT THE OWNER AND APPROPRIATE GOVERNING AGENCIES FOR APPROVAL IF ALTERNATIVE CONTROLS OTHER THAN THOSE SHOWN ON THE PLANS ARE PROPOSED BY THE CONTRACTOR.
5. THE CONTRACTOR SHALL TAKE EXTREME CARE DURING CONSTRUCTION SO AS NOT TO DISTURB UNPROTECTED WETLAND AREAS OR INSTALLED SEDIMENTATION AND EROSION CONTROL MEASURES. THE CONTRACTOR SHALL INSPECT ALL SEDIMENT AND EROSION CONTROLS WEEKLY AND WITHIN 24 HOURS OF A STORM WITH A RAINFALL AMOUNT OF 0.25 INCHES OR GREATER TO VERIFY THAT THE CONTROLS ARE OPERATING PROPERLY AND MAKE REPAIRS AS NECESSARY IN A TIMELY MANNER.
6. THE CONTRACTOR SHALL KEEP A SUPPLY OF EROSION CONTROL MATERIAL (SILT FENCE, COMPOSITE FILTER SOCK, EROSION CONTROL BLANKET, ETC.) ON-SITE FOR PERIODIC MAINTENANCE AND EMERGENCY REPAIRS.
7. ALL FILL MATERIAL PLACED ADJACENT TO ANY WETLAND AREA SHALL BE GOOD QUALITY, WITH LESS THAN 5% FINES PASSING THROUGH A #200 SIEVE (BANK RUN), SHALL BE PLACED IN MAXIMUM ONE FOOT LIFTS, AND SHALL BE COMPACTED TO 95% MAX. DRY DENSITY MODIFIED PROCTOR OR AS SPECIFIED IN THE CONTRACT SPECIFICATIONS.
8. PROTECT EXISTING TREES THAT ARE TO BE SAVED BY FENCING, ORANGE SAFETY FENCE, CONSTRUCTION TAPE, OR EQUIVALENT FENCING/TAPE. ANY LIMB TRIMMING SHOULD BE DONE AFTER CONSULTATION WITH AN ARBORIST AND BEFORE CONSTRUCTION BEGINS IN THAT AREA. FENCING SHALL BE MAINTAINED AND REPAIRED DURING CONSTRUCTION.
9. CONSTRUCTION ENTRANCES (ANTI-TRACKING PADS) SHALL BE INSTALLED PRIOR TO ANY SITE EXCAVATION OR CONSTRUCTION ACTIVITY AND SHALL BE MAINTAINED THROUGHOUT THE DURATION OF ALL CONSTRUCTION IF REQUIRED. THE LOCATION OF THE TRACKING PADS MAY CHANGE AS VARIOUS PHASES OF CONSTRUCTION ARE COMPLETED. CONTRACTOR SHALL ENSURE THAT ALL VEHICLES EXITING THE SITE ARE PASSING OVER THE ANTI-TRACKING PADS PRIOR TO EXITING.
10. ALL CONSTRUCTION SHALL BE CONTAINED WITHIN THE LIMIT OF DISTURBANCE, WHICH SHALL BE MARKED WITH SILT FENCE, SAFETY FENCE, HAY BALES, RIBBONS, OR OTHER MEANS PRIOR TO CLEARING. CONSTRUCTION ACTIVITY SHALL REMAIN ON THE UPHILL SIDE OF THE SEDIMENT BARRIER UNLESS WORK IS SPECIFICALLY CALLED FOR ON THE DOWNHILL SIDE OF THE BARRIER.
11. NO CUT OR FILL SLOPES SHALL EXCEED 2:1 EXCEPT WHERE STABILIZED BY ROCK FACED EMBANKMENTS OR EROSION CONTROL BLANKETS. ALL SLOPES SHALL BE SEEDED AND BANKS WILL BE STABILIZED IMMEDIATELY UPON COMPLETION OF FINAL GRADING UNTIL TURF IS ESTABLISHED.
12. DIRECT ANY DEWATERING PUMP DISCHARGE TO A SEDIMENT CONTROL DEVICE CONFORMING TO THE GUIDELINES WITHIN THE APPROVED LIMIT OF DISTURBANCE IF REQUIRED. DISCHARGE TO STORM DRAINS OR SURFACE WATERS FROM SEDIMENT CONTROLS SHALL BE CLEAR AND APPROVED BY THE PERMITTEE OR MUNICIPALITY.
13. THE CONTRACTOR SHALL MAINTAIN A CLEAN CONSTRUCTION SITE AND SHALL NOT ALLOW THE ACCUMULATION OF RUBBISH OR CONSTRUCTION DEBRIS ON THE SITE. PROPER SANITARY DEVICES SHALL BE MAINTAINED ON-SITE AT ALL TIMES AND SECURED APPROPRIATELY. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID THE SPILLAGE OF FUEL OR OTHER POLLUTANTS ON THE CONSTRUCTION SITE AND SHALL ADHERE TO ALL APPLICABLE POLICIES AND REGULATIONS RELATED TO SPILL PREVENTION AND RESPONSE/CONTAINMENT.
14. MINIMIZE LAND DISTURBANCES. SEED AND MULCH DISTURBED AREAS WITH TEMPORARY MIX AS SOON AS PRACTICABLE (2 WEEK MAXIMUM UNSTABILIZED PERIOD) USING PERENNIAL RYEGRASS AT 40 LBS PER ACRE. MULCH ALL CUT AND FILL SLOPES AND SWALES WITH LOOSE HAY AT A RATE OF 2 TONS PER ACRE. IF NECESSARY, REPLACE LOOSE HAY ON SLOPES WITH EROSION CONTROL BLANKETS OR JUTE CLOTH. MODERATELY GRADED AREAS, ISLANDS, AND TEMPORARY CONSTRUCTION STAGING AREAS MAY BE HYDROSEEDED WITH TACKIFIER.
15. SWEEP AFFECTED PORTIONS OF OFF SITE ROADS ONE OR MORE TIMES A DAY (OR LESS FREQUENTLY IF TRACKING IS NOT A PROBLEM) DURING CONSTRUCTION. FOR DUST CONTROL, PERIODICALLY MOISTEN EXPOSED SOIL SURFACES WITH WATER ON UNPAVED TRAVELWAYS TO KEEP THE TRAVELWAYS DAMP. CALCIUM CHLORIDE MAY ALSO BE APPLIED TO ACCESS ROADS. DUMP TRUCK LOADS EXITING THE SITE SHALL BE COVERED.
16. VEGETATIVE ESTABLISHMENT SHALL OCCUR ON ALL DISTURBED SOIL, UNLESS THE AREA IS UNDER ACTIVE CONSTRUCTION, IT IS COVERED IN STONE OR SCHEDULED FOR PAVING WITHIN 30 DAYS. TEMPORARY SEEDING OR NON-LIVING SOIL PROTECTION OF ALL EXPOSED SOILS AND SLOPES SHALL BE INITIATED WITHIN THE FIRST 7 DAYS OF SUSPENDING WORK IN AREAS TO BE LEFT LONGER THAN 30 DAYS.
17. MAINTAIN ALL PERMANENT AND TEMPORARY SEDIMENT CONTROL DEVICES IN EFFECTIVE CONDITION THROUGHOUT THE CONSTRUCTION PERIOD. UPON COMPLETION OF WORK SWEEP CONCRETE PADS. CLEAN THE STORMWATER MANAGEMENT SYSTEMS AND REMOVE ALL TEMPORARY SEDIMENT CONTROLS ONCE THE SITE IS FULLY STABILIZED AND APPROVAL HAS BEEN RECEIVED FROM PERMITTEE OR THE MUNICIPALITY.
18. SEEDING MIXTURES SHALL BE FUZZ & BUZZ MIX - PREMIUM - ERNMX-147, OR APPROVED EQUAL. NEW ENGLAND EROSION CONTROL/ RESTORATION MIX FOR STORMWATER BASINS & MOIST SITES, OR APPROVED EQUAL, SHALL BE UTILIZED ON THE BOTTOM OF THE BASIN & FUZZ & BUZZ MIX - PREMIUM - ERNMX-147, OR APPROVED EQUAL, ON THE SIDE SLOPES OF THE BASIN. SEE SHEET DN-2 FOR ALL SEED MIXTURES.
19. REFER TO SHEET 2.41 FOR SEDIMENT & EROSION CONTROL NARRATIVE & DETAILS.

CONSTRUCTION OPERATION & MAINTENANCE PLAN

E&S MEASURE	INSPECTION SCHEDULE	MAINTENANCE REQUIRED
CONSTRUCTION ENTRANCE	DAILY	PLACE ADDITIONAL STONE, EXTEND THE LENGTH OR REMOVE AND REPLACE THE STONE, CLEAN PAVED SURFACES OF TRACKED SEDIMENT.
COMPOSITE FILTER SOCK	WEEKLY & WITHIN 24 HOURS OF RAINFALL > 0.25"	REPAIR/REPLACE WHEN FAILURE OR DETERIORATION IS OBSERVED.
SILT FENCE	WEEKLY & WITHIN 24 HOURS OF RAINFALL > 0.25"	REPAIR/REPLACE WHEN FAILURE OR DETERIORATION IS OBSERVED. REMOVE SILT WHEN IT REACHES 1/2 THE HEIGHT OF THE FENCE.
TOPSOIL/BORROW STOCKPILES	DAILY	REPAIR/REPLACE SEDIMENT BARRIERS AS NECESSARY.
TEMPORARY SOIL PROTECTION	WEEKLY & WITHIN 24 HOURS OF RAINFALL > 0.25"	REPAIR ERODED OR BARE AREAS IMMEDIATELY. RESEED AND MULCH.

TEMPORARY SEDIMENT TRAP CALCULATIONS

TRAP NUMBER	DRAINAGE AREA (AC)	REQ. STORAGE VOLUME (CF)	REQ. WET VOLUME (CF)	BOTTOM ELEVATION (FT)	WET ELEVATION (FT)	DRY ELEVATION (FT)	TOP ELEVATION (FT)	WET VOL PROVIDED (CF)	DRY VOLUME PROVIDED (CF)	TOTAL VOLUME PROVIDED (CF)
1	2.35	8,503	4,251	611.00	612.00	615.00	616.00	14,044	42,650	56,694

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STATE OF CONNECTICUT · KEVIN M. SOLLI · 25759 · LICENSED PROFESSIONAL ENGINEER

Kevin Solli, P.E.
CT 25759

Project:

PROPOSED SOLAR PHOTOVOLTAIC ARRAY

250 CARTER STREET
MANCHESTER, CONNECTICUT

Sheet Title: SOIL EROSION & SEDIMENT CONTROL PLAN PHASE 1

Sheet #: 2.31

Apr 22, 2024 - 8:38am chendry
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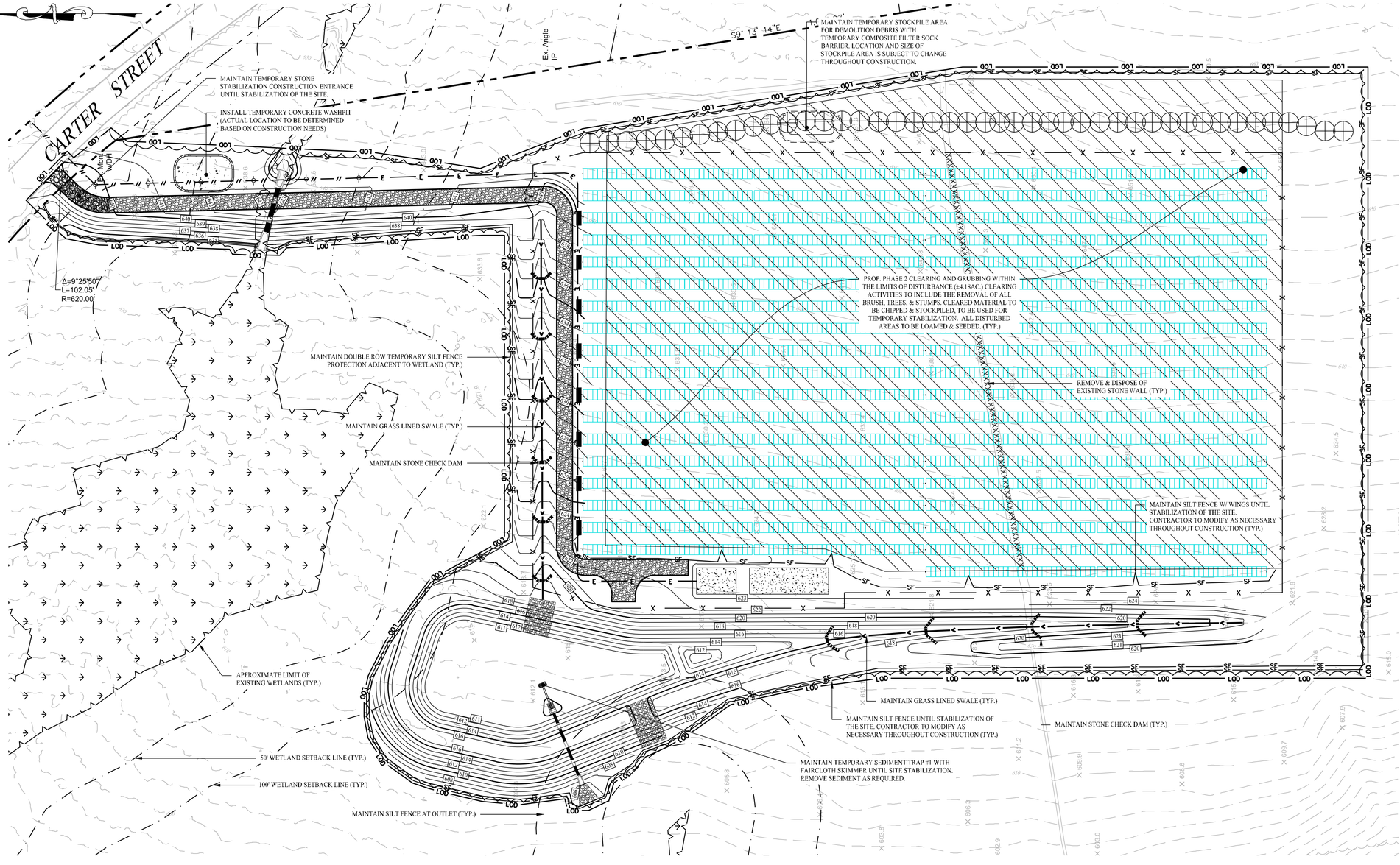

LEGEND

- PROPERTY LINE
- RIGHT-OF-WAY LINE
- ADJOINING LOT LINE
- SILT FENCE PROTECTION
- CONSTRUCTION FENCE
- CURB REMOVAL
- FENCE / ROCK WALL REMOVAL
- TEMPORARY SEDIMENT TRAP / BASIN
- STONE CHECK DAM
- MATERIAL STOCKPILE AREA
- CONSTRUCTION ENTRANCE
- CONCRETE WASHPIT
- DIVERSION SWALE/BERM
- PHASE 2 CLEARING AND GRUBBING

CONSTRUCTION SEQUENCE (PHASE II)

PHASE II:

1. TEMPORARILY SEED, THROUGHOUT CONSTRUCTION, DENUDED AREAS THAT WILL BE INACTIVE FOR 14 DAYS OR MORE.
2. ONCE SEDIMENT TRAP AND GRASS LINED SWALES ARE STABILIZED, COMPLETE PHASE 2 CLEARING AND GRUBBING. STABILIZE OPEN SOILS WITH SPECIFIED SEED MIXES.
3. INSTALL RACKING POSTS FOR SOLAR PANELS.
4. INSTALL SOLAR PANELS AND COMPLETE ELECTRIC INSTALLATION.
5. COMPLETE REMAINING SITE WORK, INCLUDING CHAIN LINK FENCE, EQUIPMENTS PADS, AND INTERCONNECTION ROUTE. STABILIZE ALL DISTURBED AREAS THROUGHOUT CONSTRUCTION.
6. PERMANENTLY STABILIZE AREAS TO BE VEGETATED AS THEY ARE BROUGHT TO FINAL GRADE.
7. PER APPENDIX I (I)(1)(C)(xiii); FOR SLOPES GREATER THAN OR EQUAL TO 8%, EROSION CONTROL BLANKETS OR STUMP GRINDINGS OR EROSION CONTROL MIX MULCH OR HYDROSEED WITH TACKIFER SHALL BE APPLIED WITHIN 72 HOURS OF FINAL GRADING, OR WHEN A RAINFALL OF 0.5 INCHES OR GREATER IS PREDICTED WITHIN 24 HOURS OF FINAL GRADING, WHICHEVER TIME PERIOD IS LESS.
8. CONVERT SEDIMENT TRAP TO PERMANENT STORMWATER BASIN. REMOVE ALL SEDIMENT AND REPAIR ALL BASIN BANKS AS REQUIRED. INSTALL LOW FLOW ORIFICES IN OUTLET CONTROL STRUCTURE.
9. REPAIR AND STABILIZE GRASS LINED SWALES AS REQUIRED.
10. PREPARE SITE FOR FINAL GRADING.
11. FINE GRADE, RAKE, SEED, AND MULCH ALL REMAINING DISTURBED AREAS.
12. CONTRACTOR / CONSTRUCTION MANAGER TO COORDINATE WITH ENGINEER OF RECORD AND SOIL CONSERVATION DISTRICT AGENT TO OBTAIN STABILIZED SITE STATUS.
13. CONTINUE DAILY INSPECTION REPORTS UNTIL THE FINAL DAILY INSPECTION REPORT IS SIGNED BY THE CONSTRUCTION MANAGER AND SUBMITTED.

SEDIMENT & EROSION CONTROL NOTES

1. THE CONTRACTOR SHALL CONSTRUCT ALL SEDIMENT AND EROSION CONTROLS IN ACCORDANCE WITH THE 2024 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL, LATEST EDITION, IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, AND AS DIRECTED BY THE TOWN OF MANCHESTER, PERMITTEE, AND/OR SWPCP MONITOR. ALL PERIMETER SEDIMENTATION AND EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO THE START OF CLEARING AND GRUBBING AND DEMOLITION OPERATIONS.
2. THESE DRAWINGS ARE ONLY INTENDED TO DESCRIBE THE SEDIMENT AND EROSION CONTROL MEASURES FOR THIS SITE. SEE CONSTRUCTION SEQUENCE FOR ADDITIONAL INFORMATION. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHOWN ON THE EROSION & SEDIMENT CONTROL PLAN ARE SHOWN AS REQUIRED BY THE ENGINEER OF RECORD. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT ALL EROSION CONTROL MEASURES ARE CONFIGURED AND CONSTRUCTED IN A MANNER THAT WILL MINIMIZE EROSION OF SOILS AND PREVENT THE TRANSPORT OF SEDIMENTS AND OTHER POLLUTANTS TO STORM DRAINAGE SYSTEMS AND/OR WATERCOURSES. ACTUAL SITE CONDITIONS OR SEASONAL AND CLIMATIC CONDITIONS MAY WARRANT ADDITIONAL CONTROLS OR CONFIGURATIONS, AS REQUIRED, AND AS DIRECTED BY THE PERMITTEE AND/OR SWPCP MONITOR. REFER TO SITE PLAN FOR GENERAL INFORMATION AND OTHER CONTRACT PLANS FOR APPROPRIATE INFORMATION.
3. A BOND OR LETTER OF CREDIT MAY BE REQUIRED TO BE POSTED WITH THE GOVERNING AUTHORITY FOR THE EROSION CONTROL INSTALLATION AND MAINTENANCE.
4. THE CONTRACTOR SHALL APPLY THE MINIMUM EROSION & SEDIMENT CONTROL MEASURES SHOWN ON THE PLAN IN CONJUNCTION WITH CONSTRUCTION SEQUENCING, SUCH THAT ALL ACTIVE WORK ZONES ARE PROTECTED. ADDITIONAL AND/OR ALTERNATIVE SEDIMENT AND EROSION CONTROL MEASURES MAY BE INSTALLED DURING THE CONSTRUCTION PERIOD IF FOUND NECESSARY BY THE CONTRACTOR, OWNER, ENGINEER OF RECORD, MUNICIPAL OFFICIALS, OR ANY GOVERNING AGENCY. THE CONTRACTOR SHALL CONTACT THE OWNER AND APPROPRIATE GOVERNING AGENCIES FOR APPROVAL IF ALTERNATIVE CONTROLS OTHER THAN THOSE SHOWN ON THE PLANS ARE PROPOSED BY THE CONTRACTOR.
5. THE CONTRACTOR SHALL TAKE EXTREME CARE DURING CONSTRUCTION SO AS NOT TO DISTURB UNPROTECTED WETLAND AREAS OR INSTALLED SEDIMENTATION AND EROSION CONTROL MEASURES. THE CONTRACTOR SHALL INSPECT ALL SEDIMENT AND EROSION CONTROLS WEEKLY AND WITHIN 24 HOURS OF A STORM WITH A RAINFALL AMOUNT OF 0.25 INCHES OR GREATER TO VERIFY THAT THE CONTROLS ARE OPERATING PROPERLY AND MAKE REPAIRS AS NECESSARY IN A TIMELY MANNER.
6. THE CONTRACTOR SHALL KEEP A SUPPLY OF EROSION CONTROL MATERIAL (SILT FENCE, COMPOSITE FILTER SOCK, EROSION CONTROL BLANKET, ETC.) ON-SITE FOR PERIODIC MAINTENANCE AND EMERGENCY REPAIRS.
7. ALL FILL MATERIAL PLACED ADJACENT TO ANY WETLAND AREA SHALL BE GOOD QUALITY, WITH LESS THAN 5% FINES PASSING THROUGH A #200 SIEVE (BANK RUN), SHALL BE PLACED IN MAXIMUM ONE FOOT LIFTS, AND SHALL BE COMPACTED TO 95% MAX. DRY DENSITY MODIFIED PROCTOR OR AS SPECIFIED IN THE CONTRACT SPECIFICATIONS.
8. PROTECT EXISTING TREES THAT ARE TO BE SAVED BY FENCING, ORANGE SAFETY FENCE, CONSTRUCTION TAPE, OR EQUIVALENT FENCING/TAPE. ANY LIMB TRIMMING SHOULD BE DONE AFTER CONSULTATION WITH AN ARBORIST AND BEFORE CONSTRUCTION BEGINS IN THAT AREA. FENCING SHALL BE MAINTAINED AND REPAIRED DURING CONSTRUCTION.
9. CONSTRUCTION ENTRANCES (ANTI-TRACKING PADS) SIALL BE INSTALLED PRIOR TO ANY SITE EXCAVATION OR CONSTRUCTION ACTIVITY AND SHALL BE MAINTAINED TIROUGHOUT TIIE DURATION OF ALL CONSTRUCTION IF REQUIRED. THE LOCATION OF TIIE TRACKING PADS MAY CIIANGE AS VARIOUS PIIASES OF CONSTRUCTION ARE COMPLETED. CONTRACTOR SIIALL ENSURE THAT ALL VEIIICLES EXITING TIIE SITE ARE PASSING OVER TIIE ANTI-TRACKING PADS PRIOR TO EXITING.
10. ALL CONSTRUCTION SHALL BE CONTAINED WITHIN THE LIMIT OF DISTURBANCE, WHICH SHALL BE MARKED WITH SILT FENCE, SAFETY FENCE, HAY BALES, RIBBONS, OR OTHER MEANS PRIOR TO CLEARING. CONSTRUCTION ACTIVITY SHALL REMAIN ON THE UPHILL SIDE OF THE SEDIMENT BARRIER UNLESS WORK IS SPECIFICALLY CALLED FOR ON THE DOWNHILL SIDE OF THE BARRIER.
11. NO CUT OR FILL SLOPES SHALL EXCEED 2:1 EXCEPT WHERE STABILIZED BY ROCK FACED EMBANKMENTS OR EROSION CONTROL BLANKETS. ALL SLOPES SHALL BE SEEDED AND BANKS WILL BE STABILIZED IMMEDIATELY UPON COMPLETION OF FINAL GRADING UNTIL TURF IS ESTABLISHED.
12. DIRECT ANY DEWATERING PUMP DISCHARGE TO A SEDIMENT CONTROL DEVICE CONFORMING TO THE GUIDELINES WITHIN THE APPROVED LIMIT OF DISTURBANCE IF REQUIRED. DISCHARGE TO STORM DRAINS OR SURFACE WATERS FROM SEDIMENT CONTROLS SHALL BE CLEAR AND APPROVED BY THE PERMITTEE OR MUNICIPALITY.
13. THE CONTRACTOR SHALL MAINTAIN A CLEAN CONSTRUCTION SITE AND SHALL NOT ALLOW THE ACCUMULATION OF RUBBISH OR CONSTRUCTION DEBRIS ON THE SITE. PROPER SANITARY DEVICES SHALL BE MAINTAINED ON-SITE AT ALL TIMES AND SECURED APPROPRIATELY. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID THE SPILLAGE OF FUEL OR OTHER POLLUTANTS ON THE CONSTRUCTION SITE AND SHALL ADHERE TO ALL APPLICABLE POLICIES AND REGULATIONS RELATED TO SPILL PREVENTION AND RESPONSE/CONTAINMENT.
14. MINIMIZE LAND DISTURBANCES. SEED AND MULCH DISTURBED AREAS WITH TEMPORARY MIX AS SOON AS PRACTICABLE (2 WEEK MAXIMUM UNSTABILIZED PERIOD) USING PERENNIAL RYEGRASS AT 40 LBS PER ACRE. MULCH ALL CUT AND FILL SLOPES AND SWALES WITH LOOSE HAY AT A RATE OF 2 TONS PER ACRE. IF NECESSARY, REPLACE LOOSE HAY ON SLOPES WITH EROSION CONTROL BLANKETS OR JUTE CLOTH. MODERATELY GRADED AREAS, ISLANDS, AND TEMPORARY CONSTRUCTION STAGING AREAS MAY BE HYDROSEEDED WITH TACKIFIER.
15. SWEEP AFFECTED PORTIONS OF OFF SITE ROADS ONE OR MORE TIMES A DAY (OR LESS FREQUENTLY IF TRACKING IS NOT A PROBLEM) DURING CONSTRUCTION. FOR DUST CONTROL, PERIODICALLY MOISTEN EXPOSED SOIL SURFACES WITH WATER ON UNPAVED TRAVELWAYS TO KEEP TIIE TRAVELWAYS DAMP. CALCIUM CIILORIDE MAY ALSO BE APPLIED TO ACCESS ROADS. DUMP TRUCK LOADS EXITING THE SITE SIIALL BE COVERED.
16. VEGETATIVE ESTABLISIIMENT SIIALL OCCUR ON ALL DISTURBED SOIL. UNLESS TIIE AREA IS UNDER ACTIVE CONSTRUCTION, IT IS COVERED IN STONE OR SCIIEDULED FOR PAVING WITIIIN 30 DAYS. TEMPORARY SEEDING OR NON-LIVING SOIL PROTECTION OF ALL EXPOSED SOILS AND SLOPES SHALL BE INITIATED WITHIN THE FIRST 7 DAYS OF SUSPENDING WORK IN AREAS TO BE LEFT LONGER THAN 30 DAYS.
17. MAINTAIN ALL PERMANENT AND TEMPORARY SEDIMENT CONTROL DEVICES IN EFFECTIVE CONDITION THROUGHOUT THE CONSTRUCTION PERIOD. UPON COMPLETION OF WORK SWEEP CONCRETE PADS, CLEAN THE STORMWATER MANAGEMENT SYSTEMS AND REMOVE ALL TEMPORARY SEDIMENT CONTROLS ONCE THE SITE IS FULLY STABILIZED AND APPROVAL HAS BEEN RECEIVED FROM PERMITTEE OR THE MUNICIPALITY.
18. SEEDING MIXTURES SHALL BE FUZZ & BUZZ MIX - PREMIUM - ERNMX-147, OR APPROVED EQUAL. NEW ENGLAND EROSION CONTROL/ RESTORATION MIX FOR STORMWATER BASINS & MOIST SITES, OR APPROVED EQUAL, SHALL BE UTILIZED ON THE BOTTOM OF THE BASIN & FUZZ & BUZZ MIX - PREMIUM - ERNMX-147, OR APPROVED EQUAL, ON THE SIDE SLOPES OF THE BASIN. SEE SHEET DN-2 FOR ALL SEED MIXTURES.
19. REFER TO SHEET 2.41 FOR SEDIMENT & EROSION CONTROL NARRATIVE & DETAILS.

CONSTRUCTION OPERATION & MAINTENANCE PLAN

E&S MEASURE	INSPECTION SCHEDULE	MAINTENANCE REQUIRED
CONSTRUCTION ENTRANCE	DAILY	PLACE ADDITIONAL STONE, EXTEND THE LENGTH OR REMOVE AND REPLACE THE STONE. CLEAN PAVED SURFACES OF TRACKED SEDIMENT.
COMPOSITE FILTER SOCK	WEEKLY & WITHIN 24 HOURS OF RAINFALL > 0.25"	REPAIR/REPLACE WHEN FAILURE OR DETERIORATION IS OBSERVED.
SILT FENCE	WEEKLY & WITHIN 24 HOURS OF RAINFALL > 0.25"	REPAIR/REPLACE WHEN FAILURE OR DETERIORATION IS OBSERVED. REMOVE SILT WHEN IT REACHES 1/2 THE HEIGHT OF THE FENCE.
TOPSOIL/BORROW STOCKPILES	DAILY	REPAIR/REPLACE SEDIMENT BARRIERS AS NECESSARY.
TEMPORARY SOIL PROTECTION	WEEKLY & WITHIN 24 HOURS OF RAINFALL > 0.25"	REPAIR ERODED OR BARE AREAS IMMEDIATELY. RESEED AND MULCH.

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Graphic Scale: 60 0 60 120

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Drawn By:	SFU
Checked By:	AWC
Approved By:	KMS
Project #:	23100101
Plan Date:	01/15/24
Scale:	1" = 60'

STATE OF CONNECTICUT KEVIN M. SOLLI 25759 LICENSED PROFESSIONAL ENGINEER
Kevin Solli, P.E.
CT 25759

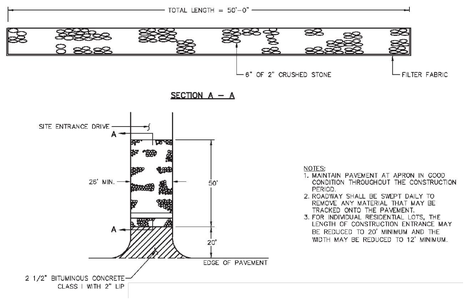
Project:

PROPOSED SOLAR PHOTOVOLTAIC ARRAY

250 CARTER STREET
MANCHESTER, CONNECTICUT

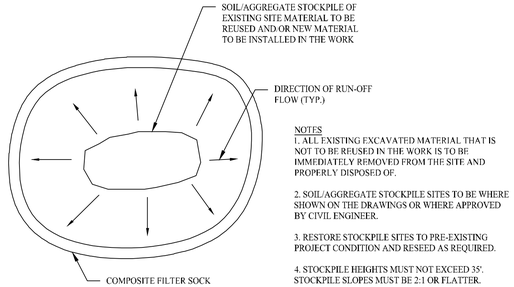
Sheet Title: SOIL EROSION & SEDIMENT CONTROL PLAN PHASE 2

Sheet #: 2.32



CONSTRUCTION ENTRANCE

SCALE: NTS SOURCE: TOWN OF MANCHESTER



NOTES

1. ALL EXISTING EXCAVATED MATERIAL THAT IS NOT TO BE REUSED IN THE WORK IS TO BE IMMEDIATELY REMOVED FROM THE SITE AND PROPERLY DISPOSED OF.

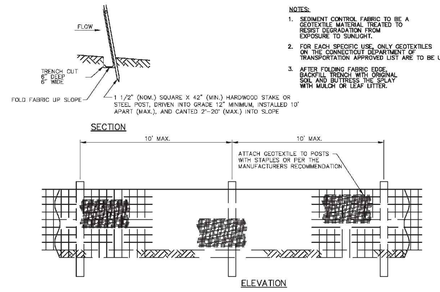
2. SOIL/AGGREGATE STOCKPILE SITES TO BE WHERE SHOWN ON THE DRAWINGS OR WHERE APPROVED BY CIVIL ENGINEER.

3. RESTORE STOCKPILE SITES TO PRE-EXISTING PROJECT CONDITION AND RESEED AS REQUIRED.

4. STOCKPILE HEIGHTS MUST NOT EXCEED 35'. STOCKPILE SLOPES MUST BE 2:1 OR FLATTER.

MATERIALS STOCKPILE DETAIL

SCALE: NTS

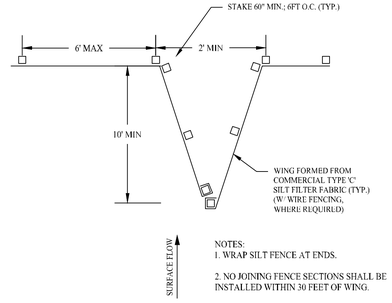


NOTES:

1. SEDIMENT CONTROL FABRIC TO BE A GEOTEXTILE MATERIAL TREATED TO RESIST DEGRADATION FROM EXPOSURE TO SUNLIGHT.
2. FOR EACH SPECIFIC USE, ONLY GEOTEXTILES ON THE CONNECTICUT DEPARTMENT OF TRANSPORTATION APPROVED LIST ARE TO BE USED.
3. AFTER FOLDING FABRIC EDGE BACKFILL TRENCH WITH ORIGINAL SOIL AND ENTRENCH THE SOCK WITH MULCH OR LEAF LITTER.

SILT FENCE PROTECTION DETAIL

SCALE: NTS SOURCE: TOWN OR MANCHESTER



NOTES:

1. WRAP SILT FENCE AT ENDS.

2. NO JOINING FENCE SECTIONS SHALL BE INSTALLED WITHIN 30 FEET OF WING.

SILT FENCE WING DETAIL

SCALE: NTS

SEDIMENT & EROSION CONTROL NARRATIVE

1. THE PROJECT INVOLVES THE CONSTRUCTION OF A GROUND MOUNTED SOLAR PANEL FACILITY WITH ASSOCIATED EQUIPMENT, INCLUDING GRADING OF APPROXIMATELY 7.5± ACRES OF EXISTING LOT.

   THE PROPOSED PROJECT INVOLVES THE FOLLOWING CONSTRUCTION:

   A. CLEARING, GRUBBING, AND GRADING OF EXISTING LOT.
   B. CONSTRUCTION OF 2,590 GROUND MOUNTED SOLAR PANELS AND ASSOCIATED EQUIPMENT.
   C. THE STABILIZATION OF DISTURBED AREAS WITH PERMANENT VEGETATIVE TREATMENTS.

2. FOR THIS PROJECT, THERE ARE APPROXIMATELY 7.5± ACRES OF THE SITE BEING DISTURBED WITH NEGLIGIBLE INCREASE IN THE IMPERVIOUS AREA OF THE SITE. IMPERVIOUS AREAS ARE LIMITED TO THE CONCRETE PADS FOR ELECTRICAL EQUIPMENT & GRAVEL ACCESS DRIVE.

3. THE PROJECT AREA, AS MAPPED IN THE SOIL SURVEY OF STATE OF CONNECTICUT (NRCS, VERSION I, SEPTEMBER 30, 2023), CONTAINS TYPE 86C (HYDROLOGIC SOIL GROUP C), 46B & 46C (HYDROLOGIC SOIL GROUP C/D) AND 2 (HYDROLOGIC SOIL GROUP D). A GEOTECHNICAL ENGINEERING REPORT IS SCHEDULED AND WILL BE PROVIDED UNDER SEPARATE COVER.

4. IT IS ANTICIPATED THAT CONSTRUCTION WILL BE COMPLETED IN APPROXIMATELY 4-6 MONTHS.

5. REFER TO THE CONSTRUCTION SEQUENCING AND EROSION AND SEDIMENTATION NOTES FOR INFORMATION REGARDING SEQUENCING OF MAJOR OPERATIONS IN THE ON-SITE CONSTRUCTION PHASES.

6. STORMWATER MANAGEMENT DESIGN CRITERIA UTILIZES THE APPLICABLE SECTIONS OF THE 2004 CONNECTICUT STORMWATER QUALITY MANUAL AND THE TOWN OF MANCHESTER STANDARDS, TO THE EXTENT POSSIBLE AND PRACTICABLE FOR THIS PROJECT ON THIS SITE. EROSION AND SEDIMENTATION MEASURES ARE BASED UPON ENGINEERING PRACTICE, JUDGEMENT AND THE APPLICABLE SECTIONS OF THE CONNECTICUT EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS, LATEST EDITION.

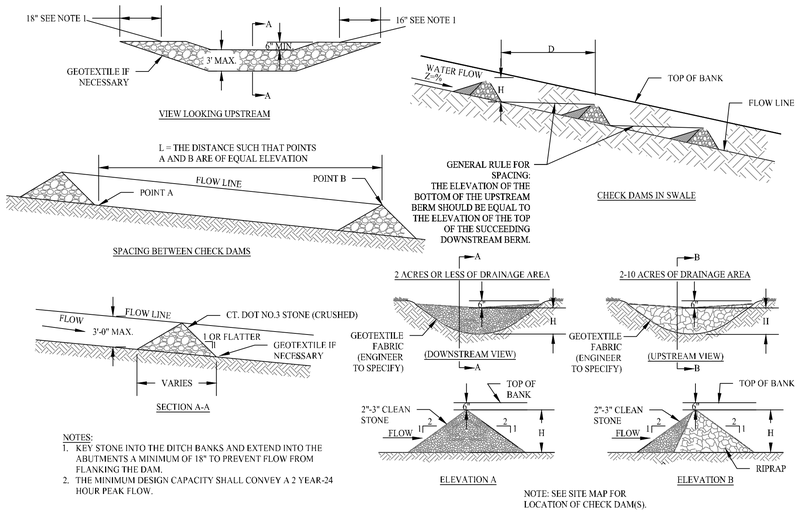
7. DETAILS FOR THE TYPICAL STORMWATER MANAGEMENT AND EROSION AND SEDIMENTATION MEASURES ARE SHOWN ON THE PLAN SHEETS OR PROVIDED AS SEPARATE SUPPORT DOCUMENTATION FOR REVIEW IN THIS PLAN.

8. CONSERVATION PRACTICES TO BE USED DURING CONSTRUCTION:

   A. STAGED CONSTRUCTION;
   B. MINIMIZE THE DISTURBED AREAS TO THE EXTENT PRACTICABLE DURING CONSTRUCTION;
   C. STABILIZE DISTURBED AREAS WITH TEMPORARY OR PERMANENT MEASURES AS SOON AS POSSIBLE, BUT NO LATER THAN 7-DAYS FOLLOWING DISTURBANCE;
   D. MINIMIZE IMPERVIOUS AREAS;
   E. UTILIZE APPROPRIATE CONSTRUCTION EROSION AND SEDIMENTATION MEASURES.

9. THE FOLLOWING SEPARATE DOCUMENTS ARE TO BE CONSIDERED A PART OF THE EROSION AND SEDIMENTATION PLAN:

   A. STORMWATER MANAGEMENT REPORT, TO BE ISSUED AT A LATER DATE.
   B. SWPCP, TO BE ISSUED AT A LATER DATE.



NOTES:

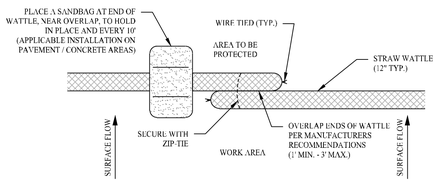
1. KEY STONE INTO THE DITCH BANKS AND EXTEND INTO THE ABUTMENTS A MINIMUM OF 18" TO PREVENT FLOW FROM FLANKING THE DAM.
2. THE MINIMUM DESIGN CAPACITY SHALL CONVEY A 2 YEAR-24 HOUR PEAK FLOW.

STONE CHECK DAM DETAIL

SCALE: NTS

CONCRETE WASHOUT PIT

SCALE: NTS



COMPOSITE FILTER SOCK

SCALE: NTS

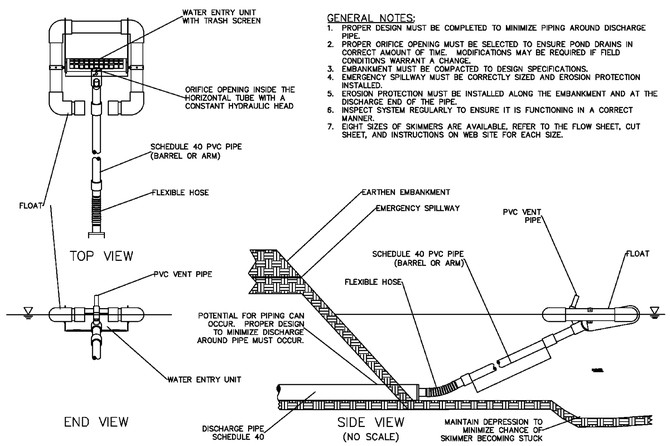
NOTE:

1. SEDIMENT TRAPS SHOULD PROVIDE A MINIMUM OF 134 CUBIC YARDS OF SEDIMENT STORAGE PER DISTURBED ACRE CONTRIBUTING TO THE TRAP. SEE SAID VOLUMES ON SOIL, EROSION AND SEDIMENT CONTROL SHEETS.
2. THE OUTLET EMBANKMENT SHELL IS TO BE ENTIRELY OF ROCK. THE DOWNSTREAM SLOPE SHOULD BE LARGER ROCK (R-3) WITH AN UPSTREAM LAYER OF SMALLER STONE (AASHTO #57)

NOTE: SEE SITE MAP FOR LOCATION OF CHECK DAM(S).

TYPICAL SEDIMENT TRAP DETAIL

SCALE: NTS



GENERAL NOTES:

1. PROPER DESIGN MUST BE COMPLETED TO MINIMIZE PIPING AROUND DISCHARGE PIPE.
2. PROPER ORIFICE OPENING MUST BE SELECTED TO ENSURE POND DRAINS IN CORRECT AMOUNT OF TIME. MODIFICATIONS MAY BE REQUIRED IF FIELD CONDITIONS WARRANT A CHANGE.
3. EMBANKMENT MUST BE COMPACTED TO DESIGN SPECIFICATIONS.
4. EMERGENCY SPILLWAY MUST BE CORRECTLY SIZED AND EROSION PROTECTION INSTALLED.
5. EROSION PROTECTION MUST BE INSTALLED ALONG THE EMBANKMENT AND AT THE DISCHARGE END OF THE PIPE.
6. INSPECT SYSTEM REGULARLY TO ENSURE IT IS FUNCTIONING IN A CORRECT MANNER.
7. EIGHT SIZES OF SKIMMERS ARE AVAILABLE. REFER TO THE FLOW SHEET, CUT SHEET, AND INSTRUCTIONS ON WEB SITE FOR EACH SIZE.

FAIRCLOTH SKIMMER DISCHARGE SYSTEM

SCALE: NTS PROVIDED BY: J. W. FAIRCLOTH & SON INC.

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Drawn By:	AWC
Checked By:	CJB
Approved By:	KMS
Project #:	23100101
Plan Date:	01/15/24
Scale:	NTS

STATE OF CONNECTICUT KEVIN M. SOLLI 25759 LICENSED PROFESSIONAL ENGINEER

Kevin Solli, P.E.
CT 25759

Project:

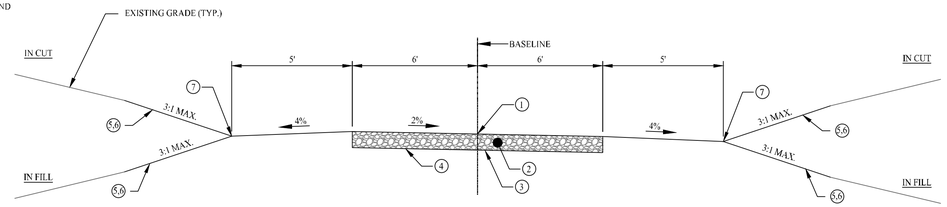
PROPOSED SOLAR PHOTOVOLTAIC ARRAY

250 CARTER STREET
MANCHESTER, CONNECTICUT

Sheet Title:	Sheet #:
SOIL EROSION & SEDIMENT CONTROL NOTES & DETAILS	2.41

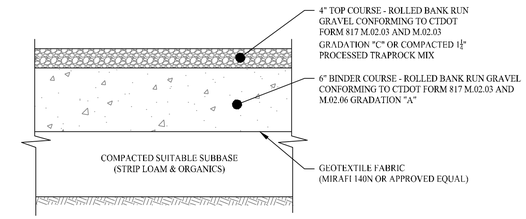
1. POINT OF APPLICATION OF GRADE OR MATCH EXISTING GROUND
2. GRAVEL ACCESS DRIVE
3. NONWOVEN GEOTEXTILE (MIRAFI 140N OR EQUAL)
4. LIMIT OF EXCAVATION OR LIMIT OF COMPACTION
5. EROSION CONTROL BLANKET ON SLOPES 3:1 OR GREATER
6. 6" TOPSOIL AND SEED
7. VEGETATED CHANNEL

NOTES:
1. THE CONTRACTOR SHALL CONTACT CT CALL BEFORE YOU DIG (CBYD) A MINIMUM OF 72 HOURS PRIOR TO BEGINNING CONSTRUCTION.
2. TRANSITIONS BETWEEN TYPICAL ACCESS ROAD SECTIONS SHALL OCCUR OVER 50 FEET. (TYPICAL)



TYPICAL GRAVEL ROADWAY SECTION

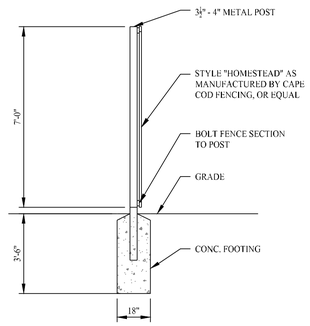
SCALE: NTS



NOTES:
1. SUBBASE MAY CONSIST OF NATIVE MATERIALS IF FOUND ACCEPTABLE BY THE ENGINEER. SUBBASE TO BE COMPACTED TO 95% MAX DRY DENSITY.
2. SUBBASE IS TO BE FREE FROM DEBRIS AND UNSUITABLE MATERIALS.

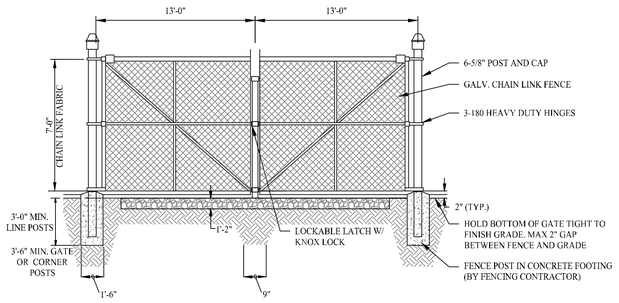
GRAVEL ACCESS DRIVE SECTION

SCALE: NTS



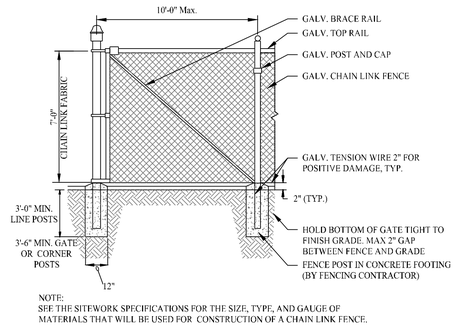
FENCE POST INSTALLATION

SCALE: NTS



DOUBLE SWING GATE DETAIL

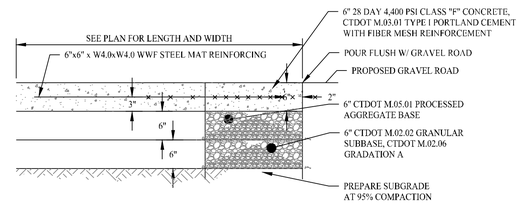
SCALE: NTS



NOTE:
SEE THE SITEWORK SPECIFICATIONS FOR THE SIZE, TYPE, AND GAUGE OF MATERIALS THAT WILL BE USED FOR CONSTRUCTION OF A CHAIN LINK FENCE.

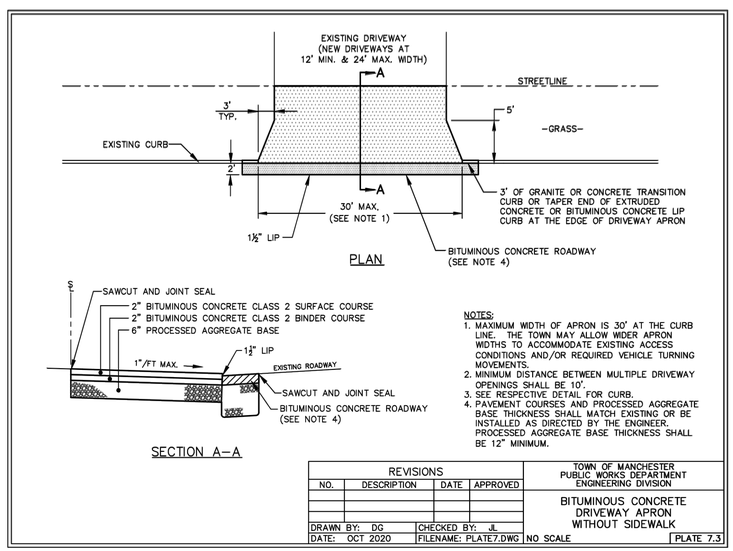
7' HIGH CHAIN LINK FENCE DETAIL

SCALE: NTS



CONCRETE UTILITY PAD

SCALE: NTS



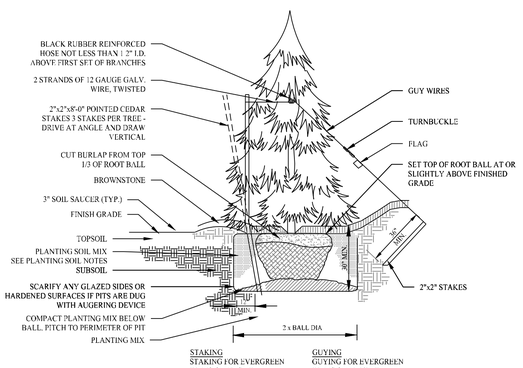
NOTES:
1. MAXIMUM WIDTH OF APRON IS 30' AT THE CURB LINE. THE TOWN MAY ALLOW WIDER APRON WIDTHS TO ACCOMMODATE EXISTING ACCESS CONDITIONS AND/OR REQUIRED VEHICLE TURNING MOVEMENTS.
2. MINIMUM DISTANCE BETWEEN MULTIPLE DRIVEWAY OPENINGS SHALL BE 10'.
3. SEE RESPECTIVE DETAIL FOR CURB.
4. PAVEMENT COURSES AND PROCESSED AGGREGATE BASE THICKNESS SHALL MATCH EXISTING OR BE INSTALLED AS DIRECTED BY THE ENGINEER. PROCESSED AGGREGATE BASE THICKNESS SHALL BE 12" MINIMUM.

REVISIONS				TOWN OF MANCHESTER PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION
NO.	DESCRIPTION	DATE	APPROVED	
				BITUMINOUS CONCRETE DRIVEWAY APRON WITHOUT SIDEWALK
DRAWN BY: DG	CHECKED BY: JL			
DATE: OCT 2020	FILENAME: PLATE7.DWG	NO SCALE		PLATE 7.3

BITUMINOUS CONCRETE DRIVEWAY APRON

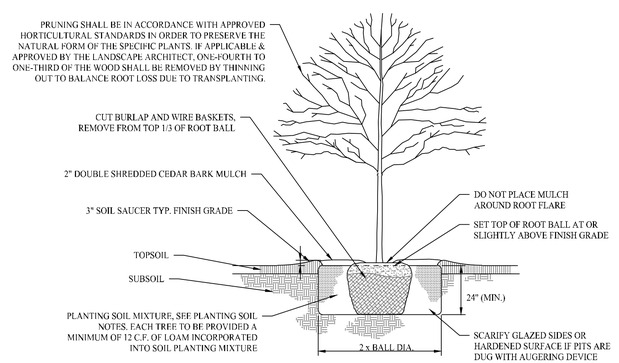
SCALE: NTS

DETAIL PER TOWN OF MANCHESTER



EVERGREEN TREE PLANTING

SCALE: NTS



DECIDUOUS TREE PLANTING

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Drawn By:	CJS
Checked By:	CJB
Approved By:	KMS
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STATE OF CONNECTICUT KEVIN M. SOLLI 25759 LICENSED PROFESSIONAL ENGINEER

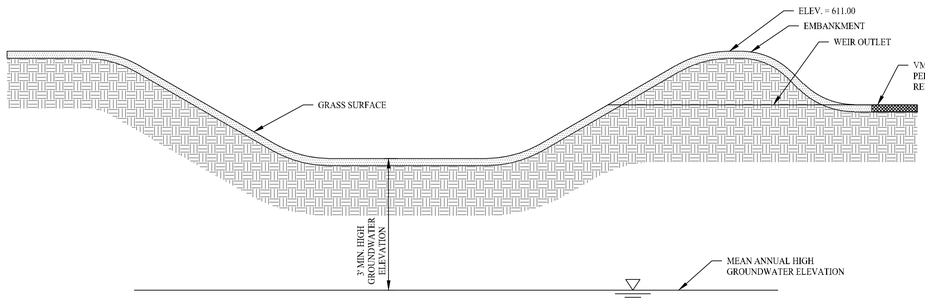
Kevin Solli, P.E.
CT 25759

Project:

PROPOSED SOLAR PHOTOVOLTAIC ARRAY

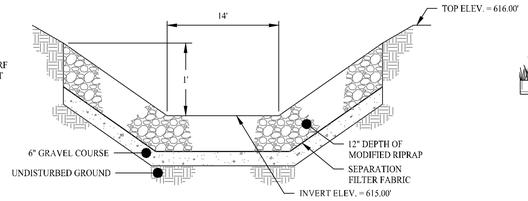
250 CARTER STREET
MANCHESTER, CONNECTICUT

Sheet Title:	Sheet #:
CONSTRUCTION DETAILS	3.01



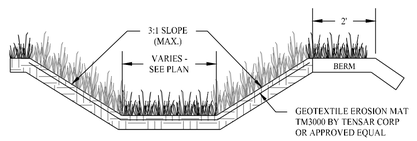
STORMWATER BASIN CROSS-SECTION

SCALE: NTS



BROADCRESTED WEIR SPILLWAY

SCALE: NTS

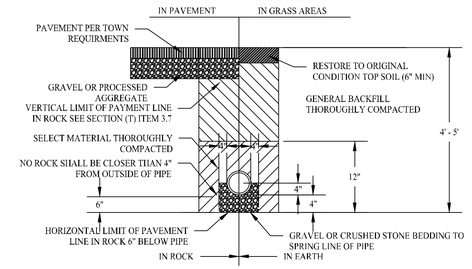


NOTE
SEED SWALE WITH NEW ENGLAND WETLAND PLANTS, INC. EROSION CONTROL/RESTORATION MIX FOR WET OR DRY SITES @ 1*/1750 SF

TYPICAL GRASS LINED SWALE

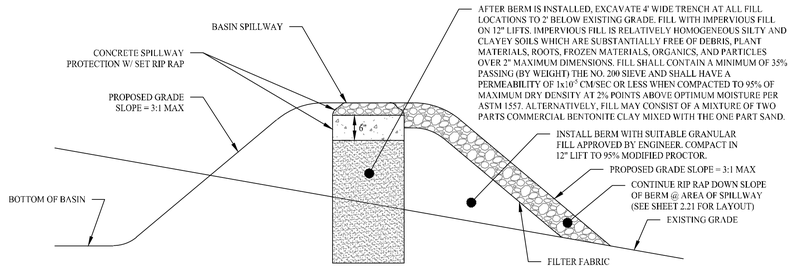
SCALE: NTS

DETAIL PER CT DEEP



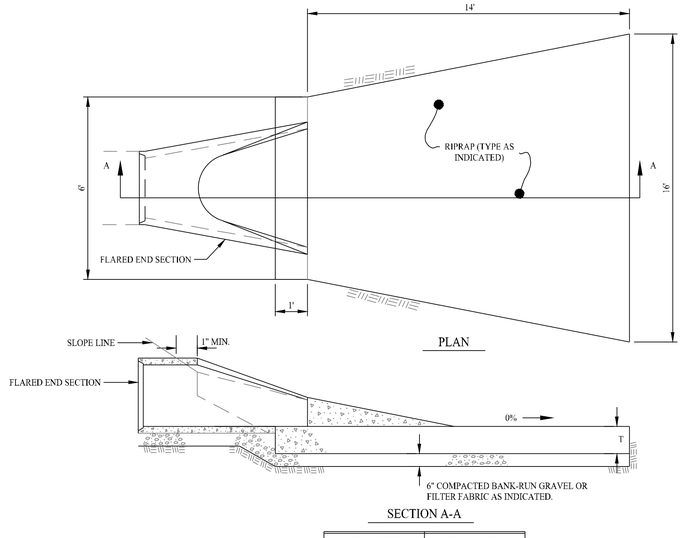
STORM TRENCH DETAIL

SCALE: NTS



TYPICAL SPILLWAY IN FILL SECTION DETAIL

SCALE: NTS



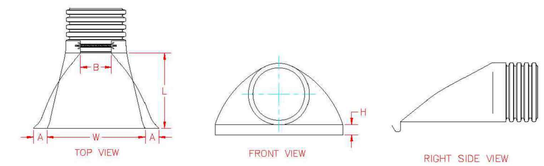
SECTION A-A

RIPRAP TYPE	"T" (INCHES)
STANDARD	36

TYPE 'A' RIPRAP APRON

SCALE: NTS

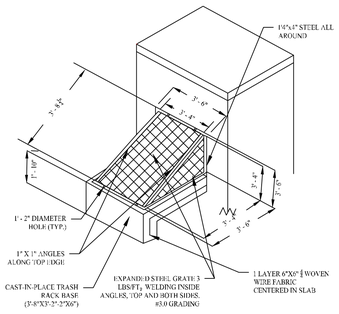
PIPE DIAMETER, in (mm)						
Diameter in (mm)	12 (300)	15 (375)	18 (450)	24 (600)	30 (750)	36 (900)
A in (mm)	6.5 (165)	6.5 (165)	7.5 (191)	7.5 (191)	7.5 (191)	7.5 (191)
B (max) in (mm)	10.0 (254)	10.0 (254)	15.0 (381)	18.0 (475)	22.0 (559)	25.0 (635)
H in (mm)	6.5 (165)	6.5 (165)	6.5 (165)	6.5 (165)	8.6 (218)	8.6 (218)
L in (mm)	25.0 (635)	25.0 (635)	32.0 (813)	36.0 (914)	58.0 (1473)	58.0 (1473)
W in (mm)	29.0 (737)	29.0 (737)	35.0 (889)	45.0 (1143)	63.0 (1600)	63.0 (1600)



FLARED END SECTION DETAILS

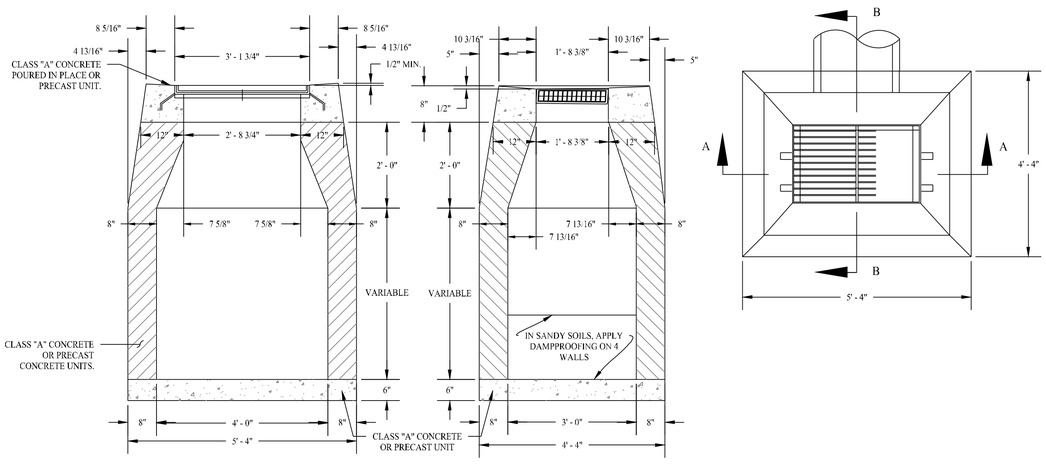
SCALE: NTS

DETAIL PER ADVANCED DRAINAGE SYSTEMS, INC.



PRIMARY OUTLET TRASH RACK DETAIL

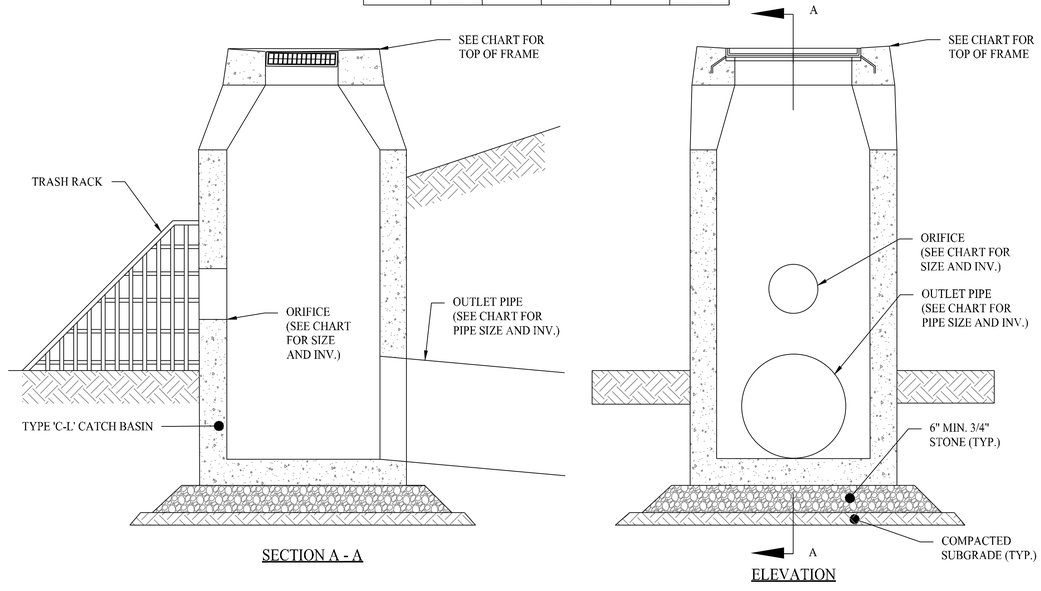
SCALE: NTS



TYPE "C-L" CATCH BASIN

SCALE: NTS

OUTLET I.D.	ORIFICE SIZE (IN.)	ORIFICE ELEV. (FT.)	TOP OF FRAME ELEV. (FT.)	OUTLET SIZE (IN.)	OUTLET ELEV. (FT.)
OCS-1	18	611.10	615.00	24	608.00



OUTLET CONTROL STRUCTURE

SCALE: NTS

Rev. #:	Date	Description
1	04/19/24	CSC INTERROGATORIES

Graphic Scale:

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11 Vanderbilt Ave, Norwood, MA 02062 T: (781) 352-8491 F: (203) 880-9695

Drawn By:	CJS
Checked By:	CJB
Approved By:	KMS
Project #:	23100101
Plan Date:	01/15/24
Scale:	NTS

STATE OF CONNECTICUT · KEVIN M. SOLLI · 25759 · LICENSED PROFESSIONAL ENGINEER

Kevin Solli, P.E.
CT 25759

Project:

PROPOSED SOLAR PHOTOVOLTAIC ARRAY

250 CARTER STREET
MANCHESTER, CONNECTICUT

Sheet Title:	Sheet #:
CONSTRUCTION DETAILS	3.02

ENVIRONMENTAL NOTES - RESOURCE PROTECTION MEASURES

EASTERN BOX TURTLE PROTECTION PROGRAM

EASTERN BOX TURTLES ARE LISTED AS STATE "SPECIES OF SPECIAL CONCERN" BY THE CT DEEP. SPECIES CLASSIFIED AS "THREATENED" BY THE CT DEEP ARE NATIVE SPECIES THAT HAVE A NATURALLY RESTRICTED RANGE IN HABITAT IN THE STATE, ARE AT A LOW POPULATION LEVEL, ARE IN SUCH HIGH DEMAND BY HUMANS THAT ITS UNREGULATED TAKING WOULD BE DETRIMENTAL TO THE CONSERVATION OF ITS POPULATION, OR HAVE BEEN EXTIRPATED FROM THE STATE. EASTERN BOX TURTLES TYPICALLY INHABIT WELL-DRAINED FOREST BOTTOMLANDS AND OPEN DECIDUOUS FORESTS AND WILL UTILIZE A VARIETY OF OTHER EARLY SUCCESSIONAL HABITATS SUCH AS FIELD EDGES (AND OTHER EDGE HABITAT SUCH AS UTILITY CORRIDORS) AND THICKETS. THEY ALSO WILL UTILIZE WETLAND HABITATS SUCH AS MARSHES, BOGS, AND STREAMS AT VARIOUS TIMES DURING THEIR ACTIVE SEASON. EASTERN BOX TURTLES ARE ACTIVE BETWEEN APRIL 1 AND NOVEMBER 1; IN THE REMAINING MONTHS, THEY ARE DORMANT, IN A STATE OF BRUMATION A FEW INCHES UNDER THE GROUND SURFACE.

THE FOLLOWING IS A SUMMARY OF MEASURES REQUIRED BY THE CT DEEP AND TO BE USED BEFORE, DURING AND FOLLOWING CONSTRUCTION TO PROTECT EASTERN BOX TURTLES THAT MAY POTENTIALLY BE ENCOUNTERED AT THE SITE. ALL GROUND DISTURBANCE WORK ASSOCIATED WITH THE PROJECT MUST BE CONDUCTED BETWEEN APRIL 1 AND NOVEMBER 1, THE EASTERN BOX TURTLES' ACTIVE SEASON. IT IS RECOMMENDED MOWING NOT OCCUR DURING MAY 15 TO SEPTEMBER 15. IF MOWING IS TO OCCUR DURING THIS TIME FRAME, WHETHER PRE- OR POST-CONSTRUCTION, THE CT DEEP RECOMMENDS THE FOLLOWING:

PRE-CONSTRUCTION:

- IN PREPARING THE SITE FOR DEVELOPMENT, EXCLUSIONARY FENCING THAT IS AT LEAST 20 INCHES TALL AND THAT IS SECURED AND KEYED INTO THE GROUND, MUST BE INSTALLED AROUND THE PERIMETER OF THE WORK AREA TO PREVENT TURTLE ACCESS TO THE SITE. THE WORK AREA INCLUDES ALL AREAS USED FOR SITE ACCESS, EQUIPMENT PARKING, MATERIAL STAGING, MATERIAL STORAGE, AND CONSTRUCTION PURPOSES. THE ENTRANCE TO THE SITE ALSO MUST BE CORDONED OFF WITH AN EXCLUSIONARY METHOD WHEN THE SITE IS NOT IN USE. THIS CAN BE ACCOMPLISHED WITH A ROW OF HAY BALES THAT CAN BE MOVED WHEN ACCESS TO THE SITE IS NEEDED.
- IF MOWING NEEDS TO OCCUR BEFORE EXCLUSIONARY FENCE INSTALLATION WITHIN THE ACTIVE TURTLE TIMEFRAME, THE MOWING STYLE, MOWING HEIGHT, MOWING DIRECTIONALITY, MOWING SPEED, AND THE LOCATION OF NON-MOWING AREAS SHOULD BE AS FOLLOWS:
  a. MOWING STYLE: AVOID FLAIL MOWER HEADS WITH GUIDE BARS THAT RIDE ALONG THE GROUND. SICKLE BAR MOWERS WILL HAVE THE LEAST IMPACT IF MOWING EVERY ONE TO FIVE YEARS. IN AREAS WITH MORE WOODY VEGETATION, A LESS THAN ONE TO TWO-INCH DIAMETER BRONTOSAURUS-STYLE MOWER WILL HAVE THE LEAST IMPACT ON TURTLES.
  b. MOWING HEIGHT: THE RETENTION OF MOWING STUBBLE SEVEN TO TWELVE INCHES IN HEIGHT WILL REDUCE MORTALITY, REDUCE BLADE WEAR, AND WILL LEAVE IMPORTANT COVER FOR ANIMALS.
  c. MOWING DIRECTIONALITY: START MOWING FROM THE CENTER OF THE FIELD AND USE A BACK-AND-FORTH APPROACH, OR LARGE CIRCULAR PATTERN TO AVOID CONCENTRATING FLEEING ANIMALS WHERE THEY MAY BE KILLED OR STRANDED. IN ADDITION, LEAVE AN UNMOWED 30-FOOT STRIP AROUND THE PERIMETER OF THE FIELD AND MOW THIS AREA LAST. MOST TURTLES ARE FOUND WITHIN THESE AREAS, AND THIS PROVIDES TIME FOR THEM TO REACT TO THE MOWING ACTIVITY AND MOVE OUT OF THE AREA. IF THE FIELD IS NEAR A STREAM, START MOWING THE SIDE FURTHEST FROM THE STREAM AND WORK TOWARDS THE STREAM. IF THE FIELD IS BORDERED BY WOODLAND, START MOWING THE SIDE FURTHEST FROM WOODLAND AND WORK TOWARDS WOODLAND. IF THE FIELD IS BORDERED BY A ROAD, START MOWING NEXT TO THE ROAD AND WORK YOUR WAY ACROSS THE FIELD.
  d. MOWING SPEED: MOWING IN LOW GEAR OR AT SLOW SPEEDS WILL ALLOW TURTLES TO REACT AND MOVE OUT OF THE FIELD.
  e. NON-MOWING AREAS: LEAVE AN UNMOWED FIELD EDGE IN IIIGH TURTLE-USE AREAS UNTIL AFTER SEPTEMBER 15.
- ONCE EXCLUSIONARY FENCING IIAS BEEN INSTALLED SURROUNDING TIIE WORK AREA, A QUALIFIED INDIVIDUAL MUST SURVEY TIIE AREA TO DETERMINE IF THERE ARE ANY TURTLES WITIIIN TIIE WORK AREA. IF TURTLES ARE IDENTIFIED, THEY ARE TO BE CAREFULLY MOVED TO AN AREA OUTSIDE OF THE WORK AREA IN A SAFE MANNER THAT WILL NOT HARM THEM. IF LISTED SPECIES OF TURTLES ARE IDENTIFIED, THE QUALIFIED INDIVIDUAL WILL DOCUMENT AND REPORT THESE FINDINGS TO THE CT DEEP IN THE MANNER IDENTIFIED WITHIN THE NDDB DETERMINATION LETTER. ONLY WHEN THE QUALIFIED INDIVIDUAL DETERMINES THAT NO TURTLES ARE WITHIN THE WORK AREA AND THAT THE SITE IS SECURE FROM TURTLES RE-ENTERING CAN CONSTRUCTION BEGIN.
- PRIOR TO COMMENCING ACTIVITY, A MEETING IS TO BE HELD WITH ALL CONSTRUCTION PERSONNEL WORKING WITHIN THE EXCLUSION AREA BY THE QUALIFIED INDIVIDUAL TO APPRAISE THEM OF THE SPECIES DESCRIPTION AND THEIR DUTIES IN REGARD TO MAINTAINING THE SECURITY OF THE SITE. SHOULD CONSTRUCTION PERSONNEL ENCOUNTER A TURTLE, THE QUALIFIED INDIVIDUAL WILL INSTRUCT PERSONNEL DURING THIS MEETING ON HOW TO CAREFULLY REMOVE THE TURTLE FROM THE SITE, HOW TO DOCUMENT THEIR FINDINGS AND TO REPORT IT TO THE QUALIFIED INDIVIDUAL FOR REPORTING TO THE CT DEEP.

MID-CONSTRUCTION:

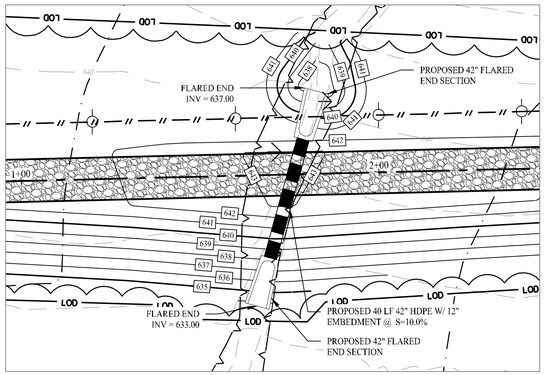
- PRIOR TO THE START OF WORK ACTIVITY EACH DAY, THE EXCLUSIONARY FENCING IS TO BE INSPECTED BY CONSTRUCTION PERSONNEL AND ALL GAPS OR OPENINGS AT THE GROUND LEVEL IDENTIFIED SHOULD BE FIXED OR REPAIRED IMMEDIATELY TO PREVENT TURTLES ACCESS TO THE SITE. IF A BREACH IS IDENTIFIED, WORK SHALL HALT UNTIL THE QUALIFIED INDIVIDUAL SURVEYS THE SITE AND DETERMINES NO TURTLES ARE WITHIN THE WORK AREA.
- ALL HEAVY MACHINERY (ACTIVE OR PARKED) MUST BE WITHIN THE LIMITS OF THE EXCLUSIONARY ZONE OR ON PAVED SURFACES. NO MACHINERY IS TO BE PARKED IN ANY TURTLE HABITAT (I.E., THE AREA OUTSIDE OF THE EXCLUSIONARY ZONE).
- AT THE END OF EACH WORK DAY, THE EXCLUSIONARY MEASURES AT THE ENTRANCE TO THE WORK SITE MUST BE REIMPLEMENTED TO PREVENT TURTLES FROM ACCESSING THE SITE. IF THIS IS NOT DONE, THE EXCLUSIONARY ZONE IS CONSIDERED VOID AND A QUALIFIED INDIVIDUAL MUST RE-SURVEY THE SITE AND CONCLUDE THAT NO TURTLES ARE PRESENT WITHIN THE WORK AREA BEFORE CONSTRUCTION ACTIVITY CAN BEGIN AGAIN.

POST-CONSTRUCTION:

- AFTER COMPLETION OF THE PROJECT, EXCLUSIONARY FENCING SHALL BE REMOVED ONCE THE AREA IS STABILIZED TO ALLOW FOR REPTILE AND AMPHIBIAN PASSAGE TO RESUME. IF CORDONING OFF SEGMENTS OF THE WORKSITE TO BE COMPLETED IN SEPARATE PHASES, ONCE THESE AREAS ARE STABLE, ONLY THEN MAY EXCLUSIONARY FENCING BE REMOVED. ALL ACTIVE AREAS MUST REMAIN EXCLUSIONARY TO TURTLES.

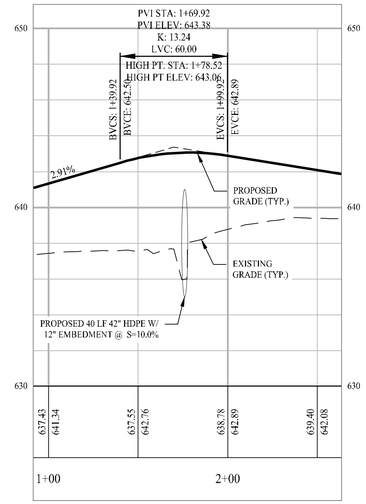
IN ADDITION TO THESE MEASURES, THE CT DEEP RECOMMENDS THE FOLLOWING BE IMPLEMENTED INTO THE GENERAL SITE DESIGN FOR THE DEVELOPMENT TO INCREASE THE VALUE OF HABITAT FOR WILDLIFE AND STATE-LISTED SPECIES.

- A SITE MANAGEMENT PLAN TO PROMOTE NATIVE VEGETATION GROWTH IN THE AREA UNDER THE SOLAR PANELS SHOULD BE CREATED.
- USE WILDLIFE-FRIENDLY FENCING TO ALLOW WILDLIFE MOVEMENT TO AND FROM THE DEVELOPMENT.
- DEVELOP A MANAGEMENT PLAN FOR AREAS OF THE PROPERTY WHERE DEVELOPMENT IS NOT OCCURRING AND/OR FOR WHEN SOLAR PANELS ARE DECOMMISSIONED THAT WILL SUPPORT STATE-LISTED SPECIES.



WETLAND CROSSING

SCALE: 1" = 20'



PARTIAL PROFILE AT WETLAND CROSSING

HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE : 1" = 4'

Rev. #:	Date	Description
1	04/19/24	CSC INTERROGATORIES

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Scale:	NTS

STATE OF CONNECTICUT · KEVIN M. SOLLI · 25759 · LICENSED PROFESSIONAL ENGINEER

Kevin Solli, P.E.
CT 25759

Project:

PROPOSED SOLAR PHOTOVOLTAIC ARRAY

250 CARTER STREET
MANCHESTER, CONNECTICUT

Sheet Title:	Sheet #:
ENVIRONMENTAL NOTES & DETAILS	3.03

EXHIBIT C

Revised Sections of Environmental Assessment

The NDDB Determination, dated August 16, 2023, is attached in Appendix C of this environmental assessment. This determination is valid until August 16, 2025.

3.5.2 USFWS CONSULTATION

The US Fish and Wildlife Service (USFWS) provides an online planning tool, its Information for Planning and Consultation (IPaC) system, allowing for project planners the ability to perform a regulatory review for protected species under the Endangered Species Act (ESA) that inhabit or potentially may inhabit their project sites. This resource is designed to provide a list of potential ESA-protected and/or candidate species, migratory bird species protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act, critical habitats, as well as the ability to consult whether a proposed project has the potential to result in "take" of listed species. "Take" refers to any means to "harass, harm, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct to threatened and endangered species". In consulting this resource, projects can determine whether they are in compliance with the ESA and other federal acts. Solli Engineering filed on November 29, 2023, an IPaC review of the Site and received a letter report from the USFWS titled "*List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project*". The report specifies that one endangered species, one candidate species and eleven migratory bird species have the potential to be impacted by the proposed Project. The endangered species is the Northern Long Eared Bat, the candidate species is the Monarch Butterfly and the migratory birds are listed in the attached report in Appendix B.

The Northern Long Eared Bat is listed as endangered under the ESA. This species range encompasses the entirety of Connecticut. The CT DEEP has compiled a map of towns with known Northern Long Eared Bat and other bat hibernacula within the state, and no known hibernacula are located within the Town of Manchester. The nearest hibernacula according to the map is within the Town of East Granby, approximately 18 miles northwest of the Project area. For more information regarding the locations of NLEB areas of concern, refer to Figure 7, Natural Diversity Database Map, included in Appendix A of this environmental assessment. Regardless, to stay in compliance with the ESA, the IPaC Consultation Package Builder (CPB) was utilized to assess whether the Project would result in the "take" of Northern Long Eared Bats. The results of the CPB can be found in the attached report "*Technical assistance for '250 Carter Street, Manchester, CT Solar Photovoltaic Array'*" found in the attached Appendix B. The results of this report indicate that the Project is not likely to result in the unauthorized "take" of Northern Long Eared Bats and therefore does not require a permit from the USFWS.

The monarch butterfly is a candidate species for protection under the ESA. Candidate species are "species which the USFWS has sufficient information to propose as endangered or threatened under the ESA, but for which their development of a proposed listing regulation is precluded by other higher priority listing activities". As such, until they are proposed for listing, these species are not officially entitled to legal protection under the ESA, and they are not considered when making a determination as to "take".

3.6 SOILS & GEOLOGY

The Project grading is expected to generate a net import of approximately 1,250 cubic yards of material. Before any fill material is removed or used, the topsoil will be stripped and stockpiled for later seeding of disturbed areas. Any soil exposed due to construction will be treated according to the *Connecticut Guidelines for Soil Erosion and Sediment Control*.

The following soils exist onsite and in surrounding areas:

1. Ridgebury fine sandy loam, 0 to 3 percent slopes.
2. Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony.
3. Woodbridge fine sandy loam, 8 to 15 percent slopes, very stony.
4. Paxton and Montauk fine sandy loams, 3 to 15 percent slopes, extremely stony.

For more information, refer to the map Figure 8, Prime Farmland Map, included in Appendix A of this environmental assessment.

3.6.1 PRIME FARMLAND SOILS

Solli Engineering has reviewed the listed soils in accordance with the Code of Federal Regulations ("CFR") Title 7, part 657. Prime Farmland Soils are distinguishable based on soil type. These soils are to be identified under CFR Title 7, part 657 in order to know the extent and location of the best land for producing food, feed, fiber forage and oilseed crops. Upon review, the Project contains no prime farmland. For more information, refer to the map Figure 8, Prime Farmland Map, included in Appendix A of this environmental assessment.

3.7 HISTORIC & ARCHAELOGICAL RESOURCES

Archaeological Consulting Services LLC (ACS) performed a Phase 1A cultural resources assessment survey on behalf of Solli Engineering and the Petitioner. Their report discloses that a property National Register of Historic Places does not exist within the Site. Background research indicates a low sensitivity for potential prehistoric cultural resources. The low scores in general can be attributed to very rocky soil contexts and great horizontal and vertical distances to the nearest major water source. ACS therefore recommends no further archaeological conservation efforts for the Site. For more information refer to the Phase 1A report in Appendix D, Cultural Resources.

3.8 SCENIC AND RECREATIONAL AREAS

No state road or local road will be affected physically or impaired visually by the Project. The Shenipsit Trail is a hiking trail that runs through the Site approximately 100-200 feet from the Project area; however, the Facility should not be visible from the trail due to dense forest cover and grading. The Charter Oak Greenway is a protected hiking trail located approximately one-half mile north of the property. The closest open space is located at Yules Park, approximately 1,500 feet southwest of the property. For more information regarding resources located within one mile of the Site refer to Figure 9, Scenic & Recreation Map, included in Appendix A.

3.9 LIGHTING

Exterior lighting is not planned for the Project. There may be onsite equipment that have small lights which will only be activated during maintenance.

3.10 FAA DETERMINATION

The closest federally obligated airport is Hartford-Brainard Airport located approximately 9 miles west of the Site.

Solli Engineering has submitted the required information to the Federal Aviation Administration (FAA) for review. The FAA reviewed multiple sample points to determine whether a potential hazard exists for air navigation. Upon review, the FAA issued a Determination of No Hazard to Air Navigation for all points. A glare analysis is not required at this time. For more information see Appendix F, FAA Determinations.

3.11 VISIBILITY

There will be solar trackers a maximum of 6' off finished grade within the solar panel facility. All disturbed areas will be contained within a 7' chain link fence. Trees constituting the existing tree line will be preserved and maintained to the best of the developer's ability. Neighbors in the vicinity of the subject property will not be able to view the solar panel facility due to existing tree coverage and additional vegetative buffers, which include American Holly and Eastern Red-Cedar trees, proposed on the eastern side of the Project area. For more information refer to Figure 10, Proposed Conditions Viewshed Map, included in Appendix A.

The solar panel products are designed in such a way that they are not highly reflective. Because the solar panel have tracking features, the panels will not reflect one direction for extended durations.

3.12 NOISE

Noise from the construction of the solar panel facility is exempted under Connecticut regulations for the control of noise. For more information refer to RCSA 22a-69-1.8(h). During construction, the increase in noise will likely lead to a subsequent elevation in ambient sound levels in the immediate vicinity of the Project. Standard construction equipment will be used for the Project, and the highest level of noise generated from this equipment - such as backhoes, bulldozers, cranes and trucks – is expected to be approximately 88 dBA from the origin.

The primary sources of noise generation associated with the Facility will be the 2,000 kVA transformer and (8) inverters. The solar panels themselves do not have any associated noise. A summary of the equipment and manufacturer's listed sound data is provided below in Table 1.

Table 1: Equipment Sound Summary

Equipment	Number of Sources	Listed Sound Pressure (dBA)	Distance of Observed Sound Level (meters)
Sungrow SG125HV 125kW Inverters	8	61.6	1
2,000 kVA Transformer	1	61	1

The logarithmic decibel scale is utilized to combine sound levels and adjust for distance based on the Inverse Square Law. Total sound levels from the proposed equipment was calculated as shown below:

Calculate Anticipated Sound Level at Nearest Property Boundary

Multiple analysis points were studied along the property boundary to determine at which point the highest level of sound will be produced by the equipment on-site. Once the point was determined, following equation was used to determine the sound level of each piece of noise-producing equipment:

$$L_b = L_a - 20 \times log_{10}(\frac{D_b}{D_a})$$

Where:
L_b = Noise level at new distance (dBA)
L_a = Noise level at original distance (dBA)
D_b = New distance from source of noise (meters)
D_a = Original distance from source of noise (meters)

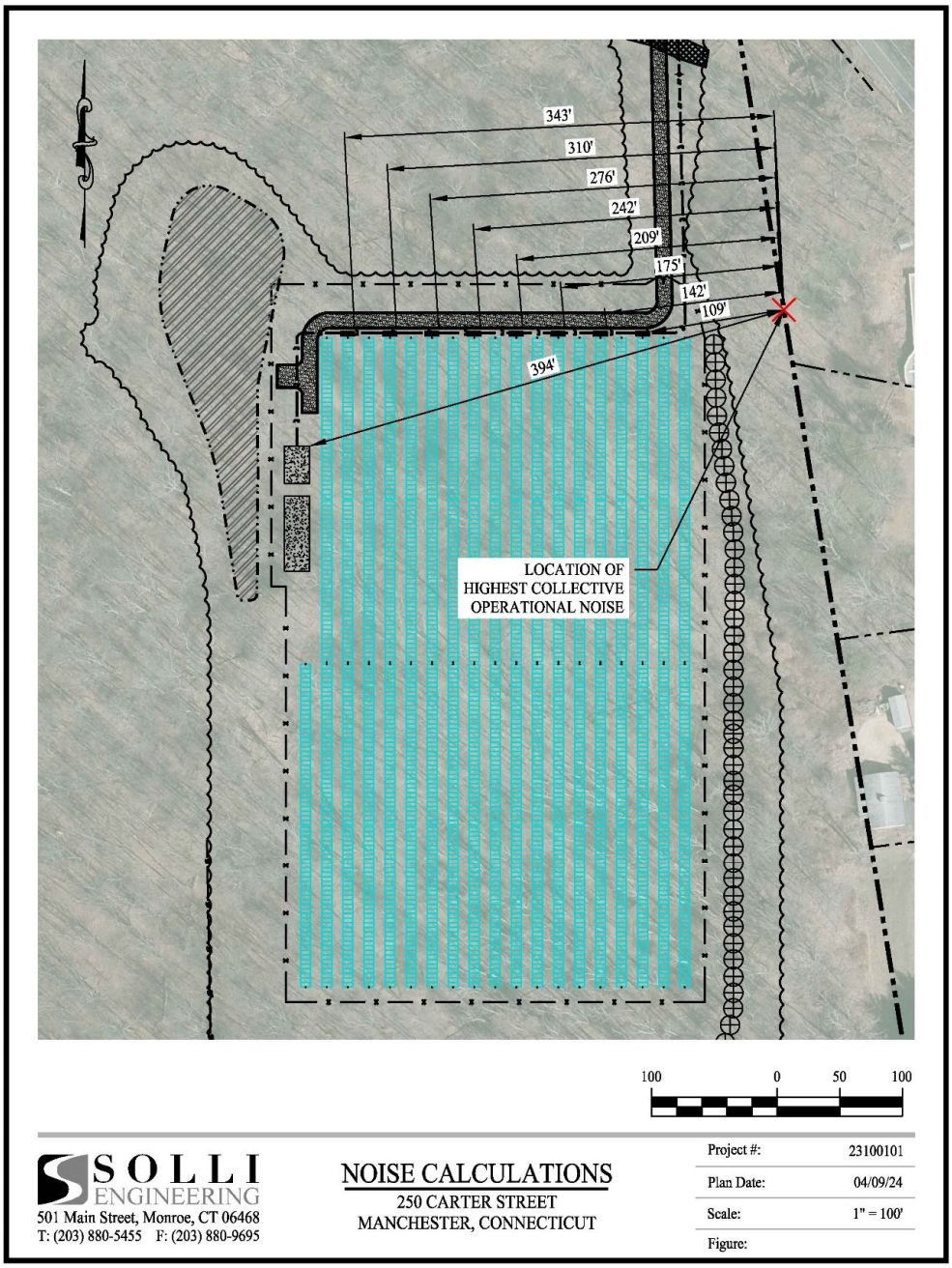
Using the data from Table 1, as well as the distances from each inverter (109', 142', 175', 209', 242', 276', 310', 343') and the transformer (394') to the property line, the total anticipated sound level for each piece equipment was calculated.

Combining Sound Levels

To add multiple sound levels of different strength, the following equation was used:

$$L_t = 10log_{10}(\sum 10^{\frac{L_b}{10}})$$

After combining all sound levels from each piece of equipment, it was determined that the highest collective operational noise at the property boundary would be 35.8 decibels. This noise level meets applicable CT DEEP Noise Standards, and noise levels will effectively be reduced to zero during nighttime hours when the array is not generating electricity.



4.0 CONCLUSION

As demonstrated by the information outlined herein, the Project will have no air emissions, no significant adverse environmental impacts, and will comply with the CT DEEP air and water quality standards. The Petitioner, therefore, respectfully requests that the Council issue a declaratory ruling that the proposed Project will comply with CT DEEP air and water quality standards, will not have a substantial adverse environmental impact, and does not require the issuance of a Certificate.

EXHIBIT D

SHPO Response Letter

State Historic Preservation Office
Department of Economic and Community Development

CONNECTICUT

March 22, 2024

Dr. Gregory F. Walwer
Archaeological Consulting Services
118 Whitfield Street
Guilford, CT 06437
(sent only via email to acsinfo@yahoo.com)

Subject: Phase Ia Archaeological Assessment Survey
250 Carter Street
Manchester, Connecticut

Dear Dr. Walwer:

The State Historic Preservation Office (SHPO) has reviewed the Phase IA Archaeological Assessment survey prepared by Archaeological Consulting Services (ACS) for a proposed solar facility and related improvements situated on the south side of Carter Street near the town line. The project parcel encompasses approximately 41 acres. The property currently consists of vacant wooded landed that is traversed by a natural gas pipeline. The proposed solar arrays will be accessed from Carter Street with a proposed gravel road. The project will require approval from the Connecticut Siting Council and has a proposed stormwater basin. Therefore, it is subject to review by our office pursuant to state and federal legislation.

The preliminary context and background research demonstrates knowledge of the project region and is consistent with the standards set forth in the *Environmental Review Primer for Connecticut's Archaeological Resources*. The ACS report describes a landscape that does not contain known cultural resources and does not possess the environmental qualities frequently associated with significant archaeological deposits. As a result, SHPO concurs with ACS that the proposed actions are unlikely to impact significant archeological sites. Based on the information provided to our office, SHPO concurs that no historic properties will be affected by this undertaking.

SHPO appreciates the opportunity to review and comment upon this project. Do not hesitate to contact Catherine Labadia, Staff Archaeologist and Deputy State Historic Preservation Officer, for additional information at (860) 500-2329 or catherine.labadia@ct.gov.

Sincerely,

Jonathan Kinney
State Historic Preservation Officer

450 Columbus Boulevard, Suite 5
Hartford, CT 06103
Phone: 860-500-2300

EXHIBIT E

USFWS Correspondence

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To: 04/09/2024 21:05:24 UTC
Project Code: 2024-0021111
Project Name: Manchester CT Solar Photovoltaic Array

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

Updated 4/12/2023 - Please review this letter each time you request an Official Species List, we will continue to update it with additional information and links to websites may change.

About Official Species Lists

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Federal and non-Federal project proponents have responsibilities under the Act to consider effects on listed species.

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested by returning to an existing project's page in IPaC.

Endangered Species Act Project Review

Please visit the "**New England Field Office Endangered Species Project Review and Consultation**" website for step-by-step instructions on how to consider effects on listed

species and prepare and submit a project review package if necessary:

https://www.fws.gov/office/new-england-ecological-services/endangered-species-project-review

NOTE Please do not use the **Consultation Package Builder** tool in IPaC except in specific situations following coordination with our office. Please follow the project review guidance on our website instead and reference your **Project Code** in all correspondence.

Northern Long-eared Bat - (**Updated 4/12/2023**) The Service published a final rule to reclassify the northern long-eared bat (NLEB) as endangered on November 30, 2022. The final rule went into effect on March 31, 2023. You may utilize the **Northern Long-eared Bat Rangewide Determination Key** available in IPaC. More information about this Determination Key and the Interim Consultation Framework are available on the northern long-eared bat species page:

https://www.fws.gov/species/northern-long-eared-bat-myotis-septentrionalis

For projects that previously utilized the 4(d) Determination Key, the change in the species' status may trigger the need to re-initiate consultation for any actions that are not completed and for which the Federal action agency retains discretion once the new listing determination becomes effective. If your project was not completed by March 31, 2023, and may result in incidental take of NLEB, please reach out to our office at newengland@fws.gov to see if reinitiation is necessary.

Additional Info About Section 7 of the Act
Under section 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to determine whether projects may affect threatened and endangered species and/or designated critical habitat. If a Federal agency, or its non-Federal representative, determines that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Federal agency also may need to consider proposed species and proposed critical habitat in the consultation. 50 CFR 402.14(c)(1) specifies the information required for consultation under the Act regardless of the format of the evaluation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/service/section-7-consultations

In addition to consultation requirements under Section 7(a)(2) of the ESA, please note that under sections 7(a)(1) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species. Please contact NEFO if you would like more information.

Candidate species that appear on the enclosed species list have no current protections under the ESA. The species' occurrence on an official species list does not convey a requirement to

consider impacts to this species as you would a proposed, threatened, or endangered species. The ESA does not provide for interagency consultations on candidate species under section 7, however, the Service recommends that all project proponents incorporate measures into projects to benefit candidate species and their habitats wherever possible.

Migratory Birds

In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see:

https://www.fws.gov/program/migratory-bird-permit

https://www.fws.gov/library/collections/bald-and-golden-eagle-management

Please feel free to contact us at **newengland@fws.gov** with your **Project Code** in the subject line if you need more information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat.

Attachment(s): Official Species List

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
(603) 223-2541

PROJECT SUMMARY

Project Code: 2024-0021111

Project Name: Manchester CT Solar Photovoltaic Array

Project Type: Power Gen - Solar

Project Description: The proposed project is a solar photovoltaic array that will produce 0.999 MW AC within 7.80 acres of the southeastern portion of the approximate 41.08-acre property at 250 Carter Street, Manchester, CT. The entirety of the property was investigated for existing environmental conditions (i.e. wetlands and watercourses surveys, wildlife and vegetation surveys, etc.). No existing improvements are present at the property. Soils throughout the investigation area are formed from dense glacial till deposits. The vegetative cover throughout the investigation area is primarily forested.

The project proposal is to develop the project site with a solar photovoltaic array and associated improvements including access drive, fencing, landscape improvements, utility pads and interconnection systems. The development will require vegetation clearing and minor earthwork within the project area that will utilize standard construction practices. Approximately 1,100 square feet of unavoidable direct impact is proposed to inland wetlands and watercourses in order to construct an access drive from Carter Street to the developable portion of the property. The crossing will be accomplished by installing 40 linear feet of a 42-inch diameter high-density polyethylene pipe embedded 12 inches into the underlying streambed substrate through the narrowest segment of the wetland/stream onsite. The project proposes to implement a variety of soil erosion and sedimentation control measures to protect wetlands and watercourses and neighboring properties from sedimentation. The stormwater management practices proposed to mitigate for the proposed increase in impervious surfaces and to provide treatment to the runoff prior to leaving the project area are still in development at this time. The timing of the project is unknown at this time.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@41.763073399999996,-72.47082150874233,14z

Counties: Hartford County, Connecticut

ENDANGERED SPECIES ACT SPECIES

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 1 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. 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.

MAMMALS

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. This species only needs to be considered under the following conditions: ▪ This species only needs to be considered if the project includes wind turbine operations. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Alexander Wojtkowiak
Address: 1899 Bronson Road
City: Fairfield
State: CT
Zip: 06824
Email awojtkowiak@wkassociates.net
Phone: 4019355101

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To: 04/09/2024 21:09:34 UTC
Project code: 2024-0021111
Project Name: Manchester CT Solar Photovoltaic Array

Federal Nexus: no
Federal Action Agency (if applicable):

Subject: Technical assistance for 'Manchester CT Solar Photovoltaic Array'

Dear Alexander Wojtkowiak:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on April 09, 2024, for 'Manchester CT Solar Photovoltaic Array' (here forward, Project). This project has been assigned Project Code 2024-0021111 and all future correspondence should clearly reference this number. **Please carefully review this letter. Your Endangered Species Act (Act) requirements are not complete.**

Ensuring Accurate Determinations When Using IPaC

The Service developed the IPaC system and associated species' determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into IPaC must accurately represent the full scope and details of the Project.

Failure to accurately represent or implement the Project as detailed in IPaC or the Northern Long-eared Bat Rangewide Determination Key (Dkey), invalidates this letter. ***Answers to certain questions in the DKey commit the project proponent to implementation of conservation measures that must be followed for the ESA determination to remain valid.***

Determination for the Northern Long-Eared Bat

Based upon your IPaC submission and a standing analysis, your project is not reasonably certain to cause incidental take of the northern long-eared bat. Unless the Service advises you within 15 days of the date of this letter that your IPaC-assisted determination was incorrect, this letter verifies that the Action is not likely to result in unauthorized take of the northern long-eared bat.

Other Species and Critical Habitat that May be Present in the Action Area

The IPaC-assisted determination for the northern long-eared bat does not apply to the following ESA-protected species and/or critical habitat that also may occur in your Action area:

- Monarch Butterfly *Danaus plexippus* Candidate
- Tricolored Bat *Perimyotis subflavus* Proposed Endangered

You may coordinate with our Office to determine whether the Action may cause prohibited take of the animal species and/or critical habitat listed above. Note that if a new species is listed that may be affected by the identified action before it is complete, additional review is recommended to ensure compliance with the Endangered Species Act.

Next Steps

Coordination with the Service is complete. This letter serves as technical assistance. All conservation measures should be implemented as proposed. Thank you for considering federally listed species during your project planning.

We are uncertain where the northern long-eared bat occurs on the landscape outside of known locations. Because of the steep declines in the species and vast amount of available and suitable forest habitat, the presence of suitable forest habitat alone is a far less reliable predictor of their presence. Based on the best available information, most suitable habitat is now expected to be unoccupied. During the interim period, while we are working on potential methods to address this uncertainty, we conclude take is not reasonably certain to occur in areas of suitable habitat where presence has not been documented.

If no changes occur with the Project or there are no updates on listed species, no further consultation/coordination for this project is required for the northern long-eared bat. However, the Service recommends that project proponents re-evaluate the Project in IPaC if: 1) the scope, timing, duration, or location of the Project changes (includes any project changes or amendments); 2) new information reveals the Project may impact (positively or negatively) federally listed species or designated critical habitat; or 3) a new species is listed, or critical habitat designated. If any of the above conditions occurs, additional coordination with the Service should take place before project implements any changes which are final or commits additional resources.

If you have any questions regarding this letter or need further assistance, please contact the New England Ecological Services Field Office and reference Project Code 2024-0021111 associated with this Project.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

Manchester CT Solar Photovoltaic Array

2. Description

The following description was provided for the project 'Manchester CT Solar Photovoltaic Array':

> The proposed project is a solar photovoltaic array that will produce 0.999 MW AC within 7.80 acres of the southeastern portion of the approximate 41.08-acre property at 250 Carter Street, Manchester, CT. The entirety of the property was investigated for existing environmental conditions (i.e. wetlands and watercourses surveys, wildlife and vegetation surveys, etc.). No existing improvements are present at the property. Soils throughout the investigation area are formed from dense glacial till deposits. The vegetative cover throughout the investigation area is primarily forested.
>
> The project proposal is to develop the project site with a solar photovoltaic array and associated improvements including access drive, fencing, landscape improvements, utility pads and interconnection systems. The development will require vegetation clearing and minor earthwork within the project area that will utilize standard construction practices. Approximately 1,100 square feet of unavoidable direct impact is proposed to inland wetlands and watercourses in order to construct an access drive from Carter Street to the developable portion of the property. The crossing will be accomplished by installing 40 linear feet of a 42-inch diameter high-density polyethylene pipe embedded 12 inches into the underlying streambed substrate through the narrowest segment of the wetland/ stream onsite. The project proposes to implement a variety of soil erosion and sedimentation control measures to protect wetlands and watercourses and neighboring properties from sedimentation. The stormwater management practices proposed to mitigate for the proposed increase in impervious surfaces and to provide treatment to the runoff prior to leaving the project area are still in development at this time. The timing of the project is unknown at this time.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@41.763073399999996,-72.47082150874233,14z


Brookside Ln
Carter St
Amanda Dr
Ridge Dr
Belle Dr

DETERMINATION KEY RESULT

Based on the answers provided, the proposed Action is consistent with a determination of "may affect, but not likely to adversely affect" for the Endangered northern long-eared bat (*Myotis septentrionalis*).

QUALIFICATION INTERVIEW

1. Does the proposed project include, or is it reasonably certain to cause, intentional take of the northern long-eared bat or any other listed species?

   Note: Intentional take is defined as take that is the intended result of a project. Intentional take could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered or proposed species?

   No

2. The action area does not overlap with an area for which U.S. Fish and Wildlife Service currently has data to support the presumption that the northern long-eared bat is present. Are you aware of other data that indicates that northern long-eared bats (NLEB) are likely to be present in the action area?

   Bat occurrence data may include identification of NLEBs in hibernacula, capture of NLEBs, tracking of NLEBs to roost trees, or confirmed NLEB acoustic detections. Data on captures, roost tree use, and acoustic detections should post-date the year when white-nose syndrome was detected in the relevant state. With this question, we are looking for data that, for some reason, may have not yet been made available to U.S. Fish and Wildlife Service.

   No

3. Does any component of the action involve construction or operation of wind turbines?

   Note: For federal actions, answer 'yes' if the construction or operation of wind power facilities is either (1) part of the federal action or (2) would not occur but for a federal agency action (federal permit, funding, etc.).

   No

4. Is the proposed action authorized, permitted, licensed, funded, or being carried out by a Federal agency in whole or in part?

   No

PROJECT QUESTIONNAIRE

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Alexander Wojtkowiak
Address: 1899 Bronson Road
City: Fairfield
State: CT
Zip: 06824
Email awojtkowiak@wkassociates.net
Phone: 4019355101

EXHIBIT F

Revised Stormwater Management Report

STORMWATER MANAGEMENT REPORT

For the Proposed:

0.99 MW SOLAR PHOTOVOLTAIC ARRAY

Located At:
250 Carter Street
Manchester, Connecticut

Prepared On:
January 15th, 2024
Revised on:
April 19th, 2024

Prepared For:

TRITEC AMERICAS

888 Prospect Street, Suite 200
La Jolla, California 92037

Prepared By:

SOLLI ENGINEERING

11 Vanderbilt Avenue, Suite 240
Norwood, Massachusetts 02062
T: (781) 352-8491

501 Main Street, Suite 2A
Monroe, Connecticut 06468
T: (203) 880-5455

993 Farmington Avenue, Suite 206
West Hartford, Connecticut 06107

Kevin Solli, P.E.
CT 25759

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SOLLI ENGINEERING

INTRODUCTION

At the request of TRITEC Americas, LLC (Petitioner), Solli Engineering (Solli) has prepared this Stormwater Management Report to provide an analysis of the potential stormwater impacts associated with the proposed 0.99± megawatt (MW) alternating current (AC) ground-mounted solar electric generating facility (Project/Facility) located at 250 Carter Street, Manchester, Connecticut (Site). The proposed stormwater management plan outlined herein has been designed accordance with the following State of Connecticut guidelines as well as other applicable state and federal requirements and regulations:

- General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities (Effective Date: December 31, 2020, Modification Date: November 25, 2022)
- Connecticut Stormwater Quality Manual (Publication Date: September 30, 2023, Effective Date: March 30, 2024)
- Connecticut Guidelines for Soil Erosion and Sediment Control (Publication Date: September 30, 2023, Effective Date: March 30, 2024)
- Connecticut Department of Transportation 2000 Drainage Manual
- CT DEEP Appendix I Stormwater Management at Solar Array Construction Projects

EXISTING SITE CONDITIONS

The Site consists of one (1) parcel totaling 41.08± acres located at 250 Carter Street, Manchester, Connecticut. The Site is bound by residential uses to the west, east, and south, and Carter Street to the north. The entire parcel is comprised of vacant land, consisting of wooded and wetland areas.

The Project area's topography gradually slopes between 7%-9% from the east property line of the site to the west. There are four (4) wetland areas located on the site. One (1) wetland is located in the southwest corner of the site, two (2) wetlands are located on the west side of the site and one (1) wetland bisects the north end of the site and runs somewhat parallel to Carter Street.

For more information regarding the Site, refer to the Property & Topographic Survey Map in Appendix A.

PROPOSED SITE CONDITIONS

The proposed Project area is 7.8± acres, within a wooded portion of the eastern region of the Site. Access to the Facility will be provided at the northeastern edge of the Site, from Carter Street, via a new 12' wide, 740'± long gravel road. The Project will be surrounded by a 7-ft tall chain link fence to provide adequate security measures.

Some work will be required within the 100' upland buffer area for northern wetland for access to the proposed project area. All other proposed work will remain outside of the 50' wetland buffer area for the other wetlands.

As currently designed, the proposed Facility will consist of 2,590 TrinaSolar TSM-DEG19C20 540W modules. The modules will be installed on a post-driven ground-mounted, single-axis tracking system, with no anticipated changes to the existing grades within the array, therefore the post-development site conditions will mimic the pre-development site conditions to the maximum extent possible. As discussed

later in this report, perimeter grassed swales with check dams and a proposed stormwater basin are proposed to assist in mitigating peak runoff flows, as well as to treat the Water Quality Volume (WQv) per CT DEEP requirements.

Approximately 1,100 square feet of unavoidable direct impact is proposed to inland wetlands and watercourses in order to construct an access drive from Carter Street to the developable portion of the property. A segment of stream is proposed to be piped to facilitate this crossing. Direct adverse impacts associated with the stream crossing will be minimized to the greatest extent practicable and the crossing will be designed in accordance with the *USACE Programmatic General Permit State of Connecticut* in regard to stream crossing BMPs. Due to the de-minimis level of impact and due to the BMPs provided during construction, the wetland and watercourse impacts associated with the stream crossing are permissible under the USACE General Permit State of Connecticut. The crossing will be accomplished by installing 40 linear feet of a 42-inch diameter high-density polyethylene pipe embedded 12 inches into the underlying streambed substrate through the narrowest segment of the wetland/stream onsite. A crossing such as this will maintain the main function of the wetland and watercourse system within the area of the proposed development, that being water conveyance.

For more information regarding the Project, refer to the Grading and Drainage Plan (Sheet 2.21) in Appendix A.

STORMWATER MANAGEMENT

The Project will add approximately 11,115 square feet of impervious/gravel area. The proposed stormwater management design consists of a stormwater basin and multiple drainage swales providing adequate storage for the water quality volume (WQv) that will effectively clean and treat the stormwater runoff prior to discharging.

METHODOLOGY

A hydrologic analysis was performed using the HydroCAD stormwater modeling system computer program developed by HydroCAD Software Solutions, LLC. Hydrographs for each watershed were developed using the SCS Synthetic Unit Hydrograph Method with a NRCC-D 24-hr rainfall distribution.

Rainfall depths for the site were used for calculating the volumes and rates of runoff for this project. The depths were taken from the NOAA Atlas documents (Latitude: 41.7621º, Longitude: -72.4704º) and the rainfall values are listed in Table 1 below.

Table 1: Rainfall Data

Return Period (Storm Event)	24-hr Rainfall Depth (inches)
2-year	3.16
10-year	4.91
25-year	6.00
50-year	6.81
100-year	7.69

The drainage areas used in the calculations are illustrated on the Existing and Proposed Drainage Area Maps (DA-1 & DA-2). These maps and the corresponding Hydrocad output are attached in Appendices B. Utilizing CT DEEP Appendix I, this hydrologic analysis will reflect a reduction of the Hydrologic Soil Group ("HSG") present on-site by a half (1/2) step (e.g., half the difference between the runoff curve number for HSG A versus HSG B). This reduction, as indicated by CT DEEP, is intended to account for

the compaction of soils that results from extensive machinery traffic during construction of the array. The WQv for the site was calculated assuming that the gravel surfaces and concrete equipment pads are effectively impervious cover.

EXISTING CONDITIONS

Approximately 23.705 acres of Off-Site and On-Site area were analyzed for stormwater management purposes. The areas analyzed contain the contributing areas which directly impact and are impacted by the proposed redevelopment. Based on existing drainage patterns, two drainage areas are defined.

The 12.707-acre Existing Drainage Area 1 (EDA-1) was considered as the contributing drainage area for the proposed development. The runoff from EDA-1 flows from Blue Ridge Drive to the east, overland to the west through the Project area and continues to flow overland through the Site to the wetlands, streams, and the western property line.

The 10.998-acre Existing Drainage Area 2 (EDA-2) was considered as the contributing drainage area for the proposed wetland crossing. The runoff from EDA-2 flows from Carter Street to the east, overland to Blue Ridge Drive and into a storm drainage system which discharges into the northern wetland.

Table 2: Existing Drainage Areas

Drainage Area Label	Drainage Area	Curve Number	Time of Concentration
Existing Drainage Area 1 (EDA-1)	12.707 AC	77	11.7 Min.
Existing Drainage Area 2 (EDA-2)	10.998 AC	80	12.3 Min.

For more information regarding the existing drainage conditions of the project area refer to the Existing Drainage Area Map (DA-1) in Appendix A and the HydroCAD calculations in Appendix B.

PROPOSED CONDITIONS

The Project proposes grassed drainage swales with stone check dams to convey stormwater runoff to the proposed stormwater infiltration basin. Infiltration tests were performed by Solli Engineering, LLC within the area of the proposed stormwater basin with an average infiltration rate of 1.2 in/hr being observed. A conservative method was used for the purpose of this design and infiltration was not utilized. Based on the proposed drainage patterns, the 12.707-acre area was divided into two (2) contributing drainage areas, Proposed Drainage Area 1A (PDA-1A) and Proposed Drainage Area 1B (PDA-1B).

PDA-1A has a contributing drainage area of approximately 10.448 acres. Similar to existing conditions, runoff from PDA-1A flows from east to west overland and into the proposed basin. Runoff then passes through an outlet control structure before discharging through a flared end section and across a level spreader before flowing to the west.

PDA-1B has a contributing drainage area of approximately 2.259 acres, which flows overland from east to west.

PDA-2 remains the same as EDA-2 and was utilized to design the wetland crossing for the proposed access drive. A 42” HDPE pipe with flared ends, and embedded 12”, is proposed to convey the runoff beneath the access drive. The crossing has been designed to convey up to the 100-year design storm without overtopping the proposed access drive.

All proposed areas of disturbance within the solar array will be seeded with a Fuzz & Buzz Mix – ERNMX-147 or approved equal. All proposed areas of disturbance outside of the solar array will be seeded with Northeast Solar Pollinator Buff Mix - ERNMX-610 or approved equal.

Table 3: Proposed Drainage Areas

Drainage Area Label	Drainage Area	Curve Number	Time of Concentration
Proposed Drainage Area 1 (PDA-1)	**12.707 AC**	-	-
Proposed Drainage Area 1A (PDA-1A)	10.448 AC	77	12.0 Min.
Proposed Drainage Area 1B (PDA-1B)	2.259 AC	77	11.5 Min.
Proposed Drainage Area 2 (PDA-2)	**10.998 AC**	**80**	**13.0 Min.**

For more information regarding the proposed stormwater management design refer to the Proposed Drainage Area Map (DA-2) in Appendix A; and the HydroCAD and WQv calculations in Appendix B.

As a result of the proposed stormwater management measures, the peak flows for the 2, 25, 50 and 100-year storm events are significantly reduced from existing conditions as shown in the chart below.

Table 4: Peak Flow Comparison Table

Peak Flow (cfs)			
Storm Event	**Total Drainage Areas**		**Percent Reduction in Peak Flow**
	EDA	**PDA**	
2-Year	12.91	4.09	68.3%
10-Year	28.42	12.13	57.3%
25-Year	38.73	15.96	58.8%
50-Year	46.54	18.56	60.1%
100-Year	55.09	27.44	50.2%

CT DEEP APPENDIX I DESIGN REGULATIONS/COMPLIANCE

The following identifies and details the regulations and proposed compliance measures within CT DEEP Appendix I that pertain specifically to civil, stormwater, and erosion control designs.

I. Design and construction requirements:

1. Roadways, gravel surfaces, transformer pads are considered effective impervious cover for the purposes of calculating the WQV. The proposed solar panels in the array that are within existing and post-construction slopes that are greater than 15% are considered impervious for the purposes of calculating the WQV. The remainder of the proposed solar panels that are proposed within existing and post-construction slopes that are less than 15% are not considered impervious cover for the purposes of calculating the WQV because the following have been met:

    a. Vegetative areas between the rows of solar panels have a width of 9 feet which is greater than the solar panel width of 7.8 feet.
    b. The post-development stormwater runoff volumes and peak flows will be less than that of the pre-development stormwater runoff due to the proposed grassed swales and stormwater management basin.
    c. The Project meets (iv) of this requirement as the plan includes specific engineered phased construction plans and detailed erosion control measures.

d. The panels are spaced and provide a minimum height of 3 feet from the ground to provide growth of native vegetation.

2. Setback and buffer requirements have been met as follows:

a. No wetlands or waters are located within 100 feet of the proposed solar facility area. No solar panels are located within the 50-foot setback of any property boundary that is located downgradient of the construction activity.
b. There is a minimum of 50 feet between the limit of construction activity and downgradient wetlands.
c. There is a minimum of 10 feet between the construction activity associated with the installation of the access road and interconnection and downgradient wetlands.

3. The wetlands and water courses were originally delineated by Ian T. Cole on October 15, 2023. The location of delineated resources, as well as buffers, are shown on the Site Layout Plan (Sheet 2.11) in Appendix A.

II. Design requirements for post-construction stormwater management measures:

1. Post-construction stormwater control measures have been designed and will be constructed to provide permanent stabilization and non-erosive conveyance of runoff from the site.
2. The orientation of the panels follows the existing slopes on the site to the extent practicable.
3. The hydrologic analysis has been completed, as described above, with the following details:

a. The Project evaluated and will control the 2, 25, 50, and 100-year 24-hour rainfall events in accordance with the CT Stormwater Quality Manual. Maximum sheet flow was kept to 100 feet and shallow concentrated flows were calculated using velocity factors per NRCS Part 630 National Engineering Handbook Chapter 15. The proposed swales have been designed to convey and control stormwater from a 100-year, 24-hr rainfall event.
b. NRCS soil mapping was used for the stormwater design.
c. There are no areas where the grades will change by more than two (2) feet from existing conditions. With the modeled half-drop (1/2) in HSG for the facility area and the change in curve number associated with the ground cover change from existing to proposed conditions, there will be a decrease in post-development runoff in comparison to pre-development runoff.
d. Pre-and post-development drainage area maps & computations are provided in Appendices A and B.
e. The information above and herein demonstrates that the Project will have no net increase in peak flows, erosive velocities or volumes, or adverse impacts to downstream properties.

SOIL EROSION & SEDIMENT CONTROL

The proposed plans for soil erosion and sediment control prepared for this project have been developed in accordance with the Connecticut Guidelines for Soil Erosion and Sediment Control, prepared by the Connecticut Council on Soil and Water Conservation in Collaboration with the Connecticut Department of Energy and Environmental Protection.

The soil erosion and sediment control measures that will be proposed as part of this project include geotextile silt fences with wings for areas less than 1 acre, compost filter socks, construction entrance, dust control measures, and a temporary sediment trap. The soil erosion and sediment control measures will be implemented in two (2) phases. Phase I measures are associated with the clearing, grubbing and installation of the sediment trap and diversion swales. Phase II measures are associated with the remain clearing and grubbing, fine grading and installation of the modules, hardscape, and utilities infrastructure.

CONCLUSION

The stormwater management for the proposed Project has been designed such that the post-development peak discharges to the waters of the State of Connecticut for the 2-, 10-, 25-, 50-, and 100- year storm events are less than the pre-development peak discharges. In addition, the Project adheres to the regulations and guidelines presented by CT DEEP's Appendix I as described above. As a result, the proposed solar array will not result in any adverse conditions to the surrounding areas and properties.

APPENDICES

Appendix A – Figures

Appendix B – Stormwater Calculations

Appendix A – Figures

- Property & Topographic Survey Map

(Prepared by Harry E. Cole & Son)

- NRCS Soil Survey Map
- Grading & Drainage Plan (2.21)
- Existing Drainage Area Map (DA-1)
- Proposed Drainage Area Map (DA-2)

LEGEND

- = Existing utility pole
- = Existing light pole
- = Existing fire hydrant
- = Existing water valve
- = Existing gas valve
- = Existing underground pipe
- = Existing edge of pavement
- = Existing bituminous concrete lip curb
- = Existing well
- = Existing catch basin
- = Existing drainage manhole
- = Existing sanitary manhole
- = Existing utility box
- = Existing contour
- x000.0 = Existing spot elevation
- = Existing iron pin
- = Existing drill hole
- = Existing monument

SURVEY NOTES:

1. This map has been prepared pursuant to the Regulation of Connecticut State Agencies Sections 20-300b-1 through 20-300b-20 and the "Standards for Surveys and Maps in the State of Connecticut" as adopted by the Connecticut Association of Land Surveyors, Inc. on September 26, 1996.

2. Type of survey performed: Property & Topographic Survey

3. Boundary determination category: Resurvey

4. Class of accuracy:
   Horizontal: A-2
   Vertical: T-2

5. The intent of this map is to depict or note the position of boundaries with respect to: (A) locations of all boundary monumentation found or set; (B) Apparent improvements and features, including as a minimum: dwellings, barns, garages, sheds, driveways, roadways, surface utilities, visible bodies of water and swimming pools; (C) record easements and visible means of ingress and egress; (D) record and apparent means of ingress and egress; (E) lines of occupation, including as a minimum: fences, walls, hedges and yards; (F) deed restrictions pertaining to the location of buildings or other apparent improvements; (G) unresolved conflicts with record deed descriptions and maps; (H) all apparent boundary encroachments; and (I) monumentation required to be set at all corners created by a deflection angle of not less than 70 degrees between two consecutive courses at an intervals not to exceed 600 feet (180 meters) along the boundaries between said corners, except where natural or man-made monumentation defines or occupies the line.

6. Map References:

a.) "Resubdivision Amanda Drive Prepared for Derekseth Homes, Amanda Drive, Manchester, Connecticut; Scale:1"=100'; Dated: October 26, 1999; Sheet 2 of 19 by Ed Lally and Associates Inc." Filed as Map 1257 at the M.L.R.

b.) "Plot Plan Birch Mountain II Prepared for Mary Catherine Development Company, Manchester, Connecticut; Scale:1"=40'; Dated: 1/30/89 by Design Professionals, Inc." Filed as Book M27, Page 60 at the M.L.R."

c.) "Resubdivision Amanda Drive Prepared for Derekseth Homes, Amanda Drive, Manchester, Connecticut; Scale:1"=100'; Dated: October 26, 1999; Sheet 4 of 19 by Ed Lally and Associates Inc." Filed as Map 1259 at the M.L.R.

d.) "Map of Highland Estates, Birch Mountain Road & Carter Street, Manchester, Connecticut; Scale:1"=50'; Dated: March 23, 1967; Sheet 2 of 3 by Hayden L. Griswold, C.E." Filed as Book M13, Page 48 at the M.L.R."

e.) "Map of Highland Estates, Birch Mountain Road & Carter Street, Manchester, Connecticut; Scale:1"=50'; Dated: March 23, 1967; Sheet 3 of 3 by Hayden L. Griswold, C.E." Filed as Book M9, Page 36 at the M.L.R."

f.) "Boundary Survey Prepared for John Vontell, Existing Boundary and Features, 143 Carter Street, Manchester, Connecticut; Scale:1"=30'; Dated: May 22, 2014 by Rob Hellstrom Land Surveying LLC." Filed as Map 2311 in Drawer 16 at the M.L.R."

g) "Subdivision Plan Prepared for Robert C. Dennison, Carter Street, Manchester, Connecticut; Scale:1"=100'; Dated: 6/20/83; Last Revised: 6-21-1983 by Fuss & O'neill." Filed as Book M22, Page 49 at the M.L.R.

7. Per agreement with property owner no boundary corners were set by this survey unless noted hereon. All monumentation found is depicted or noted hereon.

8. Zone: RR

9. Total area: 1,789,597 Sq. Ft. - 41.08 Acres

10. Owner: Wells Jacobson & Margaret Jacobson

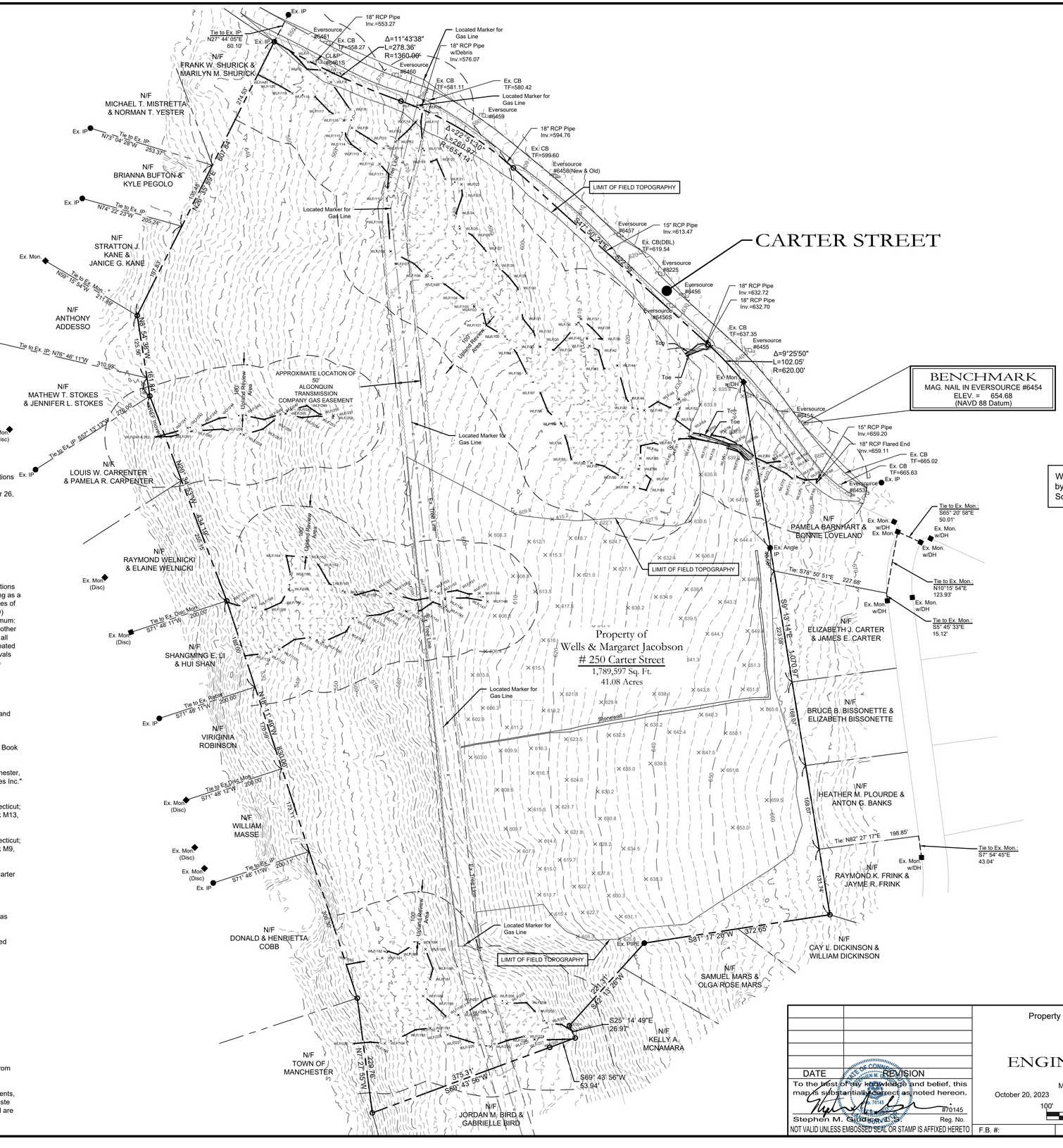
11. Town of Manchester Assessors Map #97 Lot #250

12. Filed in Volume 3397, Page 65 of the Town Clerk's office.

13. Contour interval is two(2) feet.

14. Existing contours generated from field topography. (Implemented with Aerial Topography from UCONN Base)

15. This survey does not include the location of any underground improvements or encroachments, subsurface utility lines or buried debris. Nor does it necessarily reflect the existence of any waste dumps or hazardous materials. The underground items depicted or noted are approximate and are not guaranteed. Notify "CALL BEFORE YOU DIG" 1-800-922-4455 prior to any excavation operations.



DATE	REVISION

To the best of my knowledge and belief, this map is substantially correct as noted hereon.

Stephen M. Gliddon, L.S. #70145 Reg. No.

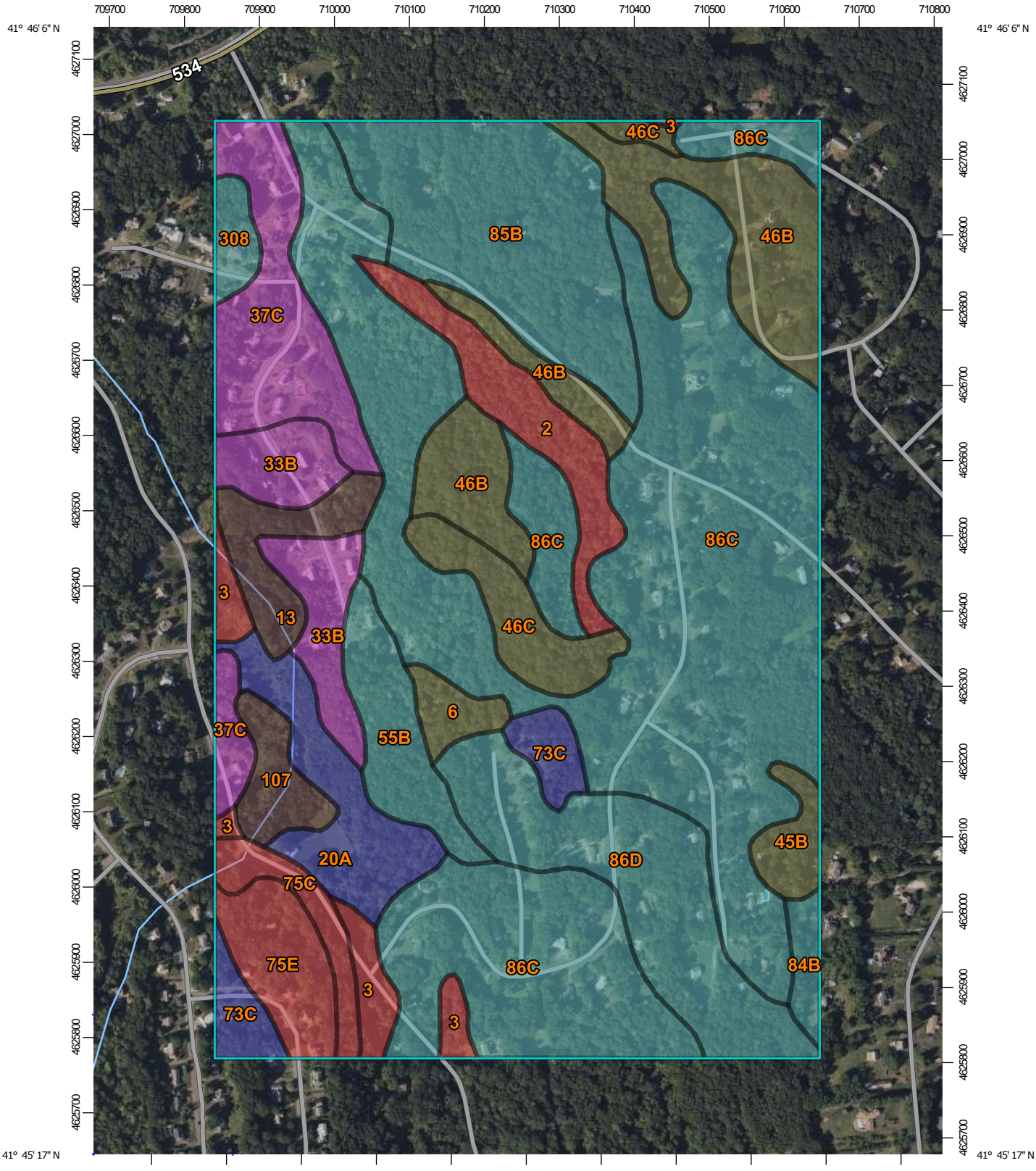
NOT VALID UNLESS EMBOSSED SEAL OR STAMP IS AFFIXED HERETO

Property & Topographic Survey Map
Prepared For
SOLLI ENGINEERING, LLC
250 Carter Street
Manchester, Connecticut
October 20, 2023 Scale: 1" = 100'
100' 50' 0 50' 100'

F.B. #: PROJECT #: 2379a

cole
HARRY E. COLE & SON
engineering. surveying. planning.
876 South Main Street
P.O. Box 44
Plantsville, CT 06479 - 0044
Tel: (860) 628-4484
Fax: (860) 620-0196
www.hecole.com

Hydrologic Soil Group—State of Connecticut
(250 CARTER ST, MANCHESTER, CT)



Map Scale: 1:7,300 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 350 700 1400 2100

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 1:12,000.

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: State of Connecticut
Survey Area Data: Version 22, Sep 12, 2022

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

Date(s) aerial images were photographed: Jun 14, 2022—Oct 6, 2022

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
2	Ridgebury fine sandy loam, 0 to 3 percent slopes	D	7.7	3.1%
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	D	4.6	1.9%
6	Wilbraham and Menlo soils, 0 to 8 percent slopes, extremely stony	C/D	2.2	0.9%
13	Walpole sandy loam, 0 to 3 percent slopes	B/D	5.2	2.1%
20A	Ellington silt loam, 0 to 5 percent slopes	B	8.8	3.5%
33B	Hartford sandy loam, 3 to 8 percent slopes	A	9.0	3.6%
37C	Manchester gravelly sandy loam, 3 to 15 percent slopes	A	14.1	5.7%
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes	C/D	2.7	1.1%
46B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	C/D	20.5	8.2%
46C	Woodbridge fine sandy loam, 8 to 15 percent slopes, very stony	C/D	6.5	2.6%
55B	Watchaug fine sandy loam, 3 to 8 percent slopes	C	6.9	2.8%
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	B	4.5	1.8%
75C	Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes	D	3.4	1.4%
75E	Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes	D	6.2	2.5%
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	C	1.8	0.7%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
85B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony	C	22.2	8.9%
86C	Paxton and Montauk fine sandy loams, 3 to 15 percent slopes, extremely stony	C	99.6	39.9%
86D	Paxton and Montauk fine sandy loams, 15 to 35 percent slopes, extremely stony	C	17.9	7.2%
107	Limerick and Lim soils	B/D	3.6	1.5%
308	Udorthents, smoothed	C	2.0	0.8%
Totals for Area of Interest			**249.5**	**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.

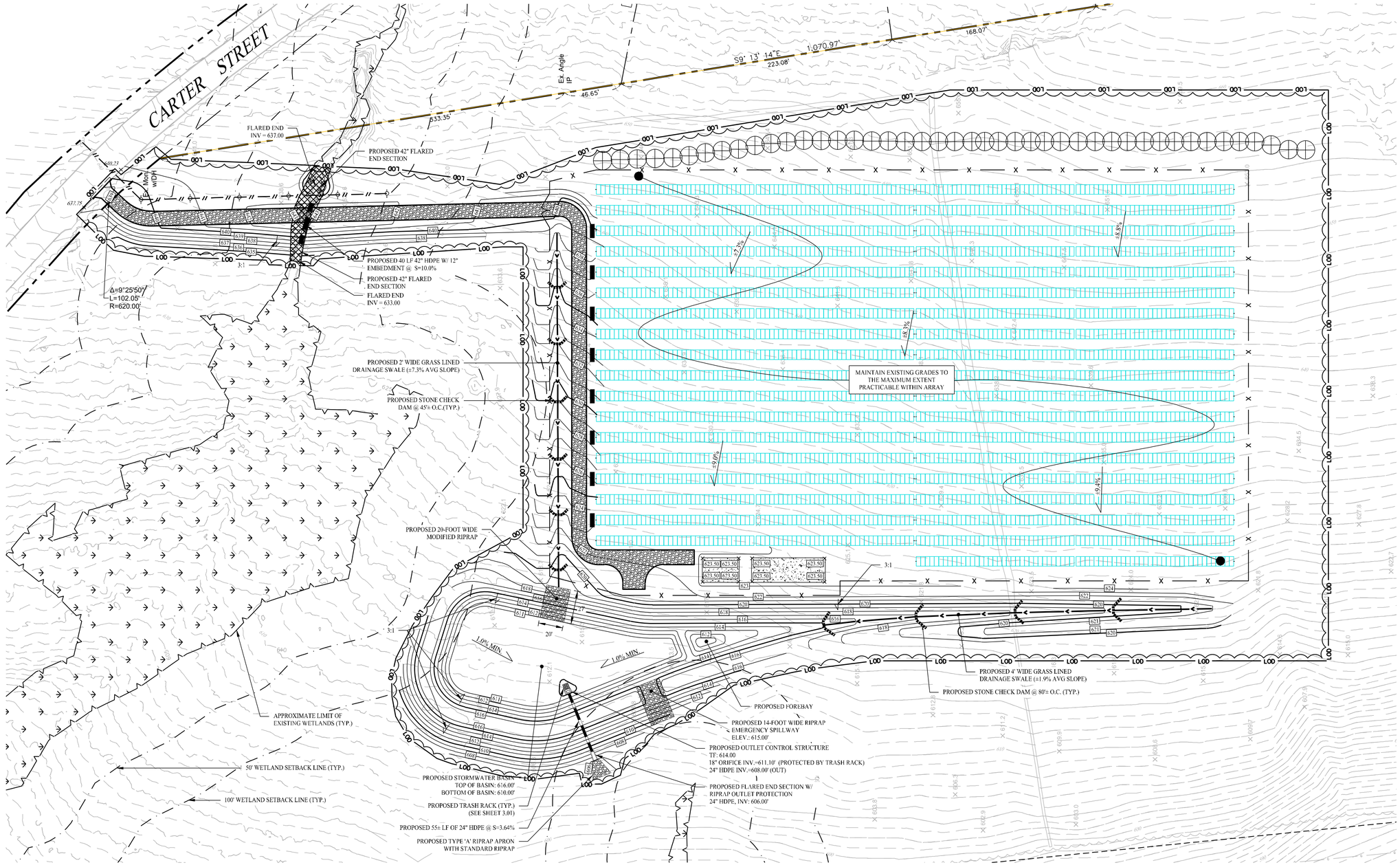
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



GENERAL NOTES

1. REFER TO THE EXISTING CONDITIONS MAP FOR THE ENTIRE PROPERTY BOUNDARY AND EXISTING CONDITIONS INFORMATION. THE PLAN HEREON DEPICTS A PORTION OF THE PROPERTY IN WHICH THE SITE WORK IS BEING PROPOSED.
2. THIS DRAWING IS INTENDED TO DESCRIBE GRADING AND DRAINAGE ONLY. REFER TO SITE PLAN FOR GENERAL INFORMATION, AND DETAIL SHEETS FOR DETAILS.
3. THE CONTRACTOR SHALL PRESERVE EXISTING VEGETATION WHERE POSSIBLE AND/OR AS NOTED ON DRAWINGS. REFER TO EROSION CONTROL PLAN FOR LIMIT OF DISTURBANCE AND EROSION CONTROL NOTES.
4. TOPSOIL SHALL BE STRIPPED AND STOCKPILED ON SITE FOR USE IN FINAL LANDSCAPING.
5. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY CONSTRUCTION PERMITS REQUIRED BY GOVERNMENT AND LOCAL AGENCIES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY CONSTRUCTION PERMITS FROM THE TOWN OF MANCHESTER REQUIRED TO PERFORM ALL WORK, INCLUDING FOR STREET CUTS AND CONNECTIONS TO EXISTING UTILITIES. THE CONTRACTOR SHALL POST ALL BONDS, PAY ALL FEES, PROVIDE PROOF OF INSURANCE AND PROVIDE TRAFFIC CONTROL NECESSARY FOR THIS WORK.
6. ALL DISTURBANCE INCURRED TO TOWN OR STATE PROPERTY DUE TO CONSTRUCTION SHALL BE RESTORED TO ITS PREVIOUS CONDITION OR BETTER, TO THE SATISFACTION OF THE TOWN OF BETHANY AUTHORITY.
7. IF IMPACTED OR CONTAMINATED SOIL IS ENCOUNTERED BY THE CONTRACTOR, THE CONTRACTOR SHALL SUSPEND EXCAVATION WORK OF IMPACTED SOIL AND NOTIFY THE OWNER AND/OR OWNER'S ENVIRONMENTAL CONSULTANT PRIOR TO PROCEEDING WITH FURTHER WORK IN THE IMPACTED SOIL LOCATION UNTIL FURTHER INSTRUCTED BY THE OWNER AND/OR OWNER'S ENVIRONMENTAL CONSULTANT.
8. ALL PIPE LENGTHS ARE HORIZONTAL DISTANCES AND ARE APPROXIMATE.
9. ALL DISTURBED AREAS TO BE RESEEDED WITH ERNMX-147 WITHIN THE ARRAY AREA. ERNMX-610 WILL BE USED OUTSIDE FENCELINE AND IN NON-ARRAY AREAS.

LEGEND

- PROPERTY LINE
- 620 — MAJOR CONTOURS
- 621 — MINOR CONTOURS
- EXISTING MAJOR CONTOURS
- EXISTING MINOR CONTOURS
- 568.85 — PROPOSED SPOT ELEVATION
- 568.85 — EXISTING SPOT ELEVATION
- STORM DRAIN PIPE
- RIP RAP SPILLWAY
- OUTLET CONTROL STRUCTURE
- FLARED END SECTION
- RIPRAP OUTLET PROTECTION
- PERMANENT WETLAND DISTURBANCE AREA

Rev. #:	Date	Description
1	04/19/24	CSC INTERROGATORIES

Graphic Scale: 40 0 40 80

SOLLI ENGINEERING
501 Main Street, Monroe, CT 06468 T: (203) 880-5455 F: (203) 880-9695
11 Vanderbilt Ave, Norwood, MA 02062 T: (781) 352-8491 F: (203) 880-9695

Drawn By:	AWC
Checked By:	CJB
Approved By:	KMS
Project #:	23100101
Plan Date:	01/15/24
Scale:	1" = 40'

STATE OF CONNECTICUT · KEVIN M. SOLLI · 25759 · LICENSED PROFESSIONAL ENGINEER

Kevin Solli, P.E.
CT 25759

Project:

PROPOSED SOLAR PHOTOVOLTAIC ARRAY

250 CARTER STREET
MANCHESTER, CONNECTICUT

Sheet Title: GRADING & DRAINAGE PLAN

Sheet #: 2.21

GENERAL NOTES

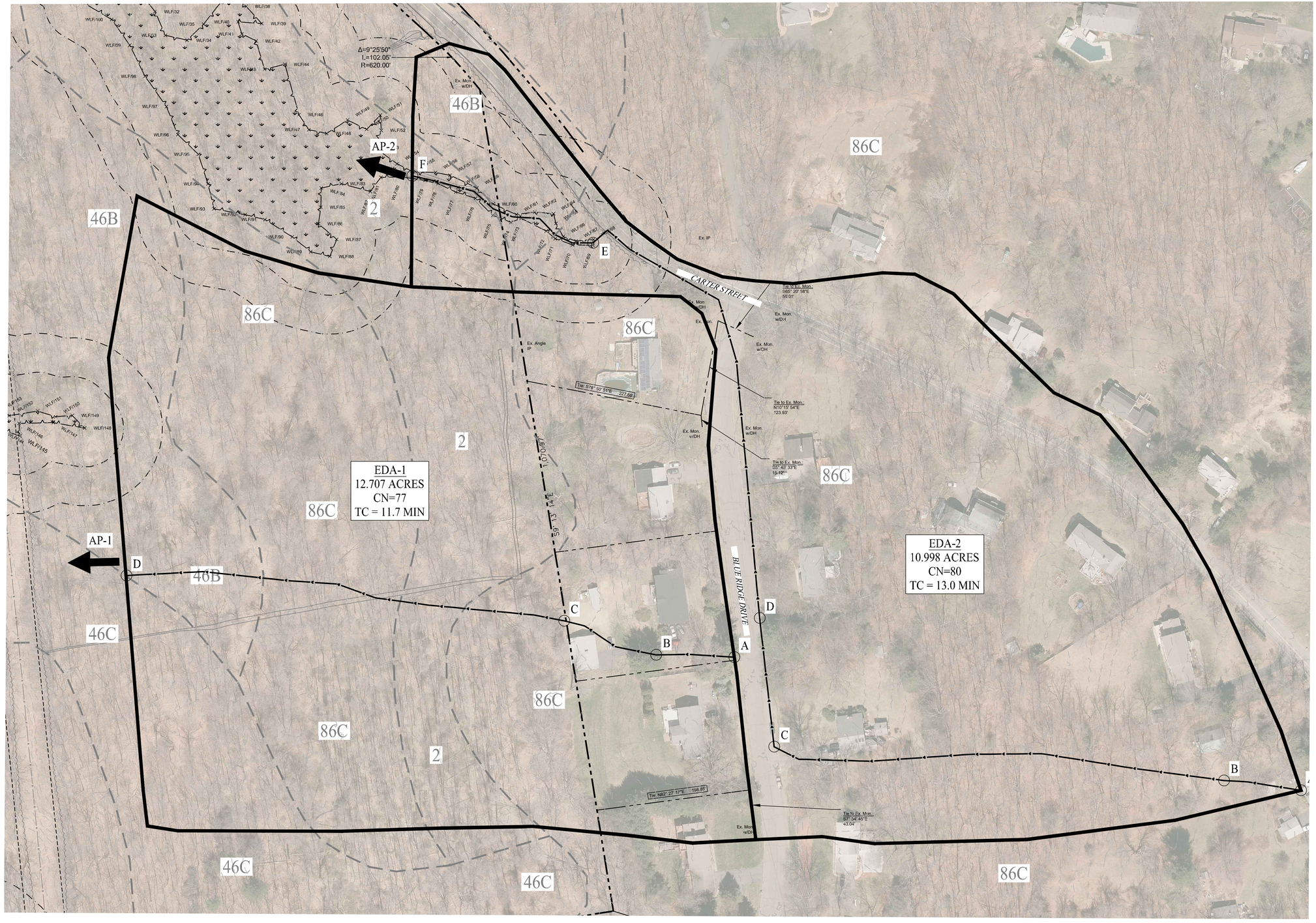
1. THE STORMWATER MANAGEMENT PLAN AND DESIGN IS INTENDED TO BE IN COMPLIANCE WITH THE CONNECTICUT DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION STORMWATER QUALITY MANUAL AND THE TOWN OF MANCHESTER, CONNECTICUT STORMWATER REGULATIONS.
2. STORMWATER RUNOFF ANALYSIS WAS CALCULATED USING THE SCS TR-55 METHODOLOGY.

LEGEND

- PROPERTY LINE
- RIGHT-OF-WAY LINE
- ADJOINING LOT LINE
- SOIL BOUNDARY
- LIMIT OF DRAINAGE AREA
- FLOW PATH

EXISTING CONDITIONS PEAK FLOWS

ANALYSIS POINT	2-YEAR (CFS)	10-YEAR (CFS)	25-YEAR (CFS)	50-YEAR (CFS)	100-YEAR (CFS)
AP-1	12.91	28.42	38.73	46.54	55.09
AP-2	12.85	26.55	35.47	42.16	49.46



Rev. #:	Date	Description
1	04/19/24	CSC INTERROGATORIES

Graphic Scale: 60 0 60 120

SOLLI ENGINEERING
501 Main Street, Monroe, CT 06468 T: (203) 880-5455 F: (203) 880-9695
11 Vanderbilt Ave, Norwood, MA 02062 T: (781) 352-8491 F: (203) 880-9695

Drawn By:	CSH
Checked By:	EEL
Approved By:	KMS
Project #:	23100101
Plan Date:	01/15/24
Scale:	1" = 60'

Kevin Solli, P.E.
CT 25759

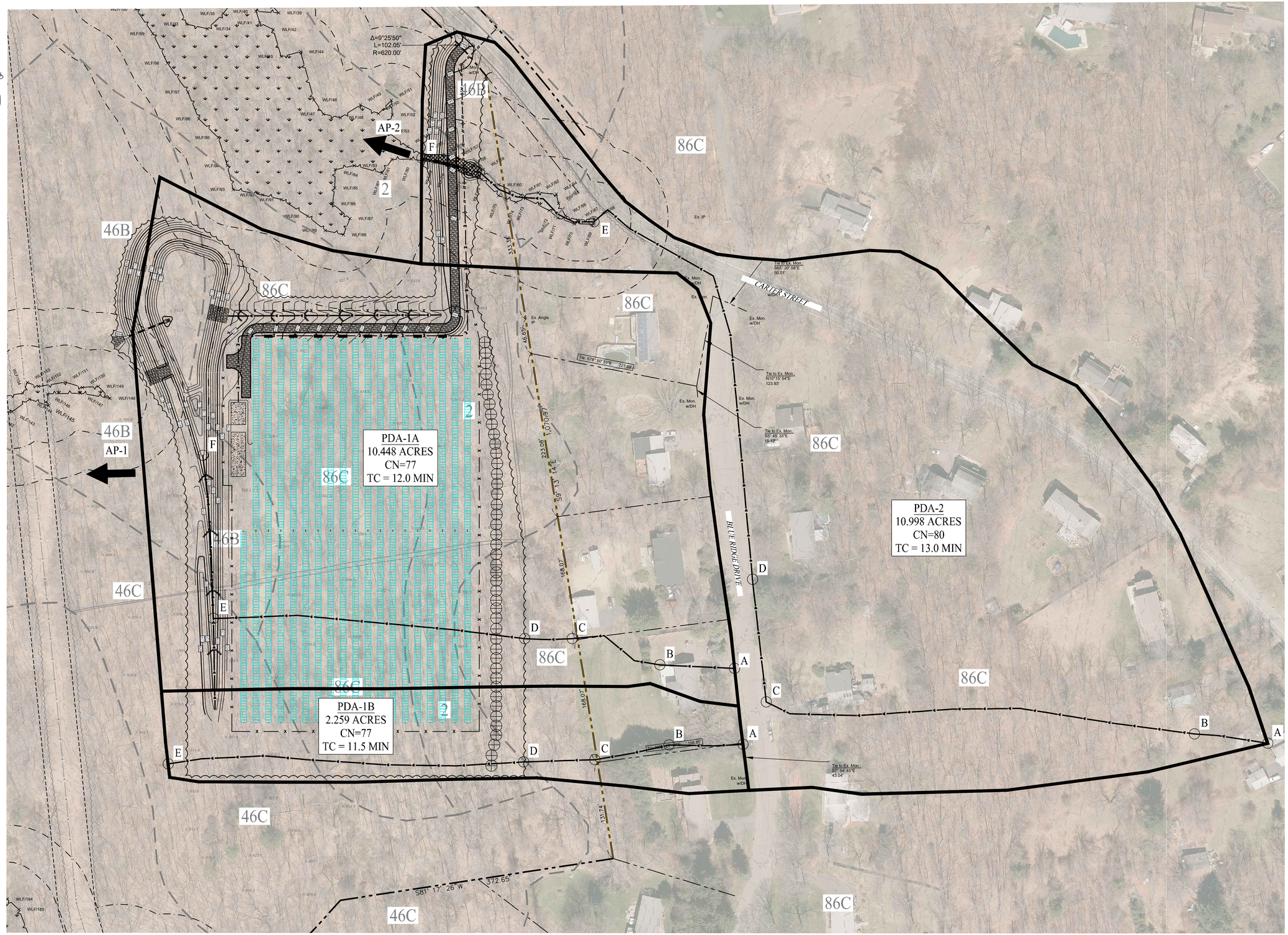
Project:

PROPOSED SOLAR PHOTOVOLTAIC ARRAY

250 CARTER STREET
MANCHESTER, CONNECTICUT

Sheet Title: EXISTING DRAINAGE AREA MAP

Sheet #: DA-1



GENERAL NOTES

1. THE STORMWATER MANAGEMENT PLAN AND DESIGN IS INTENDED TO BE IN COMPLIANCE WITH THE CONNECTICUT DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION STORMWATER QUALITY MANUAL AND THE TOWN OF MANCHESTER, CONNECTICUT STORMWATER REGULATIONS.
2. STORMWATER RUNOFF ANALYSIS WAS CALCULATED USING THE SCS TR-55 METHODOLOGY.

LEGEND

- PROPERTY LINE
- RIGHT-OF-WAY LINE
- ADJOINING LOT LINE
- SOIL BOUNDARY
- LIMIT OF DRAINAGE AREA
- FLOW PATH

PROPOSED CONDITIONS PEAK FLOWS

ANALYSIS POINT	2-YEAR (CFS)	10-YEAR (CFS)	25-YEAR (CFS)	50-YEAR (CFS)	100-YEAR (CFS)
AP-1	4.09	12.13	15.96	18.56	27.44
AP-2	12.85	26.55	35.46	42.16	49.46

Rev. #:	Date	Description
1	04/19/24	CSC INTERROGATORIES

Graphic Scale: 60 0 60 120

SOLLI ENGINEERING
501 Main Street, Monroe, CT 06468 T: (203) 880-5455 F: (203) 880-9695
11 Vanderbilt Ave, Norwood, MA 02062 T: (781) 352-8491 F: (203) 880-9695

Drawn By:	CSH
Checked By:	EEL
Approved By:	KMS
Project #:	23100101
Plan Date:	01/15/24
Scale:	1" = 60'

Kevin Solli, P.E.
CT 25759

Project:

PROPOSED SOLAR PHOTOVOLTAIC ARRAY

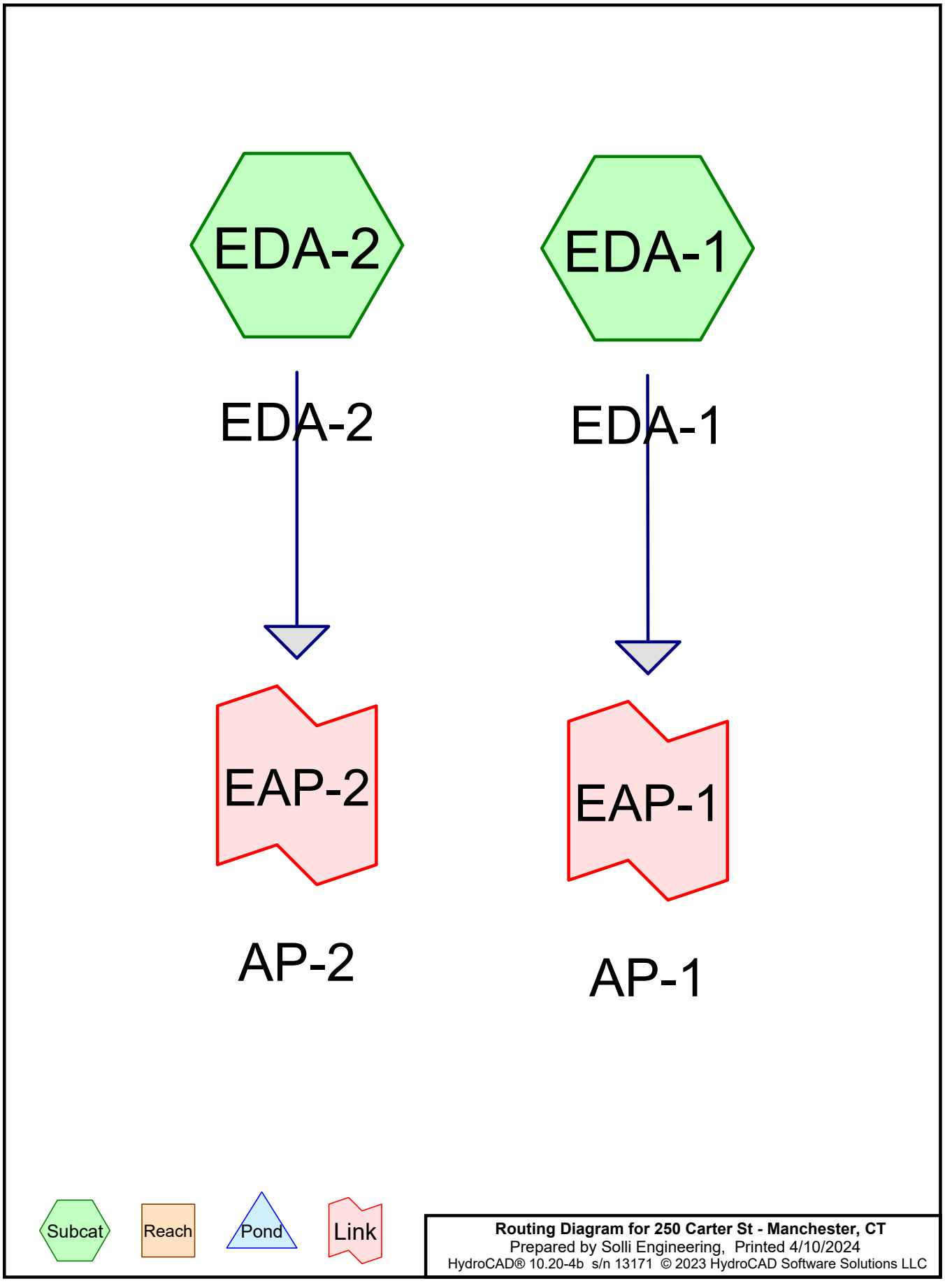
250 CARTER STREET
MANCHESTER, CONNECTICUT

Sheet Title: PROPOSED DRAINAGE AREA MAP

Sheet #: DA-2

Appendix B – Stormwater Calculations

- Hydrology Calculations (2-, 25-, 50-, 100-year storm events)
- Water Quality Volume Calculations
- NOAA Atlas Precipitation Data



Routing Diagram for 250 Carter St - Manchester, CT
Prepared by Solli Engineering, Printed 4/10/2024

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year	NRCC 24-hr	D	Default	24.00	1	3.16	2
2	10-year	NRCC 24-hr	D	Default	24.00	1	4.91	2
3	25-year	NRCC 24-hr	D	Default	24.00	1	6.00	2
4	50-year	NRCC 24-hr	D	Default	24.00	1	6.81	2
5	100-year	NRCC 24-hr	D	Default	24.00	1	7.69	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
8.575	79	1 acre lots, 20% imp, HSG C (EDA-1, EDA-2)
1.152	98	Paved roads w/curbs & sewers, HSG C (EDA-2)
0.135	98	Paved roads w/curbs & sewers, HSG D (EDA-2)
8.238	73	Woods, Fair, HSG C (EDA-1, EDA-2)
5.605	79	Woods, Fair, HSG D (EDA-1, EDA-2)
23.706	**78**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
17.965	HSG C	EDA-1, EDA-2
5.741	HSG D	EDA-1, EDA-2
0.000	Other	
23.706		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	8.575	0.000	0.000	8.575	1 acre lots, 20% imp	ED A-1 , ED A-2
0.000	0.000	1.152	0.135	0.000	1.288	Paved roads w/curbs & sewers	ED A-2
0.000	0.000	8.238	5.605	0.000	13.843	Woods, Fair	ED A-1 , ED A-2
0.000	**0.000**	**17.965**	**5.741**	**0.000**	**23.706**	**TOTAL AREA**	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	EDA-2	0.00	0.00	608.0	0.0444	0.011	0.0	15.0	0.0	

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EDA-1: EDA-1 Runoff Area=12.707 ac 4.56% Impervious Runoff Depth=1.18"
Flow Length=796' Tc=12.3 min CN=77 Runoff=12.91 cfs 1.253 af

Subcatchment EDA-2: EDA-2 Runoff Area=479,116 sf 22.03% Impervious Runoff Depth=1.37"
Flow Length=1,712' Tc=13.0 min CN=80 Runoff=12.85 cfs 1.257 af

Link EAP-1: AP-1 Inflow=12.91 cfs 1.253 af
Primary=12.91 cfs 1.253 af

Link EAP-2: AP-2 Inflow=12.85 cfs 1.257 af
Primary=12.85 cfs 1.257 af

Total Runoff Area = 23.706 ac Runoff Volume = 2.510 af Average Runoff Depth = 1.27"
87.33% Pervious = 20.703 ac 12.67% Impervious = 3.003 ac

Summary for Subcatchment EDA-1: EDA-1

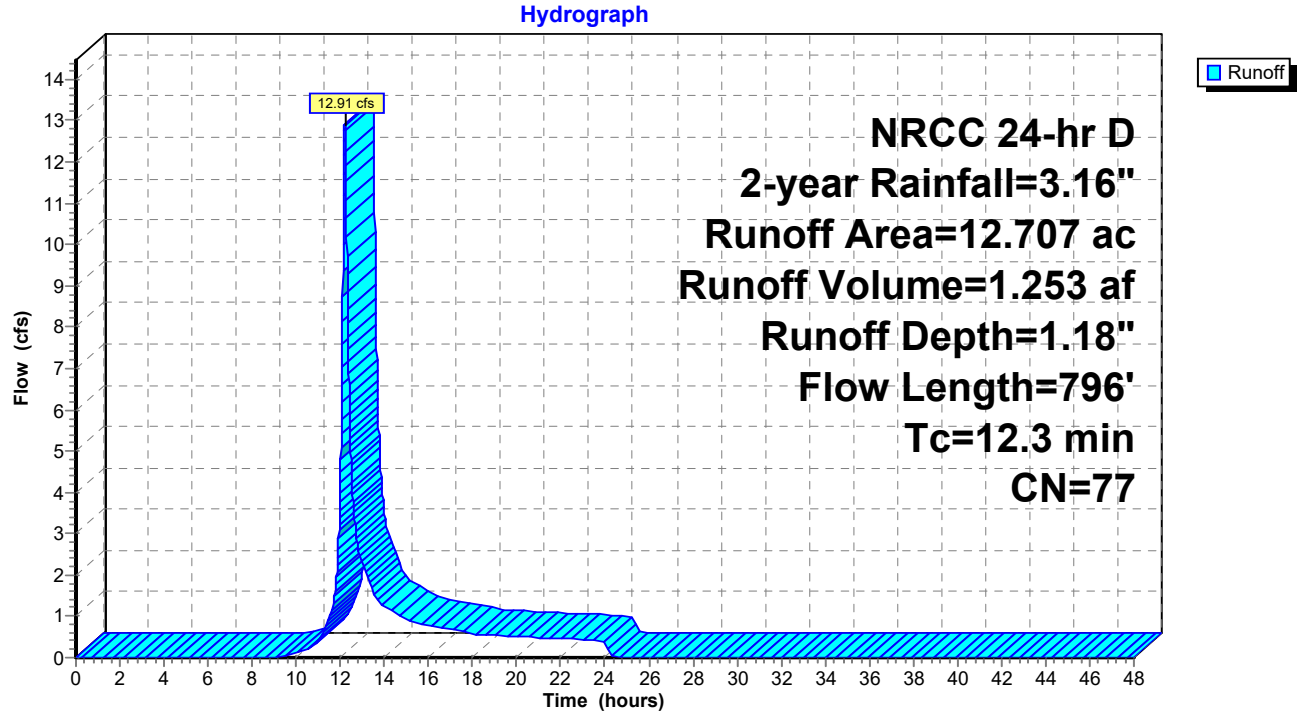
Runoff = 12.91 cfs @ 12.20 hrs, Volume= 1.253 af, Depth= 1.18"
Routed to Link EAP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-year Rainfall=3.16"

Area (ac)	CN	Description
2.898	79	1 acre lots, 20% imp, HSG C
5.274	73	Woods, Fair, HSG C
4.535	79	Woods, Fair, HSG D
12.707	77	Weighted Average
12.127		95.44% Pervious Area
0.580		4.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100	0.1100	0.33		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
1.1	128	0.0780	1.95		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
6.2	568	0.0933	1.53		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
12.3	796	Total			

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2: EDA-2

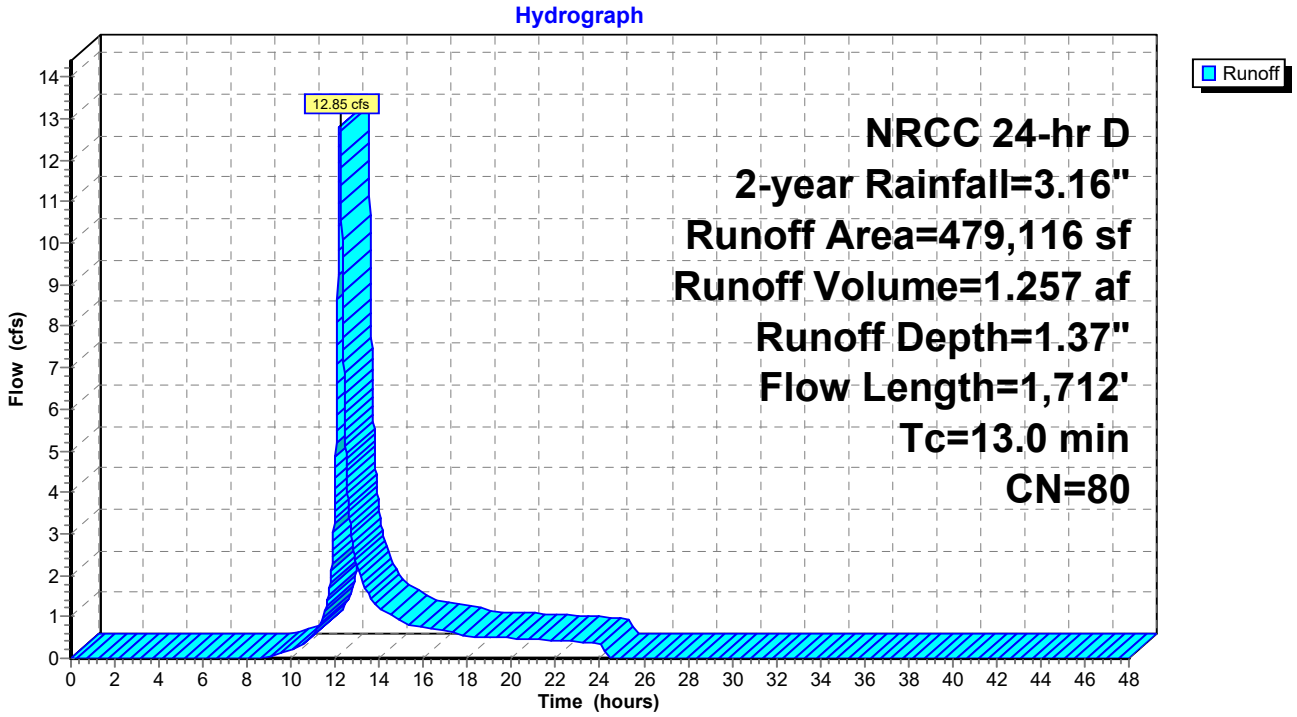
Runoff = 12.85 cfs @ 12.21 hrs, Volume= 1.257 af, Depth= 1.37"
Routed to Link EAP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-year Rainfall=3.16"

Area (sf)	CN	Description
247,300	79	1 acre lots, 20% imp, HSG C
129,102	73	Woods, Fair, HSG C
46,629	79	Woods, Fair, HSG D
50,194	98	Paved roads w/curbs & sewers, HSG C
5,891	98	Paved roads w/curbs & sewers, HSG D
479,116	80	Weighted Average
373,571		77.97% Pervious Area
105,545		22.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	100	0.1000	0.32		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
5.9	585	0.1094	1.65		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.9	167	0.0240	3.14		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.8	608	0.0444	13.11	16.09	**Pipe Channel, D-E** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
0.2	252	0.1071	26.20	487.30	**Channel Flow, E-F** Area= 18.6 sf Perim= 11.9' r= 1.56' n= 0.025 Earth, clean & winding
13.0	1,712	Total			

Subcatchment EDA-2: EDA-2

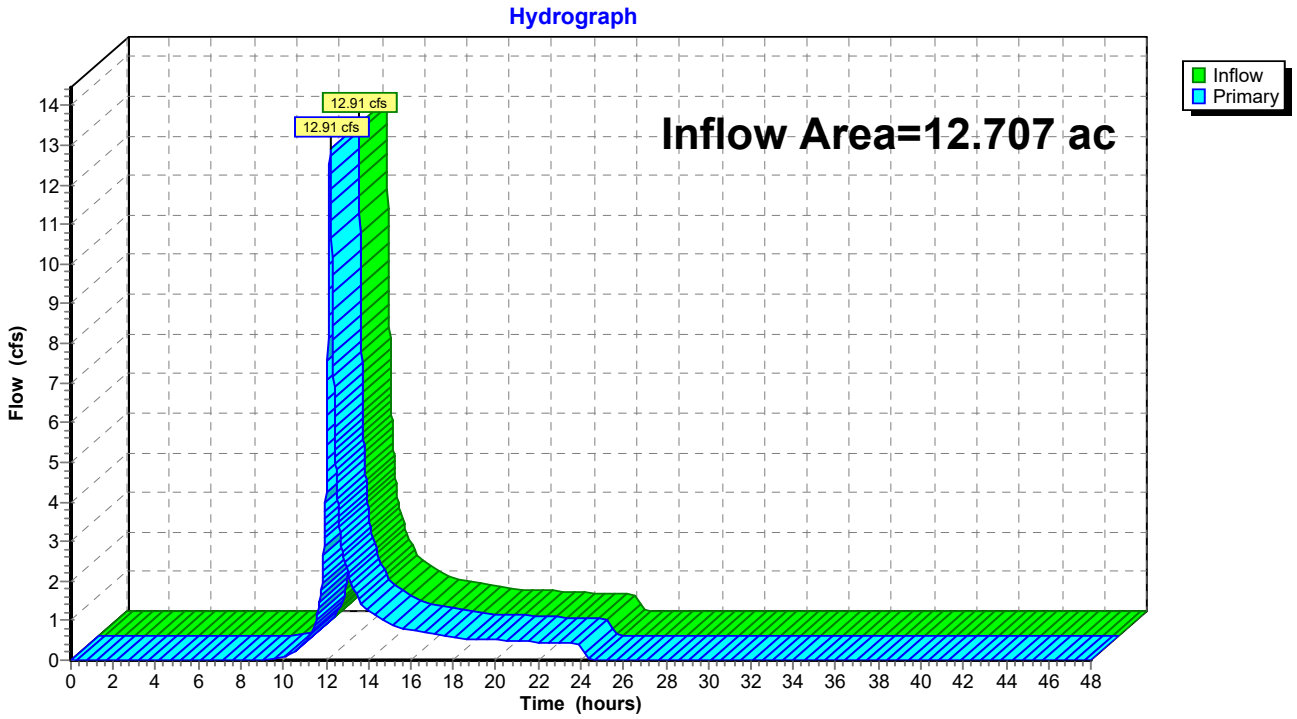


Summary for Link EAP-1: AP-1

Inflow Area = 12.707 ac, 4.56% Impervious, Inflow Depth = 1.18" for 2-year event
Inflow = 12.91 cfs @ 12.20 hrs, Volume= 1.253 af
Primary = 12.91 cfs @ 12.20 hrs, Volume= 1.253 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link EAP-1: AP-1

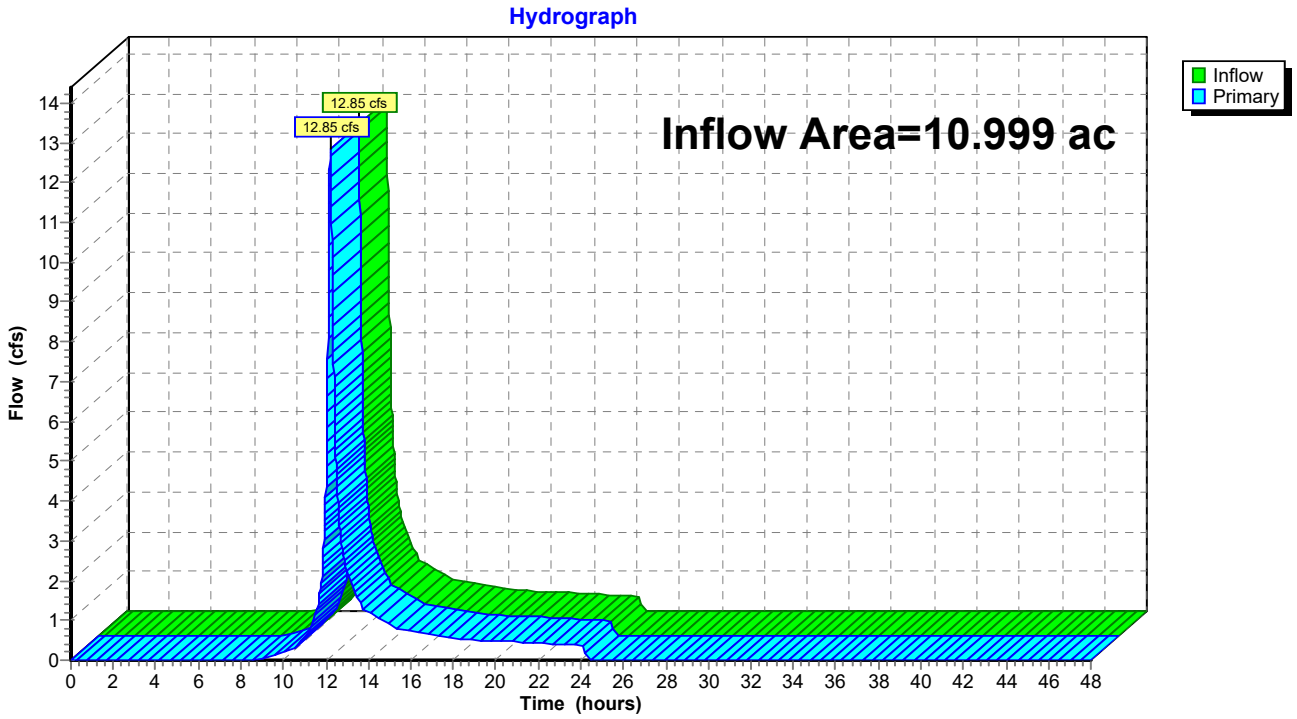


Summary for Link EAP-2: AP-2

Inflow Area = 10.999 ac, 22.03% Impervious, Inflow Depth = 1.37" for 2-year event
Inflow = 12.85 cfs @ 12.21 hrs, Volume= 1.257 af
Primary = 12.85 cfs @ 12.21 hrs, Volume= 1.257 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link EAP-2: AP-2



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EDA-1: EDA-1 Runoff Area=12.707 ac 4.56% Impervious Runoff Depth=2.55"
Flow Length=796' Tc=12.3 min CN=77 Runoff=28.42 cfs 2.698 af

Subcatchment EDA-2: EDA-2 Runoff Area=479,116 sf 22.03% Impervious Runoff Depth=2.81"
Flow Length=1,712' Tc=13.0 min CN=80 Runoff=26.55 cfs 2.580 af

Link EAP-1: AP-1 Inflow=28.42 cfs 2.698 af
Primary=28.42 cfs 2.698 af

Link EAP-2: AP-2 Inflow=26.55 cfs 2.580 af
Primary=26.55 cfs 2.580 af

Total Runoff Area = 23.706 ac Runoff Volume = 5.278 af Average Runoff Depth = 2.67"
87.33% Pervious = 20.703 ac 12.67% Impervious = 3.003 ac

Summary for Subcatchment EDA-1: EDA-1

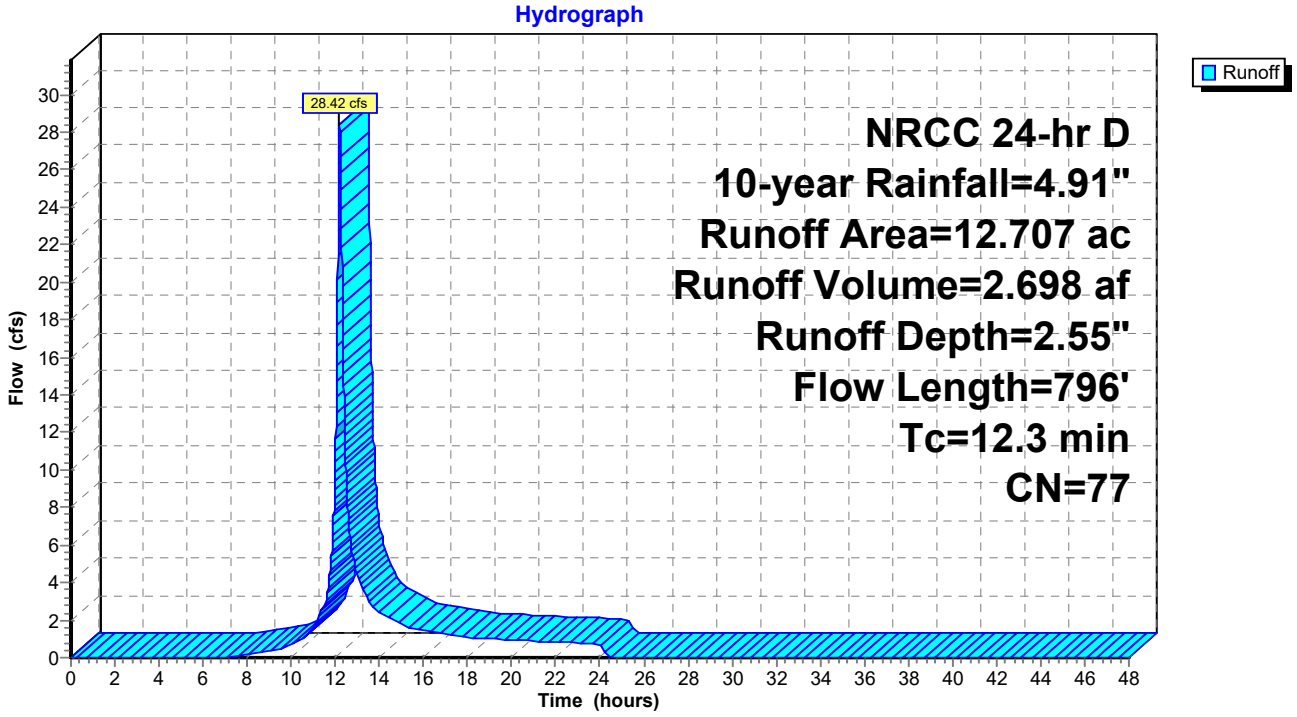
Runoff = 28.42 cfs @ 12.20 hrs, Volume= 2.698 af, Depth= 2.55"
Routed to Link EAP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-year Rainfall=4.91"

Area (ac)	CN	Description
2.898	79	1 acre lots, 20% imp, HSG C
5.274	73	Woods, Fair, HSG C
4.535	79	Woods, Fair, HSG D
12.707	77	Weighted Average
12.127		95.44% Pervious Area
0.580		4.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100	0.1100	0.33		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
1.1	128	0.0780	1.95		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
6.2	568	0.0933	1.53		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
12.3	796	Total			

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2: EDA-2

[47] Hint: Peak is 165% of capacity of segment #4

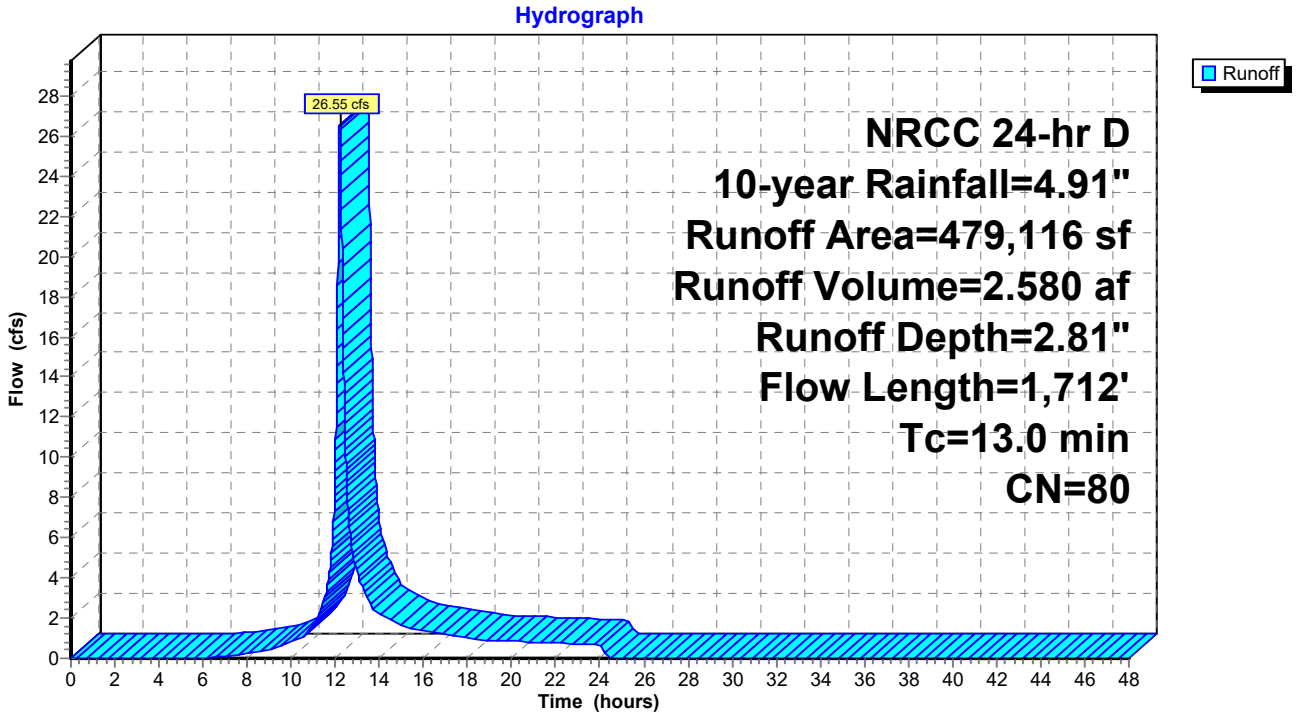
Runoff = 26.55 cfs @ 12.21 hrs, Volume= 2.580 af, Depth= 2.81"
Routed to Link EAP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-year Rainfall=4.91"

Area (sf)	CN	Description
247,300	79	1 acre lots, 20% imp, HSG C
129,102	73	Woods, Fair, HSG C
46,629	79	Woods, Fair, HSG D
50,194	98	Paved roads w/curbs & sewers, HSG C
5,891	98	Paved roads w/curbs & sewers, HSG D
479,116	80	Weighted Average
373,571		77.97% Pervious Area
105,545		22.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	100	0.1000	0.32		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
5.9	585	0.1094	1.65		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.9	167	0.0240	3.14		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.8	608	0.0444	13.11	16.09	**Pipe Channel, D-E** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
0.2	252	0.1071	26.20	487.30	**Channel Flow, E-F** Area= 18.6 sf Perim= 11.9' r= 1.56' n= 0.025 Earth, clean & winding
13.0	1,712	Total			

Subcatchment EDA-2: EDA-2

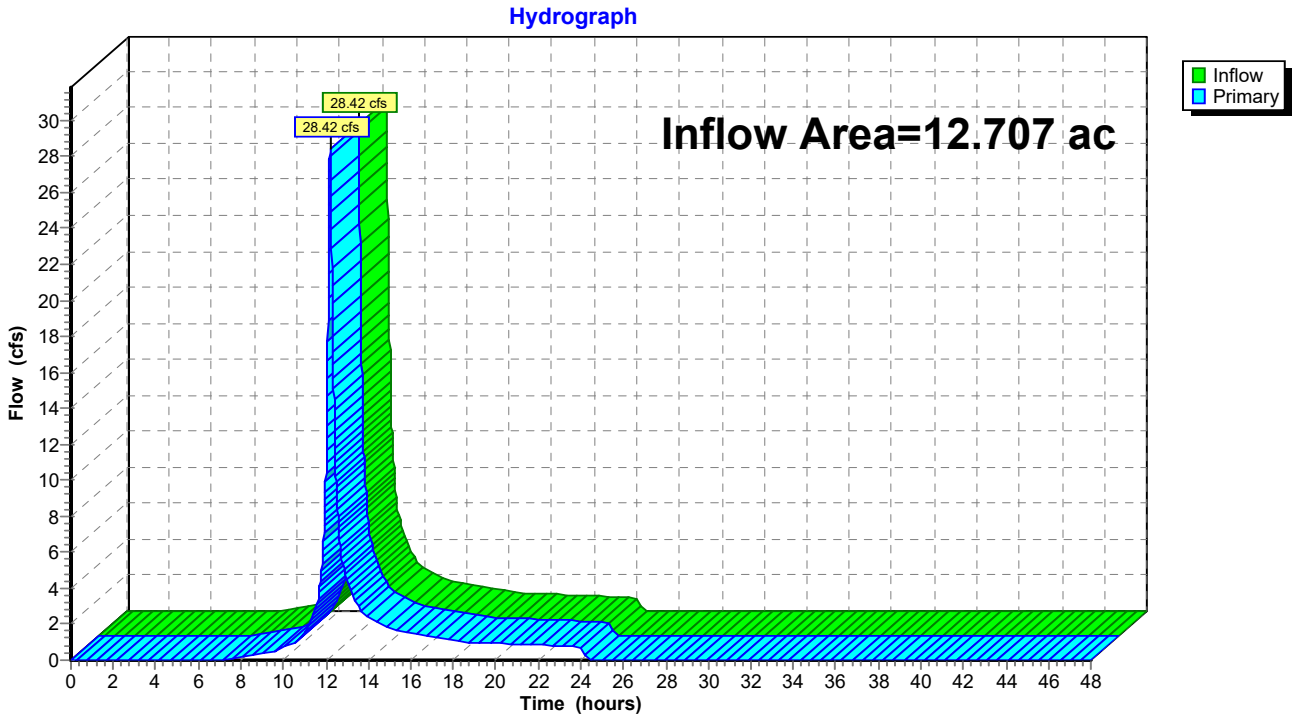


Summary for Link EAP-1: AP-1

Inflow Area = 12.707 ac, 4.56% Impervious, Inflow Depth = 2.55" for 10-year event
Inflow = 28.42 cfs @ 12.20 hrs, Volume= 2.698 af
Primary = 28.42 cfs @ 12.20 hrs, Volume= 2.698 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link EAP-1: AP-1

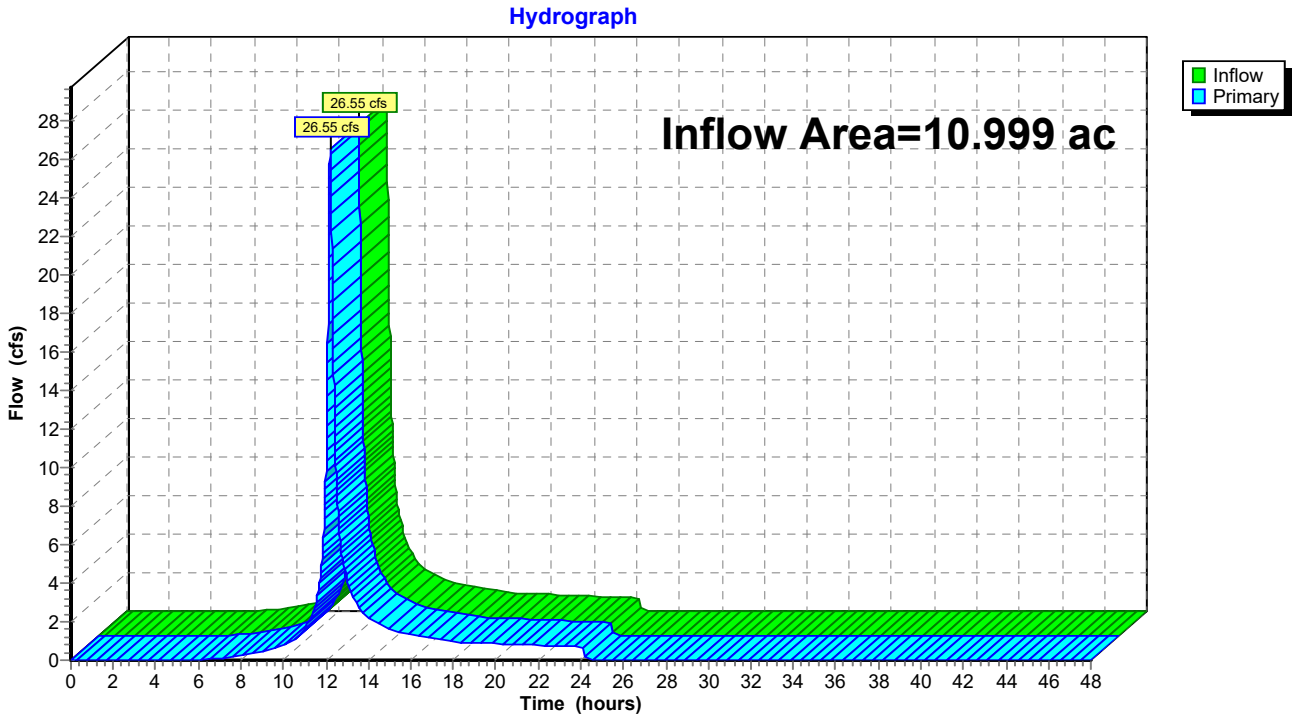


Summary for Link EAP-2: AP-2

Inflow Area = 10.999 ac, 22.03% Impervious, Inflow Depth = 2.81" for 10-year event
Inflow = 26.55 cfs @ 12.21 hrs, Volume= 2.580 af
Primary = 26.55 cfs @ 12.21 hrs, Volume= 2.580 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link EAP-2: AP-2



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EDA-1: EDA-1 Runoff Area=12.707 ac 4.56% Impervious Runoff Depth=3.48"
Flow Length=796' Tc=12.3 min CN=77 Runoff=38.73 cfs 3.684 af

Subcatchment EDA-2: EDA-2 Runoff Area=479,116 sf 22.03% Impervious Runoff Depth=3.78"
Flow Length=1,712' Tc=13.0 min CN=80 Runoff=35.47 cfs 3.466 af

Link EAP-1: AP-1 Inflow=38.73 cfs 3.684 af
Primary=38.73 cfs 3.684 af

Link EAP-2: AP-2 Inflow=35.47 cfs 3.466 af
Primary=35.47 cfs 3.466 af

Total Runoff Area = 23.706 ac Runoff Volume = 7.150 af Average Runoff Depth = 3.62"
87.33% Pervious = 20.703 ac 12.67% Impervious = 3.003 ac

Summary for Subcatchment EDA-1: EDA-1

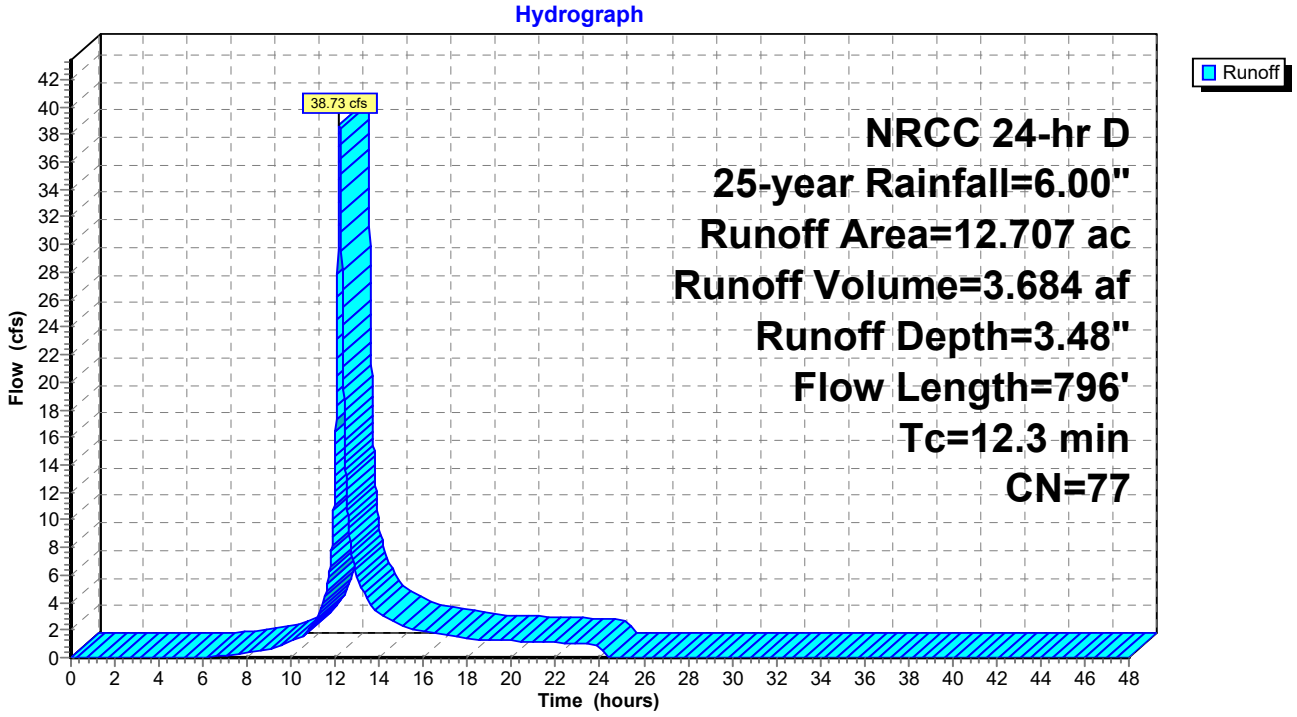
Runoff = 38.73 cfs @ 12.20 hrs, Volume= 3.684 af, Depth= 3.48"
Routed to Link EAP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 25-year Rainfall=6.00"

Area (ac)	CN	Description
2.898	79	1 acre lots, 20% imp, HSG C
5.274	73	Woods, Fair, HSG C
4.535	79	Woods, Fair, HSG D
12.707	77	Weighted Average
12.127		95.44% Pervious Area
0.580		4.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100	0.1100	0.33		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
1.1	128	0.0780	1.95		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
6.2	568	0.0933	1.53		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
12.3	796	Total			

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2: EDA-2

[47] Hint: Peak is 220% of capacity of segment #4

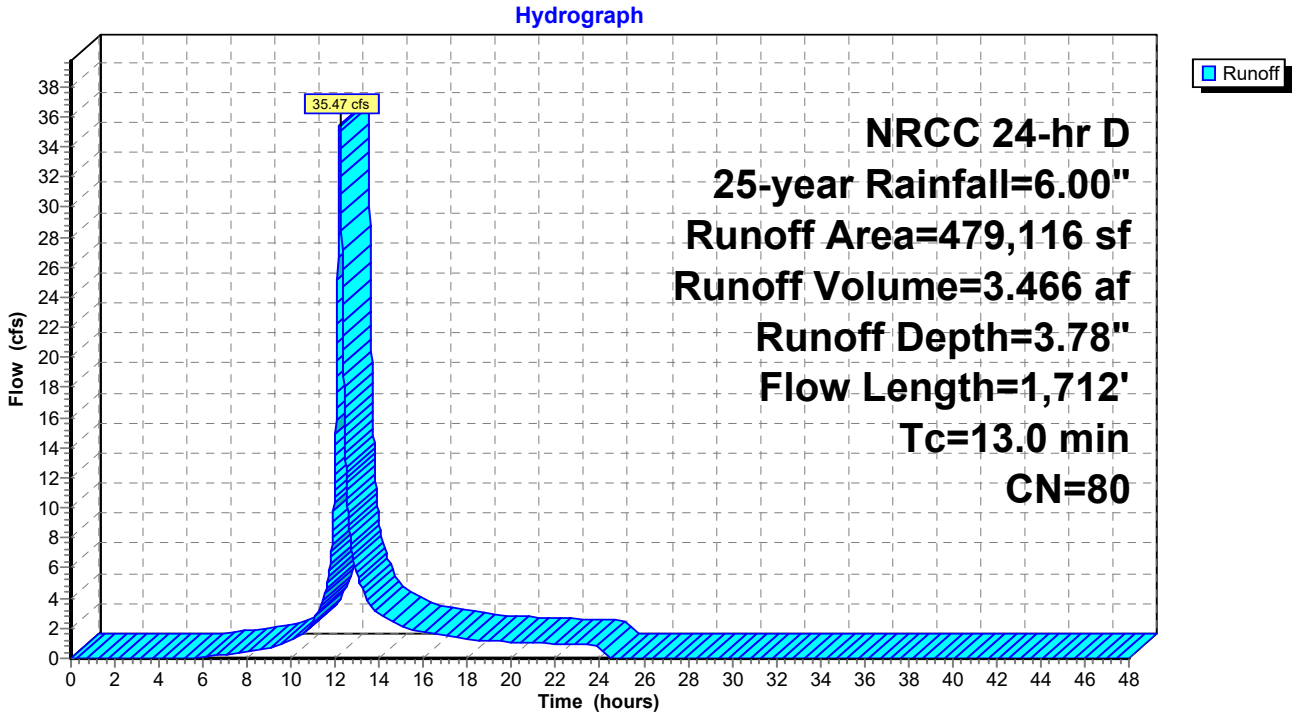
Runoff = 35.47 cfs @ 12.21 hrs, Volume= 3.466 af, Depth= 3.78"
Routed to Link EAP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 25-year Rainfall=6.00"

Area (sf)	CN	Description
247,300	79	1 acre lots, 20% imp, HSG C
129,102	73	Woods, Fair, HSG C
46,629	79	Woods, Fair, HSG D
50,194	98	Paved roads w/curbs & sewers, HSG C
5,891	98	Paved roads w/curbs & sewers, HSG D
479,116	80	Weighted Average
373,571		77.97% Pervious Area
105,545		22.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	100	0.1000	0.32		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
5.9	585	0.1094	1.65		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.9	167	0.0240	3.14		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.8	608	0.0444	13.11	16.09	**Pipe Channel, D-E** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
0.2	252	0.1071	26.20	487.30	**Channel Flow, E-F** Area= 18.6 sf Perim= 11.9' r= 1.56' n= 0.025 Earth, clean & winding
13.0	1,712	Total			

Subcatchment EDA-2: EDA-2

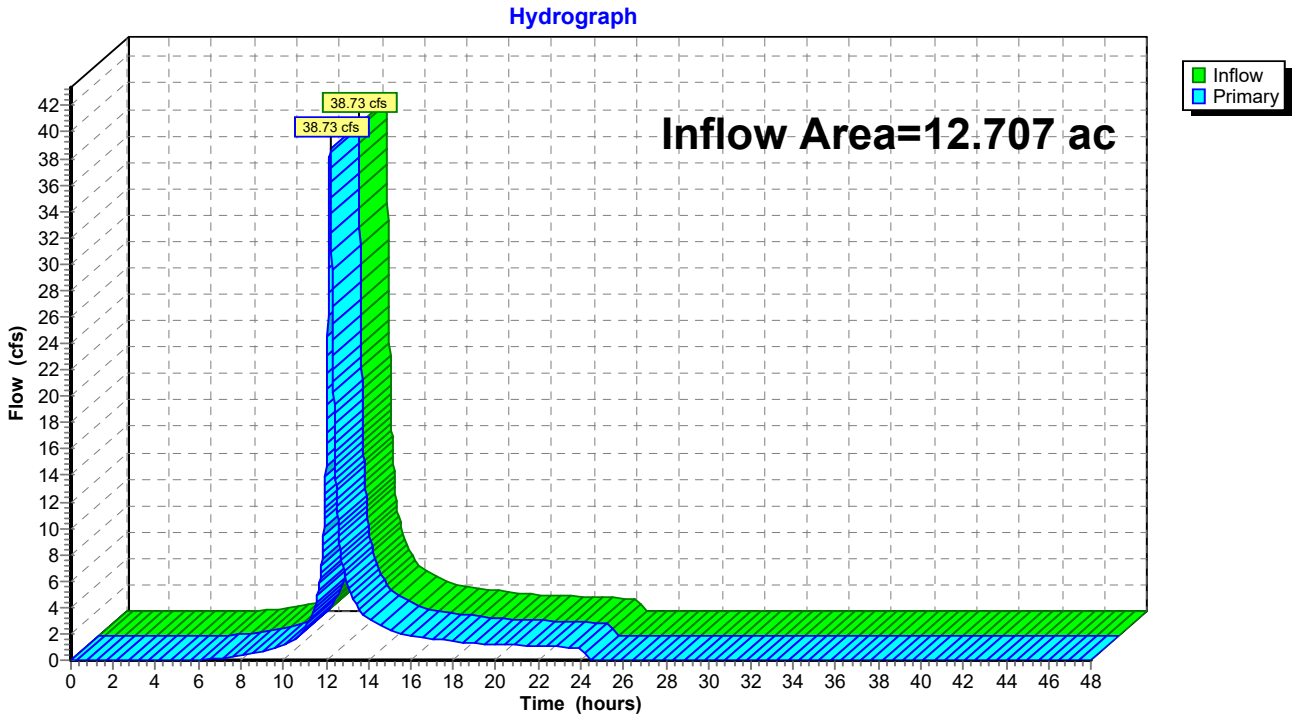


Summary for Link EAP-1: AP-1

Inflow Area = 12.707 ac, 4.56% Impervious, Inflow Depth = 3.48" for 25-year event
Inflow = 38.73 cfs @ 12.20 hrs, Volume= 3.684 af
Primary = 38.73 cfs @ 12.20 hrs, Volume= 3.684 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link EAP-1: AP-1

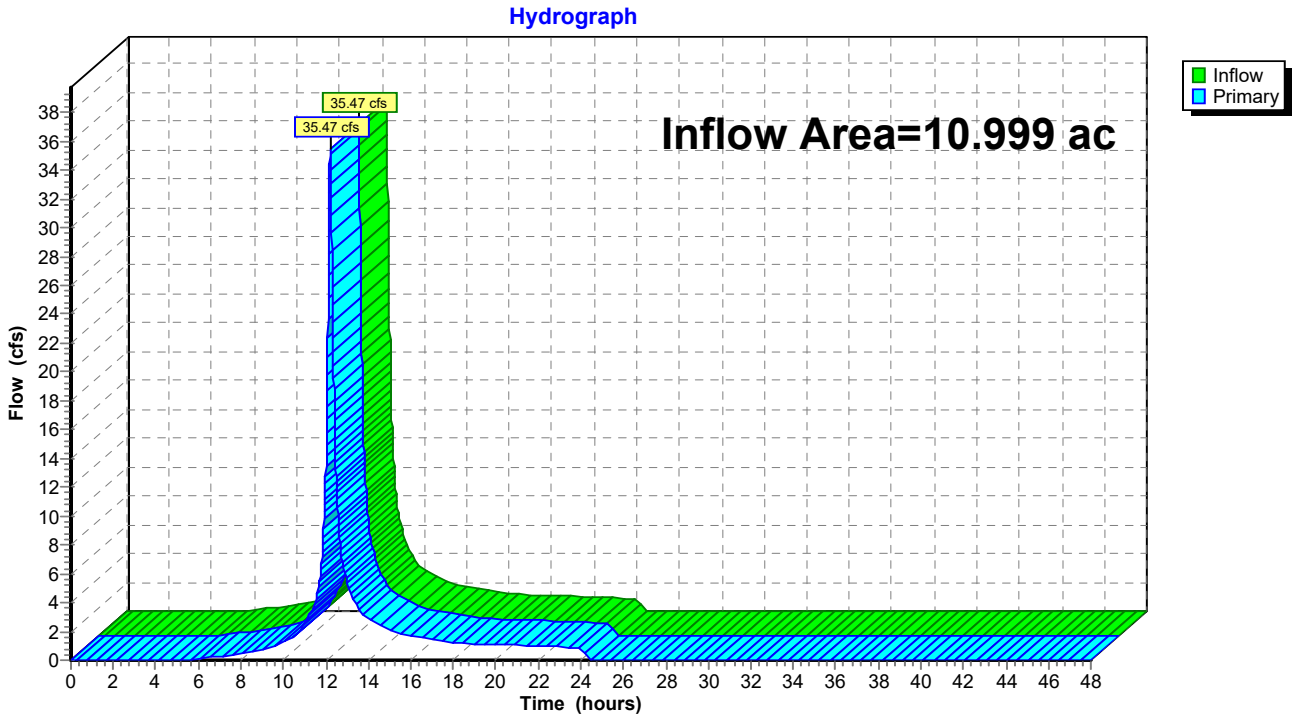


Summary for Link EAP-2: AP-2

Inflow Area = 10.999 ac, 22.03% Impervious, Inflow Depth = 3.78" for 25-year event
Inflow = 35.47 cfs @ 12.21 hrs, Volume= 3.466 af
Primary = 35.47 cfs @ 12.21 hrs, Volume= 3.466 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link EAP-2: AP-2



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EDA-1: EDA-1 Runoff Area=12.707 ac 4.56% Impervious Runoff Depth=4.20"
Flow Length=796' Tc=12.3 min CN=77 Runoff=46.54 cfs 4.443 af

Subcatchment EDA-2: EDA-2 Runoff Area=479,116 sf 22.03% Impervious Runoff Depth=4.52"
Flow Length=1,712' Tc=13.0 min CN=80 Runoff=42.16 cfs 4.142 af

Link EAP-1: AP-1 Inflow=46.54 cfs 4.443 af
Primary=46.54 cfs 4.443 af

Link EAP-2: AP-2 Inflow=42.16 cfs 4.142 af
Primary=42.16 cfs 4.142 af

Total Runoff Area = 23.706 ac Runoff Volume = 8.585 af Average Runoff Depth = 4.35"
87.33% Pervious = 20.703 ac 12.67% Impervious = 3.003 ac

Summary for Subcatchment EDA-1: EDA-1

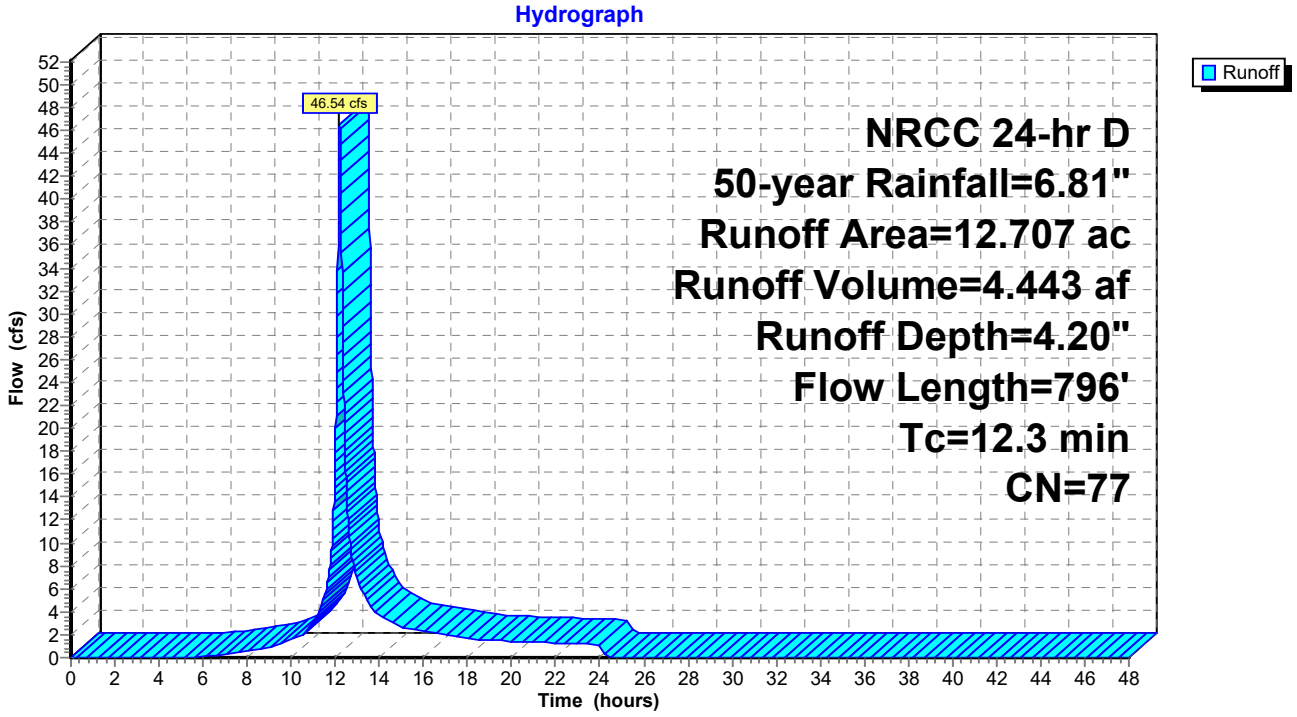
Runoff = 46.54 cfs @ 12.20 hrs, Volume= 4.443 af, Depth= 4.20"
Routed to Link EAP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 50-year Rainfall=6.81"

Area (ac)	CN	Description
2.898	79	1 acre lots, 20% imp, HSG C
5.274	73	Woods, Fair, HSG C
4.535	79	Woods, Fair, HSG D
12.707	77	Weighted Average
12.127		95.44% Pervious Area
0.580		4.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100	0.1100	0.33		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
1.1	128	0.0780	1.95		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
6.2	568	0.0933	1.53		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
12.3	796	Total			

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2: EDA-2

[47] Hint: Peak is 262% of capacity of segment #4

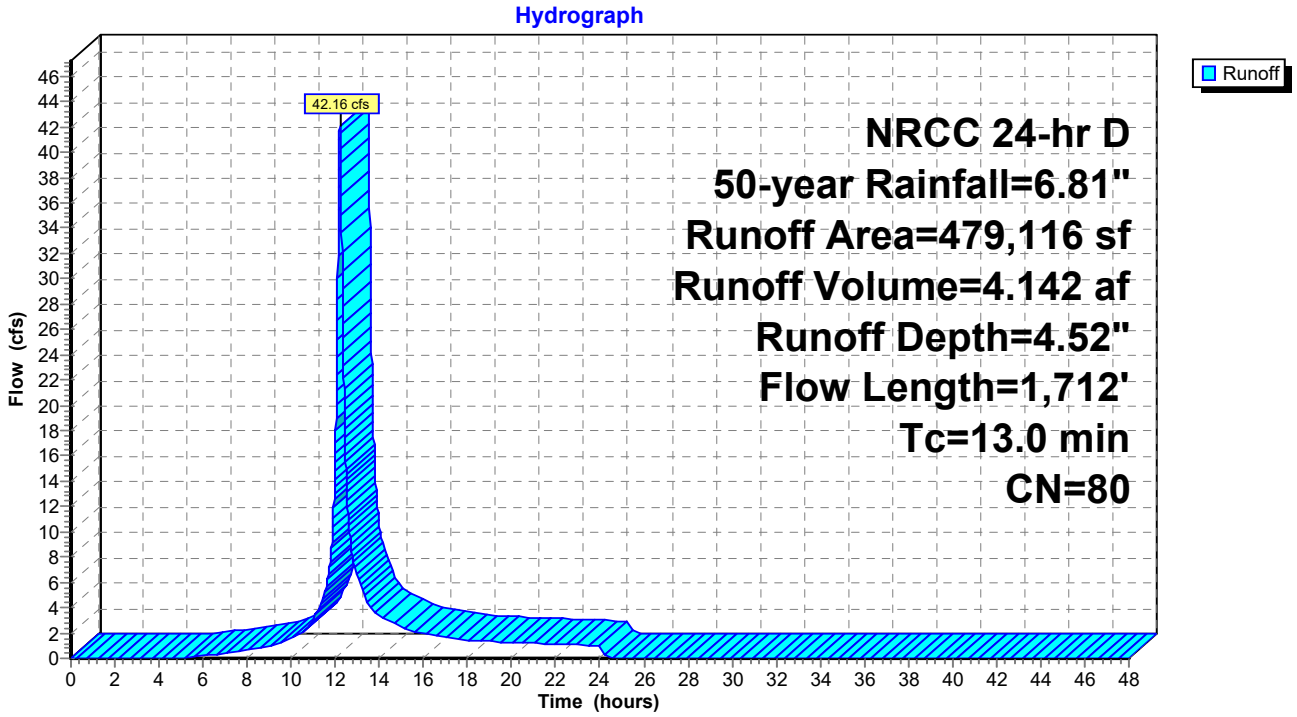
Runoff = 42.16 cfs @ 12.21 hrs, Volume= 4.142 af, Depth= 4.52"
Routed to Link EAP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 50-year Rainfall=6.81"

Area (sf)	CN	Description
247,300	79	1 acre lots, 20% imp, HSG C
129,102	73	Woods, Fair, HSG C
46,629	79	Woods, Fair, HSG D
50,194	98	Paved roads w/curbs & sewers, HSG C
5,891	98	Paved roads w/curbs & sewers, HSG D
479,116	80	Weighted Average
373,571		77.97% Pervious Area
105,545		22.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	100	0.1000	0.32		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
5.9	585	0.1094	1.65		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.9	167	0.0240	3.14		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.8	608	0.0444	13.11	16.09	**Pipe Channel, D-E** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
0.2	252	0.1071	26.20	487.30	**Channel Flow, E-F** Area= 18.6 sf Perim= 11.9' r= 1.56' n= 0.025 Earth, clean & winding
13.0	1,712	Total			

Subcatchment EDA-2: EDA-2

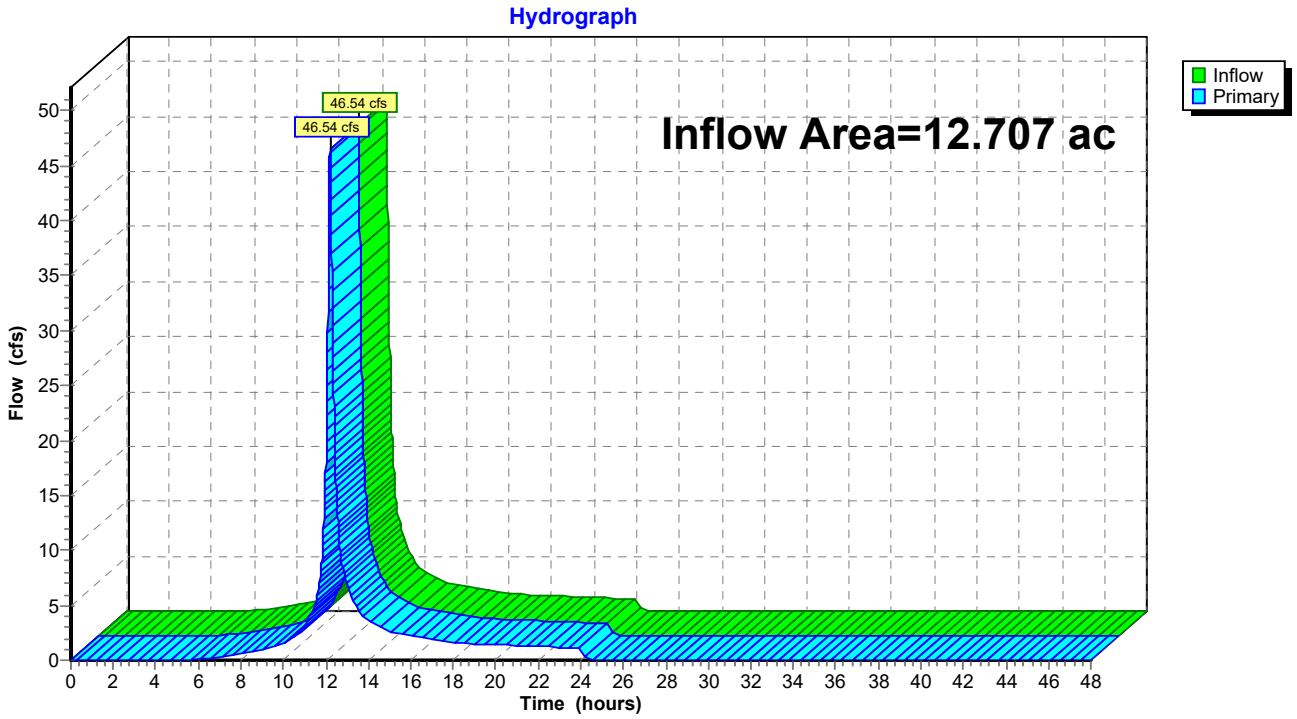


Summary for Link EAP-1: AP-1

Inflow Area = 12.707 ac, 4.56% Impervious, Inflow Depth = 4.20" for 50-year event
Inflow = 46.54 cfs @ 12.20 hrs, Volume= 4.443 af
Primary = 46.54 cfs @ 12.20 hrs, Volume= 4.443 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link EAP-1: AP-1

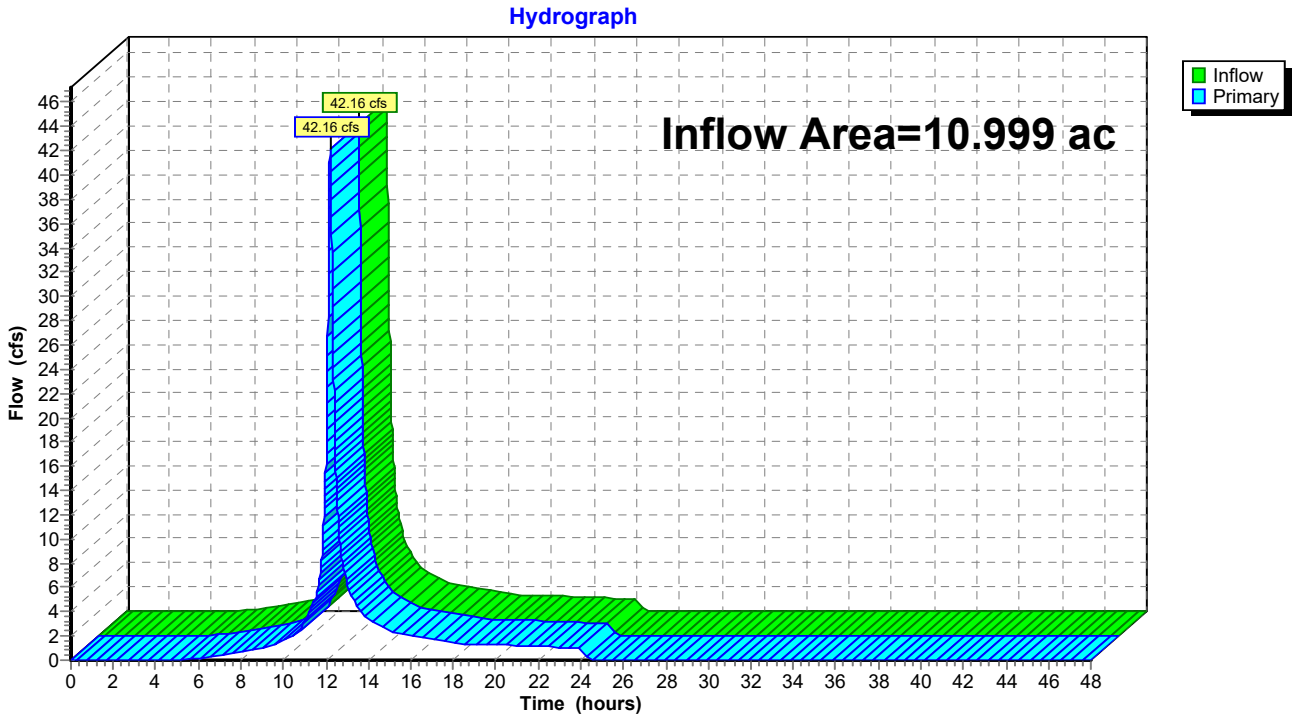


Summary for Link EAP-2: AP-2

Inflow Area = 10.999 ac, 22.03% Impervious, Inflow Depth = 4.52" for 50-year event
Inflow = 42.16 cfs @ 12.21 hrs, Volume= 4.142 af
Primary = 42.16 cfs @ 12.21 hrs, Volume= 4.142 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link EAP-2: AP-2



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EDA-1: EDA-1 Runoff Area=12.707 ac 4.56% Impervious Runoff Depth=4.99"
Flow Length=796' Tc=12.3 min CN=77 Runoff=55.09 cfs 5.285 af

Subcatchment EDA-2: EDA-2 Runoff Area=479,116 sf 22.03% Impervious Runoff Depth=5.33"
Flow Length=1,712' Tc=13.0 min CN=80 Runoff=49.46 cfs 4.890 af

Link EAP-1: AP-1 Inflow=55.09 cfs 5.285 af
Primary=55.09 cfs 5.285 af

Link EAP-2: AP-2 Inflow=49.46 cfs 4.890 af
Primary=49.46 cfs 4.890 af

Total Runoff Area = 23.706 ac Runoff Volume = 10.175 af Average Runoff Depth = 5.15"
87.33% Pervious = 20.703 ac 12.67% Impervious = 3.003 ac

Summary for Subcatchment EDA-1: EDA-1

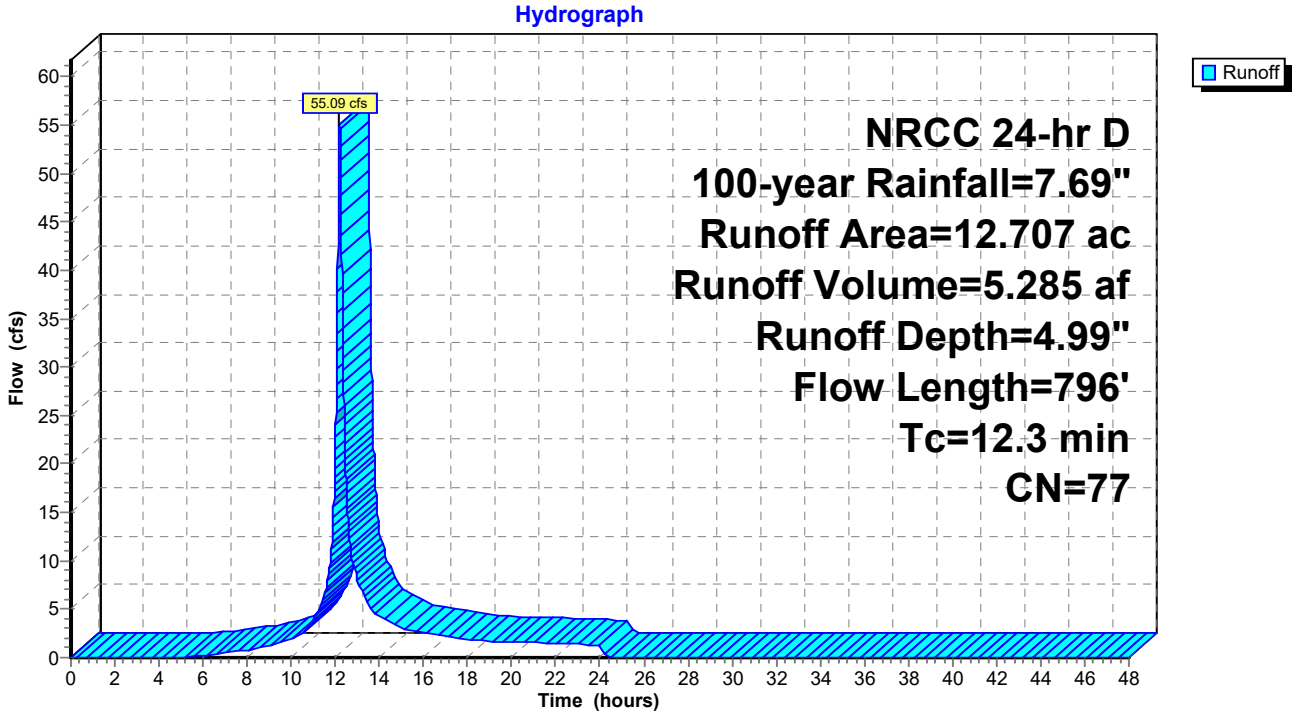
Runoff = 55.09 cfs @ 12.20 hrs, Volume= 5.285 af, Depth= 4.99"
Routed to Link EAP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-year Rainfall=7.69"

Area (ac)	CN	Description
2.898	79	1 acre lots, 20% imp, HSG C
5.274	73	Woods, Fair, HSG C
4.535	79	Woods, Fair, HSG D
12.707	77	Weighted Average
12.127		95.44% Pervious Area
0.580		4.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100	0.1100	0.33		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
1.1	128	0.0780	1.95		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
6.2	568	0.0933	1.53		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
12.3	796	Total			

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2: EDA-2

[47] Hint: Peak is 307% of capacity of segment #4

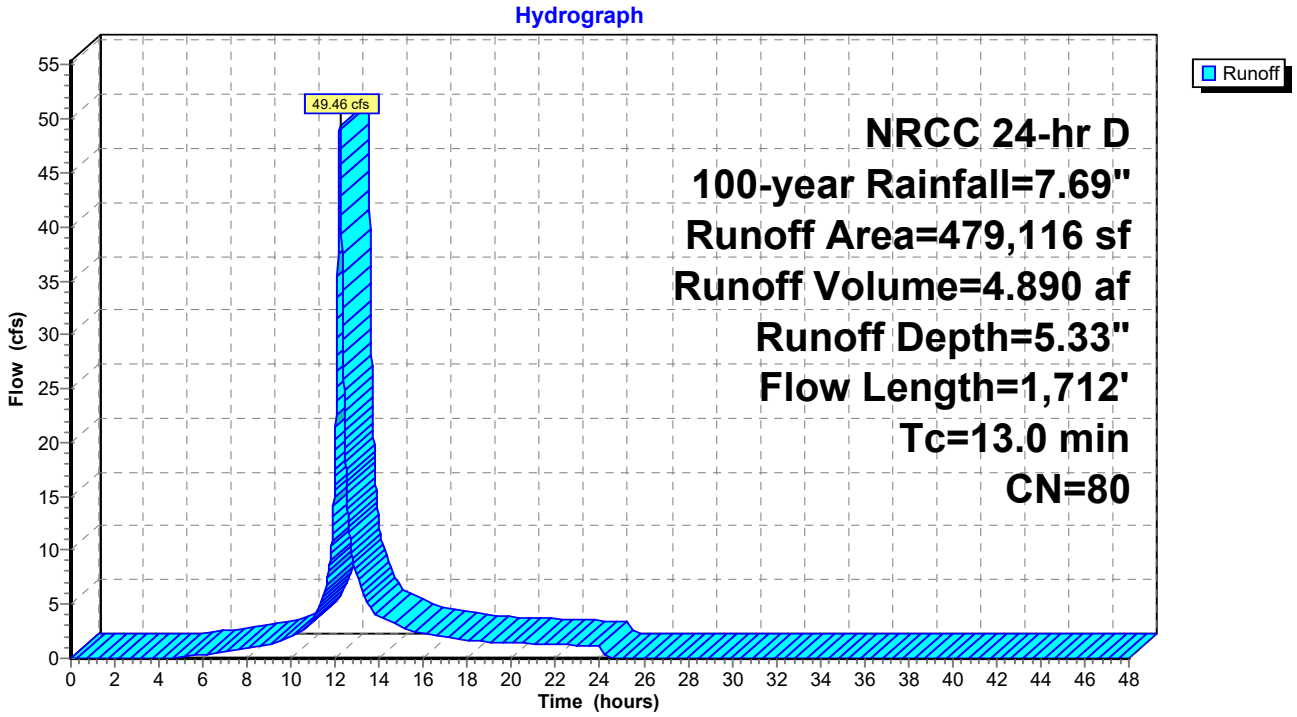
Runoff = 49.46 cfs @ 12.21 hrs, Volume= 4.890 af, Depth= 5.33"
Routed to Link EAP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-year Rainfall=7.69"

Area (sf)	CN	Description
247,300	79	1 acre lots, 20% imp, HSG C
129,102	73	Woods, Fair, HSG C
46,629	79	Woods, Fair, HSG D
50,194	98	Paved roads w/curbs & sewers, HSG C
5,891	98	Paved roads w/curbs & sewers, HSG D
479,116	80	Weighted Average
373,571		77.97% Pervious Area
105,545		22.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	100	0.1000	0.32		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
5.9	585	0.1094	1.65		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.9	167	0.0240	3.14		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.8	608	0.0444	13.11	16.09	**Pipe Channel, D-E** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
0.2	252	0.1071	26.20	487.30	**Channel Flow, E-F** Area= 18.6 sf Perim= 11.9' r= 1.56' n= 0.025 Earth, clean & winding
13.0	1,712	Total			

Subcatchment EDA-2: EDA-2

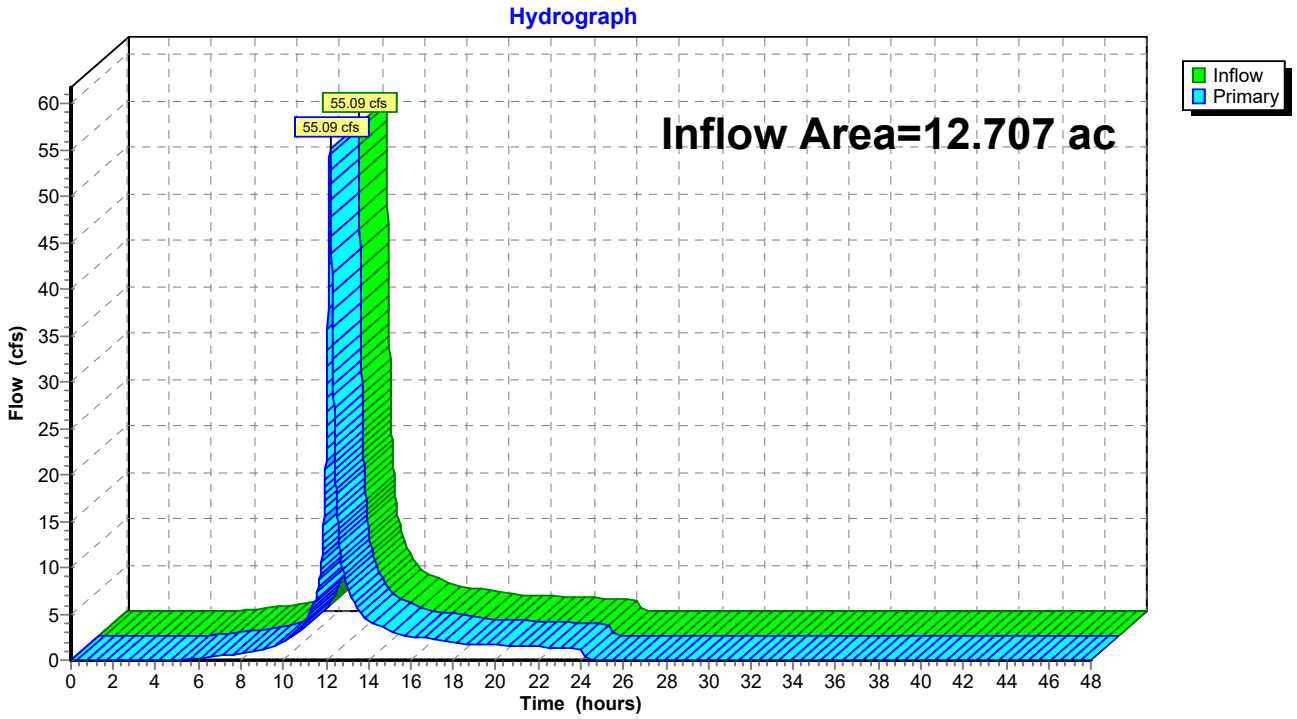


Summary for Link EAP-1: AP-1

Inflow Area = 12.707 ac, 4.56% Impervious, Inflow Depth = 4.99" for 100-year event
Inflow = 55.09 cfs @ 12.20 hrs, Volume= 5.285 af
Primary = 55.09 cfs @ 12.20 hrs, Volume= 5.285 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link EAP-1: AP-1

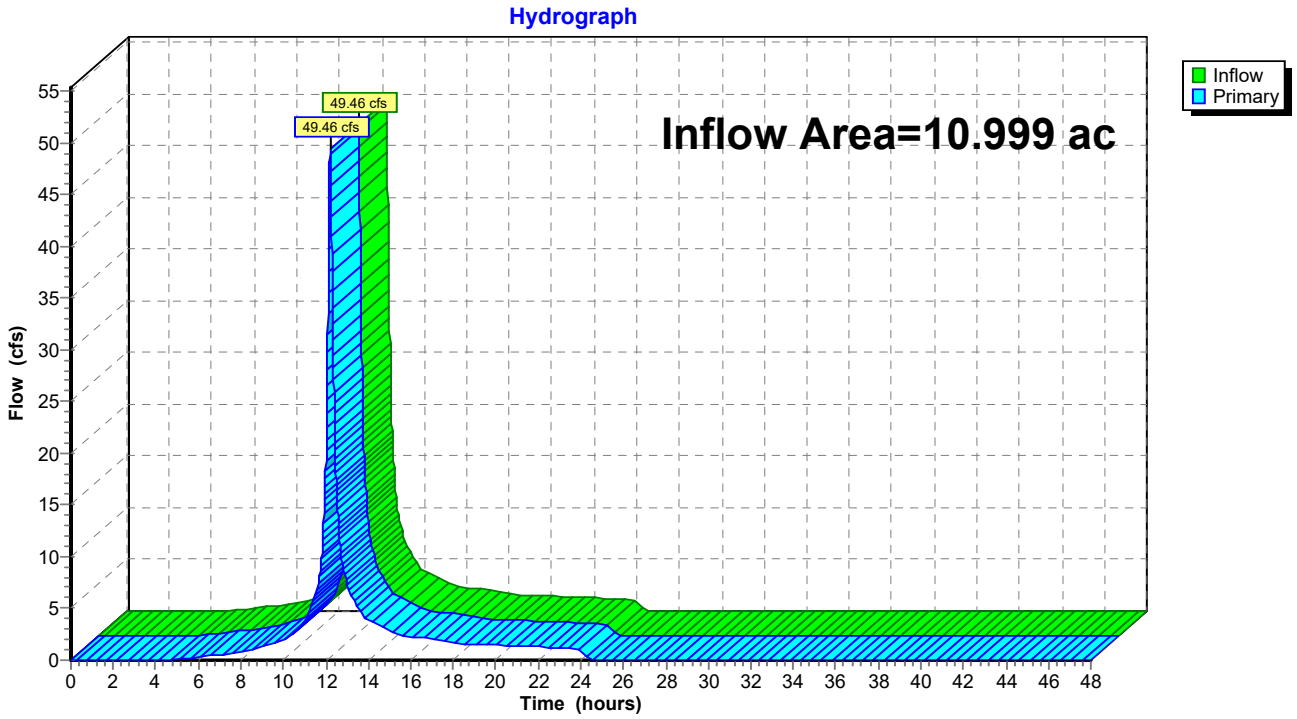


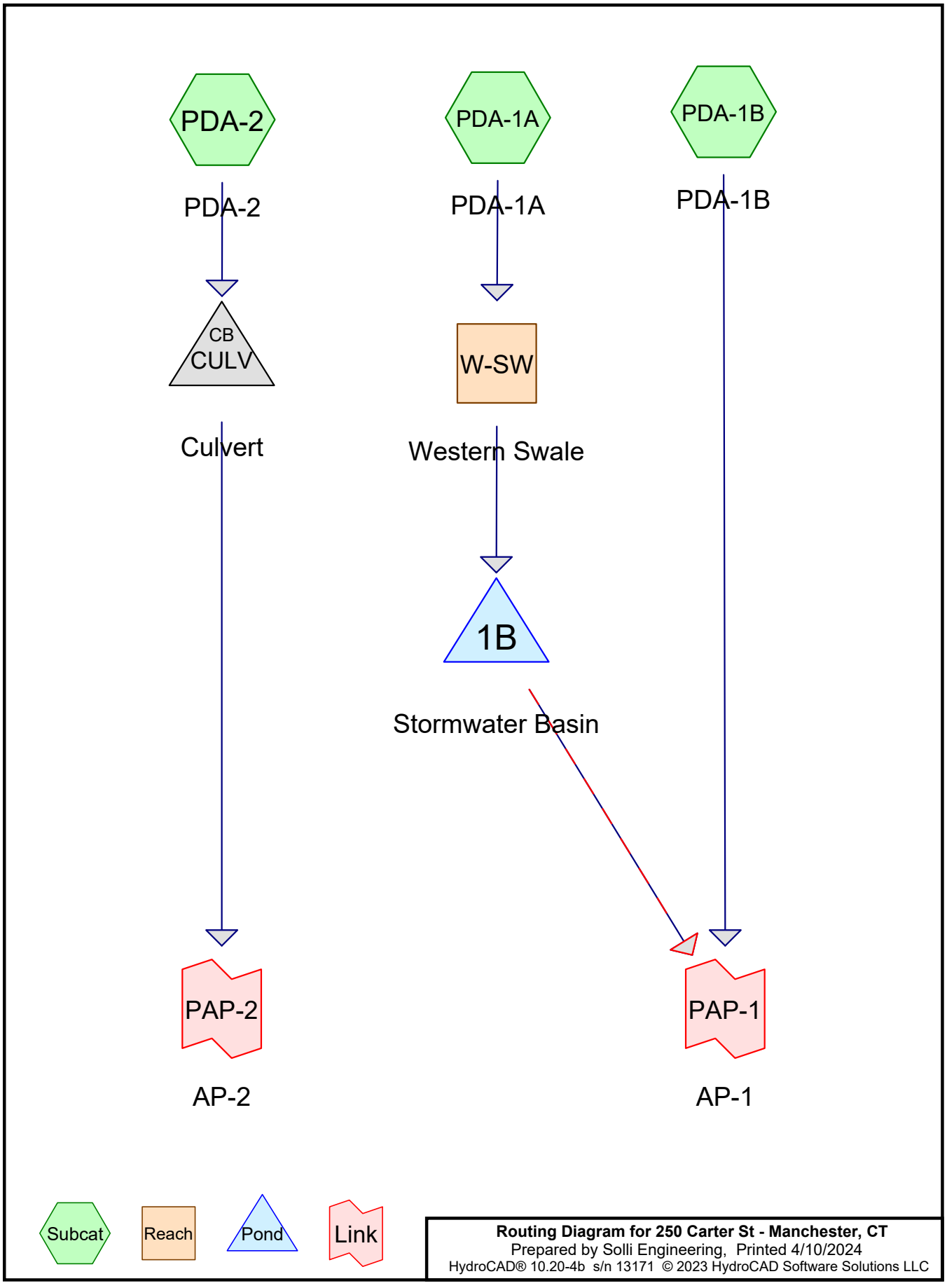
Summary for Link EAP-2: AP-2

Inflow Area = 10.999 ac, 22.03% Impervious, Inflow Depth = 5.33" for 100-year event
Inflow = 49.46 cfs @ 12.21 hrs, Volume= 4.890 af
Primary = 49.46 cfs @ 12.21 hrs, Volume= 4.890 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link EAP-2: AP-2





Routing Diagram for 250 Carter St - Manchester, CT
Prepared by Solli Engineering, Printed 4/10/2024

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year	NRCC 24-hr	D	Default	24.00	1	3.16	2
2	10-year	NRCC 24-hr	D	Default	24.00	1	4.91	2
3	25-year	NRCC 24-hr	D	Default	24.00	1	6.00	2
4	50-year	NRCC 24-hr	D	Default	24.00	1	6.81	2
5	100-year	NRCC 24-hr	D	Default	24.00	1	7.69	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
8.576	79	1 acre lots, 20% imp, HSG C (PDA-1A, PDA-1B, PDA-2)
0.127	96	Gravel surface, HSG D (PDA-1A)
1.556	71	Meadow, non-grazed, HSG C (PDA-1A)
0.565	75	Meadow, non-grazed, HSG C/D (PDA-1B)
4.665	78	Meadow, non-grazed, HSG D (PDA-1A, PDA-1B)
0.041	98	Paved parking, HSG D (PDA-1A)
1.152	98	Paved roads w/curbs & sewers, HSG C (PDA-2)
0.135	98	Paved roads w/curbs & sewers, HSG D (PDA-2)
4.437	73	Woods, Fair, HSG C (PDA-1A, PDA-1B, PDA-2)
2.451	79	Woods, Fair, HSG D (PDA-1A, PDA-1B, PDA-2)
23.705	**78**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
16.286	HSG C	PDA-1A, PDA-1B, PDA-2
7.419	HSG D	PDA-1A, PDA-1B, PDA-2
0.000	Other	
23.705		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	8.576	0.000	0.000	8.576	1 acre lots, 20% imp	PD A-1 A, PD A-1 B, PD A-2
0.000	0.000	0.000	0.127	0.000	0.127	Gravel surface	PD A-1 A
0.000	0.000	2.121	4.665	0.000	6.786	Meadow, non-grazed	PD A-1 A, PD A-1 B
0.000	0.000	0.000	0.041	0.000	0.041	Paved parking	PD A-1 A
0.000	0.000	1.152	0.135	0.000	1.287	Paved roads w/curbs & sewers	PD A-2
0.000	0.000	4.437	2.451	0.000	6.888	Woods, Fair	PD A-1 A, PD A-1 B, PD A-2
0.000	**0.000**	**16.286**	**7.419**	**0.000**	**23.705**	**TOTAL AREA**	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	PDA-2	0.00	0.00	608.0	0.0444	0.011	0.0	15.0	0.0	
2	1B	608.00	606.00	55.0	0.0364	0.013	0.0	24.0	0.0	
3	CULV	637.00	633.00	40.0	0.1000	0.013	0.0	42.0	12.0	

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PDA-1A: PDA-1A Runoff Area=10.448 ac 4.72% Impervious Runoff Depth=1.18"
Flow Length=938' Tc=12.0 min CN=77 Runoff=10.75 cfs 1.030 af

Subcatchment PDA-1B: PDA-1B Runoff Area=2.259 ac 5.66% Impervious Runoff Depth=1.18"
Flow Length=779' Tc=11.5 min CN=77 Runoff=2.35 cfs 0.223 af

Subcatchment PDA-2: PDA-2 Runoff Area=10.998 ac 22.03% Impervious Runoff Depth=1.37"
Flow Length=1,712' Tc=13.0 min CN=80 Runoff=12.85 cfs 1.257 af

Reach W-SW: Western Swale Avg. Flow Depth=0.50' Max Vel=3.52 fps Inflow=10.75 cfs 1.030 af
n=0.030 L=316.0' S=0.0190 '/' Capacity=182.01 cfs Outflow=10.57 cfs 1.030 af

Pond 1B: Stormwater Basin Peak Elev=611.97' Storage=13,727 cf Inflow=10.57 cfs 1.030 af
Primary=3.39 cfs 0.923 af Secondary=0.00 cfs 0.000 af Outflow=3.39 cfs 0.923 af

Pond CULV: Culvert Peak Elev=639.12' Inflow=12.85 cfs 1.257 af
42.0" Round Culvert w/ 12.0" inside fill n=0.013 L=40.0' S=0.1000 '/' Outflow=12.85 cfs 1.257 af

Link PAP-1: AP-1 Inflow=4.09 cfs 1.146 af
Primary=4.09 cfs 1.146 af

Link PAP-2: AP-2 Inflow=12.85 cfs 1.257 af
Primary=12.85 cfs 1.257 af

Total Runoff Area = 23.705 ac Runoff Volume = 2.510 af Average Runoff Depth = 1.27"
87.16% Pervious = 20.662 ac 12.84% Impervious = 3.043 ac

Summary for Subcatchment PDA-1A: PDA-1A

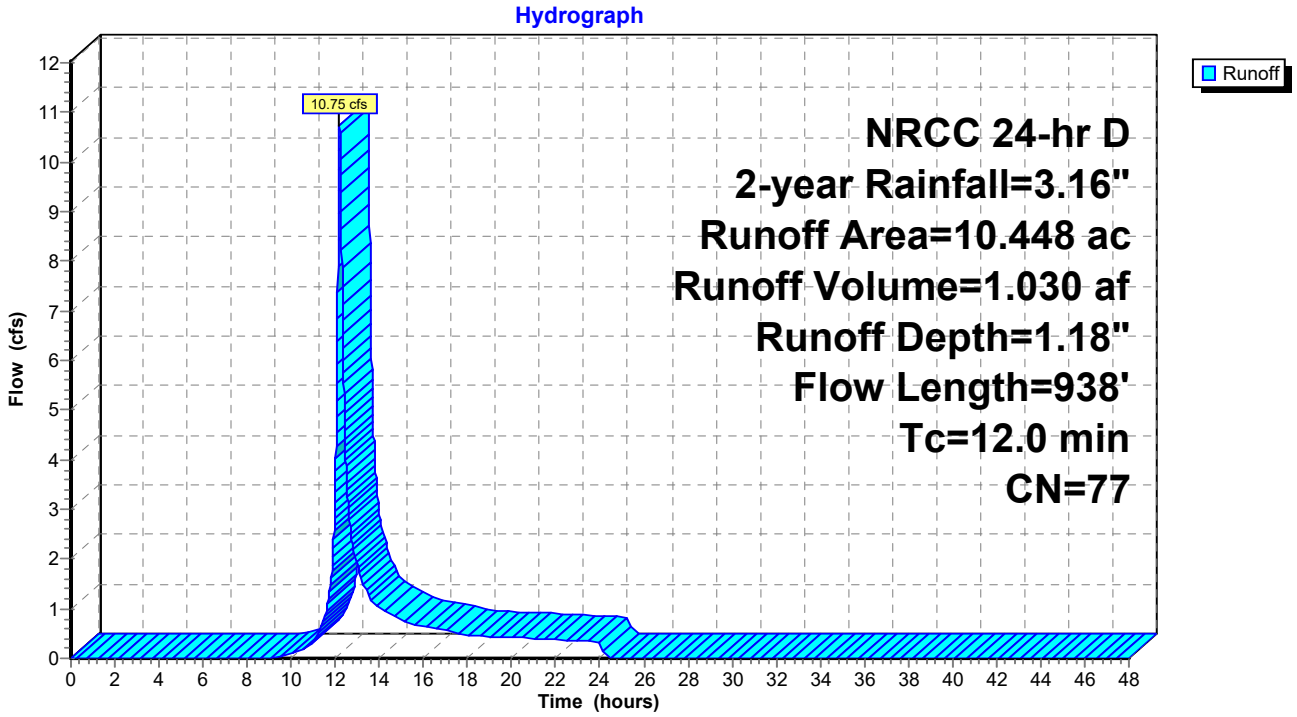
Runoff = 10.75 cfs @ 12.20 hrs, Volume= 1.030 af, Depth= 1.18"
Routed to Reach W-SW : Western Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-year Rainfall=3.16"

Area (ac)	CN	Description
2.260	79	1 acre lots, 20% imp, HSG C
1.245	73	Woods, Fair, HSG C
1.303	79	Woods, Fair, HSG D
1.556	71	Meadow, non-grazed, HSG C
3.916	78	Meadow, non-grazed, HSG D
0.127	96	Gravel surface, HSG D
0.041	98	Paved parking, HSG D
10.448	77	Weighted Average
9.955		95.28% Pervious Area
0.493		4.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100	0.1100	0.33		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
1.1	131	0.0780	1.95		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.7	65	0.1091	1.65		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
3.4	422	0.0899	2.10		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
1.8	220	0.0190	2.07		**Shallow Concentrated Flow, E-F** Grassed Waterway Kv= 15.0 fps
12.0	938	Total			

Subcatchment PDA-1A: PDA-1A



Summary for Subcatchment PDA-1B: PDA-1B

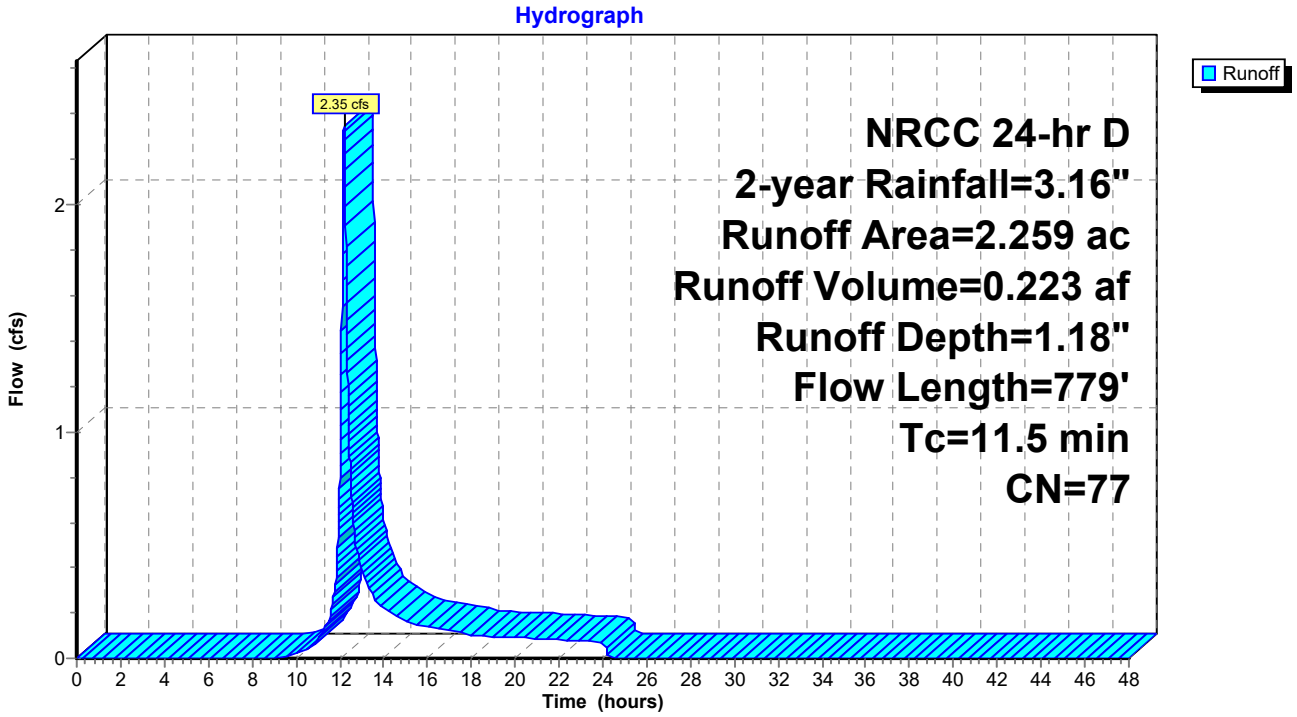
Runoff = 2.35 cfs @ 12.20 hrs, Volume= 0.223 af, Depth= 1.18"
Routed to Link PAP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-year Rainfall=3.16"

	Area (ac)	CN	Description
	0.639	79	1 acre lots, 20% imp, HSG C
	0.228	73	Woods, Fair, HSG C
	0.078	79	Woods, Fair, HSG D
*	0.565	75	Meadow, non-grazed, HSG C/D
	0.749	78	Meadow, non-grazed, HSG D
	2.259	77	Weighted Average
	2.131		94.34% Pervious Area
	0.128		5.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	100	0.1300	0.36		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
0.7	102	0.1078	2.30		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.0	96	0.0937	1.53		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
5.1	481	0.0986	1.57		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
11.5	779	Total			

Subcatchment PDA-1B: PDA-1B



Summary for Subcatchment PDA-2: PDA-2

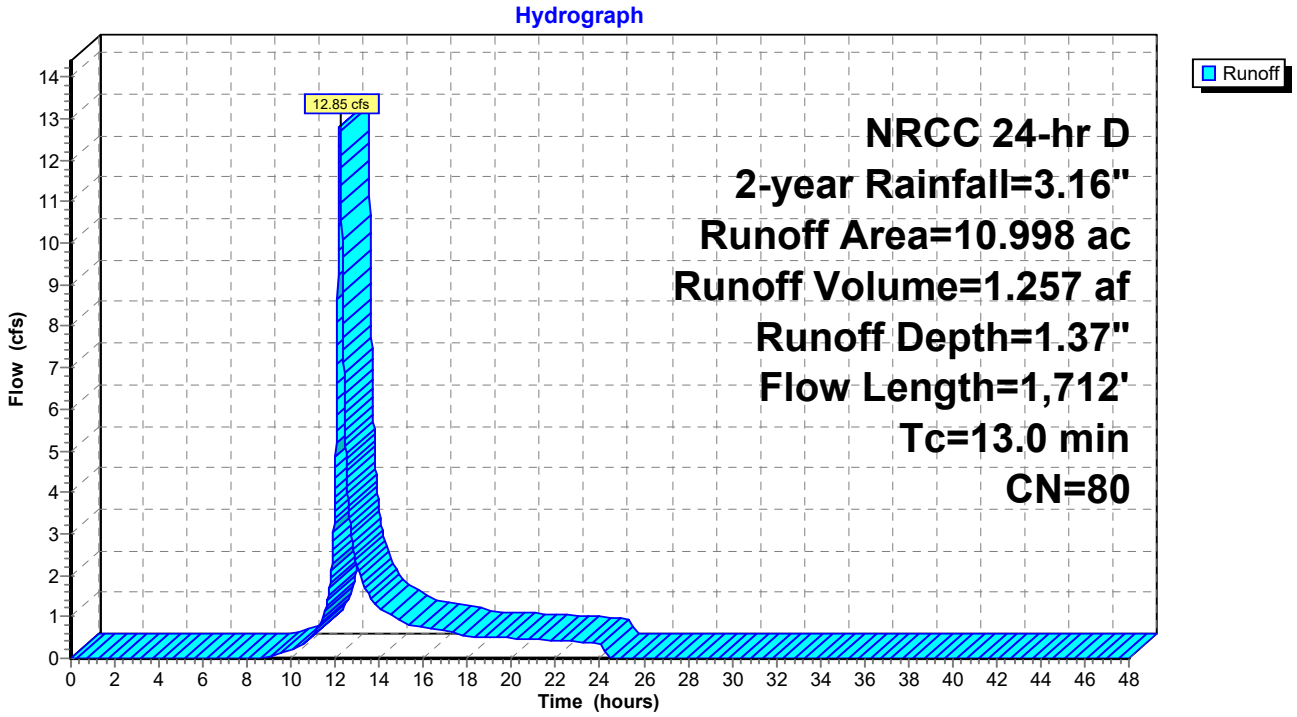
Runoff = 12.85 cfs @ 12.21 hrs, Volume= 1.257 af, Depth= 1.37"
Routed to Pond CULV : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-year Rainfall=3.16"

Area (ac)	CN	Description
5.677	79	1 acre lots, 20% imp, HSG C
2.964	73	Woods, Fair, HSG C
1.070	79	Woods, Fair, HSG D
1.152	98	Paved roads w/curbs & sewers, HSG C
0.135	98	Paved roads w/curbs & sewers, HSG D
10.998	80	Weighted Average
8.576		77.97% Pervious Area
2.422		22.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	100	0.1000	0.32		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
5.9	585	0.1094	1.65		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.9	167	0.0240	3.14		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.8	608	0.0444	13.11	16.09	**Pipe Channel, D-E** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
0.2	252	0.1071	26.20	487.30	**Channel Flow, E-F** Area= 18.6 sf Perim= 11.9' r= 1.56' n= 0.025 Earth, clean & winding
13.0	1,712	Total			

Subcatchment PDA-2: PDA-2



Summary for Reach W-SW: Western Swale

Inflow Area = 10.448 ac, 4.72% Impervious, Inflow Depth = 1.18" for 2-year event
Inflow = 10.75 cfs @ 12.20 hrs, Volume= 1.030 af
Outflow = 10.57 cfs @ 12.24 hrs, Volume= 1.030 af, Atten= 2%, Lag= 2.6 min
Routed to Pond 1B : Stormwater Basin

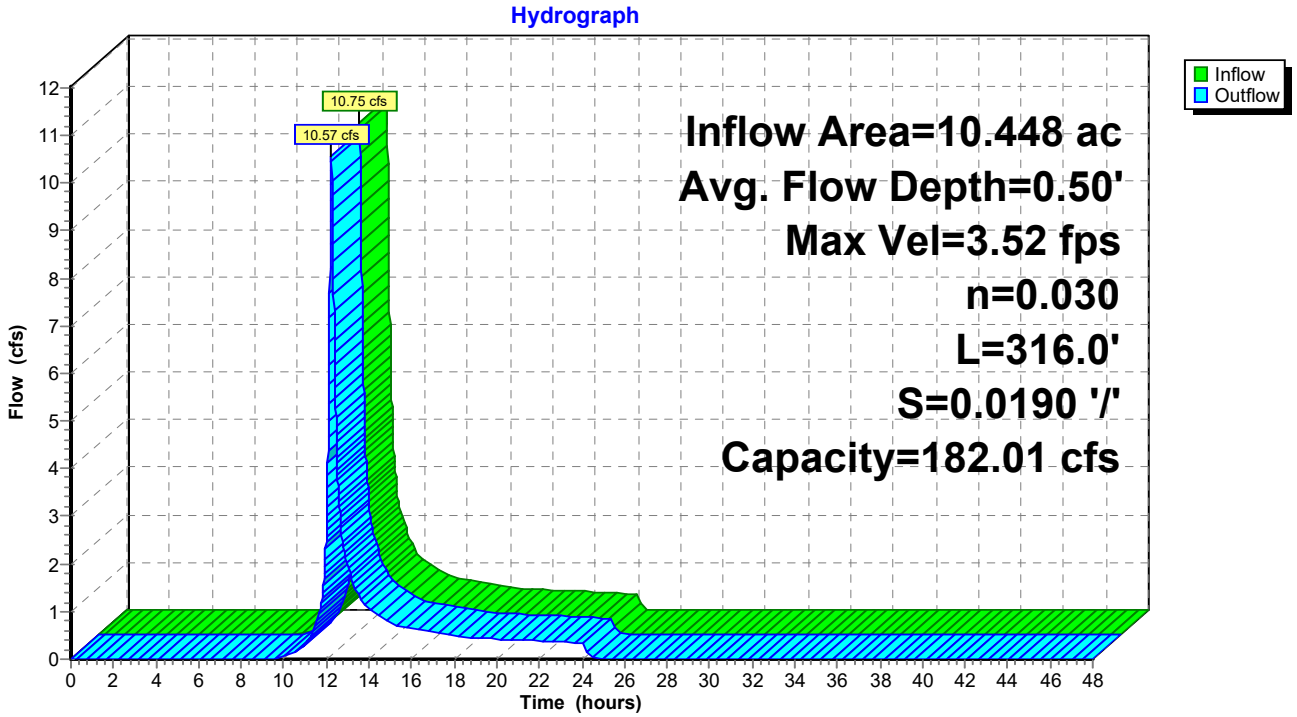
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.52 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 1.29 fps, Avg. Travel Time= 4.1 min

Peak Storage= 950 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.50' , Surface Width= 8.01'
Bank-Full Depth= 2.00' Flow Area= 24.0 sf, Capacity= 182.01 cfs

4.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 20.00'
Length= 316.0' Slope= 0.0190 '/'
Inlet Invert= 621.00', Outlet Invert= 615.00'

‡

Reach W-SW: Western Swale



Summary for Pond 1B: Stormwater Basin

Inflow Area = 10.448 ac, 4.72% Impervious, Inflow Depth = 1.18" for 2-year event
Inflow = 10.57 cfs @ 12.24 hrs, Volume= 1.030 af
Outflow = 3.39 cfs @ 12.59 hrs, Volume= 0.923 af, Atten= 68%, Lag= 20.5 min
Primary = 3.39 cfs @ 12.59 hrs, Volume= 0.923 af
Routed to Link PAP-1 : AP-1
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link PAP-1 : AP-1

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 611.97' @ 12.59 hrs Surf.Area= 11,329 sf Storage= 13,727 cf

Plug-Flow detention time= 158.4 min calculated for 0.923 af (90% of inflow)
Center-of-Mass det. time= 105.8 min (999.5 - 893.7)

Volume	Invert	Avail.Storage	Storage Description
#1	610.00'	75,163 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

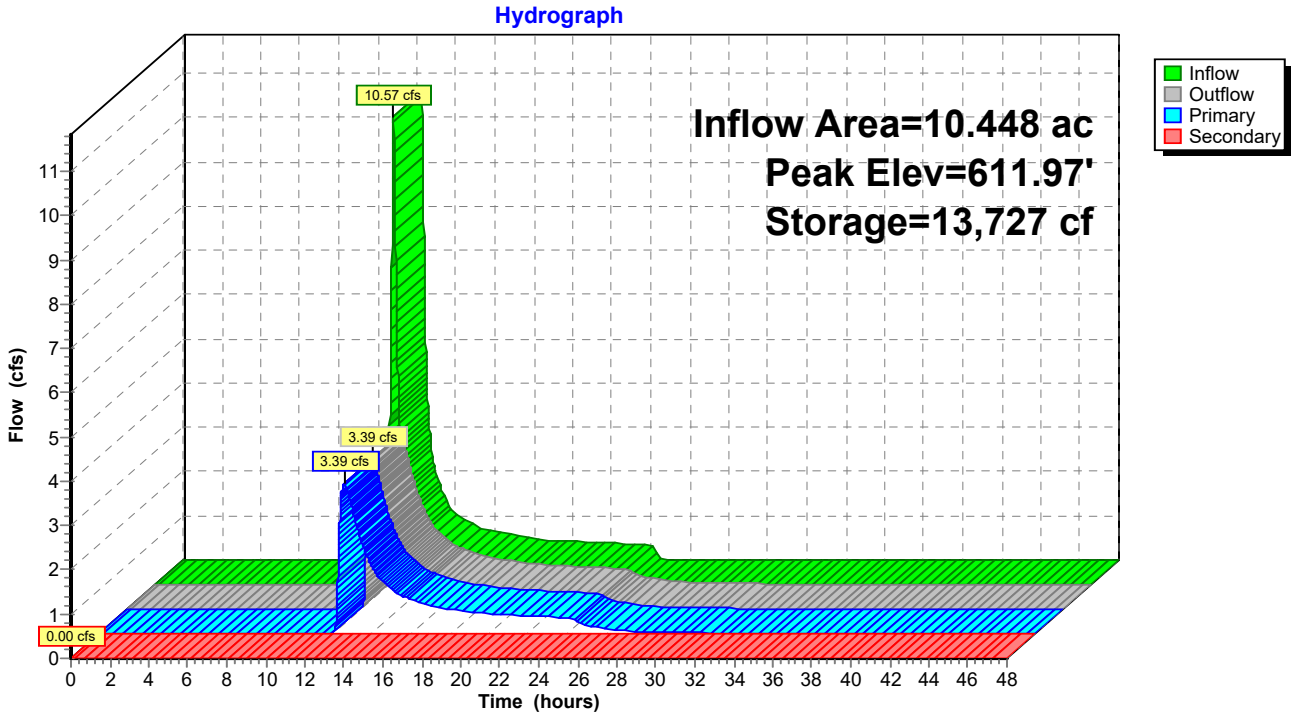
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
610.00	126	42.7	0	0	126
611.00	9,551	438.8	3,591	3,591	15,305
612.00	11,382	522.9	10,453	14,044	21,759
613.00	13,181	584.7	12,271	26,315	27,234
614.00	15,158	647.5	14,158	40,473	33,423
615.00	17,308	711.0	16,221	56,694	40,321
616.00	19,655	774.8	18,469	75,163	47,901

Device	Routing	Invert	Outlet Devices
#1	Primary	608.00'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 608.00' / 606.00' S= 0.0364 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	611.10'	**18.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	614.00'	**36.0" x 21.0" Horiz. Oriface/Grate Outlet** C= 0.600 Limited to weir flow at low heads
#4	Secondary	615.00'	**16.0' long + 3.0 '/' SideZ x 14.0' 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) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=3.39 cfs @ 12.59 hrs HW=611.97' (Free Discharge)
└**1=Culvert** (Passes 3.39 cfs of 26.08 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 3.39 cfs @ 3.18 fps)
└**3=Oriface/Grate Outlet** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=610.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1B: Stormwater Basin



Summary for Pond CULV: Culvert

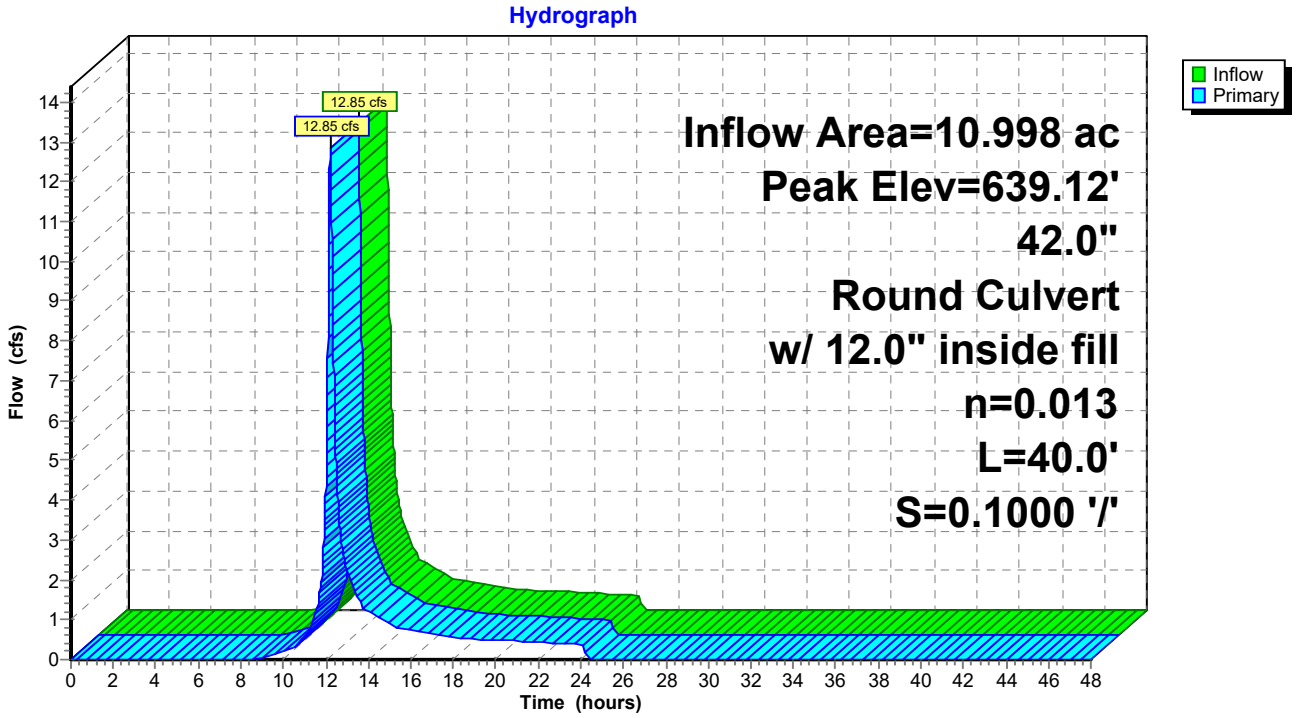
Inflow Area = 10.998 ac, 22.03% Impervious, Inflow Depth = 1.37" for 2-year event
Inflow = 12.85 cfs @ 12.21 hrs, Volume= 1.257 af
Outflow = 12.85 cfs @ 12.21 hrs, Volume= 1.257 af, Atten= 0%, Lag= 0.0 min
Primary = 12.85 cfs @ 12.21 hrs, Volume= 1.257 af
Routed to Link PAP-2 : AP-2

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 639.12' @ 12.21 hrs
Flood Elev= 643.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	638.00'	**42.0" Round Culvert w/ 12.0" inside fill** L= 40.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 637.00' / 633.00' S= 0.1000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.35 sf

Primary OutFlow Max=12.84 cfs @ 12.21 hrs HW=639.12' TW=636.50' (Fixed TW Elev= 636.50')
1=Culvert (Inlet Controls 12.84 cfs @ 3.37 fps)

Pond CULV: Culvert

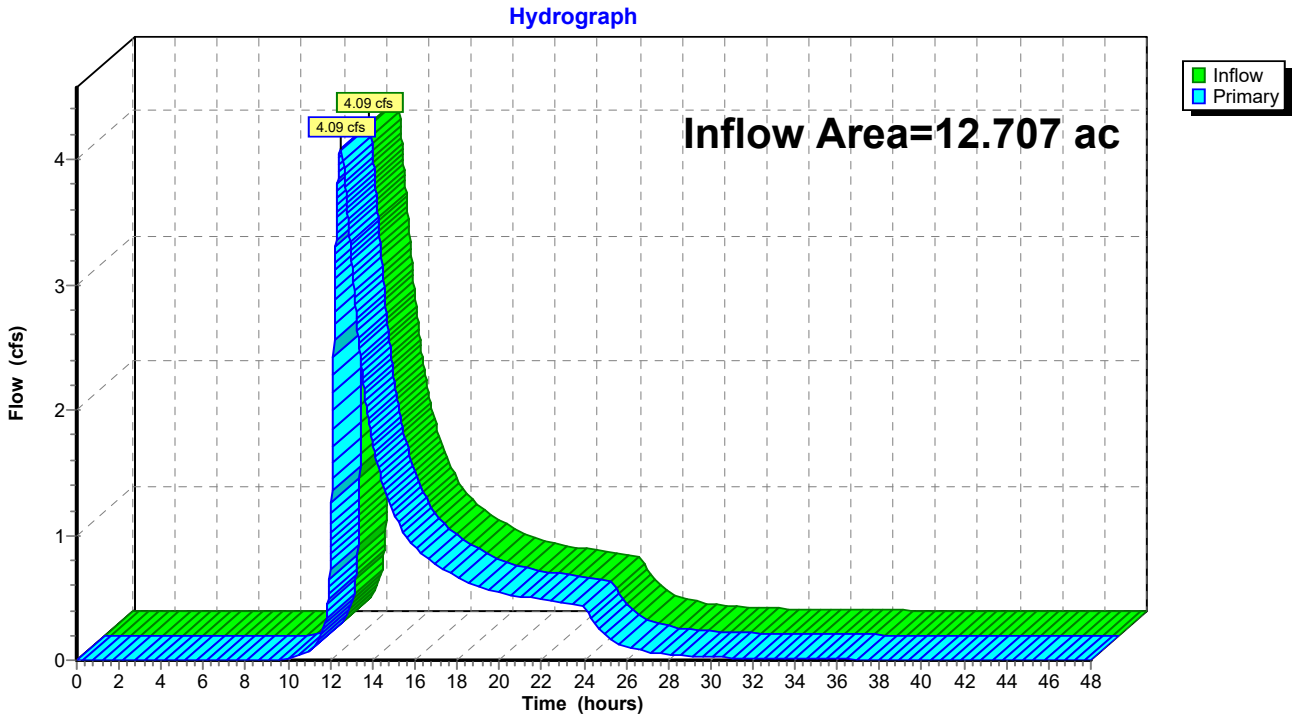


Summary for Link PAP-1: AP-1

Inflow Area = 12.707 ac, 4.89% Impervious, Inflow Depth > 1.08" for 2-year event
Inflow = 4.09 cfs @ 12.51 hrs, Volume= 1.146 af
Primary = 4.09 cfs @ 12.51 hrs, Volume= 1.146 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link PAP-1: AP-1

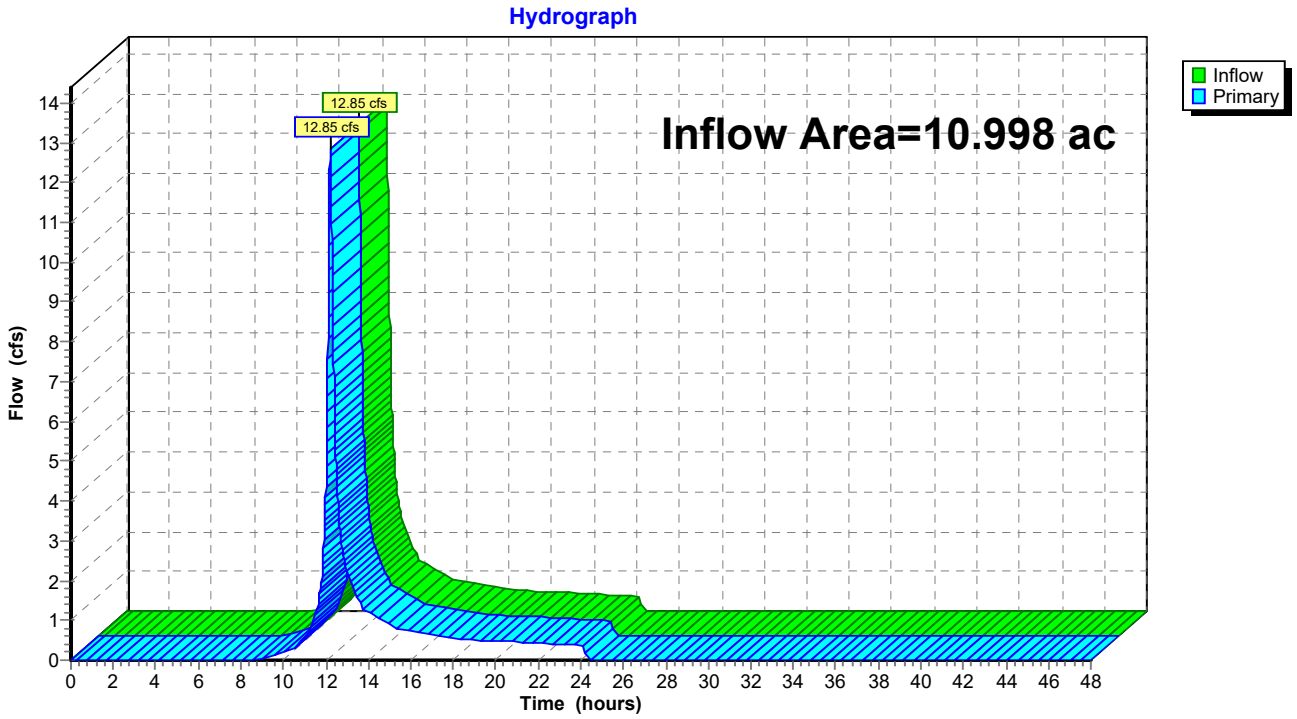


Summary for Link PAP-2: AP-2

Inflow Area = 10.998 ac, 22.03% Impervious, Inflow Depth = 1.37" for 2-year event
Inflow = 12.85 cfs @ 12.21 hrs, Volume= 1.257 af
Primary = 12.85 cfs @ 12.21 hrs, Volume= 1.257 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link PAP-2: AP-2



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PDA-1A: PDA-1A Runoff Area=10.448 ac 4.72% Impervious Runoff Depth=2.55"
Flow Length=938' Tc=12.0 min CN=77 Runoff=23.64 cfs 2.218 af

Subcatchment PDA-1B: PDA-1B Runoff Area=2.259 ac 5.66% Impervious Runoff Depth=2.55"
Flow Length=779' Tc=11.5 min CN=77 Runoff=5.17 cfs 0.480 af

Subcatchment PDA-2: PDA-2 Runoff Area=10.998 ac 22.03% Impervious Runoff Depth=2.81"
Flow Length=1,712' Tc=13.0 min CN=80 Runoff=26.55 cfs 2.579 af

Reach W-SW: Western Swale Avg. Flow Depth=0.76' Max Vel=4.41 fps Inflow=23.64 cfs 2.218 af
n=0.030 L=316.0' S=0.0190 '/' Capacity=182.01 cfs Outflow=23.40 cfs 2.218 af

Pond 1B: Stormwater Basin Peak Elev=613.06' Storage=27,167 cf Inflow=23.40 cfs 2.218 af
Primary=9.38 cfs 2.111 af Secondary=0.00 cfs 0.000 af Outflow=9.38 cfs 2.111 af

Pond CULV: Culvert Peak Elev=639.82' Inflow=26.55 cfs 2.579 af
42.0" Round Culvert w/ 12.0" inside fill n=0.013 L=40.0' S=0.1000 '/' Outflow=26.55 cfs 2.579 af

Link PAP-1: AP-1 Inflow=12.13 cfs 2.590 af
Primary=12.13 cfs 2.590 af

Link PAP-2: AP-2 Inflow=26.55 cfs 2.579 af
Primary=26.55 cfs 2.579 af

Total Runoff Area = 23.705 ac Runoff Volume = 5.277 af Average Runoff Depth = 2.67"
87.16% Pervious = 20.662 ac 12.84% Impervious = 3.043 ac

Summary for Subcatchment PDA-1A: PDA-1A

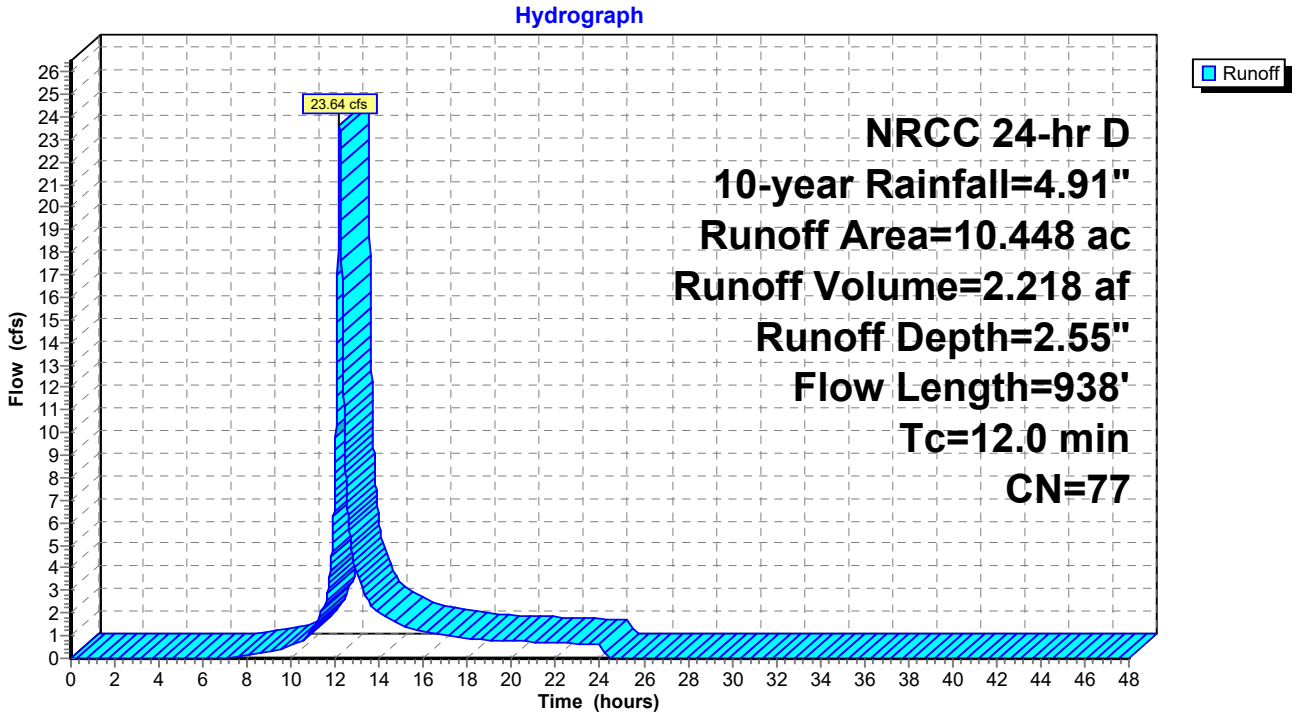
Runoff = 23.64 cfs @ 12.20 hrs, Volume= 2.218 af, Depth= 2.55"
Routed to Reach W-SW : Western Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-year Rainfall=4.91"

Area (ac)	CN	Description
2.260	79	1 acre lots, 20% imp, HSG C
1.245	73	Woods, Fair, HSG C
1.303	79	Woods, Fair, HSG D
1.556	71	Meadow, non-grazed, HSG C
3.916	78	Meadow, non-grazed, HSG D
0.127	96	Gravel surface, HSG D
0.041	98	Paved parking, HSG D
10.448	77	Weighted Average
9.955		95.28% Pervious Area
0.493		4.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100	0.1100	0.33		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
1.1	131	0.0780	1.95		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.7	65	0.1091	1.65		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
3.4	422	0.0899	2.10		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
1.8	220	0.0190	2.07		**Shallow Concentrated Flow, E-F** Grassed Waterway Kv= 15.0 fps
12.0	938	Total			

Subcatchment PDA-1A: PDA-1A



Summary for Subcatchment PDA-1B: PDA-1B

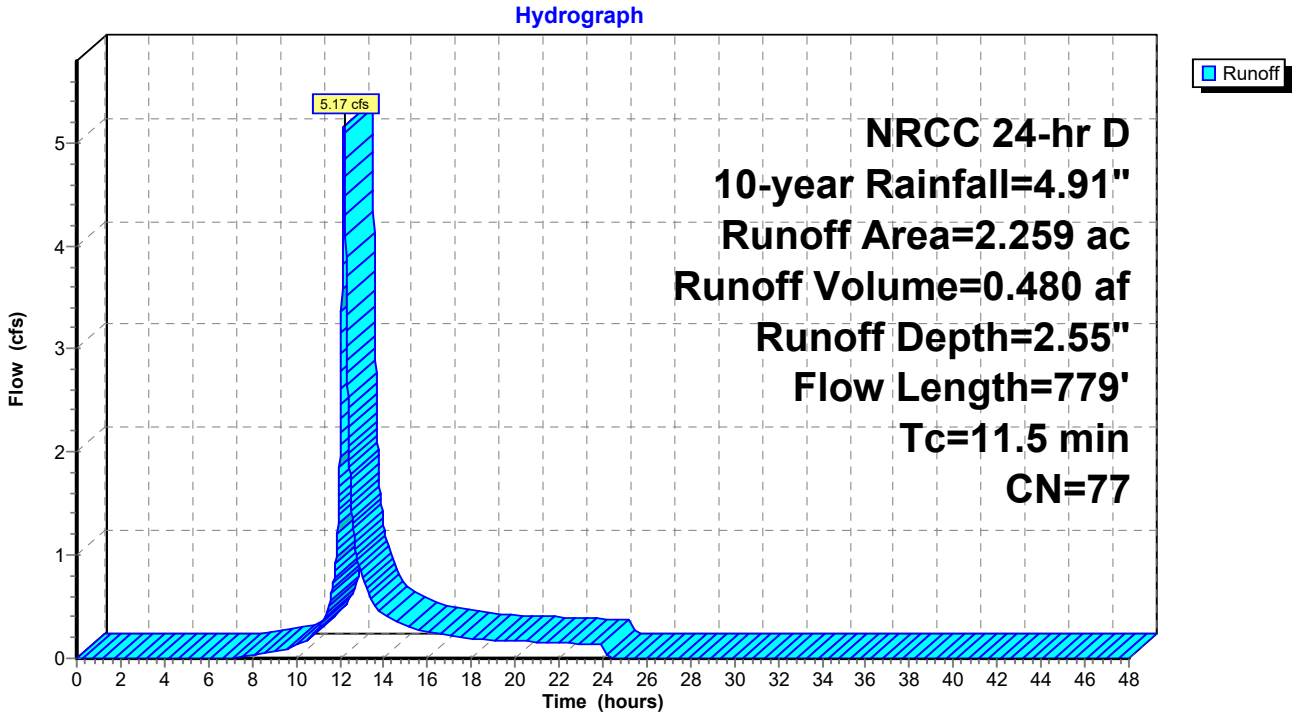
Runoff = 5.17 cfs @ 12.19 hrs, Volume= 0.480 af, Depth= 2.55"
Routed to Link PAP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-year Rainfall=4.91"

	Area (ac)	CN	Description
	0.639	79	1 acre lots, 20% imp, HSG C
	0.228	73	Woods, Fair, HSG C
	0.078	79	Woods, Fair, HSG D
*	0.565	75	Meadow, non-grazed, HSG C/D
	0.749	78	Meadow, non-grazed, HSG D
	2.259	77	Weighted Average
	2.131		94.34% Pervious Area
	0.128		5.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	100	0.1300	0.36		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
0.7	102	0.1078	2.30		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.0	96	0.0937	1.53		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
5.1	481	0.0986	1.57		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
11.5	779	Total			

Subcatchment PDA-1B: PDA-1B



Summary for Subcatchment PDA-2: PDA-2

[47] Hint: Peak is 165% of capacity of segment #4

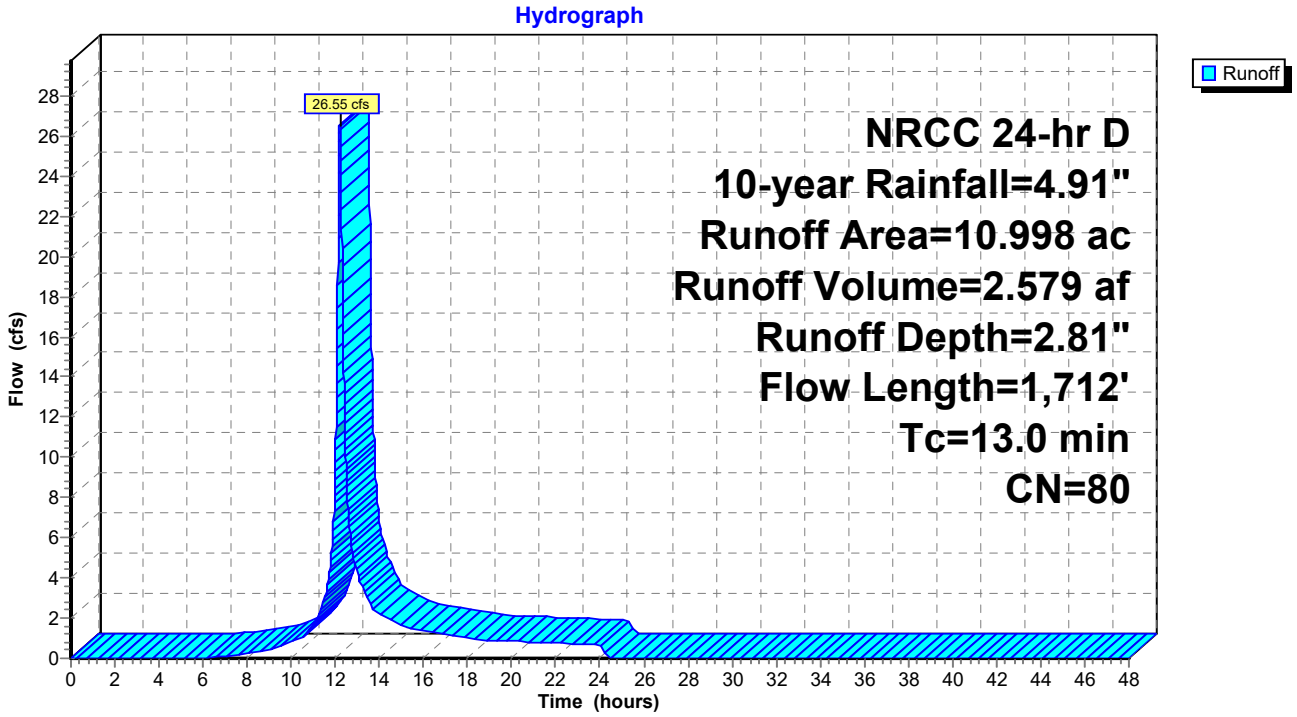
Runoff = 26.55 cfs @ 12.21 hrs, Volume= 2.579 af, Depth= 2.81"
Routed to Pond CULV : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-year Rainfall=4.91"

Area (ac)	CN	Description
5.677	79	1 acre lots, 20% imp, HSG C
2.964	73	Woods, Fair, HSG C
1.070	79	Woods, Fair, HSG D
1.152	98	Paved roads w/curbs & sewers, HSG C
0.135	98	Paved roads w/curbs & sewers, HSG D
10.998	80	Weighted Average
8.576		77.97% Pervious Area
2.422		22.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	100	0.1000	0.32		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
5.9	585	0.1094	1.65		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.9	167	0.0240	3.14		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.8	608	0.0444	13.11	16.09	**Pipe Channel, D-E** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
0.2	252	0.1071	26.20	487.30	**Channel Flow, E-F** Area= 18.6 sf Perim= 11.9' r= 1.56' n= 0.025 Earth, clean & winding
13.0	1,712	Total			

Subcatchment PDA-2: PDA-2



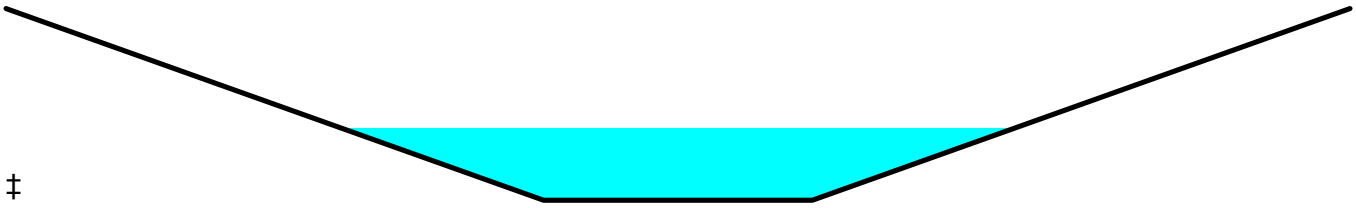
Summary for Reach W-SW: Western Swale

Inflow Area = 10.448 ac, 4.72% Impervious, Inflow Depth = 2.55" for 10-year event
Inflow = 23.64 cfs @ 12.20 hrs, Volume= 2.218 af
Outflow = 23.40 cfs @ 12.23 hrs, Volume= 2.218 af, Atten= 1%, Lag= 2.0 min
Routed to Pond 1B : Stormwater Basin

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.41 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 1.56 fps, Avg. Travel Time= 3.4 min

Peak Storage= 1,678 cf @ 12.21 hrs
Average Depth at Peak Storage= 0.76' , Surface Width= 10.05'
Bank-Full Depth= 2.00' Flow Area= 24.0 sf, Capacity= 182.01 cfs

4.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 20.00'
Length= 316.0' Slope= 0.0190 '/'
Inlet Invert= 621.00', Outlet Invert= 615.00'



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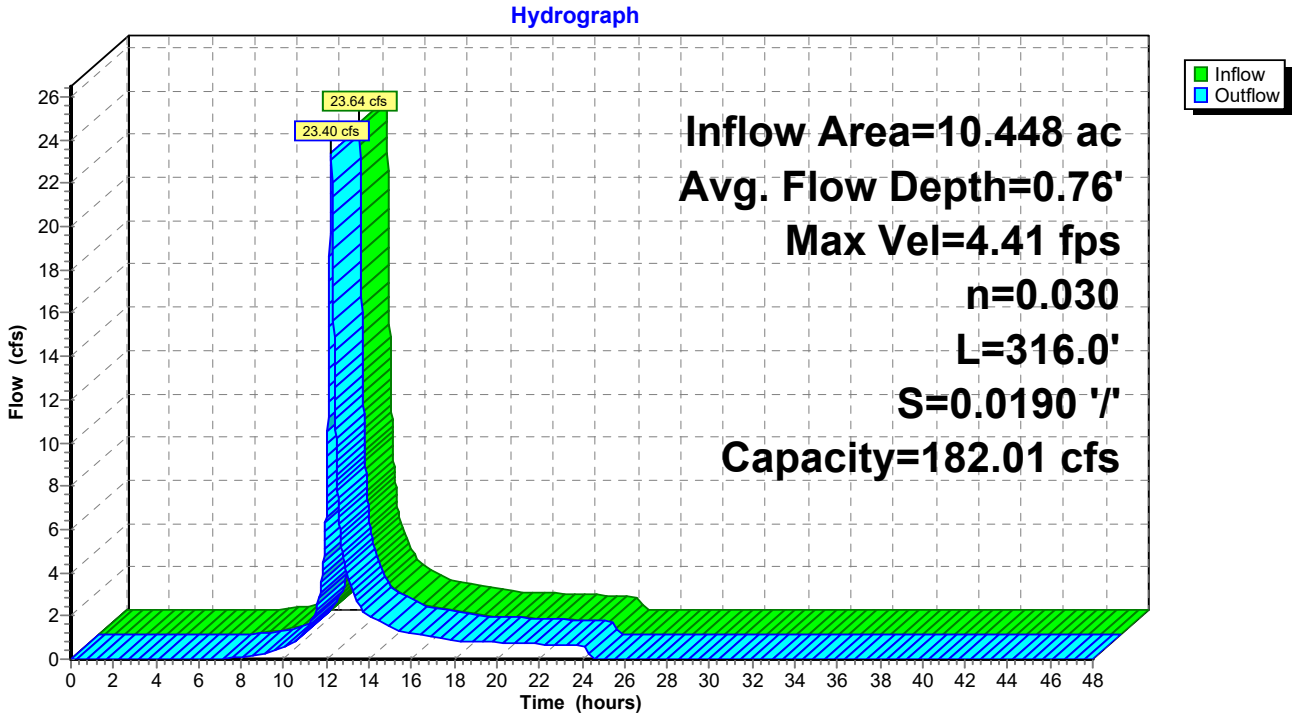
Reach W-SW: Western Swale



Summary for Pond 1B: Stormwater Basin

Inflow Area = 10.448 ac, 4.72% Impervious, Inflow Depth = 2.55" for 10-year event
Inflow = 23.40 cfs @ 12.23 hrs, Volume= 2.218 af
Outflow = 9.38 cfs @ 12.47 hrs, Volume= 2.111 af, Atten= 60%, Lag= 14.5 min
Primary = 9.38 cfs @ 12.47 hrs, Volume= 2.111 af
Routed to Link PAP-1 : AP-1
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link PAP-1 : AP-1

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 613.06' @ 12.47 hrs Surf.Area= 13,304 sf Storage= 27,167 cf

Plug-Flow detention time= 99.6 min calculated for 2.111 af (95% of inflow)
Center-of-Mass det. time= 72.6 min (936.6 - 864.1)

Volume	Invert	Avail.Storage	Storage Description
#1	610.00'	75,163 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

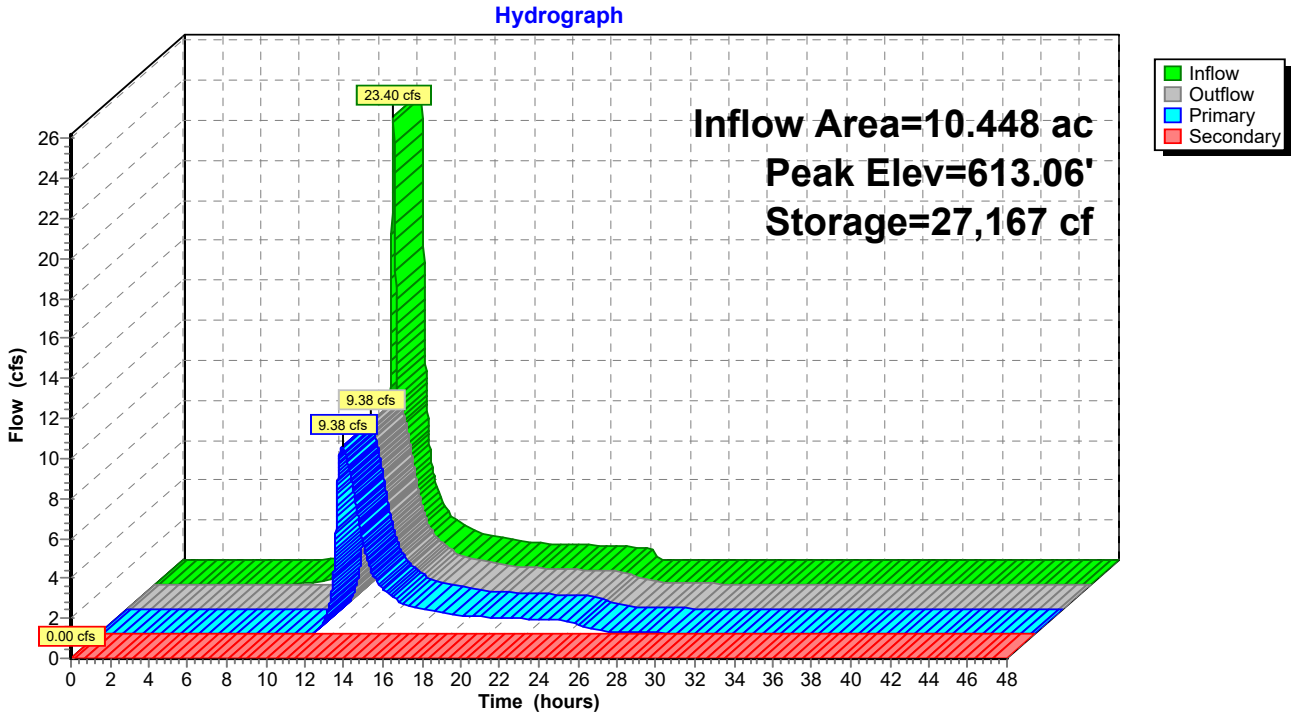
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
610.00	126	42.7	0	0	126
611.00	9,551	438.8	3,591	3,591	15,305
612.00	11,382	522.9	10,453	14,044	21,759
613.00	13,181	584.7	12,271	26,315	27,234
614.00	15,158	647.5	14,158	40,473	33,423
615.00	17,308	711.0	16,221	56,694	40,321
616.00	19,655	774.8	18,469	75,163	47,901

Device	Routing	Invert	Outlet Devices
#1	Primary	608.00'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 608.00' / 606.00' S= 0.0364 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	611.10'	**18.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	614.00'	**36.0" x 21.0" Horiz. Oriface/Grate Outlet** C= 0.600 Limited to weir flow at low heads
#4	Secondary	615.00'	**16.0' long + 3.0 '/' SideZ x 14.0' 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) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=9.38 cfs @ 12.47 hrs HW=613.06' (Free Discharge)
└**1=Culvert** (Passes 9.38 cfs of 30.50 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 9.38 cfs @ 5.31 fps)
└**3=Oriface/Grate Outlet** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=610.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1B: Stormwater Basin



Summary for Pond CULV: Culvert

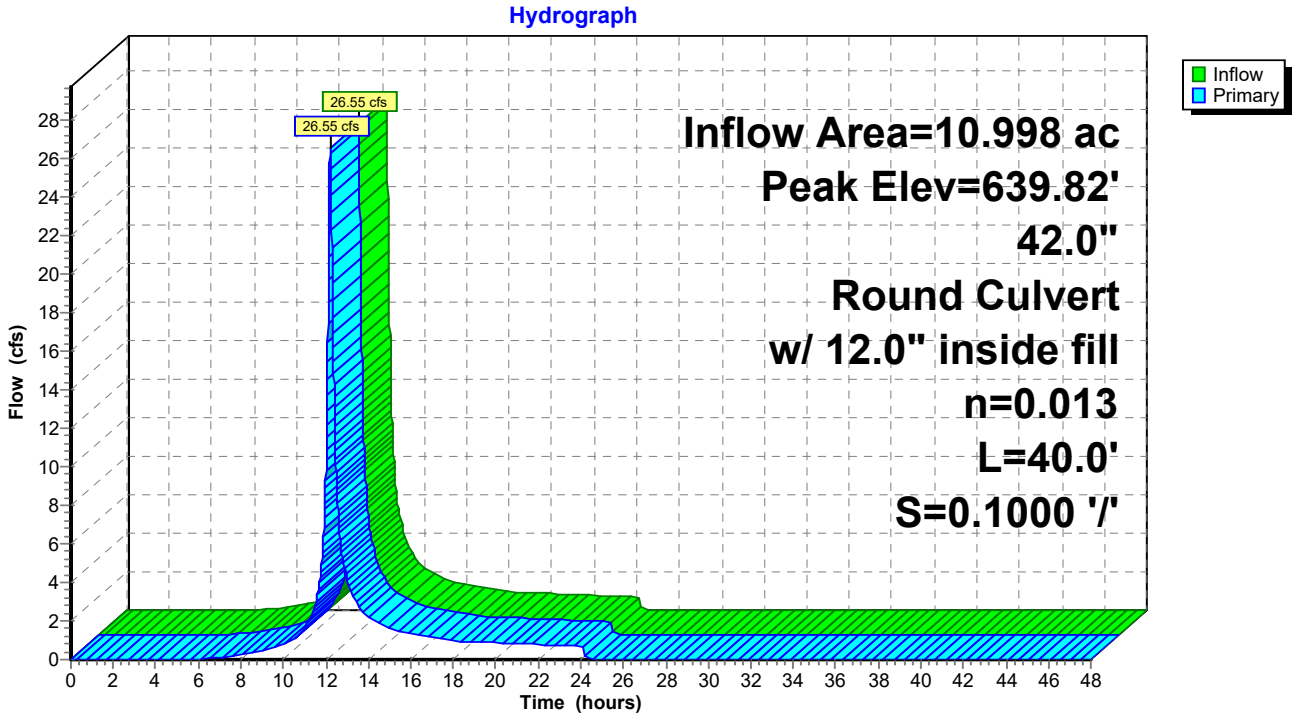
Inflow Area = 10.998 ac, 22.03% Impervious, Inflow Depth = 2.81" for 10-year event
Inflow = 26.55 cfs @ 12.21 hrs, Volume= 2.579 af
Outflow = 26.55 cfs @ 12.21 hrs, Volume= 2.579 af, Atten= 0%, Lag= 0.0 min
Primary = 26.55 cfs @ 12.21 hrs, Volume= 2.579 af
Routed to Link PAP-2 : AP-2

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 639.82' @ 12.21 hrs
Flood Elev= 643.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	638.00'	**42.0" Round Culvert w/ 12.0" inside fill** L= 40.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 637.00' / 633.00' S= 0.1000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.35 sf

Primary OutFlow Max=26.52 cfs @ 12.21 hrs HW=639.82' TW=636.50' (Fixed TW Elev= 636.50')
1=Culvert (Inlet Controls 26.52 cfs @ 4.39 fps)

Pond CULV: Culvert

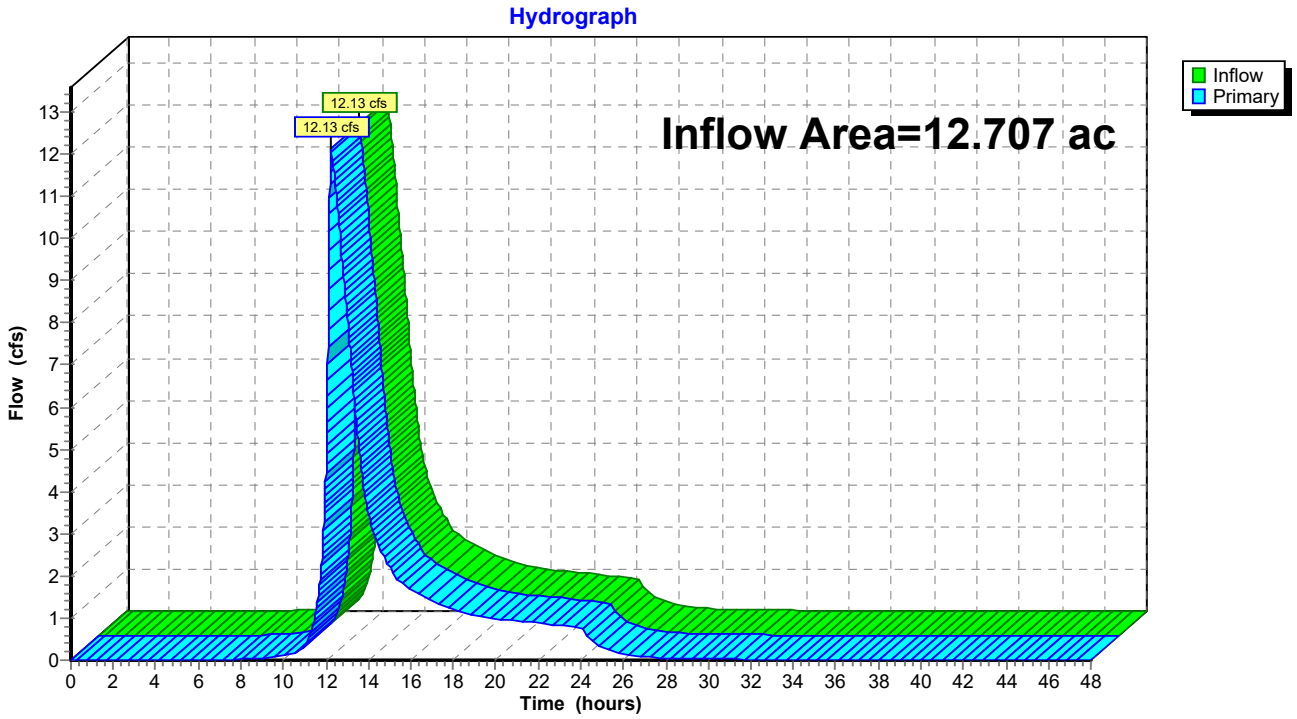


Summary for Link PAP-1: AP-1

Inflow Area = 12.707 ac, 4.89% Impervious, Inflow Depth > 2.45" for 10-year event
Inflow = 12.13 cfs @ 12.26 hrs, Volume= 2.590 af
Primary = 12.13 cfs @ 12.26 hrs, Volume= 2.590 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link PAP-1: AP-1

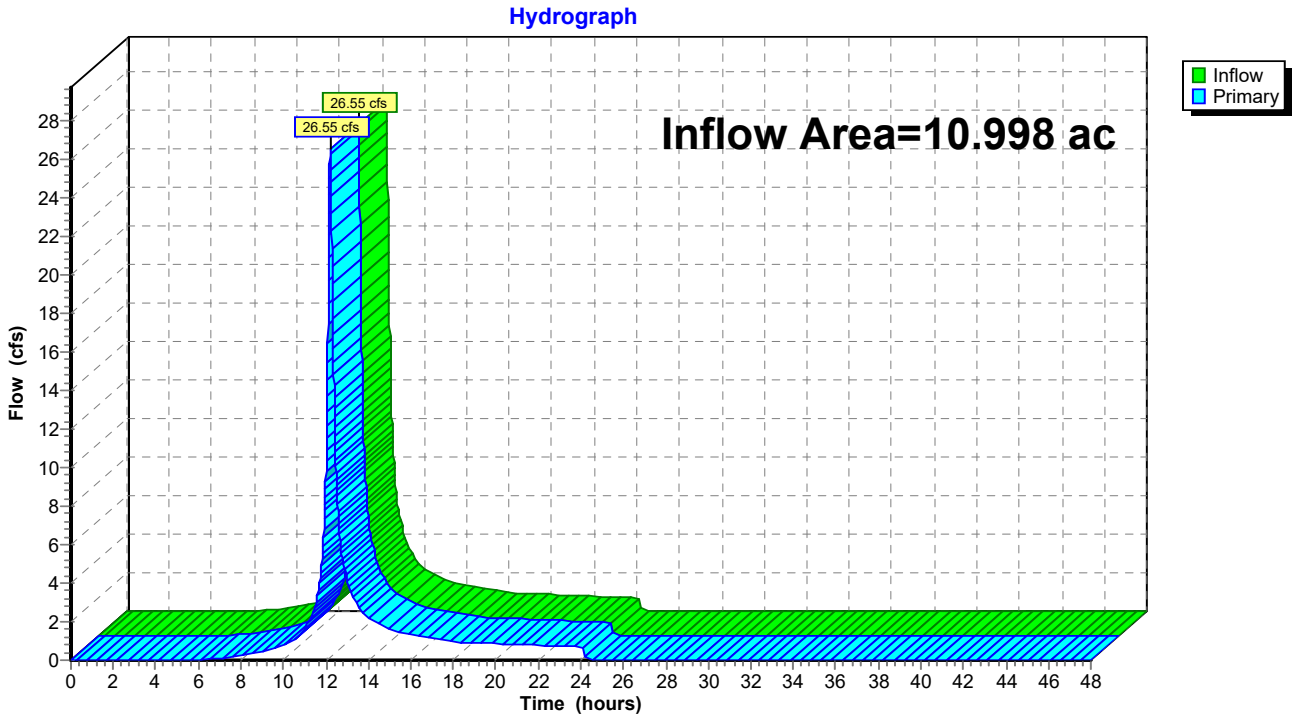


Summary for Link PAP-2: AP-2

Inflow Area = 10.998 ac, 22.03% Impervious, Inflow Depth = 2.81" for 10-year event
Inflow = 26.55 cfs @ 12.21 hrs, Volume= 2.579 af
Primary = 26.55 cfs @ 12.21 hrs, Volume= 2.579 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link PAP-2: AP-2



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PDA-1A: PDA-1A Runoff Area=10.448 ac 4.72% Impervious Runoff Depth=3.48"
Flow Length=938' Tc=12.0 min CN=77 Runoff=32.22 cfs 3.029 af

Subcatchment PDA-1B: PDA-1B Runoff Area=2.259 ac 5.66% Impervious Runoff Depth=3.48"
Flow Length=779' Tc=11.5 min CN=77 Runoff=7.05 cfs 0.655 af

Subcatchment PDA-2: PDA-2 Runoff Area=10.998 ac 22.03% Impervious Runoff Depth=3.78"
Flow Length=1,712' Tc=13.0 min CN=80 Runoff=35.46 cfs 3.466 af

Reach W-SW: Western Swale Avg. Flow Depth=0.88' Max Vel=4.80 fps Inflow=32.22 cfs 3.029 af
n=0.030 L=316.0' S=0.0190 '/' Capacity=182.01 cfs Outflow=31.91 cfs 3.029 af

Pond 1B: Stormwater Basin Peak Elev=613.73' Storage=36,447 cf Inflow=31.91 cfs 3.029 af
Primary=11.66 cfs 2.922 af Secondary=0.00 cfs 0.000 af Outflow=11.66 cfs 2.922 af

Pond CULV: Culvert Peak Elev=640.25' Inflow=35.46 cfs 3.466 af
42.0" Round Culvert w/ 12.0" inside fill n=0.013 L=40.0' S=0.1000 '/' Outflow=35.46 cfs 3.466 af

Link PAP-1: AP-1 Inflow=15.95 cfs 3.576 af
Primary=15.95 cfs 3.576 af

Link PAP-2: AP-2 Inflow=35.46 cfs 3.466 af
Primary=35.46 cfs 3.466 af

Total Runoff Area = 23.705 ac Runoff Volume = 7.150 af Average Runoff Depth = 3.62"
87.16% Pervious = 20.662 ac 12.84% Impervious = 3.043 ac

Summary for Subcatchment PDA-1A: PDA-1A

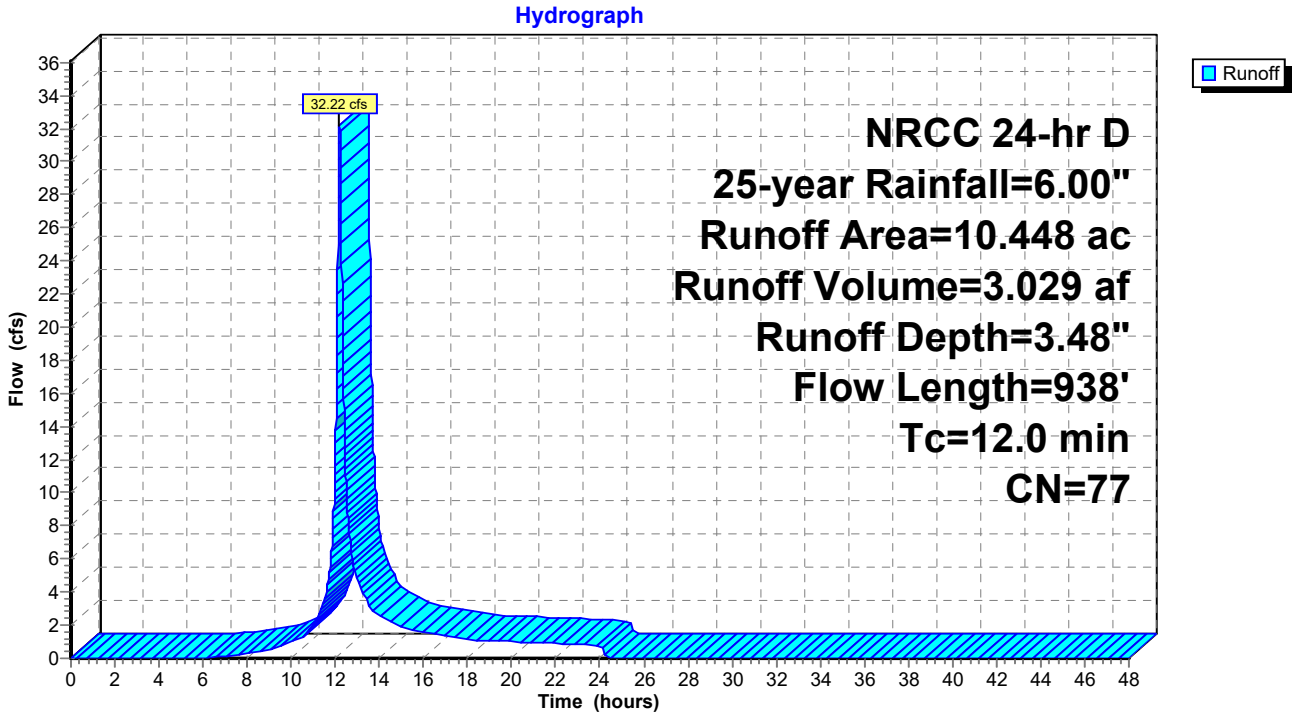
Runoff = 32.22 cfs @ 12.20 hrs, Volume= 3.029 af, Depth= 3.48"
Routed to Reach W-SW : Western Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 25-year Rainfall=6.00"

Area (ac)	CN	Description
2.260	79	1 acre lots, 20% imp, HSG C
1.245	73	Woods, Fair, HSG C
1.303	79	Woods, Fair, HSG D
1.556	71	Meadow, non-grazed, HSG C
3.916	78	Meadow, non-grazed, HSG D
0.127	96	Gravel surface, HSG D
0.041	98	Paved parking, HSG D
10.448	77	Weighted Average
9.955		95.28% Pervious Area
0.493		4.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100	0.1100	0.33		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
1.1	131	0.0780	1.95		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.7	65	0.1091	1.65		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
3.4	422	0.0899	2.10		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
1.8	220	0.0190	2.07		**Shallow Concentrated Flow, E-F** Grassed Waterway Kv= 15.0 fps
12.0	938	Total			

Subcatchment PDA-1A: PDA-1A



Summary for Subcatchment PDA-1B: PDA-1B

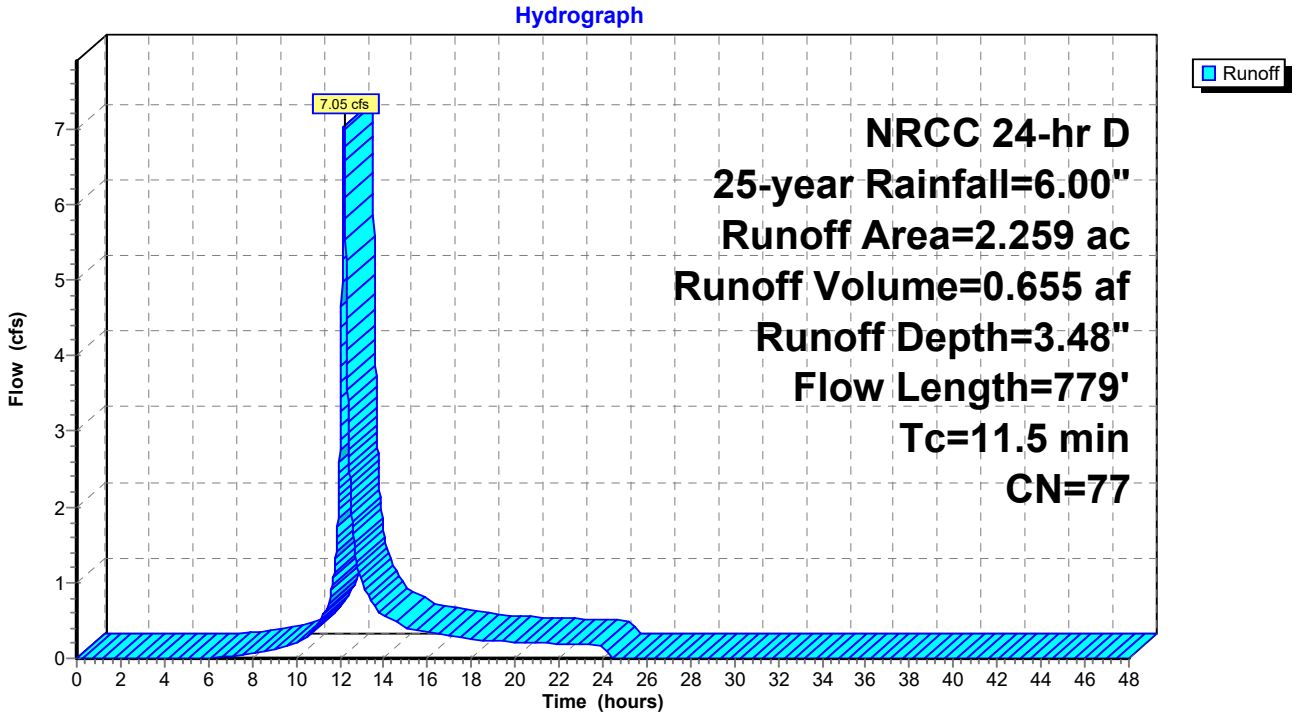
Runoff = 7.05 cfs @ 12.19 hrs, Volume= 0.655 af, Depth= 3.48"
Routed to Link PAP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 25-year Rainfall=6.00"

	Area (ac)	CN	Description
	0.639	79	1 acre lots, 20% imp, HSG C
	0.228	73	Woods, Fair, HSG C
	0.078	79	Woods, Fair, HSG D
*	0.565	75	Meadow, non-grazed, HSG C/D
	0.749	78	Meadow, non-grazed, HSG D
	2.259	77	Weighted Average
	2.131		94.34% Pervious Area
	0.128		5.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	100	0.1300	0.36		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
0.7	102	0.1078	2.30		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.0	96	0.0937	1.53		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
5.1	481	0.0986	1.57		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
11.5	779	Total			

Subcatchment PDA-1B: PDA-1B



Summary for Subcatchment PDA-2: PDA-2

[47] Hint: Peak is 220% of capacity of segment #4

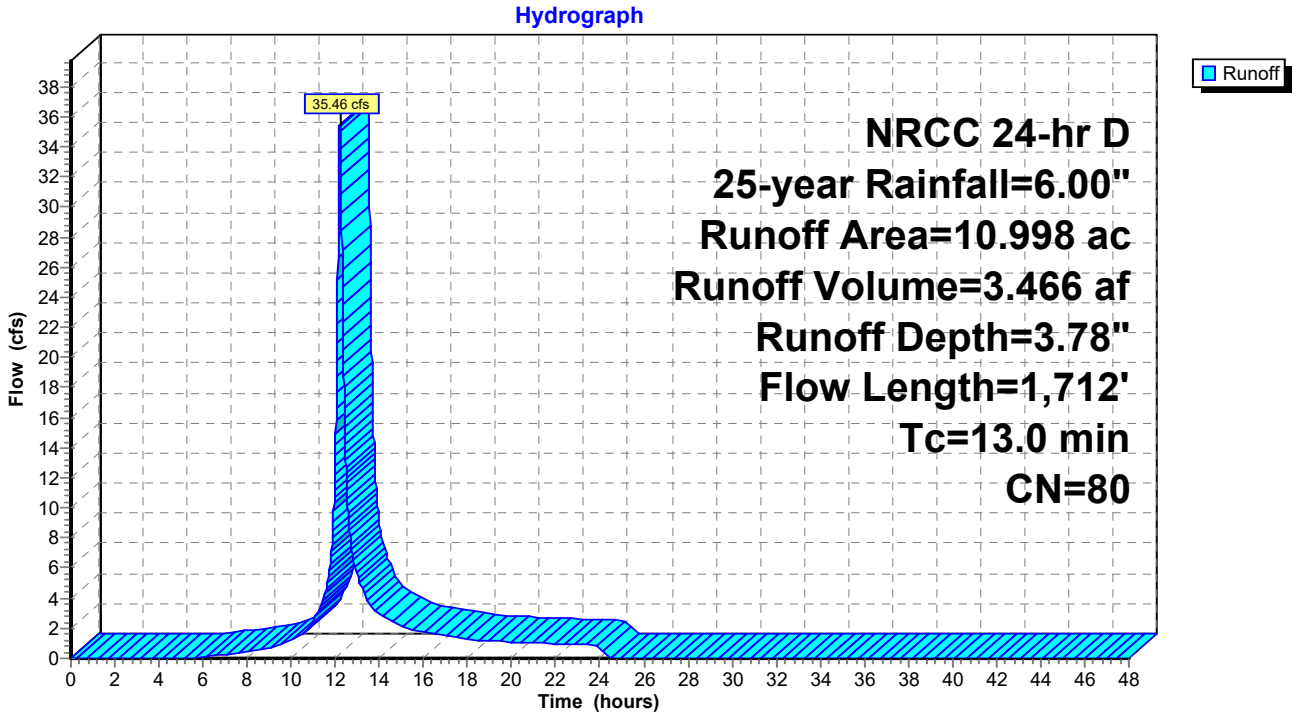
Runoff = 35.46 cfs @ 12.21 hrs, Volume= 3.466 af, Depth= 3.78"
Routed to Pond CULV : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 25-year Rainfall=6.00"

Area (ac)	CN	Description
5.677	79	1 acre lots, 20% imp, HSG C
2.964	73	Woods, Fair, HSG C
1.070	79	Woods, Fair, HSG D
1.152	98	Paved roads w/curbs & sewers, HSG C
0.135	98	Paved roads w/curbs & sewers, HSG D
10.998	80	Weighted Average
8.576		77.97% Pervious Area
2.422		22.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	100	0.1000	0.32		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
5.9	585	0.1094	1.65		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.9	167	0.0240	3.14		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.8	608	0.0444	13.11	16.09	**Pipe Channel, D-E** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
0.2	252	0.1071	26.20	487.30	**Channel Flow, E-F** Area= 18.6 sf Perim= 11.9' r= 1.56' n= 0.025 Earth, clean & winding
13.0	1,712	Total			

Subcatchment PDA-2: PDA-2



Summary for Reach W-SW: Western Swale

Inflow Area = 10.448 ac, 4.72% Impervious, Inflow Depth = 3.48" for 25-year event
Inflow = 32.22 cfs @ 12.20 hrs, Volume= 3.029 af
Outflow = 31.91 cfs @ 12.23 hrs, Volume= 3.029 af, Atten= 1%, Lag= 1.9 min
Routed to Pond 1B : Stormwater Basin

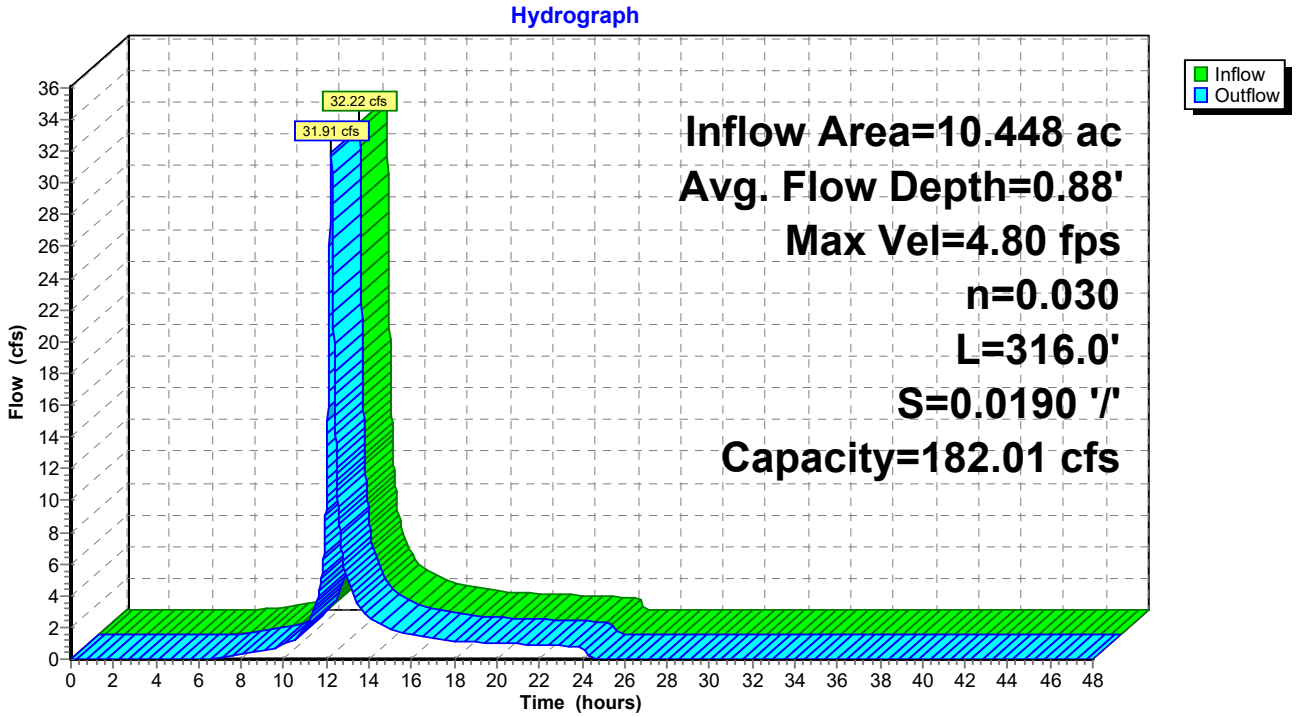
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.80 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.69 fps, Avg. Travel Time= 3.1 min

Peak Storage= 2,102 cf @ 12.21 hrs
Average Depth at Peak Storage= 0.88' , Surface Width= 11.07'
Bank-Full Depth= 2.00' Flow Area= 24.0 sf, Capacity= 182.01 cfs

4.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 20.00'
Length= 316.0' Slope= 0.0190 '/'
Inlet Invert= 621.00', Outlet Invert= 615.00'

‡

Reach W-SW: Western Swale



Summary for Pond 1B: Stormwater Basin

Inflow Area = 10.448 ac, 4.72% Impervious, Inflow Depth = 3.48" for 25-year event
Inflow = 31.91 cfs @ 12.23 hrs, Volume= 3.029 af
Outflow = 11.66 cfs @ 12.49 hrs, Volume= 2.922 af, Atten= 63%, Lag= 15.7 min
Primary = 11.66 cfs @ 12.49 hrs, Volume= 2.922 af
Routed to Link PAP-1 : AP-1
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link PAP-1 : AP-1

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 613.73' @ 12.49 hrs Surf.Area= 14,610 sf Storage= 36,447 cf

Plug-Flow detention time= 86.7 min calculated for 2.921 af (96% of inflow)
Center-of-Mass det. time= 66.6 min (918.8 - 852.2)

Volume	Invert	Avail.Storage	Storage Description
#1	610.00'	75,163 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

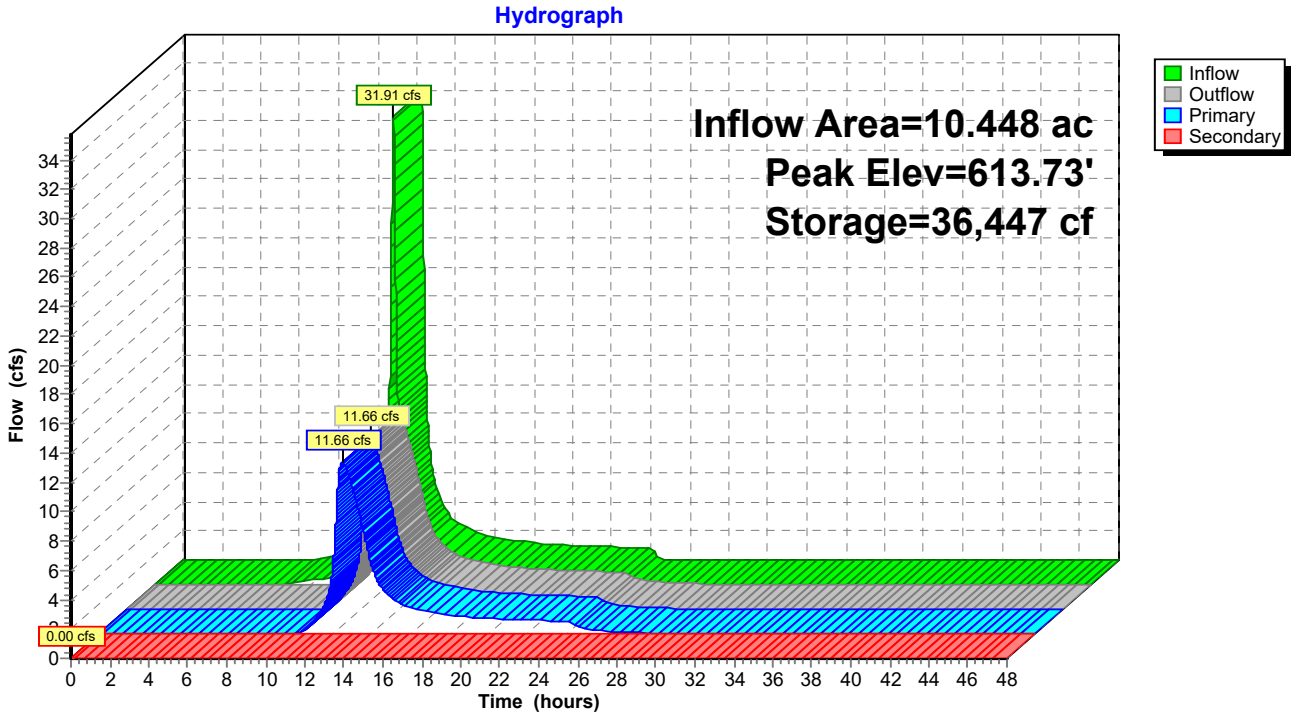
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
610.00	126	42.7	0	0	126
611.00	9,551	438.8	3,591	3,591	15,305
612.00	11,382	522.9	10,453	14,044	21,759
613.00	13,181	584.7	12,271	26,315	27,234
614.00	15,158	647.5	14,158	40,473	33,423
615.00	17,308	711.0	16,221	56,694	40,321
616.00	19,655	774.8	18,469	75,163	47,901

Device	Routing	Invert	Outlet Devices
#1	Primary	608.00'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 608.00' / 606.00' S= 0.0364 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	611.10'	**18.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	614.00'	**36.0" x 21.0" Horiz. Oriface/Grate Outlet** C= 0.600 Limited to weir flow at low heads
#4	Secondary	615.00'	**16.0' long + 3.0 '/' SideZ x 14.0' 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) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=11.67 cfs @ 12.49 hrs HW=613.73' (Free Discharge)
└**1=Culvert** (Passes 11.67 cfs of 32.90 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 11.67 cfs @ 6.60 fps)
└**3=Oriface/Grate Outlet** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=610.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1B: Stormwater Basin



Summary for Pond CULV: Culvert

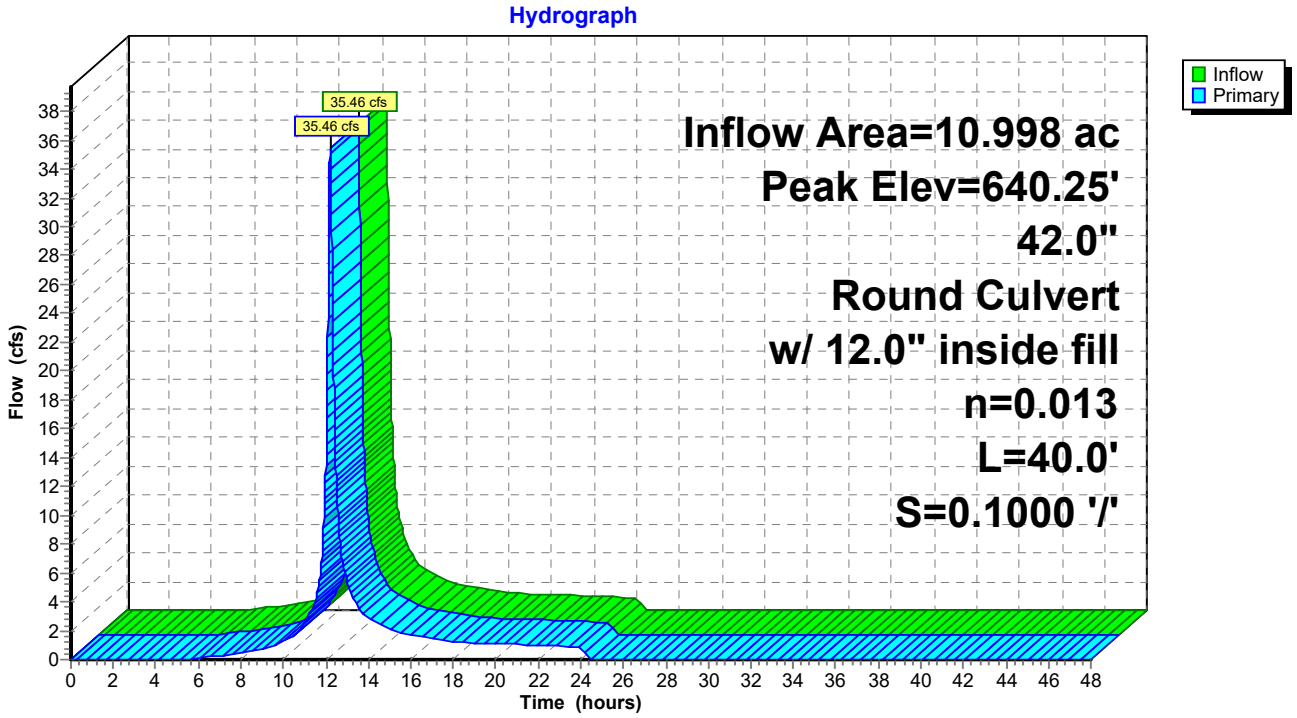
Inflow Area = 10.998 ac, 22.03% Impervious, Inflow Depth = 3.78" for 25-year event
Inflow = 35.46 cfs @ 12.21 hrs, Volume= 3.466 af
Outflow = 35.46 cfs @ 12.21 hrs, Volume= 3.466 af, Atten= 0%, Lag= 0.0 min
Primary = 35.46 cfs @ 12.21 hrs, Volume= 3.466 af
Routed to Link PAP-2 : AP-2

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 640.25' @ 12.21 hrs
Flood Elev= 643.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	638.00'	**42.0" Round Culvert w/ 12.0" inside fill** L= 40.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 637.00' / 633.00' S= 0.1000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.35 sf

Primary OutFlow Max=35.43 cfs @ 12.21 hrs HW=640.25' TW=636.50' (Fixed TW Elev= 636.50')
1=Culvert (Inlet Controls 35.43 cfs @ 5.03 fps)

Pond CULV: Culvert

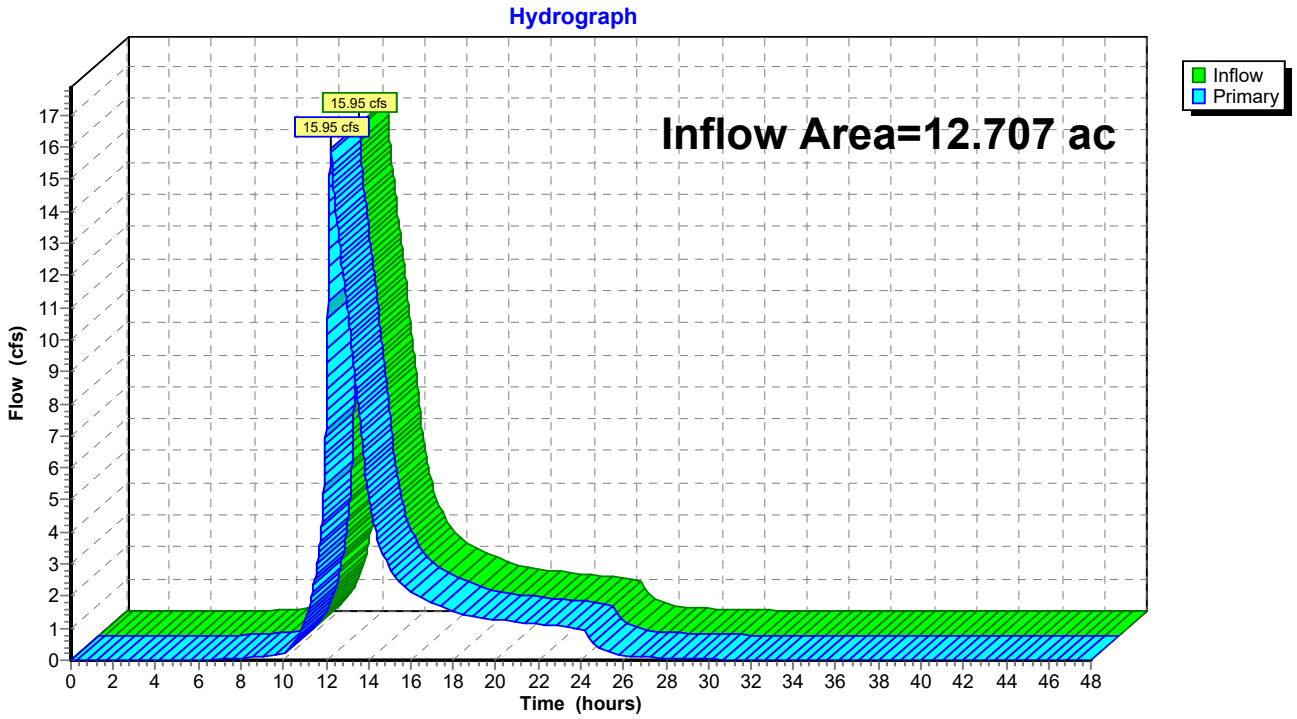


Summary for Link PAP-1: AP-1

Inflow Area = 12.707 ac, 4.89% Impervious, Inflow Depth > 3.38" for 25-year event
Inflow = 15.95 cfs @ 12.23 hrs, Volume= 3.576 af
Primary = 15.95 cfs @ 12.23 hrs, Volume= 3.576 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link PAP-1: AP-1

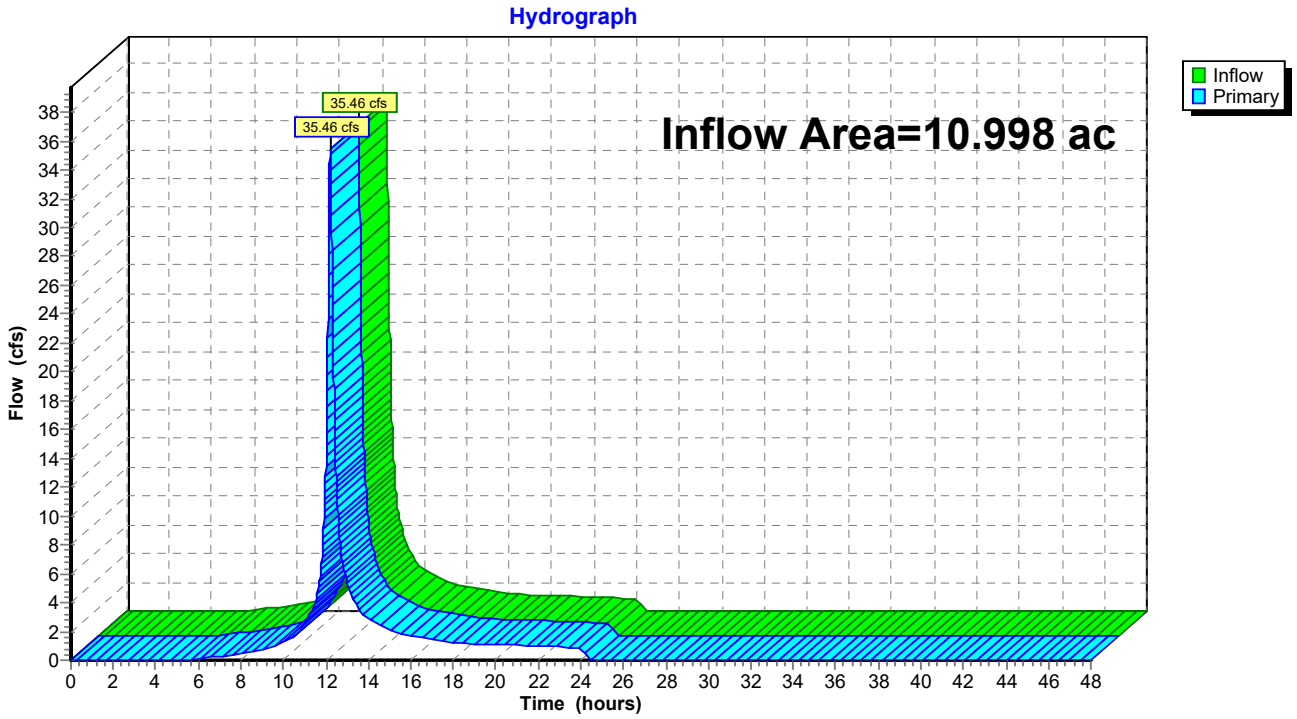


Summary for Link PAP-2: AP-2

Inflow Area = 10.998 ac, 22.03% Impervious, Inflow Depth = 3.78" for 25-year event
Inflow = 35.46 cfs @ 12.21 hrs, Volume= 3.466 af
Primary = 35.46 cfs @ 12.21 hrs, Volume= 3.466 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link PAP-2: AP-2



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PDA-1A: PDA-1A Runoff Area=10.448 ac 4.72% Impervious Runoff Depth=4.20"
Flow Length=938' Tc=12.0 min CN=77 Runoff=38.71 cfs 3.653 af

Subcatchment PDA-1B: PDA-1B Runoff Area=2.259 ac 5.66% Impervious Runoff Depth=4.20"
Flow Length=779' Tc=11.5 min CN=77 Runoff=8.47 cfs 0.790 af

Subcatchment PDA-2: PDA-2 Runoff Area=10.998 ac 22.03% Impervious Runoff Depth=4.52"
Flow Length=1,712' Tc=13.0 min CN=80 Runoff=42.16 cfs 4.142 af

Reach W-SW: Western Swale Avg. Flow Depth=0.97' Max Vel=5.05 fps Inflow=38.71 cfs 3.653 af
n=0.030 L=316.0' S=0.0190 '/' Capacity=182.01 cfs Outflow=38.36 cfs 3.653 af

Pond 1B: Stormwater Basin Peak Elev=614.17' Storage=43,037 cf Inflow=38.36 cfs 3.653 af
Primary=15.10 cfs 3.545 af Secondary=0.00 cfs 0.000 af Outflow=15.10 cfs 3.545 af

Pond CULV: Culvert Peak Elev=640.61' Inflow=42.16 cfs 4.142 af
42.0" Round Culvert w/ 12.0" inside fill n=0.013 L=40.0' S=0.1000 '/' Outflow=42.16 cfs 4.142 af

Link PAP-1: AP-1 Inflow=18.55 cfs 4.335 af
Primary=18.55 cfs 4.335 af

Link PAP-2: AP-2 Inflow=42.16 cfs 4.142 af
Primary=42.16 cfs 4.142 af

Total Runoff Area = 23.705 ac Runoff Volume = 8.585 af Average Runoff Depth = 4.35"
87.16% Pervious = 20.662 ac 12.84% Impervious = 3.043 ac

Summary for Subcatchment PDA-1A: PDA-1A

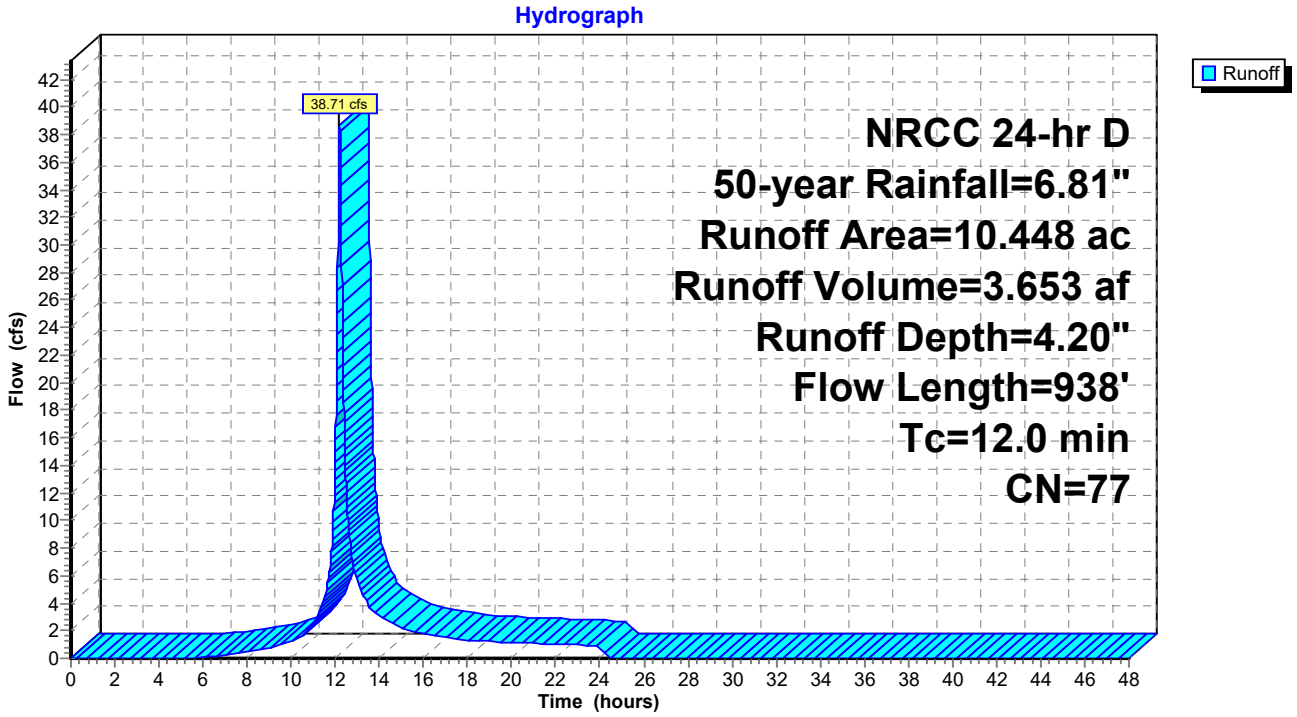
Runoff = 38.71 cfs @ 12.20 hrs, Volume= 3.653 af, Depth= 4.20"
Routed to Reach W-SW : Western Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 50-year Rainfall=6.81"

Area (ac)	CN	Description
2.260	79	1 acre lots, 20% imp, HSG C
1.245	73	Woods, Fair, HSG C
1.303	79	Woods, Fair, HSG D
1.556	71	Meadow, non-grazed, HSG C
3.916	78	Meadow, non-grazed, HSG D
0.127	96	Gravel surface, HSG D
0.041	98	Paved parking, HSG D
10.448	77	Weighted Average
9.955		95.28% Pervious Area
0.493		4.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100	0.1100	0.33		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
1.1	131	0.0780	1.95		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.7	65	0.1091	1.65		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
3.4	422	0.0899	2.10		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
1.8	220	0.0190	2.07		**Shallow Concentrated Flow, E-F** Grassed Waterway Kv= 15.0 fps
12.0	938	Total			

Subcatchment PDA-1A: PDA-1A



Summary for Subcatchment PDA-1B: PDA-1B

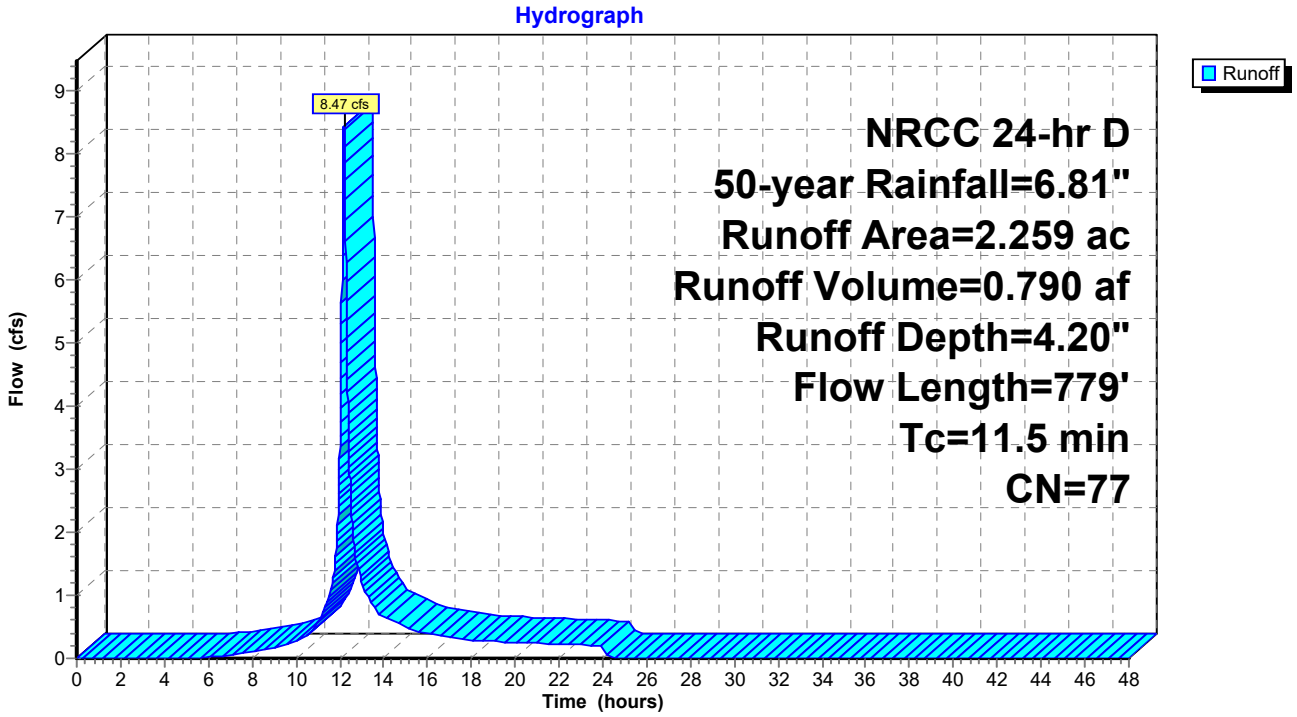
Runoff = 8.47 cfs @ 12.19 hrs, Volume= 0.790 af, Depth= 4.20"
Routed to Link PAP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 50-year Rainfall=6.81"

	Area (ac)	CN	Description
	0.639	79	1 acre lots, 20% imp, HSG C
	0.228	73	Woods, Fair, HSG C
	0.078	79	Woods, Fair, HSG D
*	0.565	75	Meadow, non-grazed, HSG C/D
	0.749	78	Meadow, non-grazed, HSG D
	2.259	77	Weighted Average
	2.131		94.34% Pervious Area
	0.128		5.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	100	0.1300	0.36		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
0.7	102	0.1078	2.30		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.0	96	0.0937	1.53		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
5.1	481	0.0986	1.57		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
11.5	779	Total			

Subcatchment PDA-1B: PDA-1B



Summary for Subcatchment PDA-2: PDA-2

[47] Hint: Peak is 262% of capacity of segment #4

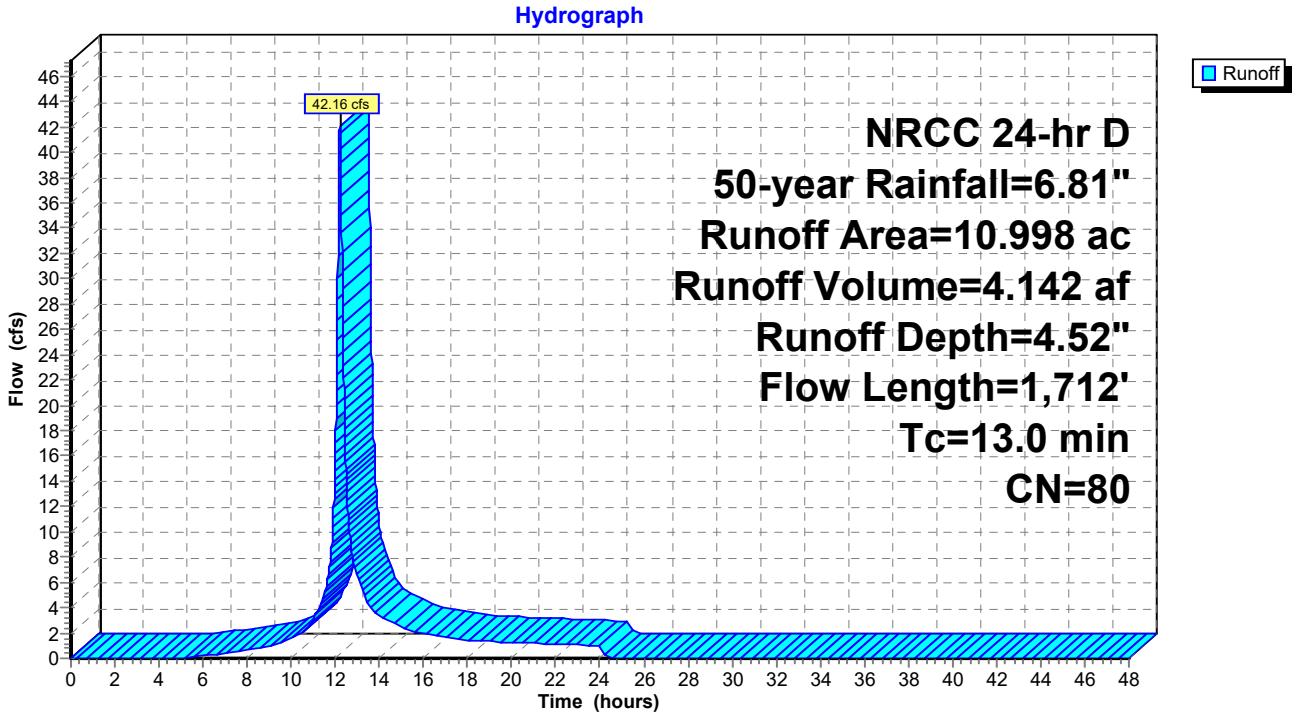
Runoff = 42.16 cfs @ 12.21 hrs, Volume= 4.142 af, Depth= 4.52"
Routed to Pond CULV : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 50-year Rainfall=6.81"

Area (ac)	CN	Description
5.677	79	1 acre lots, 20% imp, HSG C
2.964	73	Woods, Fair, HSG C
1.070	79	Woods, Fair, HSG D
1.152	98	Paved roads w/curbs & sewers, HSG C
0.135	98	Paved roads w/curbs & sewers, HSG D
10.998	80	Weighted Average
8.576		77.97% Pervious Area
2.422		22.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	100	0.1000	0.32		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
5.9	585	0.1094	1.65		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.9	167	0.0240	3.14		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.8	608	0.0444	13.11	16.09	**Pipe Channel, D-E** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
0.2	252	0.1071	26.20	487.30	**Channel Flow, E-F** Area= 18.6 sf Perim= 11.9' r= 1.56' n= 0.025 Earth, clean & winding
13.0	1,712	Total			

Subcatchment PDA-2: PDA-2



Summary for Reach W-SW: Western Swale

Inflow Area = 10.448 ac, 4.72% Impervious, Inflow Depth = 4.20" for 50-year event
Inflow = 38.71 cfs @ 12.20 hrs, Volume= 3.653 af
Outflow = 38.36 cfs @ 12.23 hrs, Volume= 3.653 af, Atten= 1%, Lag= 1.8 min
Routed to Pond 1B : Stormwater Basin

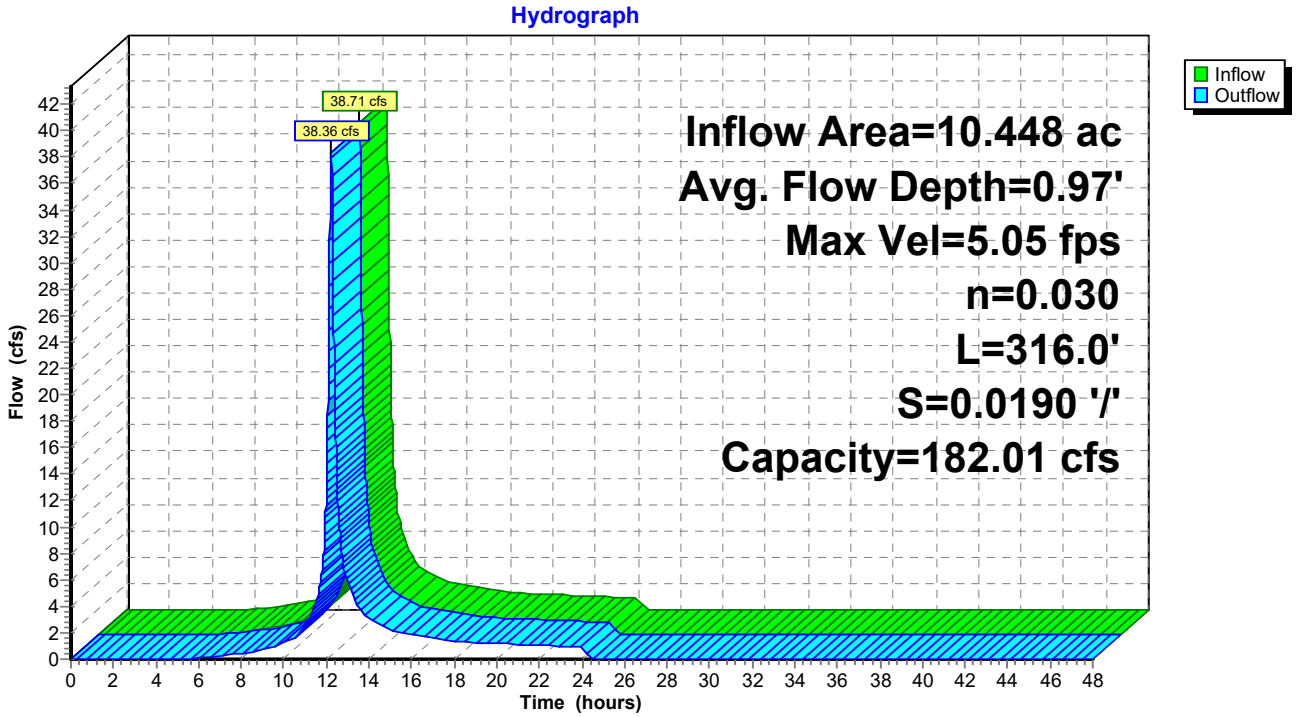
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.05 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 1.77 fps, Avg. Travel Time= 3.0 min

Peak Storage= 2,405 cf @ 12.21 hrs
Average Depth at Peak Storage= 0.97' , Surface Width= 11.74'
Bank-Full Depth= 2.00' Flow Area= 24.0 sf, Capacity= 182.01 cfs

4.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 20.00'
Length= 316.0' Slope= 0.0190 '/'
Inlet Invert= 621.00', Outlet Invert= 615.00'

‡

Reach W-SW: Western Swale



Summary for Pond 1B: Stormwater Basin

Inflow Area = 10.448 ac, 4.72% Impervious, Inflow Depth = 4.20" for 50-year event
Inflow = 38.36 cfs @ 12.23 hrs, Volume= 3.653 af
Outflow = 15.10 cfs @ 12.47 hrs, Volume= 3.545 af, Atten= 61%, Lag= 14.3 min
Primary = 15.10 cfs @ 12.47 hrs, Volume= 3.545 af
Routed to Link PAP-1 : AP-1
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link PAP-1 : AP-1

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 614.17' @ 12.47 hrs Surf.Area= 15,508 sf Storage= 43,037 cf

Plug-Flow detention time= 80.9 min calculated for 3.545 af (97% of inflow)
Center-of-Mass det. time= 63.6 min (908.7 - 845.1)

Volume	Invert	Avail.Storage	Storage Description
#1	610.00'	75,163 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

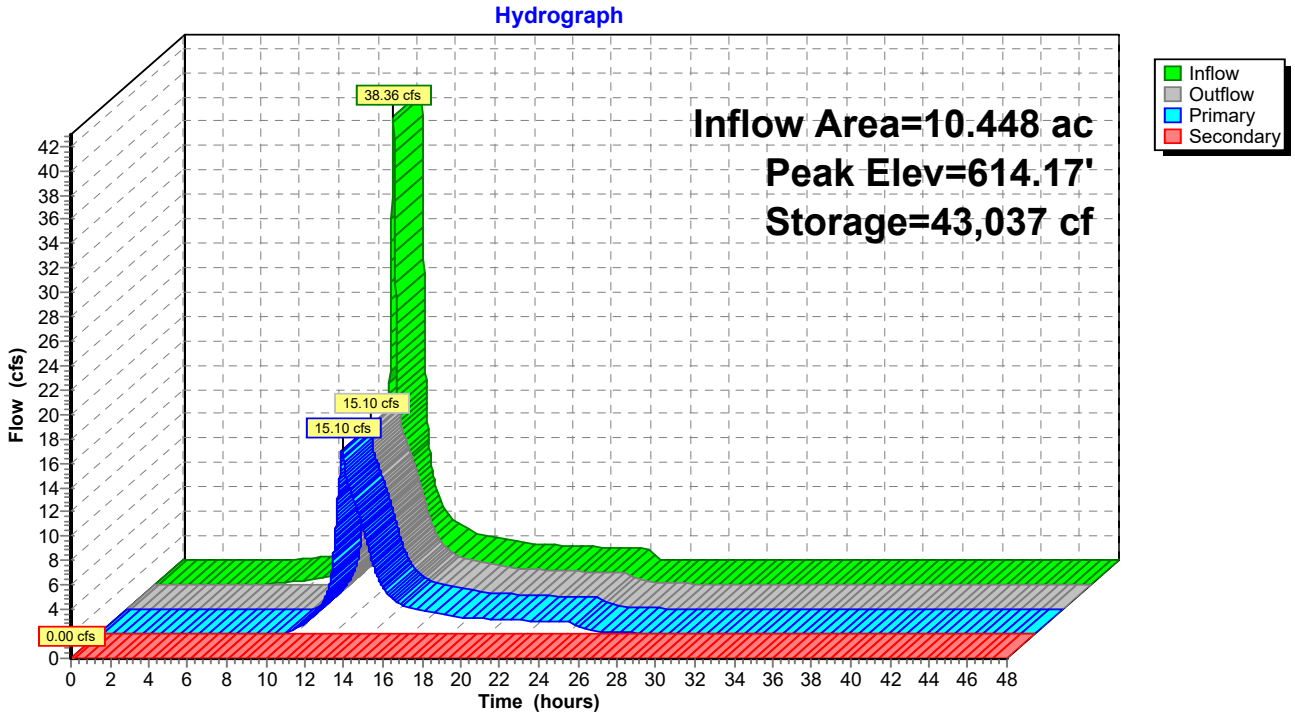
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
610.00	126	42.7	0	0	126
611.00	9,551	438.8	3,591	3,591	15,305
612.00	11,382	522.9	10,453	14,044	21,759
613.00	13,181	584.7	12,271	26,315	27,234
614.00	15,158	647.5	14,158	40,473	33,423
615.00	17,308	711.0	16,221	56,694	40,321
616.00	19,655	774.8	18,469	75,163	47,901

Device	Routing	Invert	Outlet Devices
#1	Primary	608.00'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 608.00' / 606.00' S= 0.0364 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	611.10'	**18.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	614.00'	**36.0" x 21.0" Horiz. Oriface/Grate Outlet** C= 0.600 Limited to weir flow at low heads
#4	Secondary	615.00'	**16.0' long + 3.0 '/' SideZ x 14.0' 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) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=15.07 cfs @ 12.47 hrs HW=614.17' (Free Discharge)
└**1=Culvert** (Passes 15.07 cfs of 34.38 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 12.95 cfs @ 7.33 fps)
└**3=Oriface/Grate Outlet** (Weir Controls 2.12 cfs @ 1.34 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=610.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1B: Stormwater Basin



Summary for Pond CULV: Culvert

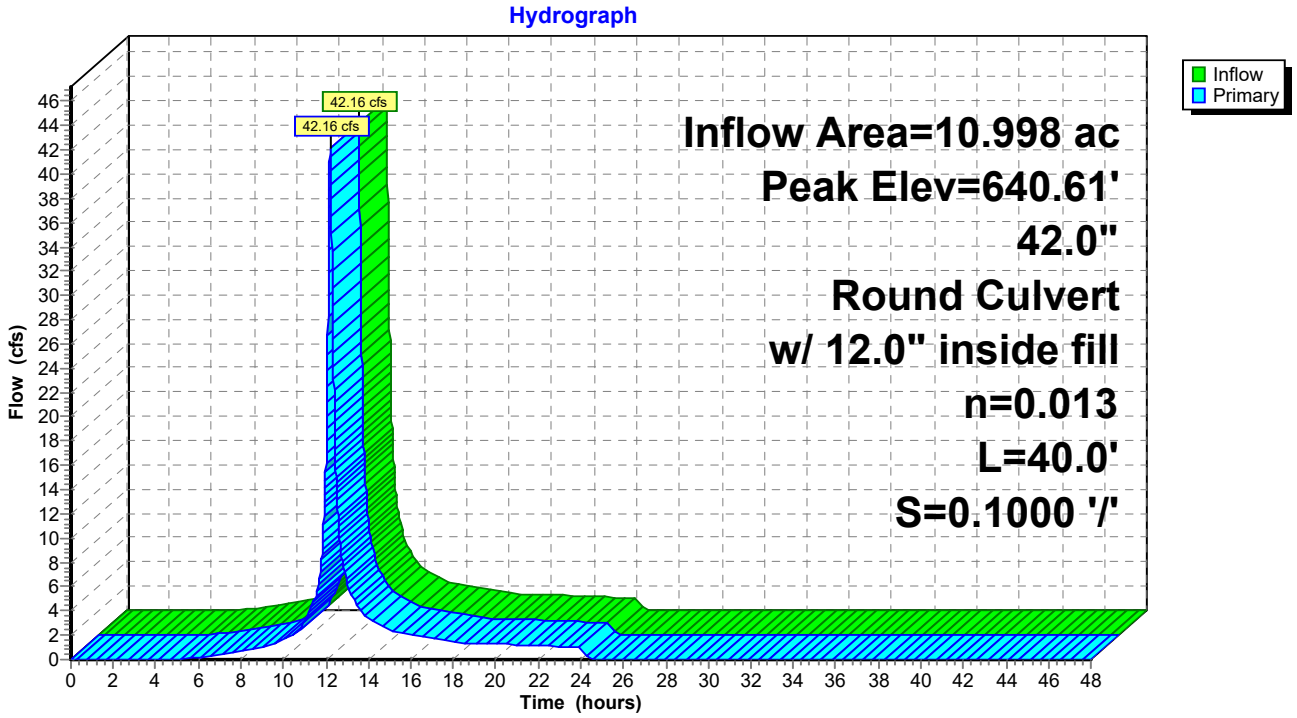
Inflow Area = 10.998 ac, 22.03% Impervious, Inflow Depth = 4.52" for 50-year event
Inflow = 42.16 cfs @ 12.21 hrs, Volume= 4.142 af
Outflow = 42.16 cfs @ 12.21 hrs, Volume= 4.142 af, Atten= 0%, Lag= 0.0 min
Primary = 42.16 cfs @ 12.21 hrs, Volume= 4.142 af
Routed to Link PAP-2 : AP-2

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 640.61' @ 12.21 hrs
Flood Elev= 643.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	638.00'	**42.0" Round Culvert w/ 12.0" inside fill** L= 40.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 637.00' / 633.00' S= 0.1000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.35 sf

Primary OutFlow Max=42.11 cfs @ 12.21 hrs HW=640.61' TW=636.50' (Fixed TW Elev= 636.50')
1=Culvert (Inlet Controls 42.11 cfs @ 5.73 fps)

Pond CULV: Culvert

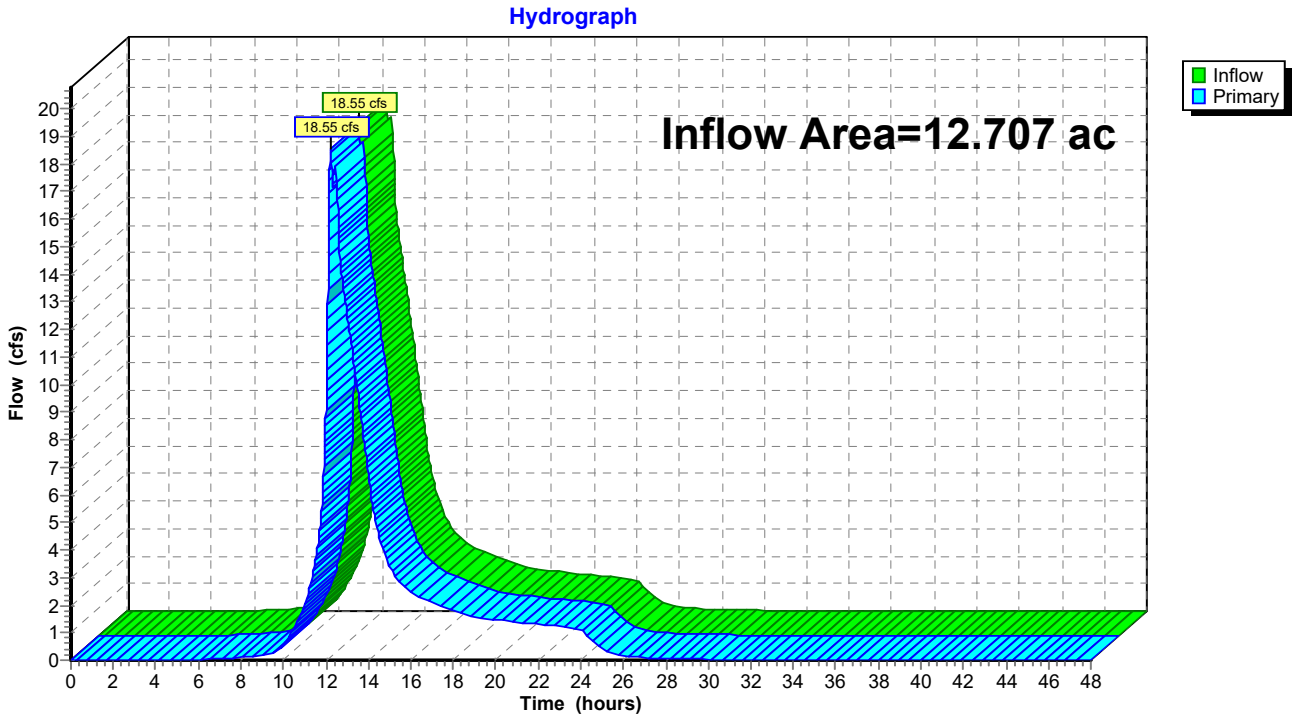


Summary for Link PAP-1: AP-1

Inflow Area = 12.707 ac, 4.89% Impervious, Inflow Depth > 4.09" for 50-year event
Inflow = 18.55 cfs @ 12.23 hrs, Volume= 4.335 af
Primary = 18.55 cfs @ 12.23 hrs, Volume= 4.335 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link PAP-1: AP-1

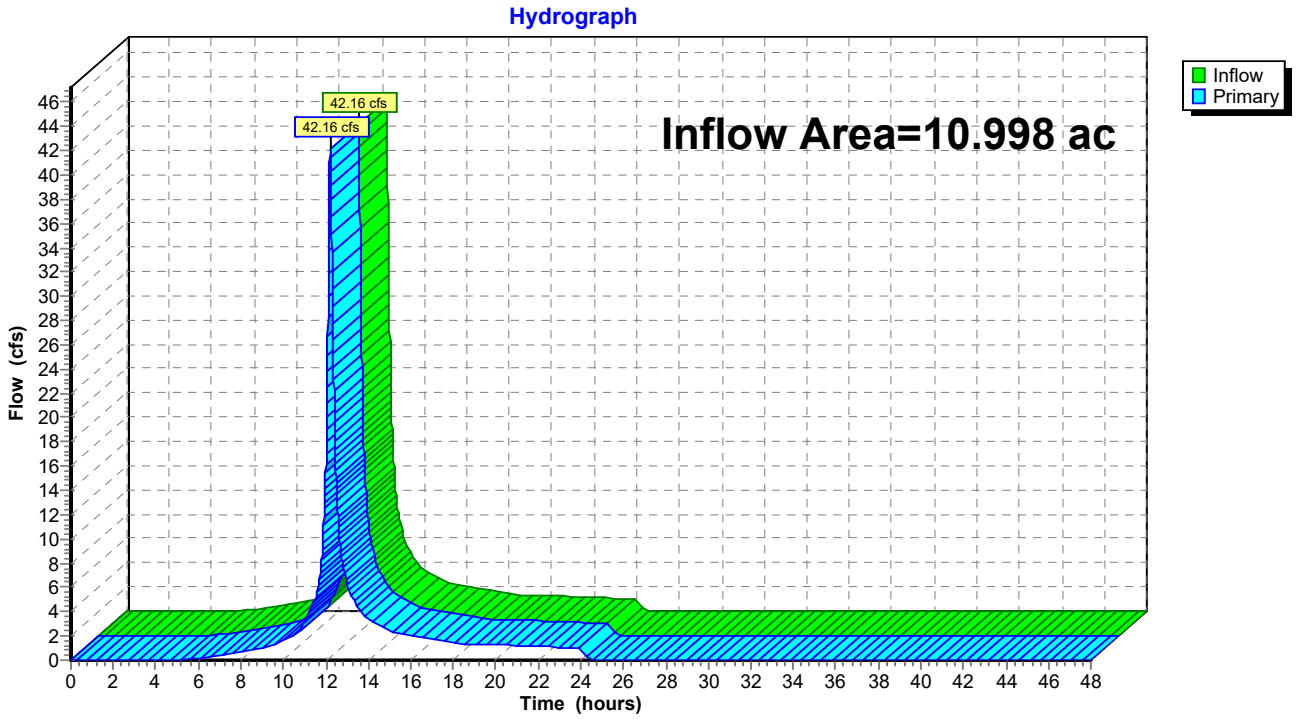


Summary for Link PAP-2: AP-2

Inflow Area = 10.998 ac, 22.03% Impervious, Inflow Depth = 4.52" for 50-year event
Inflow = 42.16 cfs @ 12.21 hrs, Volume= 4.142 af
Primary = 42.16 cfs @ 12.21 hrs, Volume= 4.142 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link PAP-2: AP-2



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PDA-1A: PDA-1A Runoff Area=10.448 ac 4.72% Impervious Runoff Depth=4.99"
Flow Length=938' Tc=12.0 min CN=77 Runoff=45.82 cfs 4.345 af

Subcatchment PDA-1B: PDA-1B Runoff Area=2.259 ac 5.66% Impervious Runoff Depth=4.99"
Flow Length=779' Tc=11.5 min CN=77 Runoff=10.03 cfs 0.940 af

Subcatchment PDA-2: PDA-2 Runoff Area=10.998 ac 22.03% Impervious Runoff Depth=5.33"
Flow Length=1,712' Tc=13.0 min CN=80 Runoff=49.46 cfs 4.890 af

Reach W-SW: Western Swale Avg. Flow Depth=1.05' Max Vel=5.28 fps Inflow=45.82 cfs 4.345 af
n=0.030 L=316.0' S=0.0190 '/' Capacity=182.01 cfs Outflow=45.43 cfs 4.345 af

Pond 1B: Stormwater Basin Peak Elev=614.45' Storage=47,474 cf Inflow=45.43 cfs 4.345 af
Primary=23.04 cfs 4.238 af Secondary=0.00 cfs 0.000 af Outflow=23.04 cfs 4.238 af

Pond CULV: Culvert Peak Elev=641.12' Inflow=49.46 cfs 4.890 af
42.0" Round Culvert w/ 12.0" inside fill n=0.013 L=40.0' S=0.1000 '/' Outflow=49.46 cfs 4.890 af

Link PAP-1: AP-1 Inflow=27.44 cfs 5.177 af
Primary=27.44 cfs 5.177 af

Link PAP-2: AP-2 Inflow=49.46 cfs 4.890 af
Primary=49.46 cfs 4.890 af

Total Runoff Area = 23.705 ac Runoff Volume = 10.174 af Average Runoff Depth = 5.15"
87.16% Pervious = 20.662 ac 12.84% Impervious = 3.043 ac

Summary for Subcatchment PDA-1A: PDA-1A

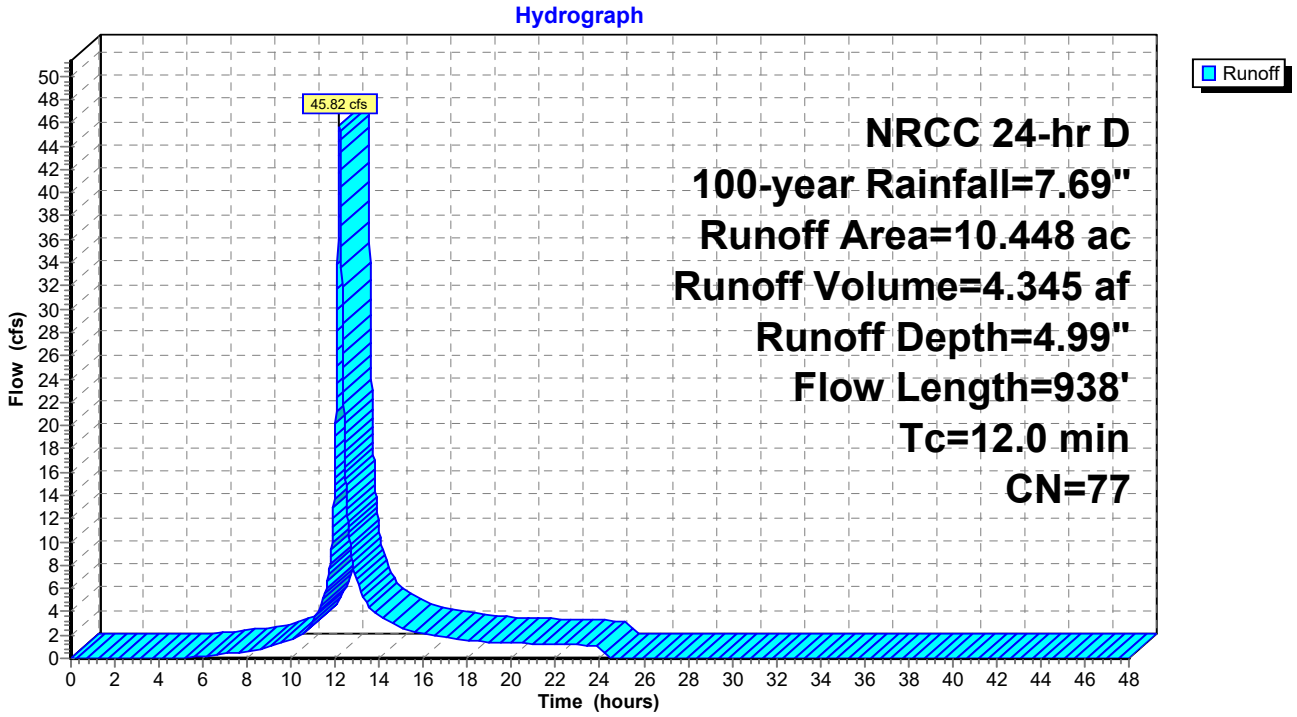
Runoff = 45.82 cfs @ 12.20 hrs, Volume= 4.345 af, Depth= 4.99"
Routed to Reach W-SW : Western Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-year Rainfall=7.69"

Area (ac)	CN	Description
2.260	79	1 acre lots, 20% imp, HSG C
1.245	73	Woods, Fair, HSG C
1.303	79	Woods, Fair, HSG D
1.556	71	Meadow, non-grazed, HSG C
3.916	78	Meadow, non-grazed, HSG D
0.127	96	Gravel surface, HSG D
0.041	98	Paved parking, HSG D
10.448	77	Weighted Average
9.955		95.28% Pervious Area
0.493		4.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100	0.1100	0.33		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
1.1	131	0.0780	1.95		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.7	65	0.1091	1.65		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
3.4	422	0.0899	2.10		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
1.8	220	0.0190	2.07		**Shallow Concentrated Flow, E-F** Grassed Waterway Kv= 15.0 fps
12.0	938	Total			

Subcatchment PDA-1A: PDA-1A



Summary for Subcatchment PDA-1B: PDA-1B

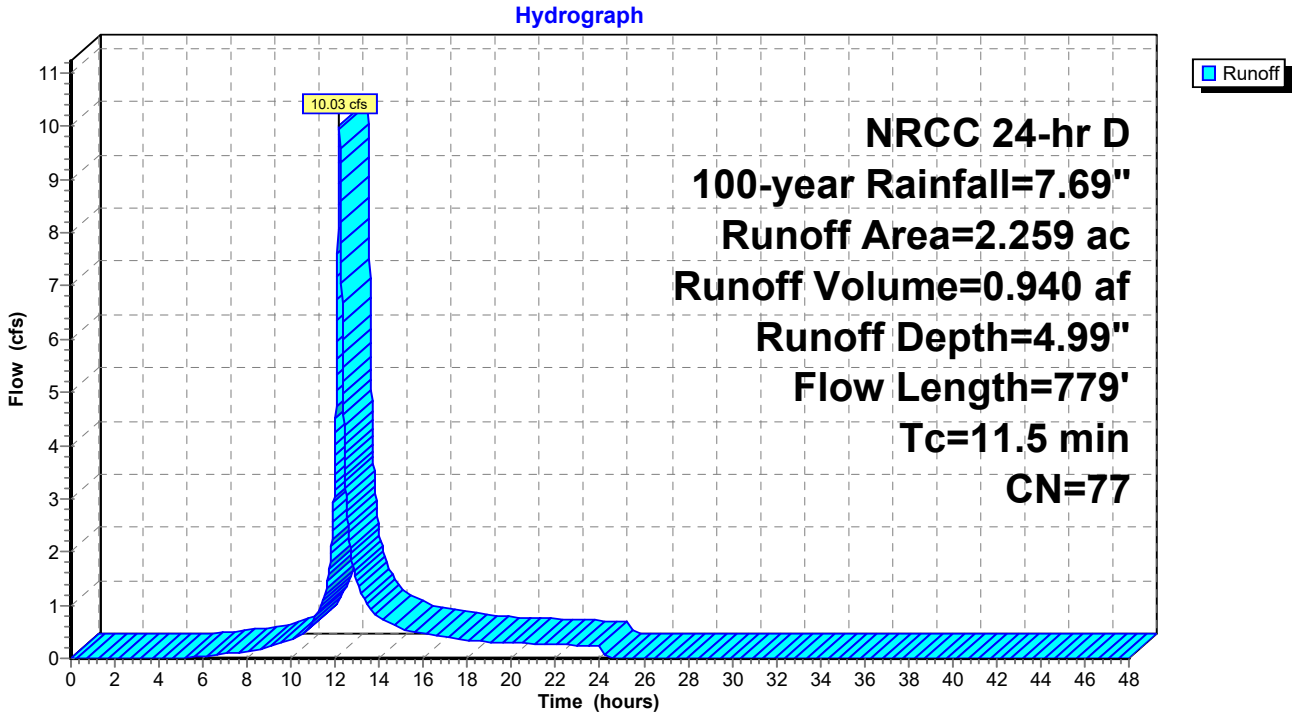
Runoff = 10.03 cfs @ 12.19 hrs, Volume= 0.940 af, Depth= 4.99"
Routed to Link PAP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-year Rainfall=7.69"

	Area (ac)	CN	Description
	0.639	79	1 acre lots, 20% imp, HSG C
	0.228	73	Woods, Fair, HSG C
	0.078	79	Woods, Fair, HSG D
*	0.565	75	Meadow, non-grazed, HSG C/D
	0.749	78	Meadow, non-grazed, HSG D
	2.259	77	Weighted Average
	2.131		94.34% Pervious Area
	0.128		5.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	100	0.1300	0.36		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
0.7	102	0.1078	2.30		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.0	96	0.0937	1.53		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
5.1	481	0.0986	1.57		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
11.5	779	Total			

Subcatchment PDA-1B: PDA-1B



Summary for Subcatchment PDA-2: PDA-2

[47] Hint: Peak is 307% of capacity of segment #4

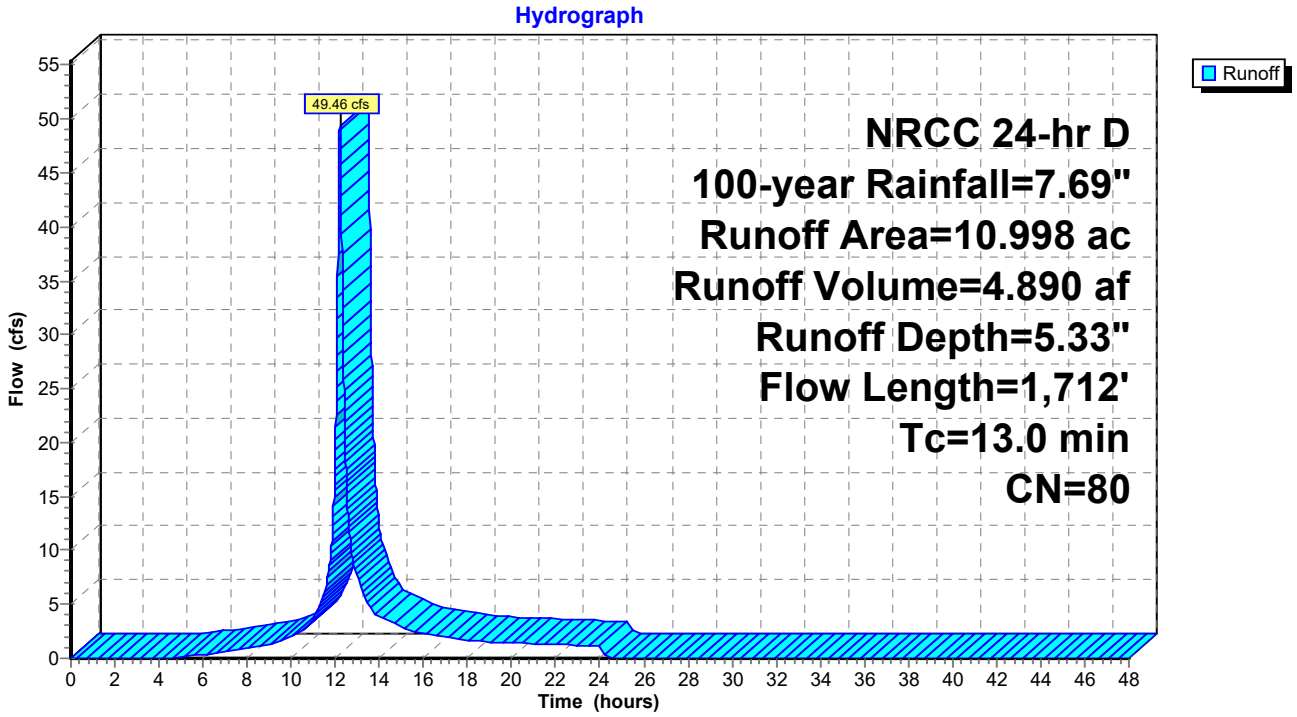
Runoff = 49.46 cfs @ 12.21 hrs, Volume= 4.890 af, Depth= 5.33"
Routed to Pond CULV : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-year Rainfall=7.69"

Area (ac)	CN	Description
5.677	79	1 acre lots, 20% imp, HSG C
2.964	73	Woods, Fair, HSG C
1.070	79	Woods, Fair, HSG D
1.152	98	Paved roads w/curbs & sewers, HSG C
0.135	98	Paved roads w/curbs & sewers, HSG D
10.998	80	Weighted Average
8.576		77.97% Pervious Area
2.422		22.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	100	0.1000	0.32		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.16"
5.9	585	0.1094	1.65		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.9	167	0.0240	3.14		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.8	608	0.0444	13.11	16.09	**Pipe Channel, D-E** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
0.2	252	0.1071	26.20	487.30	**Channel Flow, E-F** Area= 18.6 sf Perim= 11.9' r= 1.56' n= 0.025 Earth, clean & winding
13.0	1,712	Total			

Subcatchment PDA-2: PDA-2



Summary for Reach W-SW: Western Swale

Inflow Area = 10.448 ac, 4.72% Impervious, Inflow Depth = 4.99" for 100-year event
Inflow = 45.82 cfs @ 12.20 hrs, Volume= 4.345 af
Outflow = 45.43 cfs @ 12.22 hrs, Volume= 4.345 af, Atten= 1%, Lag= 1.7 min
Routed to Pond 1B : Stormwater Basin

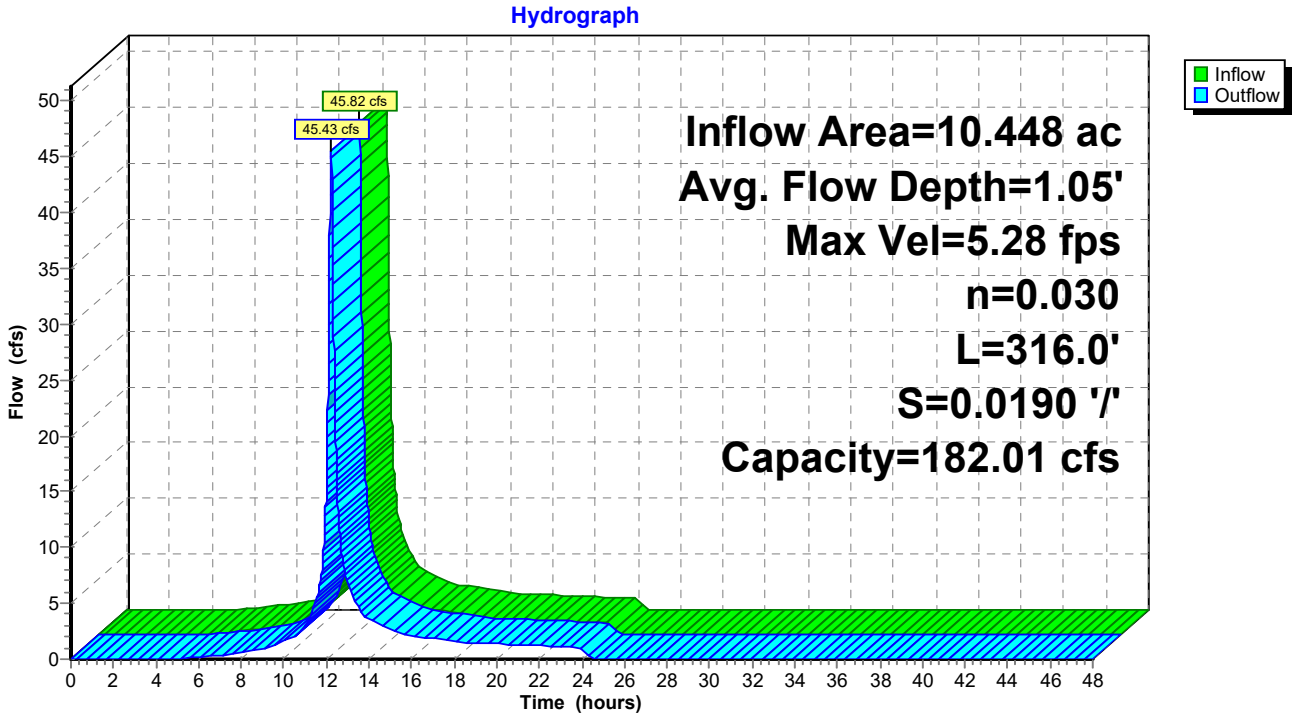
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.28 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 1.86 fps, Avg. Travel Time= 2.8 min

Peak Storage= 2,722 cf @ 12.21 hrs
Average Depth at Peak Storage= 1.05' , Surface Width= 12.40'
Bank-Full Depth= 2.00' Flow Area= 24.0 sf, Capacity= 182.01 cfs

4.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 20.00'
Length= 316.0' Slope= 0.0190 '/'
Inlet Invert= 621.00', Outlet Invert= 615.00'

‡

Reach W-SW: Western Swale



Summary for Pond 1B: Stormwater Basin

Inflow Area = 10.448 ac, 4.72% Impervious, Inflow Depth = 4.99" for 100-year event
Inflow = 45.43 cfs @ 12.22 hrs, Volume= 4.345 af
Outflow = 23.04 cfs @ 12.40 hrs, Volume= 4.238 af, Atten= 49%, Lag= 10.6 min
Primary = 23.04 cfs @ 12.40 hrs, Volume= 4.238 af
Routed to Link PAP-1 : AP-1
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link PAP-1 : AP-1

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 614.45' @ 12.40 hrs Surf.Area= 16,103 sf Storage= 47,474 cf

Plug-Flow detention time= 74.0 min calculated for 4.237 af (98% of inflow)
Center-of-Mass det. time= 59.5 min (898.0 - 838.5)

Volume	Invert	Avail.Storage	Storage Description
#1	610.00'	75,163 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

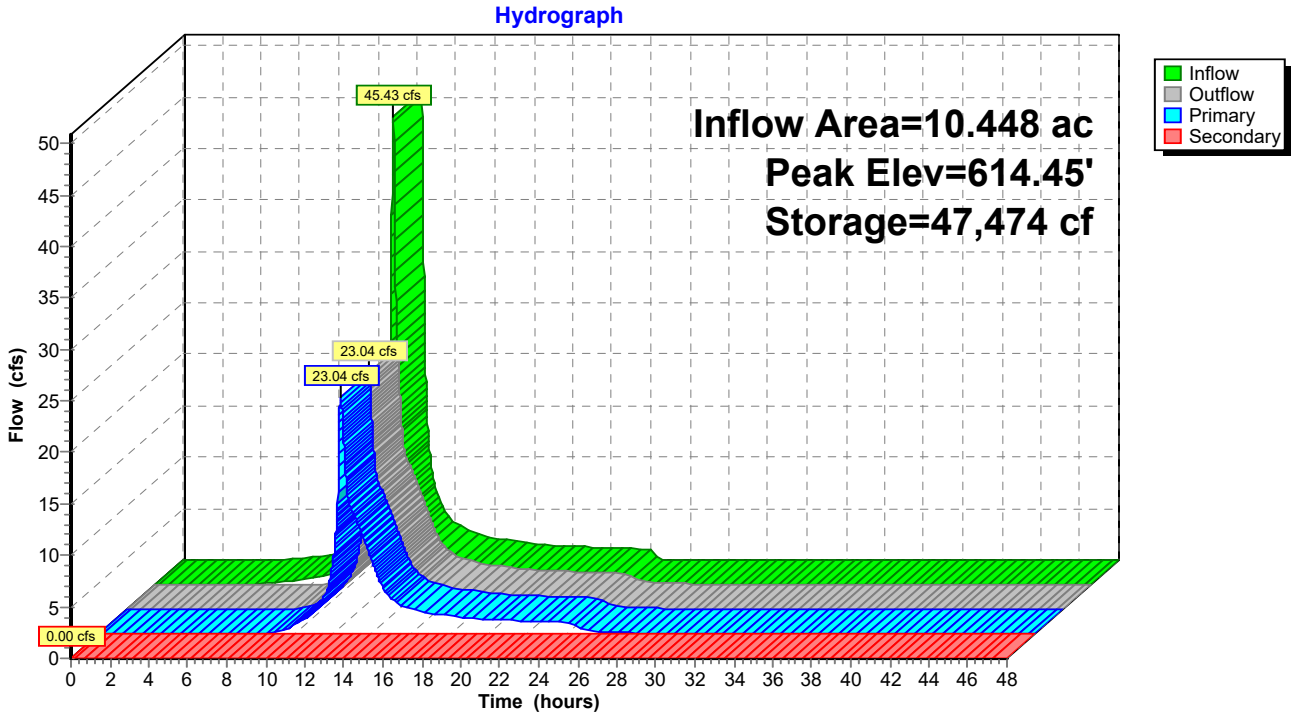
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
610.00	126	42.7	0	0	126
611.00	9,551	438.8	3,591	3,591	15,305
612.00	11,382	522.9	10,453	14,044	21,759
613.00	13,181	584.7	12,271	26,315	27,234
614.00	15,158	647.5	14,158	40,473	33,423
615.00	17,308	711.0	16,221	56,694	40,321
616.00	19,655	774.8	18,469	75,163	47,901

Device	Routing	Invert	Outlet Devices
#1	Primary	608.00'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 608.00' / 606.00' S= 0.0364 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	611.10'	**18.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	614.00'	**36.0" x 21.0" Horiz. Oriface/Grate Outlet** C= 0.600 Limited to weir flow at low heads
#4	Secondary	615.00'	**16.0' long + 3.0 '/' SideZ x 14.0' 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) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=23.03 cfs @ 12.40 hrs HW=614.45' (Free Discharge)
└**1=Culvert** (Passes 23.03 cfs of 35.31 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 13.71 cfs @ 7.76 fps)
└**3=Oriface/Grate Outlet** (Weir Controls 9.31 cfs @ 2.19 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=610.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1B: Stormwater Basin



Summary for Pond CULV: Culvert

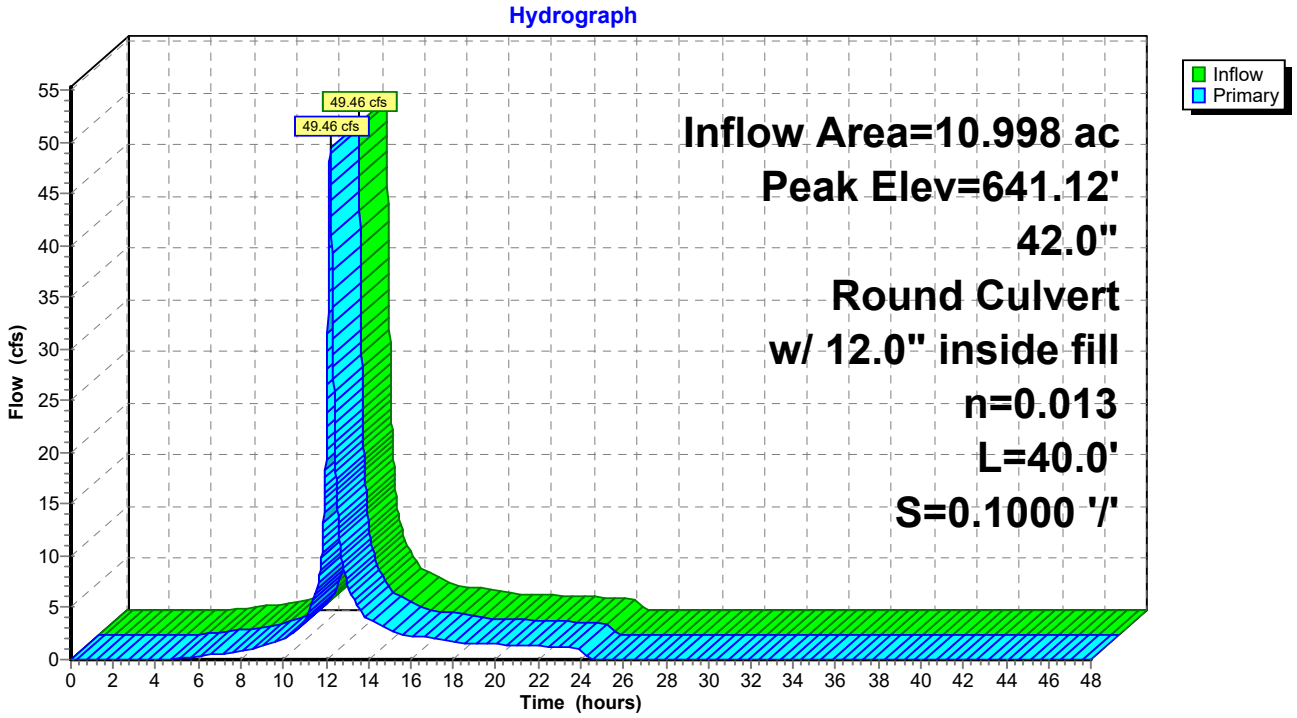
Inflow Area = 10.998 ac, 22.03% Impervious, Inflow Depth = 5.33" for 100-year event
Inflow = 49.46 cfs @ 12.21 hrs, Volume= 4.890 af
Outflow = 49.46 cfs @ 12.21 hrs, Volume= 4.890 af, Atten= 0%, Lag= 0.0 min
Primary = 49.46 cfs @ 12.21 hrs, Volume= 4.890 af
Routed to Link PAP-2 : AP-2

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 641.12' @ 12.21 hrs
Flood Elev= 643.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	638.00'	**42.0" Round Culvert w/ 12.0" inside fill** L= 40.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 637.00' / 633.00' S= 0.1000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.35 sf

Primary OutFlow Max=49.40 cfs @ 12.21 hrs HW=641.12' TW=636.50' (Fixed TW Elev= 636.50')
1=Culvert (Inlet Controls 49.40 cfs @ 6.72 fps)

Pond CULV: Culvert

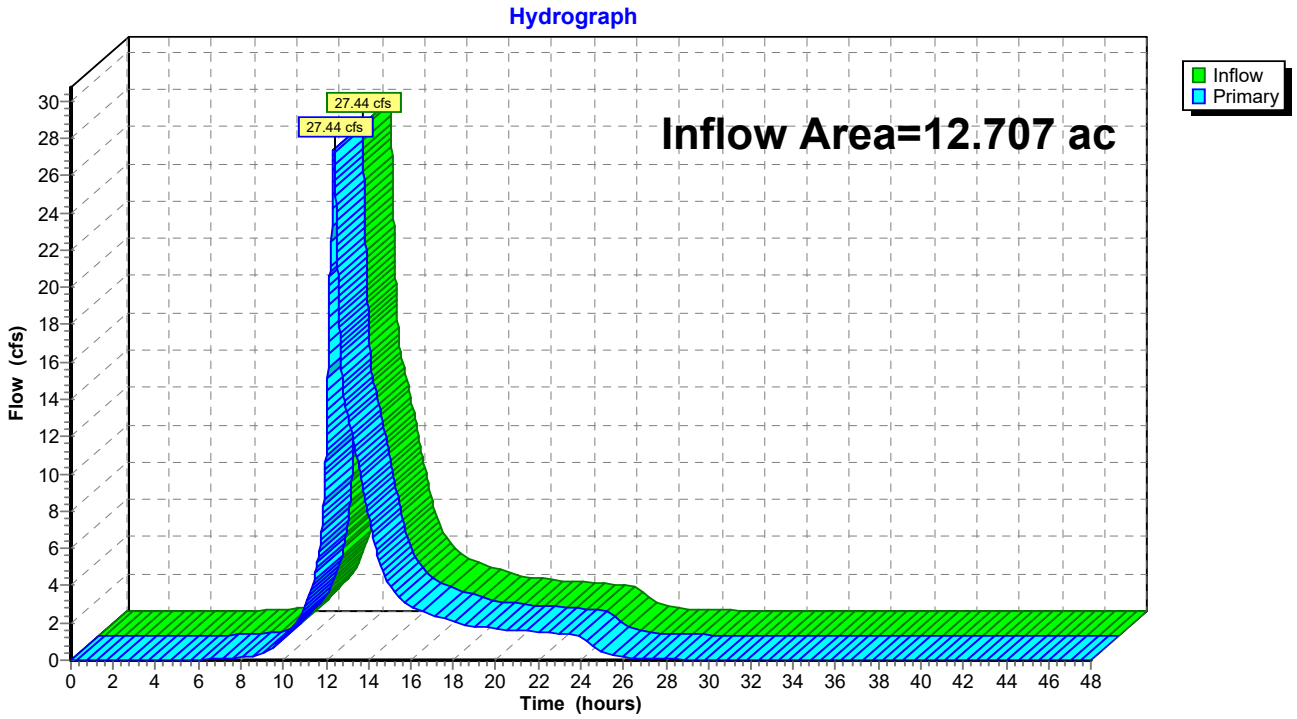


Summary for Link PAP-1: AP-1

Inflow Area = 12.707 ac, 4.89% Impervious, Inflow Depth > 4.89" for 100-year event
Inflow = 27.44 cfs @ 12.38 hrs, Volume= 5.177 af
Primary = 27.44 cfs @ 12.38 hrs, Volume= 5.177 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link PAP-1: AP-1

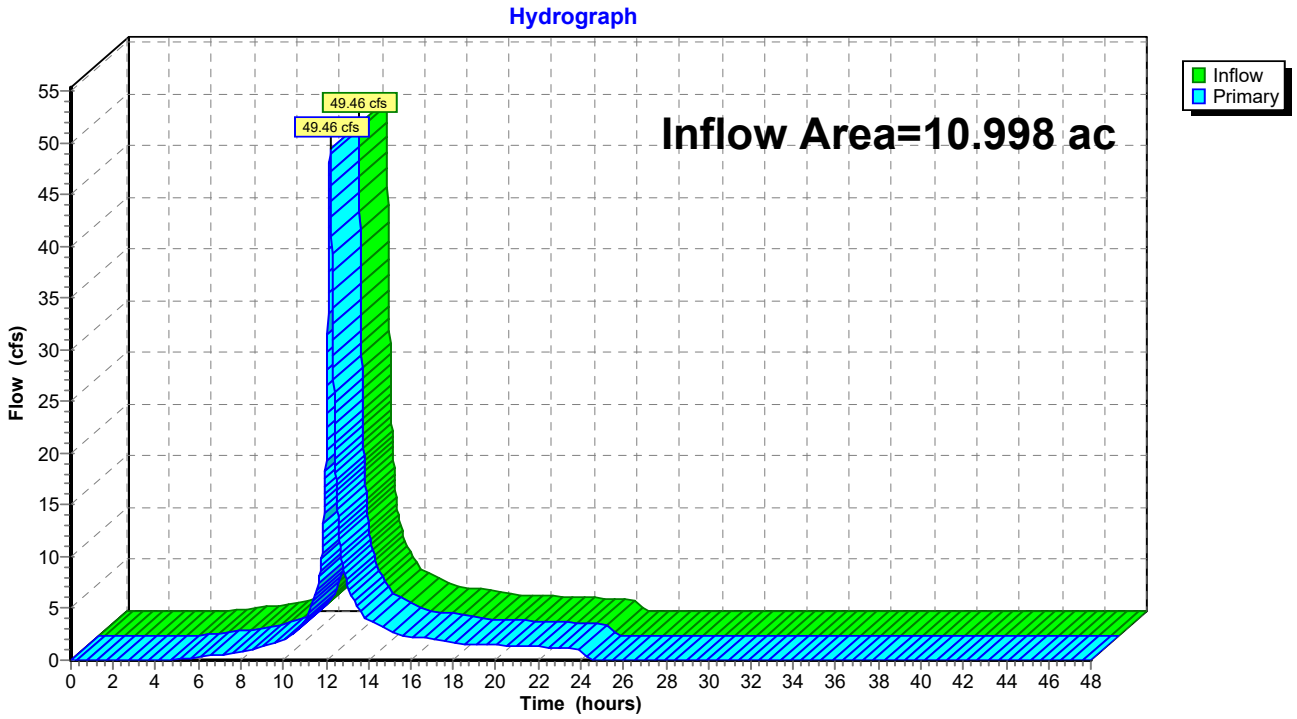


Summary for Link PAP-2: AP-2

Inflow Area = 10.998 ac, 22.03% Impervious, Inflow Depth = 5.33" for 100-year event
Inflow = 49.46 cfs @ 12.21 hrs, Volume= 4.890 af
Primary = 49.46 cfs @ 12.21 hrs, Volume= 4.890 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link PAP-2: AP-2



WATER QUALITY VOLUME (WQV) COMPUTATIONS FOR PDA-1A

Project: Proposed Solar Photovoltaic Array
Location: 250 Carter St., Manchester, CT
Date: 10/13/23

Water Quality Volume Calculations:

$$WQV = \frac{(1.3")(R)(A)}{12}$$

Where:
WQV = water quality volume (ac-ft)
R = volumentric runoff coefficient = 0.05+0.009(I)
I = percent impervious cover (see below)
A = site area in acres

$$I = \frac{A_{IMP}}{A_{TOT}} \times 100$$

Where:
I = percent impervious cover
A_{IMP} = area of impervious cover
A_{TOT} = total area of watershed

Watershed Description:	PDA-1A		
Area of impervious coverage, A_{IMP}	0.26	Acres	
Total area of watershed, A_{TOT}	11.40	Acres	
Percent impverious cover, I	2.28	%	
Volumentric runoff coefficient, R	0.07		
Water Quality Volume, WQV	0.087	ac-ft	3,794 CF required

4,555 CF provided

NOAA Atlas 14, Volume 10, Version 3
Location name: Town of Manchester, Connecticut, USA*
Latitude: 41.7621°, Longitude: -72.4704°
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	0.331 (0.255-0.427)	0.403 (0.310-0.520)	0.520 (0.399-0.674)	0.617 (0.471-0.805)	0.751 (0.556-1.02)	0.851 (0.620-1.18)	0.957 (0.677-1.38)	1.08 (0.722-1.58)	1.25 (0.808-1.90)	1.39 (0.881-2.16)
10-min	0.469 (0.362-0.605)	0.570 (0.439-0.737)	0.736 (0.565-0.955)	0.873 (0.666-1.14)	1.06 (0.788-1.45)	1.21 (0.877-1.68)	1.36 (0.960-1.96)	1.53 (1.02-2.24)	1.77 (1.15-2.69)	1.97 (1.25-3.06)
15-min	0.552 (0.425-0.712)	0.671 (0.517-0.867)	0.866 (0.665-1.12)	1.03 (0.785-1.34)	1.25 (0.927-1.70)	1.42 (1.03-1.97)	1.60 (1.13-2.30)	1.80 (1.20-2.64)	2.08 (1.35-3.17)	2.32 (1.47-3.60)
30-min	0.746 (0.575-0.963)	0.907 (0.699-1.17)	1.17 (0.899-1.52)	1.39 (1.06-1.81)	1.69 (1.25-2.30)	1.92 (1.40-2.67)	2.16 (1.53-3.11)	2.43 (1.63-3.57)	2.82 (1.82-4.28)	3.14 (1.98-4.87)
60-min	0.940 (0.725-1.21)	1.14 (0.881-1.48)	1.48 (1.13-1.92)	1.75 (1.34-2.29)	2.13 (1.58-2.90)	2.42 (1.76-3.36)	2.72 (1.92-3.92)	3.06 (2.05-4.50)	3.55 (2.30-5.40)	3.95 (2.50-6.13)
2-hr	1.21 (0.941-1.56)	1.47 (1.14-1.89)	1.88 (1.45-2.43)	2.23 (1.71-2.89)	2.70 (2.02-3.67)	3.06 (2.24-4.24)	3.44 (2.46-4.96)	3.89 (2.62-5.69)	4.57 (2.97-6.92)	5.15 (3.27-7.94)
3-hr	1.40 (1.09-1.79)	1.69 (1.31-2.17)	2.16 (1.68-2.78)	2.56 (1.97-3.31)	3.10 (2.32-4.20)	3.50 (2.58-4.86)	3.94 (2.83-5.69)	4.47 (3.01-6.51)	5.28 (3.43-7.96)	5.98 (3.80-9.18)
6-hr	1.77 (1.38-2.25)	2.14 (1.67-2.72)	2.74 (2.13-3.50)	3.23 (2.50-4.16)	3.92 (2.95-5.29)	4.42 (3.28-6.11)	4.98 (3.60-7.16)	5.66 (3.83-8.20)	6.71 (4.38-10.0)	7.62 (4.86-11.6)
12-hr	2.18 (1.72-2.77)	2.65 (2.08-3.36)	3.42 (2.67-4.35)	4.05 (3.15-5.18)	4.92 (3.72-6.60)	5.56 (4.14-7.63)	6.26 (4.55-8.95)	7.12 (4.84-10.3)	8.44 (5.52-12.6)	9.58 (6.13-14.5)
24-hr	2.57 (2.03-3.24)	3.16 (2.49-3.98)	4.12 (3.24-5.21)	4.91 (3.84-6.25)	6.00 (4.57-8.02)	6.81 (5.09-9.30)	7.69 (5.62-11.0)	8.79 (5.99-12.6)	10.5 (6.88-15.5)	12.0 (7.68-18.0)
2-day	2.90 (2.30-3.64)	3.61 (2.87-4.54)	4.78 (3.78-6.02)	5.75 (4.52-7.28)	7.08 (5.42-9.44)	8.06 (6.07-11.0)	9.14 (6.75-13.0)	10.5 (7.20-15.0)	12.8 (8.40-18.7)	14.7 (9.49-22.0)
3-day	3.15 (2.51-3.94)	3.93 (3.13-4.92)	5.22 (4.14-6.55)	6.28 (4.95-7.93)	7.74 (5.95-10.3)	8.81 (6.66-12.0)	10.0 (7.41-14.2)	11.6 (7.91-16.4)	14.0 (9.26-20.5)	16.3 (10.5-24.2)
4-day	3.38 (2.70-4.21)	4.21 (3.36-5.26)	5.57 (4.43-6.98)	6.70 (5.30-8.44)	8.26 (6.36-11.0)	9.40 (7.12-12.8)	10.7 (7.92-15.1)	12.3 (8.44-17.4)	15.0 (9.88-21.8)	17.3 (11.2-25.7)
7-day	3.99 (3.20-4.96)	4.93 (3.95-6.13)	6.46 (5.15-8.05)	7.72 (6.13-9.68)	9.47 (7.31-12.5)	10.7 (8.15-14.5)	12.2 (9.03-17.1)	14.0 (9.62-19.6)	16.9 (11.2-24.4)	19.4 (12.6-28.6)
10-day	4.62 (3.71-5.72)	5.61 (4.50-6.96)	7.22 (5.78-8.99)	8.57 (6.82-10.7)	10.4 (8.05-13.6)	11.8 (8.94-15.8)	13.3 (9.83-18.5)	15.1 (10.4-21.2)	18.1 (12.0-26.1)	20.6 (13.4-30.3)
20-day	6.61 (5.35-8.15)	7.67 (6.20-9.47)	9.40 (7.57-11.6)	10.8 (8.67-13.5)	12.8 (9.92-16.6)	14.3 (10.8-18.8)	15.9 (11.7-21.6)	17.7 (12.3-24.5)	20.3 (13.5-29.1)	22.5 (14.7-32.8)
30-day	8.32 (6.75-10.2)	9.40 (7.62-11.6)	11.2 (9.03-13.8)	12.7 (10.2-15.7)	14.7 (11.4-18.8)	16.2 (12.3-21.2)	17.8 (13.0-24.0)	19.5 (13.6-26.9)	21.9 (14.6-31.1)	23.7 (15.5-34.5)
45-day	10.5 (8.51-12.8)	11.6 (9.41-14.2)	13.4 (10.9-16.5)	14.9 (12.0-18.4)	17.0 (13.2-21.7)	18.6 (14.1-24.1)	20.2 (14.8-26.9)	21.8 (15.3-30.0)	23.9 (16.0-33.8)	25.4 (16.6-36.6)
60-day	12.3 (10.0-15.0)	13.4 (10.9-16.4)	15.3 (12.4-18.8)	16.8 (13.6-20.8)	19.0 (14.8-24.1)	20.7 (15.7-26.6)	22.3 (16.2-29.4)	23.8 (16.7-32.6)	25.6 (17.2-36.2)	26.9 (17.6-38.8)

[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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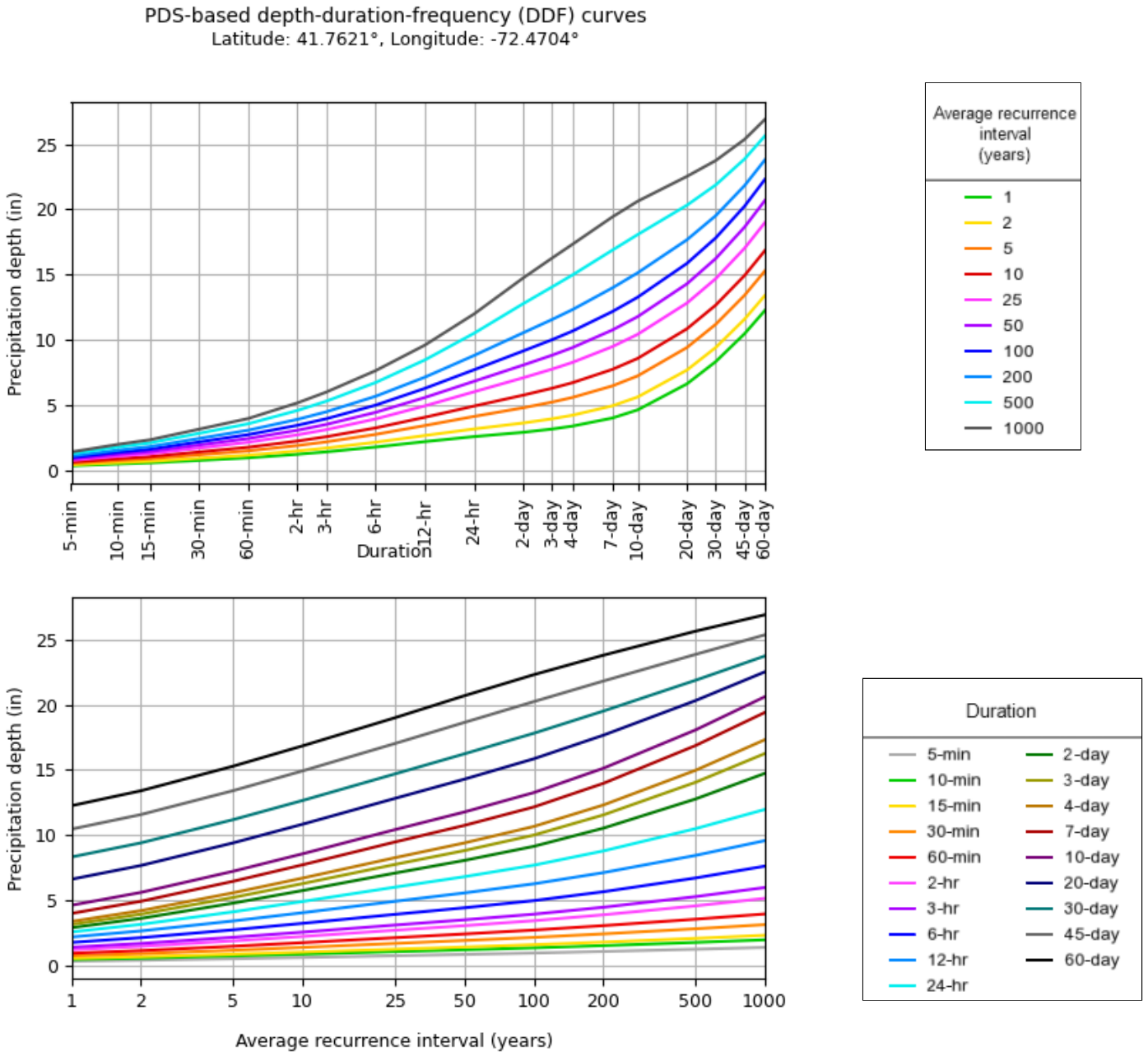
PF graphical



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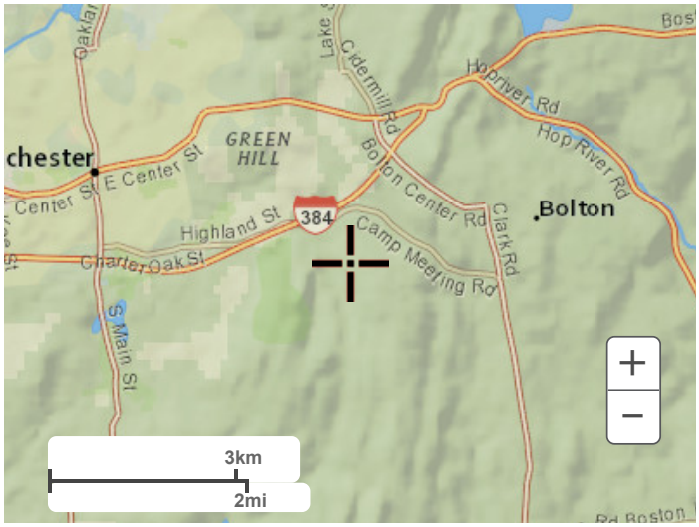
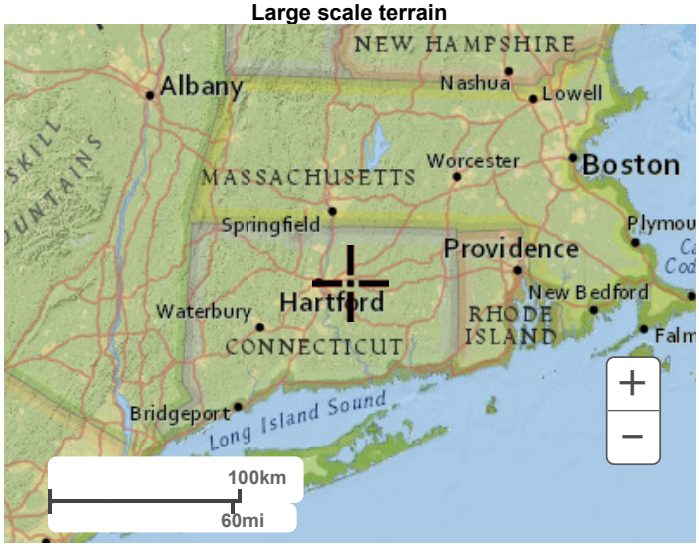
Maps & aerials

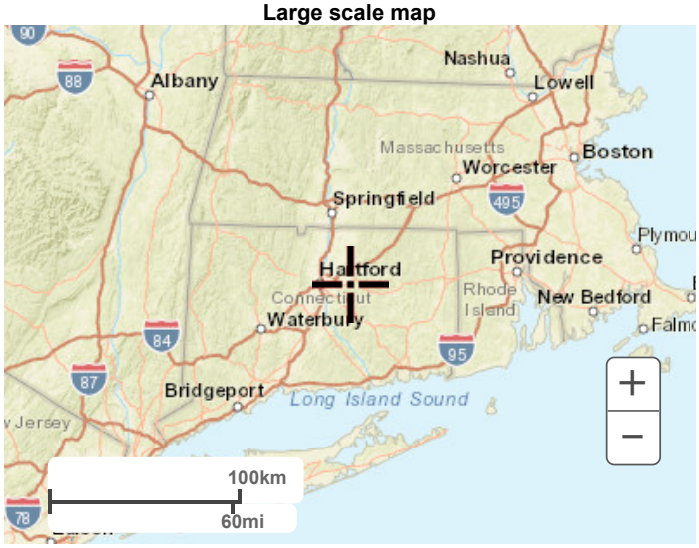
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial