Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
Scientists

August 20, 2025

AnneMarie Skinner, AICP– City Planner
Concord City Hall
41 Green Street
Concord, NH 03301

RE: Site Plan Application
Unitil West Concord Substation Rebuild
1 – 7 McGuire Street, Concord, NH 03301
Tax Map 494Z Lot 44

Dear AnneMarie:

On behalf of our Client, Unitil Energy Systems, Inc. (Unitil), a major site plan and conditional use permits associated with shoreland buffer impacts and the principal use for the Unitil West Concord Substation at the above noted address are being requested.

The project consists of retiring vintage substation equipment and installing new current technology to meet the growing electrical demand in the Concord area and provide further redundancy for service reliability. In order to accommodate the substation relocation on the subject lot, an existing pole storage area will be relocated, and stormwater management areas will be incorporated.

Should there be any questions or concerns regarding this submittal or the project in general please do not hesitate to contact the undersigned at 472-4488 or jbelanger@tfmoran.com

Sincerely,
TFMoran, Inc.

Jeremy Belanger

Jeremy Belanger, P.E.
Senior Project Engineer

48 Constitution Drive
Bedford, NH 03110
Phone (603) 472-4488
Fax (603) 472-9747
www.tfmoran.com

August 20, 2025

City of Concord
41 Green Street 3rd Floor
Concord, NH 03301

New Hampshire Department of Environmental Services
29 Hazen Drive
Concord, New Hampshire 03301

RE: Letter of Authorization
Unitil West Concord Substation Relocation
1-7 McGuire Street, Concord, NH 03301
Tax Map 494Z Lot 44

To whom it may concern;

Unitil Energy Systems, Inc. (Unitil) authorizes TFMoran, Inc. (TFM) to act as their representative for all permitting and siting requirements relating to the proposed Until West Concord Substation Relocation project at the above location.

Sincerely,
Unitil Energy Systems, Inc.

Nathan Sherwood, PE
Principal Electric Engineer

TOWN OF PEMBROKE

Town Hall ~ 311 Pembroke Street, Pembroke, New Hampshire 03275 Tel: 603-485-4747

December 3, 2025

City of Concord
Planning Board
c/o Alec Bass
41 Green Street
Concord, NH 03301

Re: DRI Notice, 1-7 Mcguire St.

Dear Chairman Woodfin,

Thank you for the opportunity to review and comment on the Unitil Site Development Plans at 1-7 McGuire Street. On November 25th, the Pembroke Planning Board reviewed the plans CNHRPC's review.

Based on the information provided, the Pembroke Planning Board respectfully offer the following comments for consideration.

1. The Board recommends a berm be installed around the yard to contain any potential onsite spills of hazardous material.

2. The Board recommends that any transformers onsite have secondary containment to protect natural resource areas from potential spills.

The Pembroke Planning Board appreciates the opportunity to participate in the review of this application. Please feel free to reach out if you have any questions.

Sincerely,

Carolyn Cronin
Town Planner
Town of Pembroke

Central New Hampshire Regional Planning Commission
28 Commercial Street ❖ Concord, NH 03301
Telephone: (603) 226-6020 ❖ Fax: (603) 226-6023 ❖ www.cnhrpc.org

September 8, 2025

City of Concord
Planning Board
41 Green Street
Concord, NH 03301

Re: Development of Regional Impact:
"Unitil Energy Systems, Inc. Substation Relocation Project at 1-7 Mcquire Street, Tax Map 494Z Lot 44, Concord, NH."

Dear Members of the Planning Board,

We have reviewed the application material transmitted for a replacement electrical substation by "Unitil Energy Systems, Inc. at the end of McGuire Street located just easterly of N. Main Street (NH-3) in the Industrial (IN) Zoning District. The project is to be constructed in an existing utility pole storage area, and the sub-station will be upgraded and expanded, and the pole storage area will be improved and reduced in size. The project was submitted by TFMoran, Inc.

The following items were provided by email and were reviewed.

1. Site Plan - Unitil West Concord Substation, 1-7 Mcquire Street, Concord, New Hampshire, 17 sheets., August 20, 2025.
2. Stormwater Management Report, August 20, 2025
3. Colored Overall Plan, , August 20, 2025
4. Narrative - Principal Use, August 20, 2025
5. Narrative – Shoreland Conditional Use Permit, August 20, 2025

As you know, RSA Chapter 36:54-58 deals with the review of Developments of Regional Impact. Section 36:55 lists a series of characteristics that "could reasonably be expected to impact on a neighboring municipality." This review is therefore focused only on the factors listed in the RSA and includes the following:

I. Relative size or number of dwelling units as compared with the existing stock.
II. Proximity to the borders of a neighboring community.
III. Transportation networks.
IV. Anticipated emissions such as light, noise, smoke, odors, or particles.
V. Proximity to aquifers or surface waters which transcend municipal boundaries.
VI. Shared facilities such as schools or solid waste disposal facilities.

CNHRPC's review of the proposal:

I. Relative to the number of dwelling units – The project will not involve the construction of any dwelling units.

II. Proximity to the borders of a neighboring community – The project is 4-5 miles from any municipal boundary.

III. Transportation networks – The facility is a replacement for an existing sub-station on site. After completion, no vehicle trips are expected except for occasional maintenance of the automated equipment. Since the equipment is newer and more advanced, less maintenance should be required.

IV. Anticipated Emissions & Noise – The project is not expected to generate additional noise or emissions since this is a replacement project.

V. Proximity to shared aquifers or surface waters – This development encroaches approximately 40' into the 250' Shoreland Buffer from The Merrimack River. No impact is proposed to the 75' Natural or the 150' Woodland Buffer area. No outdoor equipment is proposed in the buffer area and less than 75 square feet of the enclosed Control House is within the edge of 250' buffer area.

A Conditional Use Permit has been requested to construct the substation in a portion in a previously disturbed area used for utility pole storage on the top of the bluff above the Merrimack River floodplain. Existing drainage discharge points will be maintained throughout the site. The proposed filtration basin with sediment forebay will be utilized to maintain peak runoff flows and volume in post-development conditions.

Stormwater treatment and measures for ground water recharge are being provided to meet or exceed NH Department of Environmental Services standards. These drainage improvements will provide treatment for the site and nearby pavement area where none existed before, resulting in improved post development drainage conditions.

VI. Shared facilities (schools, sewer, water, emergency response agreements)
No shared facilities are involved.

Concord is part of the Capitol Area Mutual Aid Fire Compact. This project is located within a mile of Concord's main fire station, and several other stations are located between this facility and nearby communities. If an emergency occurred at this facility, given the project size and location, there is a low probability that there would be any significant impacts to the communities in the compact.

Comments:

Article 28-4-4 Buffers to Bluffs of the Concord Zoning Ordinance requires a 50' buffer to be maintained at the top and bottom of bluffs including those found along the Merrimack River. This project is located partially in that bluff buffer area. The City should consider if the disturbance proposed triggers a need for Conditional Use Permit. In any case, items in the past have been thrown over the bluffs in this general area which should not have been, such as cars and construction materials and equipment. The City and Until may wish to consider if an opportunity exists to rectify

some of these past errors during the construction process. The Northern Rail Trail will pass below this site between the bluff and the Merrimack River.

Care will be needed to ensure that the main sewer line serving the NH State Prison is not adversely impacted during the construction of the projects proposed drainage improvements.

Thank you for the opportunity to comment on this development. Please contact CNHRPC at 603-226-6020 if you have any questions.

Sincerely,

Stephen Henninger
Project Planner

PLANNING BOARD CITY OF CONCORD, NH
MAJOR SITE PLAN CHECKLIST

This checklist is intended to assist applicants and design professionals in the preparation of major site plan applications for consideration by the City of Concord Planning Board. The checklist is also intended as an aid to City staff in its review of a subdivision application. Any question about the applicability of any of the items in the checklist to a particular subdivision application should be discussed with a member of the Planning staff at 603-225-8515, before an application is submitted.

The first section lists the plans and documents needed for an application to be complete. The second section lists elements of each of the plans and documents required for an application to be complete. The third section is designed to provide guidance on the items to be completed after conditional Planning Board approval is obtained from the Planning Board.

Summary

Name of Development: Unitil West Concord Substation Relocation

Owner's Name(s): Unitil Energy Systems, Inc. c/o Nathan Sherwood, PE

Street Address: 1-7 McGuire Street Nearest Street(s): McGuire St. & N. State St.

Map\Block\Lot(s): 494Z-44 Map\Block\Lot(s): _____ Map\Block\Lot(s): _____

Zoning District(s): Industrial (ID) Overlay District(s): Shoreland Protection

Municipal Water Supply Available: Yes X No____ Municipal Sanitary Sewer Available: Yes X No_____

Lot Frontage: 900 ft Lot Frontage Required: 200 ft

Lot Size 377,125 sf Minimum Lot Size Required: 40,000 sf

Building Setbacks Required: Front 50 ft Back 30 ft Side 25 ft Shoreland N/A

Building Setbacks Proposed: Front 155 ft Back 30 ft Side 25 ft Shoreland N/A

Part 1: The following documents and plans are needed for an application to be determined complete by the Planning Board.

Documents

X An application either signed by all the current owner(s) of the property or signed by an individual authorized by the owner(s) to act as the agent. A letter must be submitted with the application authorizing the individual to act as agent on the owner(s) behalf when the agent signs the application.

X The appropriate application fees.

X List of the current abutters to the property including those property owners located across streets and streams from the property being subdivided. Please include the name, address, and profession of the professionals responsible for the preparation of the subdivision plans and supporting studies.

N/A If the project is to be phased, a description of project phasing and the proposed start and completion date for each phase.

X Two (2) copies of a Storm Water Management Plan as called for in Section 22.

N/A Two (2) copies of a Traffic Study as called for in Section 32.

N/A Special Investigative fee for review of a Traffic Study as set forth in Section 32.

N/A One (1) copy of any Impact Study which may be required by the Clerk of the Board.

N/A Special Investigative or Third Party Review fees as set forth in Section 32.
X Requests for any waivers from the Site Plan Regulations if any.
N/A A copy of any variances or special exceptions, which have been granted by the Zoning Board of Adjustment.
N/A Where Conditional Use Permits (CUP) are required in conjunction with a proposed subdivision, two (2) copies of complete CUP applications shall be provided for each CUP as set forth in Section 34.

Drawings

X Five (5) full sized hard copies of the site plans and one (1) digital copy sized at 11" x 17", including existing condition plan(s), demolition plan(s), site layout plan(s), grading, drainage and erosion control plan(s), utility plan(s), landscape plan(s), lighting plan(s), construction detail plan(s), and other improvement plans(s). Please note pursuant to Section 16, the plans may be consolidated onto one or more sheets, if the information can be clearly shown without obscuring information.
N/A Five (5) full sized hard copies of any off-site improvement plans and one (1) digital copy sized at 11" x 17".
N/A Two (2) hard copies of the architectural elevations and one (1) digital copy.
X Colored overview plan showing entire development with lot lines, buildings, parking lots, driveways, loading areas, solid waste facilities, green space and tree plantings, fences/walls/buffers, any outside sales and display areas, adjacent streets, along with other significant physical features shown on a single sheet suitable for display purposes.
X One (1) set of reductions (8½ x 11) of the site plan drawings except for construction detail plans, including architectural elevations.
X A New Hampshire Licensed Land Surveyor shall prepare, sign and seal the existing condition plan.
X A New Hampshire Licensed Professional Engineer shall prepare, sign and seal all plans where grading, drainage and utility information is proposed.
X Landscape plans shall be prepared by a New Hampshire Licensed Landscape Architect who shall sign and seal the landscape plan(s).
N/A Architectural elevations shall be signed or sealed by a New Hampshire Licensed Architect, or a New Hampshire Licensed Professional Engineer, as allowed by the State of New Hampshire professional licensing boards.
X Where wetland boundaries are required to be delineated, the delineation shall be performed by a New Hampshire Certified Wetland Scientist who shall sign and seal the plan upon which the wetland boundaries are mapped.
N/A Where soils are required to be identified, classified, and delineated, the identification, classification, and delineation shall be performed by a New Hampshire Certified Soil Scientist who shall sign and seal the plan upon which the soils are mapped.

Part 2: The following standards and items need to be shown on plans in order for a site plan application to be determined complete.

Drawing Standards

X All drawings shall be shown at 1"=10', 1"=20', 1"=30', 1"=40' or 1"=50' for all drawing sheets except for location plans, cover sheets, architectural elevations or engineering detail sheets. If alternative map scales may be warranted by the size and/or shape of the site, consult with the Planning Division staff prior to preparing the drawings.
X If multiple sheets are necessary to provide design detail at required scales, then a concept drawing sheet or cover sheet shall be included. The concept drawing sheet can be flexible in scale while showing general project information and a graphic conceptual layout. Each detail sheet must be indexed on the concept drawing sheet.

__X__ North arrow.
__X__ Bar scale.
__X__ Drawing sheets not exceed 24" x 36" except for the colored overlay plan.

Title Block
__X__ Title of development.
__X__ Name and address of the owner and applicant.
__X__ Date the plan was prepared and the date of subsequent revisions.
__X__ Name, address, seal, and signature of the licensed professional who prepared the plan.
__X__ Street Address(s).

Vicinity Plan
__X__ The location of the development shall be shown.
__X__ Streets, water bodies, city limits, parks, schools, and other significant physical and man made features shall be shown on the vicinity plan.
__X__ Scale between 1"=1000' and 1"=2000'.

Location Plan
__X__ Proposed property to be developed.
__X__ Property lines.
__X__ Abutters' property lines.
__X__ Names and locations of nearby and adjacent City streets.
__X__ Names and locations of adjacent water bodies and watercourses.
__X__ Names and locations of nearby and adjacent parks, schools, churches, and other significant physical and man-made features.
__X__ Nearest street intersections.
__X__ The Tax Assessor's map-block-lot number, or map-lot number as applicable, for abutters and the properties to be developed.
__X__ Zoning district designations and boundaries.
__TBD__ Other special information which may be required by the Planning Board.
__X__ Minimum scale 1" = 400'.

Standard Notes
_____ Purpose of the site plan.
__X__ Ownership of parcel with deed references.
__X__ Tax map-block-lot numbers, or map-lot number as applicable, of the existing parcels.
__X__ Title reference for Book and Page number of the lot(s) being proposed for development and abutting properties from the Merrimack County Registry of Deeds. Title reference shall not be more than 5 days old at the time of filing.
__X__ Plan references for prior recorded subdivisions or surveys on the properties proposed for development or abutting said properties proposed to be developed.
__N/A__ Addresses for all proposed buildings or condominium units.
__X__ Area of subject parcel(s).
_____ Zoning designation of subject parcel(s) including all overlay zones.
__X__ Minimum lot area, frontage, and setback dimensions required for the zoning district(s) and for wetland buffers, bluff setbacks, the Shoreland Protection Overlay District buffers, and Aquifer Protection Areas.
__N/A__ Required useable lot and buildable lot area and calculations.
__X__ Tabulations of existing and proposed areas of wetlands, bluffs and ravines, steep slopes greater than 15% and greater than 25%. Existing and proposed impervious surface areas.

X Plan or deed references for recorded easements, whether public or private, on the properties proposed for development and existing easements on abutting properties, which are for the purposes of providing access, utilities, and drainage to the properties proposed to be subdivided.
X Deed reference and statement of any existing recorded covenants or restrictions relating to the use of the land proposed to be developed.
X Source of sanitary sewer and potable water supply.
N/A Zoning variances and/or special exceptions granted.
X Flood Insurance Rate Map sheets used to identify 100 year flood elevation and zone designation.
N/A If applicable, Flood Hazard Designation along Merrimack River (F1) or (F2) and minimum finished floor elevation.
X List of required local, state, and federal permits.
X List of any Planning Board waivers and Conditional Use Permits requested.
N/A Phasing description.

Existing Condition Plan

X Property lines for the parcel to be developed with bearings and dimensions.
X Full names and addresses of all abutters of the property.
X Addresses of the existing lots and/or uses located on the property.
X Title reference for Book and Page number of the lot from the Merrimack County Registry of Deeds. Title reference shall not be more than 5 days old at the time of filing.
X Zoning district designation and boundaries including Floodway and Floodplain Districts.
X Building setback lines and dimensions for all lots including wetland buffers, bluff setbacks, the Shoreland Protection Overlay District buffers, and Aquifer Protection areas.
X The location of existing features such as water courses and bodies, parks, open space, large trees, foliage lines, rock outcrops, railroads, buildings, and significant natural and man-made features. Other pertinent features such as, but not limited to, wetlands, cemeteries, and drainage ditches.
X The location of all existing buildings, structures, fences, stonewalls, driveways, parking, and any vehicular use areas.
X The location and dimensions of existing driveways, curb cuts, parking lots, loading areas, or any other vehicular use areas.
X The location of all existing access points (driveways) onto city streets.
X The location, travel way width, and rights-of-way of all existing adjacent city streets, as well as mapped future streets.
X The location, dimensions, and purpose of any easements or rights-of-way.
X Existing topographic conditions and all proposed changes in ground elevation at a contour interval of two (2) feet referred to sea level datum of the US Coast and Geodetic Survey.
X Where the land slopes less than two percent, spot elevations shall be shown at all breaks in grade, along all drainage channels or swales, and at selected points not more than 100 feet apart in all directions.
N/A Finished floor elevations and minimum finished floor elevations required within the Floodway or Floodplain Zoning District, if applicable.
X Wetland Delineation by NH Certified Wetland Scientist if the presence of wetlands is suspected.
X Steep slopes greater than 15% and greater than 25%.
N/A Buildable and Useable land area calculations as applicable.
X The location and size of existing ground signs.
X The type and location of existing outdoor lighting.
X The identification and classification of the extent and type of soils using the USDA Soil Conservation Services system, specifically identifying those soils recognized as wetlands and those important for agriculture.

N/A Soil test data as required by the NH Water Supply and Pollution Control Division, where municipal sewers are not present. A High Intensity Soil Survey may be required.

X The location, size, and invert elevations of existing sanitary and storm sewers including manholes, catch basins, and culverts.

X The location and size of all existing water mains including hydrants, gates, valves, and blowoffs.

N/A The location of wells and subsurface disposal systems if the property is not served by municipal water and sanitary sewers, including those on abutting property.

X The location of all existing non-municipal utilities including electric, telephone, gas, steam, and CATV systems, along with fire alarm cables, both on-site and within abutting rights-of-way.

X The type and location of existing solid waste disposal facilities.

Demolition Plan

X The demolition plan shall be based on the existing condition plan.

X The location and extent of removal of all buildings, structures, paving and landscaping shall be shown on the plan including the limits of any clearing, or site disturbance.

X Provisions for the removal or reuse or any construction or demolition debris from the site.

X The location and extent of any removal of utilities and drainage along with the provisions for the removal, and capping of underground public and private utilities.

X Plans and provisions for site restoration, erosion control and repaving of public or private streets disturbed.

Site Plan

X Property lines of the parcel to be developed including bearings and dimensions.

X Zoning district designation and boundaries including the Floodway and Floodplain Districts.

X Building setback lines, including dimensions including wetland buffers, bluff setbacks, the Shoreland Protection Overlay District buffers, and Aquifer Protection areas including labels.

X Full names and addresses of all abutters to the property.

X Title reference for Book and Page number of the lot from the Merrimack County Registry of Deeds. Title reference shall not be more than 5 days old at the time of filing.

X Locations of any wetlands, bluffs and ravines, and steep slopes greater than 15% and greater than 25%.

N/A Flood Hazard areas and boundaries.

N/A Finished floor elevations and minimum finished floor elevations required within the Floodway or Floodplain Zoning District, if applicable.

X Wetland Delineation by NH Certified Wetland Scientist if the presence of wetlands is suspected.

X The location, use and dimensions of all existing and proposed buildings and structures including fences, stonewalls, towers, mechanical equipment, etc. Separately identify proposed additions to buildings and structures.

X The location and dimensions of existing and proposed driveways, curb cuts, parking lots, loading areas, or any other vehicular use areas, including the number of parking and loading spaces per bay, and the designation of spaces for compact vehicles and the handicapped.

X The location and dimensions of existing and proposed pedestrian walkways, sidewalks and other paved surfaces, both on-site and within abutting rights-of-way.

X The location of existing features such as water courses and bodies, parks, open space, large trees, foliage lines, railroads, buildings, and significant natural and man-made features. Other pertinent features such as, but not limited to, wetlands, cemeteries, and drainage ditches.

X The location, travel way width, and right-of-way of all existing adjacent city streets, as well as mapped future streets.

X Existing public or private street names.

X Addresses for all existing and proposed buildings or condominium units.
N/A The location of any wells and the NHDES well radii.
N/A The location of septic tank drainfields and the required 4,000 square foot septic drain field area required by the NHDES.
X Fire lanes and fire access for fire apparatus.
N/A Phase boundaries and labels.
N/A The location, bearings, and dimensions and area of all property proposed to be set aside for park or playground use or other public or private reservation, with designation of the purpose thereof, and conditions, if any, of the dedication or reservation.
X The location, bearings, and dimensions of all existing and proposed easements.
X Notations of all covenants, easements, self-imposed restrictions, and any other restrictions or notations required by the Board.

Tabulations

X Gross acreage - Lot size in square feet is recommended for projects less than 1 acre.
X Square feet or acres devoted to the various uses.
X Ground coverage of buildings and structures in square feet and percent.
X Ground coverage for parking and loading areas including aisles and internal landscaping in square feet and percent.
N/A Internal parking lot landscaping in square feet and percent.
X Impervious surface coverage in square feet and percent.
X Useable land area calculations for residential development and net land area calculations for non-residential development.
N/A Total number of dwelling units, and total numbers of dwelling units by type and number of bedrooms.
X Square feet of floor area by type of use for all non-residential uses.
N/A Projected number of employees by shift if necessary for calculating required parking.
N/A Building occupancy or fixed seating if necessary for calculating required parking.
N/A Calculations of required parking and loading areas, including handicapped and compact spaces.
N/A Parking and loading areas provided including handicapped and compact spaces.

Note: Tabulations shall be completed for the entire project and for each development phase. When a site falls into more than one zoning district, separate tabulations will be required for each area covered by a different zoning district.

Please note the existing condition plan, demolition plan, grading and drainage plans, utilities plan, lighting, landscape and erosion control plans may be combined on the site plan or other drawing sheets if all the existing and proposed information is presented in a clear, understandable and legible manner.

Grading & Drainage Plans

X Existing topographic conditions and all proposed changes in ground elevation at a contour interval of two (2) feet referred to sea level datum of the North American Vertical Datum 1988 (NAVD88). Where the land slopes less than two percent (2%), spot elevations shall be shown at all breaks in grade, along all drainage channels or swales, and at selected points not more than one hundred (100) feet apart in all directions.

X Where the land slopes less than two percent, spot elevations shall be shown at all breaks in grade, along all drainage channels or swales, and at selected points not more than 100 feet apart in all directions.

X The identification and classification of the extent and type of soils using the USDA Soil Conservation Services system, specifically identifying those soils recognized as wetlands and those important for agriculture.

X The location of all significant natural features including, but not limited to, ledge outcroppings, streams and water bodies, wetlands, bluffs and ravines, and steep slopes in excess of 15% and 25%.

X Setbacks shall be shown and dimensioned including those required for yards, and the Shoreland Protection District, as well as bluff and wetland buffers and setbacks.

X The location and size of all swales, drainage ditches, culverts, drain pipes, inlet and outlet structures, catch basins and manholes, storm water treatment structures, easements, and detention and retention ponds, including invert elevations and cross-sections as may be necessary to determine the suitability and adequacy of the proposed system.

X 2-year, 10-year, 25-year and 100-year storm water runoff estimates, including all calculations.

X The location and size of proposed buildings, driveways (including proposed grades), and septic tank drain fields and receiving layers.

N/A Where municipal sewer service is not available, soil data and test results sufficient to submit an application for subdivision approval to the NHDES including a plan showing the location of test pits, the soil profiles, ground water elevation, and seasonal high water table elevation at each test pit. The required 4,000 square foot septic drain field area required by the NHDES shall be shown.

X The location, width, and purpose of existing and proposed easements for road rights-of-way, utilities, drainage, slope, open space or conservation easements, and any other easement as required. The easements to be shown include both public and private easements. The dimensions and bearings shall be shown for the boundaries of all easement areas except slope easements.

Utility Plans

X The location, size, and invert elevations of existing and proposed sanitary and storm sewers, including manholes, catch basins, culverts, and the location of any pump stations, lift stations, and other appurtenant facilities or structures.

X The location and size of all existing and proposed water mains, including hydrants, gates, valves, and blowoffs, and the location of any other appurtenant facilities.

N/A Profiles of all municipal utilities.

X Details for pump or lift stations, manholes, catch basins, fire hydrants, valves, etc. The use of details from the City of Concord Construction Standards is required when available, unless otherwise approved by the City Engineer.

X The location and size of all existing and proposed private underground and overhead utility improvements including, but not limited to, gas lines, electric transmission lines, telephone transmission lines, cable television, steam distribution mains, and fire and police alarm transmission lines. The location of all manholes, transformers, poles, and other appurtenant facilities or structures shall be shown.

N/A In the absence of municipal water supply, a plan indicating individual well locations shall be submitted including the NHDES required well radii.

N/A Where municipal sewer service is not available, soil data and test results sufficient to submit an application for subdivision approval to the NHDES including a plan showing the location of test pits, soil profiles, ground water elevation, and seasonal high water table elevation at each test pit. The 4,000 square foot septic drain field area required by the NHDES shall be shown.

X The location, width, and purpose of existing and proposed easements for road rights-of-way, utilities, drainage, slope, open space or conservation easements, and any other easement as required. The easements to be shown include both public and private easements. The dimensions and bearings shall be shown for the boundaries of all easement areas except slope easements.

Lighting Plan

__X__ Lighting including building and pole and luminaire locations and details for poles and fixtures including colors, materials, dimensions and wattage.
__X__ A lighting plan showing light levels in foot-candles shall be provided.
__X__ Details of fixtures, poles, and mounting details.

Landscaping and Erosion Control Plans

__X__ Plantings including location, caliper size, common and botanical names, and planting specifications and details. A landscape table is required.
__X__ Plants to be preserved and methods to preserve trees during construction.
__X__ Clearing limits.
__X__ Calculations of trees required to be planted or preserved and the number and type provided and/or protected.
__N/A__ Phased clearing plan with provisions for soil stabilization.
__X__ Erosion Control and Sedimentation Plan.

Architectural Elevations

__N/A__ Architectural elevations of all sides of all new buildings and of those sides or areas which are proposed to be altered showing the following types of information:
__N/A__ Exterior materials and colors.
__N/A__ Type and pitch of roofs.
__N/A__ Size, spacing of windows, doors, and other openings.
__N/A__ Size, location, colors, and copy of signs to be affixed to, or hanging from, the building.
__N/A__ Size, height, colors, and copy of proposed ground signs.
__N/A__ Size, type, and location of towers, chimneys, roof structures, flagpoles, antennas and similar structures.
__N/A__ The relationship in bulk and height to other existing structures in the vicinity.
__N/A__ Photographs of all existing facades and adjacent buildings and lots.

Off-site Improvement Plans

__N/A__ Off-site improvement plans shall be prepared by a registered architect or engineer who shall sign the drawings and place his/her seal upon it.
__N/A__ Any off-site improvement plans shall conform to the requirements as set forth in the City of Concord Subdivision Regulations and Construction Standards.

Part 3: The following documents and plans are required for a Certificate of Approval to successfully complete the site plan approval process prior to the issuance of any building permits.

Documents Needing Approval Prior To Issuance of a Certificate of Approval, where applicable.

__N/A__ Easement deeds for street rights-of-way, utility, drainage, slope, conservation, or other public easements.
__N/A__ Warranty deed or conservation easements for land set aside as open space.
__N/A__ Agreements to convey easements for private access, utilities, drainage, or other common facilities to be recorded with a future property transfer.
__TBD__ Construction cost estimate for all public and private common facilities.
__N/A__ Financial guarantees for all public improvements.

TBD	Where applicable, a Site Stabilization Guarantee.
N/A	Agreements between the applicant and the City regarding public improvements.
N/A	Certificate of City Council approval where required for utility extension.
PENDING	Copies of any approvals or permits required from State and Federal agencies.
PENDING	Electronic plan submission as set forth in Section 12.08 of the Subdivision Regulations.
N/A	License from City Council, where applicable, for a use within the public right-of-way.

Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
Scientists

September 22, 2025

AnneMarie Skinner
AICP, City Planner
City of Concord
41 Green Street
Concord, NH 03301

RE: Response to Town Comments Project No. (2025-015)
Unitil West Concord - Substation
Tax Map 494Z, Lot 44 – Concord, NH

Dear Ms. Skinner:

We have prepared this letter in response to comments as noted in the Staff Report, dated September 11, 2025. The following is a summary of those comments with the format of this letter following that of the Memorandum, with our responses in *italics.*

Staff Review Comments, dated September 11, 2025

General Comments:

1.1 Section 28-4-2 *Buffer Requirements for Residential District Boundaries* has buffer requirements for nonresidential uses in nonresidential districts abutting residential districts. The site is in the IN District, and the northerly portion of the boundary abuts the Open Space Residential (RO) District. However, Section 28-4-2 (b)(1) states that where the abutting residential district is the RO District, and the adjacent lots in the RO District are undeveloped and less than half of the area of the lots comprises buildable land area, no buffers are required in the adjacent nonresidential district. The abutting lot is the railroad and is not buildable land; therefore, the residential district buffer is not required.
Acknowledged.

2.1 Per Section 6.01(4) of the Site Plan Regulations, staff was unaware of any nonconformities with the Zoning Ordinance at the time the abutter notifications were mailed.
Acknowledged.

3.1 Per Section 6.01(5) of the Site Plan Regulations, a completed conditional use permit application if required shall be made at the same time as the site plan application. This project requires two conditional use permit approvals – one for the use and one for disturbance to the bluff. The conditional use permit application for the use was submitted, **but the required application for the bluff disturbance is missing and must be added before the major site plan application can be deemed complete.**
A Conditional Use Permit Application for Disturbances to a Bluff has been included as part of this resubmittal.

2.2 Per Section 12.01 *Research* of the Site Plan Regulations, applicants are responsible for familiarizing themselves with all city, state, and federal regulations relative to zoning, site plan design and approval, land sales, utilities, drainage, health, buildings, roads, and other pertinent data so that the applicants are aware of the obligations, standards expected, and documents to be submitted.
Acknowledged.

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2.3 Per Section 25.01 *Nonmunicipal Utilities General Requirements* of the Site Plan Regulations, the applicant is responsible for all coordination with the utility companies to ensure that utilities are installed in accordance with the Board-approved plans. Staff recommend that the applicant coordinate with all nonmunicipal utilities providing services to the site to ensure the existing services are adequate. Any changes to the utilities after the Board's conditional approval will require either administrative approval or an amendment to the conditional approval depending upon the changes proposed.
It is understood that private utility coordination is the responsibility of the applicant and is denoted accordingly under Utility Note #5 on Sheet C-02. In the case of this project, Unitil is the electric provider and telecommunication coordination shall be the responsibility of the Applicant. There are no proposed sewer or water connections, and drainage is privately held on-site.

2.4 As a development of regional impact, the Central New Hampshire Regional Planning Commission reviewed the application and provided comments in a letter to the Planning Board, dated September 8, 2025, and attached to this staff report.
The CNHRPC Comment Letter has been reviewed and we do not believe there are any comments which have an impact on the site as currently shown. If Planning Staff believes any of the comments need to be addressed on the Site Plans we will update accordingly.

2.5 The Assessing Department, Engineering Services Division, Fire Department, and General Services Division had no general comments.
Acknowledged.

Site Plan Regulations Determination of Completeness

3.1 Sections 12.06(2) *Easements,* (3) *Existing Restrictions,* 15.01(1), and 16.01(1) *Required Information* require certain information to be accurately shown on both the existing conditions plan and the site plan. The existing conditions plan contains notes regarding the existing easements and restrictions as required, but sheet C-05 misses these same notes. Notes 7, 8, 9, 10, and 11 that are listed on the existing conditions plan shall also be listed on sheet C-05. Additionally, the dimensions of the sanitary sewer easement and the McGuire Street access easement shall be added to the existing conditions plan. (also Sections 15.02(5) *Easements and Restrictions*, 15.04(7) *Restrictions*, 15.04(12) *Easements and Rights-of-way,* and 16.02(9) *Restrictions*)
The requested notes have been added to Sheet C-05 (see #9 to #13), and easement dimensions have been added to the Existing Conditions Plan.

3.2 Sections 12.07 *Wetland Delineation*, 15.01(1), 15.01(6), and 16.01(1) require that the date of the wetland delineation be included on both the existing conditions plan and site plan, along with the signature and seal of the New Hampshire certified wetland scientist who performed the delineation. Sheet C-05 is missing the date of the wetland delineation and the signature and seal of the New Hampshire certified wetland scientist, and the existing conditions plan is missing the date of the wetland delineation. This required information shall be added to both sheets accordingly.
The Wetland Certification on the Existing Conditions Plan has been revised to denote the date of delineation and added to Sheet C-05.

3.3 Sections 15.01(4), 15.03 Existing Conditions Plan, and 16.01(3) Required Information require certain information to be accurately shown on the existing conditions plan. All required information is accurately depicted except the following:

15.03(4) *Soils.* Requires the identification and classification of the extent and type of soils using the USDA Natural Resources Conservation Service system. the legend lists soils type 26E, but the plan view has it labeled as 43E. Either the legend is incorrect, or the labeling on the plan view is incorrect and needs to be corrected.
The Existing Conditions Plan NRCS Soils Legend has been corrected to reflect 43E.

15.03(7) *Buildings and Structures.* Requires the location, layout, and use of existing buildings and structures with exterior dimensions. While the location, layout, and use of existing buildings and structures are show, the required exterior dimensions are missing and need to be added.
A waiver has been requested of this requirement as the buildings will not be modified as part of this application.

15.03(8) *Parking, Loading, and Access.* Requires that the location and layout of existing driveways, curb cuts, parking areas, and loading areas, with dimensions and number of spaces identified by parking bay be shown. All this information is present except the dimensions and the number of spaces identified by parking bay. This missing information needs to be added.
The number of parking spaces has been added to the Existing Conditions Plan. A waiver has been requested for the dimensions of existing parking spaces as the addition of each parking space dimensions will cause the plan to be illegible.

15.03(13) *Flood Hazard.* Requires a notation as to whether or not the property is in the City's FH – Flood Hazard Zoning Overlay District. This required notation is missing and shall be added.
Note #5 on the Existing Conditions Plan has been expanded to indicate the project is not located in the City's Flood Hazard (FH) Zoning Overlay District.

15.03(14) *Aquifers.* Requires that the boundaries and label for the Aquifer Protection (AP) Overlay District be shown. The site is in the AP Overlay District, but the boundary for the district and its label are missing from the existing conditions plan. The missing information shall be added.
Per City GIS, the boundary for the AP Overlay District resides on the adjacent property but has been added to the extent practical within the viewport of the Existing Conditions Plan.

15.03(16) *Signs.* The locations of existing ground signs are shown on the existing conditions plan, but the sizes of the existing ground signs are missing as required by this section and shall be added.
A waiver has been requested of this requirement as no changes to the signage is proposed and it is outside the area of proposed work.

15.03(17) *Solid Waste and Outside Storage.* The type and location of existing solid waste disposal facilities is missing from the existing conditions plan, as is the existing outside storage areas noting the dimensions, height, and types of material or equipment stored, and shall be added.
A waiver has been requested of this requirement due to the nature of the project as a electrical infrastructure facility.

15.03(18) *Lighting.* The existing conditions plan gives no indication of the type and location of existing outdoor lighting. Either add the type and location of existing outdoor lighting or add a note stating that the site does not contain any existing outdoor lighting.
A waiver has been requested of this requirement as no work is being done in the area of existing outdoor lighting.

15.03(19) *Setbacks and Buffers.* The existing conditions plan is not showing the building setback along the westerly boundary and shall be added. The existing conditions plan is not showing the bluff or the 50-foot-wide bluff buffer. Both shall be added and labeled.
The applicable setback information has been added to the Existing Conditions Plan.

15.03(22) *Abutting Properties.* The abutting properties are shown, along with the names and addresses of the property owners. However, the actual address of the abutting property is missing from the labeling. The actual address of the abutting properties must be added for a complete determination.
The physical addresses of the abutting properties has been added to the Existing Conditions Plan.

15.03(23) *Tabulations.* The listed tabulations are missing this required information: square feet or acres devoted to existing and proposed uses; square feet of each existing building broken down by floor and use category; impervious surface coverage in square foot and percent; and the buildable land area for nonresidential development.
A waiver has been requested for this requirement. The Site Layout Plan, Sheet C-05 addresses the necessary elements as they relate to the project. A breakdown of the existing building use is not necessary to support this application.

15.03(24) *Zoning.* Requires showing and labeling the zoning district boundary lines. These pieces of information are missing and shall be added.
Zoning lines and labels have been added to the Existing Conditions Plan.

3.4 Sections 15.01(5), 15.04 Proposed Site Plan, 16.01(3) and (4), and 16.02 require certain information to be accurately shown on the site plan. All required information is accurately depicted, except the following, and shall be added to sheet C-05 as noted:

15.04(2) *Abutting Property.* The property addresses of the abutting properties are missing and shall be added.
The physical addresses of the abutting properties has been added to the plan.

15.04(5) *Addresses*. Requires the address of each existing and proposed building and unit to be noted on the site plan. None of the buildings contain the required address. The building address for each building shall be added inside the building footprint. (also Sections 16.02(7) *Addresses* and 17.04 *Addressing)*
Existing building addresses have been added to Sheet C-05.

15.04(6) *Proposed Site Plan Topography.* Requires the existing topographic conditions and all proposed changes to be shown on sheet C-05. This information is missing and shall be added.
A waiver has been requested for this requirement. Topographic information is shown on Sheets C-04, C-07, and C-08.

15.04(8) *Natural Features.* Requires the location of all significant natural features including, but not limited to, ledge outcroppings, streams and water bodies, wetlands, bluffs and ravines, and steep slopes in excess of 15% and 25%. Based on the definition of "bluff" in the Glossary of the Zoning Ordinance, it appears to staff as though the railroad area adjacent to the easterly boundary of the site is a bluff. Nothing is identified on sheet C-05 indicating bluffs or lack thereof. Sheet C-05 needs to be revised to include a listing of all significant natural features (or not), as well as showing and clearly labeling them, and clearly showing and labeling the 50-foot-wide bluff buffer. Staff further notes that buildings and structures are prohibited in the bluff buffer and a conditional use permit is required for any disturbance of the bluff buffer.
The bluff has been determined to exist at approximate elevation 280 and has been added to the Site Plans. A CUP Application for disturbances to the City Bluff Buffer has been submitted to the City.

15.04(10) *Buildings and Structures.* Requires that the location, layout, and use of existing and proposed buildings and structures, with exterior dimensions shall be shown. Exterior dimensions are not shown for any of the existing buildings and shall be added.
Please see response to 15.03(7) above.

15.04(11) *Parking, Loading, and Access.* Requires that the location and layout of existing and proposed driveways, curb cuts, parking lots, and loading areas with dimensions and number of spaces by parking bay be shown on sheet C-5. The number of spaces by parking bay, as well as dimensions, shall be added.
Please see response to 15.03(8) above. There are no proposed parking or loading spaces within this scope of work as the existing facility provides adequate parking. Please see revised Note #8 on C-05.

15.04(20) *Flood Hazard.* Requires a note regarding the property's location in the City's FH – Flood Hazard Zoning Overlay District. This required note is missing from sheet C-05 and shall be added.
The requested note has been added to C-05, please see Note #14.

15.04(21) *Signs.* The locations and sizes of proposed ground signs are required to be shown on the site plan. It is not clear from what is provided if any ground signs are proposed as part of this project. For clarification, add a note regarding proposed ground signs. If any are proposed, add the locations and sizes to the plan view.
Please see response to 15.03(16) above. There is no proposed signage within this scope of work. The requested note has been added to C-05, please see Note #15.

15.04(23) *Zoning*. The zoning district boundary lines with labels are missing from sheet C-05 and shall be added as required.
Zoning lines and labels have been added to C-05.

15.04(24) *Solid Waste Facilities.* It is unclear from what is provided if there are any existing or proposed solid waste facilities on the site. For clarification, add a note regarding existing and proposed solid waste facilities. If there are any either existing or proposed, the locations shall be added to the plan view with labels, along with the type and dimensions of required screening.
Please see response to 15.03(17) above. There are no proposed solid waste facilities within this scope of work. The requested note has been added to C-05, please see Note #16.

15.04(25) *Outside Storage.* It is unclear from what is provided if there are any existing or proposed outside storage areas. For clarification, add a note regarding existing and proposed outside storage areas. If there are any either existing or proposed, the locations shall be added to the plan view with labels, along with the type and dimensions of required screening.
Please see response to 15.03(17) above. The requested note has been added to C-05, please see Note #17.

15.04(26) *Aquifer Protection.* Sheet C-05 is missing the required information for the Aquifer Protection (AP) Overlay District. The boundary of the district with labels shall be added for a complete determination. Management provisions for the aquifer protection district shall also be noted on sheet C-05 for the applicable aquifer protection area. (also Section 16.02(17) *Aquifer Protection*).
Please see response to 15.03(14) above.

15.04(28) *Tabulations.* The ground coverage for parking and loading areas including aisles and internal landscaping in square feet and percent is missing as required and shall be added.

Additionally, the net land area calculation for nonresidential development appears to be inaccurate and shall be confirmed for accuracy and corrected if necessary. Note that buildable land excludes wetlands, surface waters, bluffs, ravines, land within the natural vegetative buffer of the SP District, and land subject to easements, covenants, or other recorded legal instruments that prohibit development or disallow the construction or placement of buildings or structures on said land.
The Tabulations values have been revised for accuracy with the existing and proposed conditions.

Site Plan Regulations and Compliance

3.5 Section 16.02(16) Lighting Plan requires a lighting plan that shows the light levels in foot-candles, the size and type of fixture and wattage, details of all fixtures, color and height of light poles to the top of the structure, and the detail for the poles. All the information has been provided as required, but sheet D-04 shows two light pole details, neither of which are from the City's Construction Standards and Details, and sheet D-02 includes another light pole detail which is the correct Detail M-13 from the City's details. Sheet D-04 shall be revised by removing the two light pole details shown.
The Light Pole and Base Details have been removed from D-04.

3.6 Sections 13.01(6) State and Federal Permits, 13.02(8) State and Federal Permits, 15.01(2), and 16.01(2) Required Information require that copies of permit applications to, and permits received from, state and federal agencies shall be submitted to the Planning Division. The initial submittal did not include copies of any applications or permits, although the necessary permits are listed on sheet C-01 in the "PERMITS/APPROVALS" table. The table needs to be completed to include the permit numbers, approval dates, and expiration dates, and copies of both the applications and the issued permits need to be submitted to the Planning Division.
Copies of the two (2) NHDES Permit Applications have been included as part of this submittal. The City of Concord Driveway Permit will be submitted by the Applicant or their representative prior to the start of construction. The EPA NPDES eNOI will be submitted by the Applicant or their representative two (2) weeks prior to the start of construction. Copies of applications and granted permits shall be provided to the Planning Division upon submittal or receipt.

3.7 Section 18.03 Required Parking requires listing the required and provided parking spaces for the proposed use. Sheet C-05 states that there is no parking requirement because the use is not listed in Section 28-7-2 Off-street Parking Requirements of the Zoning Ordinance. However, Section 28-7-2(b) Parking Requirements for Uses Not Listed states that the parking requirement shall be as required for the closest similar use when the proposed use does not fall into one of the categories from Section 28-7-2(e) Table of Off-Street Parking Requirements. The closest use in the table to an essential public utility facility is an unmanned utility equipment structure with a parking requirement of two spaces for each structure. The parking tabulations shall be corrected accordingly. The site already has existing parking, so the required spaces are being provided.
Note #8 on C-05 has been revised to reflect the above request.

3.8 Section 20.06 Solid Waste Facility Screening provides requirements for the screening of solid waste disposal, dumpsters, bins, or other outside storage facilities or areas. It is unclear from the submitted materials if the project proposes any solid waste disposal dumpsters or any other outside storage areas or facilities. Clarification shall be provided by added a note to sheet C-05 stating that no solid waste disposal, dumpsters, or bins are proposed and no outside storage areas or facilities are proposed. If any are proposed, the note shall state as much and the locations shall be clearly shown and labeled in the plan view, along with the height and type of screening to show requirement with this section.
A waiver has been requested of this requirement as the pole bunker is not easily seen by the public.

3.9 Section 26.02 Mechanical Equipment requires that rooftop and ground-mounted mechanical equipment shall be provided with full screening from both abutting properties and public rights-of-way. In the IN District, the Board may reduce or eliminate this requirement where the proposed equipment will not be readily viewed outside the IN District. Where grades or unusually large equipment is required and full screening is not possible, the Board shall require appropriate screening, baffling, cosmetic treatments or a combination of measures, to reduce the visual, glare, and noise impacts of said equipment on abutting properties and the public right-of-way. Specifically, staff notes the abutting properties to the west, located in the Institutional District and south, located in the Urban Transitional District, will be visually impacted from the unusually large equipment necessary for the proposed substation and enhanced screening shall be provided, including the use of an 8-foot-tall solid opaque fence in lieu of the proposed chain link fence with privacy screening, and an enhanced four-season landscape buffer along those sides of the substation adjacent to the Institutional or Urban Transitional Districts to reduce the visual impacts to those abutting properties.
A waiver has been requested of this requirement as solid fencing and/or landscaping cannot be safely installed at an electric substation.

3.10 Per Section 26.03 Outside Screening of Outside Storage, outside storage areas shall be screened as set forth in Section 28-5-37 of the Zoning Ordinance. Where grades make screening difficult, or unusually large material or equipment is stored, the Board shall require the best appropriate and feasible screening in order to reduce the visual impacts of said equipment or material from abutting properties and the public right-of-way.
Specifically, staff notes the abutting properties to the west, located in the Institutional District and south, located in the Urban Transitional District, will be visually impacted from the proposed outside storage areas, and an 8-foot solid opaque fence in lieu of the proposed chain link fence with privacy screening shall be provided to reduce the visual impacts to those abutting properties.
A waiver has been requested of this requirement as solid fencing and/or landscaping cannot be safely installed at an electric substation.

3.11 It is unclear from sheet C-09 if full compliance with Section 27 Landscaping is being achieved. The sheet shall be revised to ensure and show compliance with the following:

27.06(5) *Underground Utilities.* Prohibits planting of trees within 10 feet of existing or proposed underground utility lines. Add a note to the sheet stating that no trees shall be planted within existing or proposed underground utility lines. Review the placement of the proposed trees in relation to the pole-mounted lights and show and label the distance from the electrical line and all other utility lines to show that they are 10 feet or more away from any existing or proposed underground utility lines.
The above note has been added under Requirements, and a dimension from landscape planting to the closest utility structure (light pole) has been added to C-09. We acknowledge light poles are exempt from the minimum separation requirements, all other utility structures are located further away.

27.07(1) *Groundcover.* To ensure continued compliance with this section, a note shall be added to sheet C-09 stating that all open space areas not covered with natural vegetation shall be covered with grass or other vegetative groundcovers, with the exception of planting beds which may be mulched.
The above note has been added under Requirements on C-09.

27.07(4) *Biodiversity.* Requires that no more than 25% of the trees to be planted shall be of the same species. The three trees being planted are all of the same species. With three trees being planted, each must be of a different species. Sheet C-09 shall be revised to show in the plan view and list in the landscape legend tree species compliant with this section.
The revised landscape design includes only one (1) tree. As such, this comment is no longer applicable.

27.07(5) *Plant Material Standards.* States that invasive species are prohibited and native species are encouraged. For compliance with this section, revise sheet C-09 to replace in the plan view and the landscape legend the proposed non-native plantings to species that are native to northern New England.
The tree variety has been revised to Red Maple.

27.07(6) *Planting Specifications.* Requires the use of the City's Construction Standards and Details for the plant of all plant materials. Sheet D-04 shows a tree with mulch berm detail that is not from the City's Construction Standards and Details. This detail shall be removed from sheet D-04 and replaced with Detail L-1, L-2, and L-9 from the City's Construction Standards and Details.
The Tree With Mulch Berm Detail has been replaced with the City Details L-1, L-2, and L-9 on D-04.

27.07(10) *Undesirable Growth and Debris.* Requires the removal of existing invasive species, trash, construction material and debris. Also requires removal of dead and dying trees presenting a potential hazard to existing and proposed structures. It is unclear from the submitted materials if the area proposed for development contains any invasive species or dead and dying trees. The proposed development area shall be assessed for invasive species and dead and dying trees and the status of the assessment shall be noted on sheet C-09. If the assessment shows that there are invasive species or dead and dying trees in the development area, the statement shall be added to the assessment that said invasive species and dead and dying trees shall be removed prior to Planning Division's final inspection of the project.
The above note has been added under Requirements on C-09.

3.12 Section 36.08 Waivers requires that certain criteria are met for the granting of any waiver. The application includes a request for one waiver but does not include the required criteria. The applicant shall submit an analysis of the required waiver criteria for the Board's consideration in granting or denying the requested waiver.
The revised waiver requests addressing the required criteria have been included as part of this submittal.

3.13 The Assessing Department, Fire Department, and General Services Department had no compliance requirements.
Acknowledged.

3.14 The Engineering Services Division's compliance requirements are noted as follows:
Sheet C-02

a. Under utility notes 14, it mentions existing gas is on the site; however, none can be found on the existing conditions plan. Ensure that the gas line is shown on the existing conditions plan or remove gas from the list in utility notes 14.
Utility Note #14 has been revised to denote no gas services on site.

Sheet C-06

a. State the type of surface used in the pole-butt and pea-stone bunkers (if it's concrete for example).
The surface below the bunkers will be bituminous concrete pavement, depths to match the rest of the area. The linework has been revised for clarity.

b. Turn off the rip rap and flared end section symbols at the pond.
Under TFM's preset drafting standards, turning off the FES and riprap would result in all drainage structures (catchbasins, drain manholes, etc.) being turned off. We respectfully request these items be allowed to remain on in C-06.

c. On the location plan, show the site location and change the spelling of "Call State Street" to "Call Street."
The location plan has been revised as requested.

Sheet C-07

a. Show a grade break line through the substation with flow arrows.
A grade break line and flow arrows have been added to C-07.

b. Add finished grade spot shots at the southern and southwest corner of the asphalt parking lot.
The requested spot grades have been added to C-07.

Sheet C-08

a. Add an erosion control legend to this sheet. Enlarge the inlet protection erosion control symbol to view. Inlet protection is not shown for the proposed inlet structures and shall be added. Ensure inlet protection is used on both the exiting and proposed drainage structures.
Inlet protection has been added to existing and proposed structures, symbols has been enlarged for legibility, and a Legend has been added to C-08.

b. Add the construction entrance to this sheet, and move it down into the site entrance location to ensure vehicles will drive through it, and move the site disturbance line to match the construction entrance location.
A second construction entrance has been added to ensure vehicles entering either access will traverse stone. The southern entrance has been aligned to correspond to the sawcut/existing edge of pavement location; no change to limit of work at the entrances was required.

Sheet D-02

a. Bituminous concrete curb is not allowed per Section 3(2)(c) of the City's Construction Standards and Details. However, a waiver has been requested. If the Planning Board approves the waiver, the detail may remain. If the waiver is denied, the detail shall be removed and replaced with a granite curb detail from the City's Construction Standards and Details.
Acknowledged.

b. Replace the storm drain trench detail with Detail SD-1 from the City's Construction Standards and Details.
The Storm Drain Trench Detail has been replaced with SD-1 as requested.

General

a. The proposed detention pond and pipe outlet shall be located such that they are completely outside of any of the City's easements on the site. Engineering Services Division also notes that the location of the City's sewer easement needs to change since the existing pipe is not centered within the existing easement. The city surveyor is still researching the existing easements and possible conditions of approval regarding modifications to existing easements or the addition of new easements.
The proposed filtration basin has been reconfigured to be located outside of the proposed 16-foot wide revised sewer easement, as agreed to upon review with the City Surveyor.

b. Darken existing line types and fonts to make them readable on paper.
Existing features have been set to a darker gray to improve legibility.

c. Note 10 on the existing conditions plan lists several deeds related to the sanitary sewer easement. It appears that Book 521, Page 108 should be Book 521, Page 109, and Book 529, Page 100 should be Book 521, Page 110. Review and correct the deed references as necessary.
The above easement references have been revised.

d. On the existing conditions plan, the reference of Book 917, Page 169, paragraph 2, is incorrect. This deed is in New London, New Hampshire. Review this information and correct as necessary.

Deed references have been reviewed and revised for accuracy.

e. On the existing conditions plan, specify which deed provides the legal description of the sewer easement that is delineated on the existing conditions plan.
Please see Note #10 for deeds associated with the sewer easement.

4 Variances

4.1 No variances are requested for this application
Correct.

5 Waivers

5.1 The applicant requests a waiver from the following section of the Site Plan Regulations:
a. Section 16.02(22) *Construction Details* to not use Section 3(2)(c) of the City's Construction Standards and Details to allow the use of bituminous concrete curb within the proposed project area.

Additional waiver requests have been provided in response to City review comments and are denoted on the Cover Sheet.

6 Conditional Use Permits:

6.1 The applicant requests approval for a conditional use permit pursuant to Section 28-2-4(j) *Table of Principal Uses* K.11 *Essential public utilities and appurtenances* and Section 28-9-4(b) *Conditional Use Permits* of the Zoning Ordinance to allow use of a portion of the site as a substation and associated pole storage yard (essential public utilities and appurtenances).
Acknowledged.

6.2 A conditional use permit application is required for the disturbance of the bluff pursuant to Section 28-4-4(d) Conditional Use Permits Required for Certain Disturbance of Bluffs and Buffers. Neither the existing conditions plan or the site plan show and label the bluff and the corresponding 50-foot bluff buffer. However, staff estimates that at least a portion of the project area is within the 50-foot bluff buffer. If this is the case, a conditional use permit application must be completed, the criteria of both Sections 28-4-4(d)(1) and (2) and 28-9-4(b) must be addressed, a recommendation from the Conservation Commission is needed, and the plan set must be revised to address Section 28-4-4(d)(1) and (2).
A CUP Application has been provided with this resubmittal and the plans updated accordingly to address the required criteria.

6.3 The applicant is scheduled to appear before the Architectural Design Review Committee for a recommendation on architectural design review on September 30, 2025.
Acknowledged.

6.4 No appearances before the Conservation Commission are necessary for this application as submitted. However, staff estimates that a portion of the project may be in the 50-foot-wide bluff buffer. If that is the case, a conditional use permit is required for the bluff disturbance, and a recommendation from the Conservation Commission is needed.
Acknowledged.

7 Architectural Design Review

7.1 The applicant is scheduled to appear before the Architectural Design Review Committee for a recommendation on architectural design review on September 30, 2025.
Acknowledged.

8 Conservation Commission

8.1 No appearances before the Conservation Commission are necessary for this application as submitted. However, staff estimates that a portion of the project may be in the 50-foot-wide bluff

buffer. If that is the case, a conditional use permit is required for the bluff disturbance, and a recommendation from the Conservation Commission is needed.
Acknowledged.

9 Recommendation:

9.1 Staff reviewed the application for completeness based upon the criteria of the Site Plan Regulations, and concluded that not all the required information is present, including items required by Sections 12, 13, 15, and 16 of the Site Plan Regulations as outlined in Item 3 of the staff report, detailed bluff and bluff information is missing, and the required conditional use permit application for disturbance to the bluff buffer is missing.

- Based upon staff's review of the application, it is recommended that the Board move to:
- Determine the application INCOMPLETE;
- State that the project IS A DEVELOPMENT OF REGIONAL IMPACT per RSA 36:55; and
- Advise the applicant to address the incomplete items noted in Item 3 of the staff report, revise and resubmit the plan set, and submit a conditional use permit application for disturbance to the bluff buffer.

Acknowledged.

Comments from Paul Gendron:

1) Existing Conditions Survey Plan – Sheet 1 of 1: The boundary survey has revealed that the City's sanitary sewer is partially located outside of the existing easement. We have discussed this with Nick Golon and Michael Dahlberg of TFMoran. It is our collective agreement that an easement plan should be prepared to delineate the current easement location and a proposed easement location. The current easement would be extinguished in its entirety, and a new easement, conforming to the as-built location of the sanitary sewer, would be established. I can assist with preparing an easement agreement between the City and Unitil which extinguishes the current easement and establishes a new one. The easement agreement will also spell out more specifically the rights of each party, including what can be placed in the easement and what should not be placed in the easement. The easement agreement will need to be considered by the Concord City Council prior to execution by the City Manager and eventually recorded at the MCRD with the easement plan.
Addressing the potential sewer easement as noted above is ongoing.

2) Overall Site Layout Plan - Sheet C-05: Proposed permanent improvements, such as flared end sections, drain manholes, pavement, curbing, fencing, a concrete pole bunker, and a snow storage area, etc., are shown within the proposed easement. All permanent improvements should be moved outside of the proposed easement. Permanent improvements within the easement would impede the City's maintenance of the sanitary sewer. Generally, private improvements allowed by the City within the easement area are placed at the risk of the property owner. For example, in the event that the City needs to conduct maintenance on the sanitary sewer and the new driveway is excavated, the City will not be responsible for repairing or restoring to conform to the approved site plan.
Site improvements within the pending potential easement have been relocated to the extent practical. We will continue to work with City departments to resolve this comment as appropriate.

3) Site Layout Plan – Sheet C-06: See comment above for Sheet C-05.
Please see response above.

4) Grading, Drainage & Utility Plan – Sheet C-07: See comment above for Sheet C-05.
Please see response above.

5) Grading, Drainage & Utility Plan – Sheet C-07: The FES #1, the DMH Frame & Cover, Sediment Forebay #1, Sediment Forebay #2, and Filtration Basin #1 should be moved out of the proposed easement.
Response

6) Stormwater Management Plan – Sheet C-08: See comments above for Sheet C-05, C-06, and C-07.
Please see response above.

7) Landscaping Plan – Sheet C-09: See comments above for Sheet C-05, C-06, and C-07.
Please see response above.

8) Turning Movement Plan – Sheet T-01: See comments above for Sheet C-05, C-06, and C-07.
Please see response above.

Comments from CNHRPC:

Article 28-4-4 Buffers to Bluffs of the Concord Zoning Ordinance requires a 50' buffer to be maintained at the top and bottom of bluffs including those found along the Merrimack River. This project is located partially in that bluff buffer area. The City should consider if the disturbance proposed triggers a need for Conditional Use Permit.
A CUP Application for disturbances to the City Bluff Buffer has been submitted to the City.

In any case, items in the past have been thrown over the bluffs in this general area which should not have been, such as cars and construction materials and equipment. The City and Unitil may wish to consider if an opportunity exists to rectify some of these past errors during the construction process. The Northern Rail Trail will pass below this site between the bluff and the Merrimack River.
Non-native materials encountered within the limits of work will be removed and disposed of in accordance with applicable regulations; as noted on the applicable Plan sheets and notes.

Care will be needed to ensure that the main sewer line serving the NH State Prison is not adversely impacted during the construction of the projects proposed drainage improvements.
The stormwater management area has been designed to protect and maintain existing utilities.

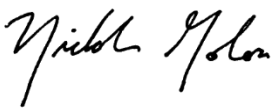
Comments from UMRLAC

1. The UMRLAC was uncertain how the original substation area was to be finished and would like the applicant to consider restoring this area to grassland or other impervious landscaping, if not already planned for.
   The existing substation will remain in its current configuration until the rebuilt substation has been brought online. A decommissioning plan for the existing substation will be the responsibility of the Applicant and lies outside the scope of this project. Future use of the area has not yet been determined, but due to the age of the electrical equipment within the existing yard, it is not recommended to convert this area from an impervious to pervious surface.

2. The UMRLAC noted that the Shoreland Permit box was checked "no." However, a Shoreland Permit by Notification was required and was referenced in the Description of Project section.
   On page 3 of the NHDES AoT Permit application, "no" is selected as the question pertains to whether the application has been filed. At this point in time, the Shoreland Permit-By-Notification (PBN) has not yet been submitted as it is an unamendable permit with a five-day review period. The Plans associated with the Application need to incorporate any/all City and AoT comments prior to submittal.

We believe we have adequately addressed the comments provided at this time. Should there be any questions or concerns regarding this submittal or the project in general please do not hesitate to contact the undersigned at (603) 472-4488 or ngolon@tfmoran.com.

Sincerely,
TFMoran, Inc.



Nicholas Golon, P.E.
Civil Department Manager, Principal

Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
Scientists

August 20, 2025

AnneMarie Skinner, AICP– City Planner
Concord City Hall
41 Green Street
Concord, NH 03301

RE: Waiver Request – CCSD Section 3(2)(c)
Unitil West Concord Substation Rebuild
1 – 7 McGuire Street, Concord, NH 03301
Tax Map 494Z Lot 44

On behalf of our Client, Unitil Energy Systems, Inc. (Unitil), we respectfully request a waiver from CCSD Section 3(2)(c) to allow the applicant to utilize bituminous concrete curb within the area of limited improvements for the West Concord Substation Rebuild and associated pole storage area.

The project consists of retiring vintage substation equipment and installing new current technology to meet the growing electrical demand in the Concord area and provide further redundancy for service reliability. In order to accommodate the substation relocation on the subject lot, an existing pole storage area will be relocated, and stormwater management areas will be incorporated. Bituminous concrete curb (BCC) is proposed at the limits of interior paved areas that provide for appropriate circulation for Unitil vehicles for access to the substation and for management of materials within the pole storage area. The BCC's purpose is to provide a gutter line to direct stormwater from portions of the developed area to the proposed stormwater management areas. Given its intended use and remote location, the use of curb identified by the CCSD (vertical granite or sloped granite curb) appears unnecessary as it does not provide a material benefit to the public but carries an additional burden of cost to the applicant.

We feel this request is appropriate and consistent with the expectations of the Planning Board and that this Site Plan upholds the spirit and intent of the City's Site Plan Regulations and granting the waiver will not adversely affect public convenience or welfare. As such, we respectfully request a waiver from CCSD Section 3(2)(c).

Sincerely,
TFMoran, Inc.

Jeremy Belanger

Jeremy Belanger, P.E.
Senior Project Engineer

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September 22, 2025

AnneMarie Skinner, AICP– City Planner
Concord City Hall
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Concord, NH 03301

RE: Waiver Request – Section 6.03(2)(c) Application Stages &
Section 11.05 Major Site Plan Procedure
Unitil West Concord Substation Rebuild
1 – 7 McGuire Street, Concord, NH 03301
Tax Map 494Z Lot 44

On behalf of our Client, Unitil Energy Systems, Inc. (Unitil), we respectfully request a waiver from the above noted sections – to notice the proposed project for determination of completeness and public hearing for the same night (October 15th), such that the project would have the opportunity to be approved in a one-step process if determined appropriate by Staff and the Planning Board at that time.

As noted elsewhere in the application, the project consists of retiring vintage substation equipment and installing new current technology to meet the growing electrical demand in the Concord area and provide further redundancy for service reliability. In order to accommodate the substation relocation on the subject lot, an existing pole storage area will be relocated, and stormwater management areas will be incorporated.

Waiver Justification:

1) The granting of the waiver will not be detrimental to the public safety, health, or welfare or injurious to other property;
   We understand the primary reasoning for the two-step process for Major Site Plan Review is to provide;
   a) Additional time for City offices to review and comment as Major Site plans typically have a higher level of complexity to design the level of infrastructure required to support such a project, and
   b) Adequate time to notify and educate abutters and the public about the proposed project

   Although the project is classified as a Major Site Plan, it is important to note the limited scope as it is a relocation of an existing substation to the location of an existing pole storage area. The project does not create additional demand on emergency services as it is essentially an upgrade of the existing facilities, and the utility infrastructure required to accommodate the use (electric/telecommunications) are all readily available on site. There are no proposed water, sewer, or gas connections. Comments from City Departments were received under the initial Completeness Review and have been addressed at this time.

   Compliance with the specific Site Plan Regulations identified herein would unduly burden the Applicant while providing little or no informational benefit to the Planning Board or Public by requiring Completeness and the Public Hearing to be held at two (2) meetings. Granting the requested waivers will have no impact on the public safety, health, or welfare.
2) The conditions upon which the request for a waiver is based are unique to the property for which the waiver is sought and are not applicable generally to other property;

   The project is limited and unique to the property, involving modification to only a portion of the property.

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3) Because of the particular physical surroundings, shape, or topographical conditions of the specific property involved, a particular and unnecessary hardship to the owner would result, as distinguished from a mere inconvenience, if the strict letter of these regulations are carried out;

   Strict conformance with the Site Plan Regulations will impose an unnecessary hardship on the Applicant while providing little to no informational value to the Planning Board and public. As noted, the project only takes place on a portion of the property, preliminary review by City Departments has been completed and comments addressed. Requiring a second meeting would not provide a benefit to the public.

4) Specific circumstances relative to the site plan or conditions of the land where a site plan is proposed indicate that the waiver will properly carry out, or not be contrary to, the spirit and intent of these regulations; and

   The project is limited in scope, City Departments have reviewed and provided comments, which have been addressed. Therefore, allowing the project to be heard during a single meeting will not be contrary to the spirt and intent of the regulations.

5) The waivers will not in any manner vary the provisions of the Zoning Ordinance, Master Plan Reports, or Official Map.

   The requested waiver will not in any manner vary the provisions of the Zoning Ordinance, Master Plan or Official Map.

Sincerely,
TFMoran, Inc.

Jeremy Belanger

Jeremy Belanger, P.E.
Senior Project Engineer

Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
Scientists

September 22, 2025

AnneMarie Skinner, AICP– City Planner
Concord City Hall
41 Green Street
Concord, NH 03301

RE: Waiver Request – Section 15.03(7), (8), (16), (17), (18) & (23)
Unitil West Concord Substation Rebuild
1 – 7 McGuire Street, Concord, NH 03301
Tax Map 494Z Lot 44

On behalf of our Client, Unitil Energy Systems, Inc. (Unitil), we respectfully request a waiver from Section 15.03(7), (8), (16), (17), (18) & (23) Existing Conditions, to not provide extraneous information that is outside the limits of the proposed project and the provision to provide would provide no benefit to the applicant or the public.

As noted elsewhere in the application, the project consists of retiring vintage substation equipment and installing new current technology to meet the growing electrical demand in the Concord area and provide further redundancy for service reliability. In order to accommodate the substation relocation on the subject lot, an existing pole storage area will be relocated, and stormwater management areas will be incorporated. The survey provided is appropriate for the scope of the proposed project noting some extraneous information for areas outside the area of work have not been provided in full compliance with the regulations.

Waiver Justification:

1) The granting of the waiver will not be detrimental to the public safety, health, or welfare or injurious to other property;

   Compliance with the specific Site Plan Regulations identified herein would unduly burden the Applicant while providing little or no informational benefit to the Planning Board. Because the improvements specifically reside on only a portion of the property, the existing conditions elements required to be shown per the Site Plan Regulations for the full property are unnecessary (including but not limited to; existing site signage, existing parking spaces dimensions, existing building dimensions, existing outdoor lighting, etc.) as these elements will not change. Granting the requested waivers will have no impact on the public safety, health or welfare.

2) The conditions upon which the request for a waiver is based are unique to the property for which the waiver is sought and are not applicable generally to other property;

   The project is limited and unique to the property, involving modification to only a portion of the property.

3) Because of the particular physical surroundings, shape, or topographical conditions of the specific property involved, a particular and unnecessary hardship to the owner would result, as distinguished from a mere inconvenience, if the strict letter of these regulations are carried out;

   Strict conformance with the Site Plan Regulations will impose an unnecessary hardship on the Applicant while providing no informational value to the Planning Board. As noted, the project only takes place on a portion of the property, and the existing conditions elements depicted in these areas are appropriate to support the proposed work. Evaluation of existing areas beyond the scope of the project is more of a mere inconvenience, and does not provide a benefit to the public.

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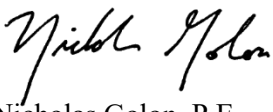
4) Specific circumstances relative to the site plan or conditions of the land where a site plan is proposed indicate that the waiver will properly carry out, or not be contrary to, the spirit and intent of these regulations; and

   The conditions of the land for which a waiver is sought will remain the same as they currently exist and therefore will not be contrary to the spirt and intent of the regulations.

5) The waivers will not in any manner vary the provisions of the Zoning Ordinance, Master Plan Reports, or Official Map.

   The requested waiver will not in any manner vary the provisions of the Zoning Ordinance, Master Plan or Official Map.

Sincerely,
TFMoran, Inc.



Nicholas Golon, P.E.
Civil Department Manager, Principal

Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
Scientists

August 20, 2025
Revised September 22, 2025

AnneMarie Skinner, AICP– City Planner
Concord City Hall
41 Green Street
Concord, NH 03301

RE: Waiver Request – CCSD Section 3(2)(c)
Unitil West Concord Substation Rebuild
1 – 7 McGuire Street, Concord, NH 03301
Tax Map 494Z Lot 44

On behalf of our Client, Unitil Energy Systems, Inc. (Unitil), we respectfully request a waiver from CCSD Section 3(2)(c) to allow the applicant to utilize bituminous concrete curb within the area of limited improvements for the West Concord Substation Rebuild and associated pole storage area.

The project consists of retiring vintage substation equipment and installing new current technology to meet the growing electrical demand in the Concord area and provide further redundancy for service reliability. In order to accommodate the substation relocation on the subject lot, an existing pole storage area will be relocated, and stormwater management areas will be incorporated. Bituminous concrete curb (BCC) is proposed at the limits of interior paved areas that provide for appropriate circulation for Unitil vehicles for access to the substation and for management of materials within the pole storage area. The BCC's purpose is to provide a gutter line to direct stormwater from portions of the developed area to the proposed stormwater management areas. Given its intended use and remote location, the use of curb identified by the CCSD (vertical granite or sloped granite curb) appears unnecessary as it does not provide a material benefit to the public but carries an additional burden of cost to the applicant.

Waiver Justification:

1) The granting of the waiver will not be detrimental to the public safety, health, or welfare or injurious to other property;

   Curb type as described above will not be detrimental to the public safety, health, or welfare or injurious to other property.

2) The conditions upon which the request for a waiver is based are unique to the property for which the waiver is sought and are not applicable generally to other property;

   The requirement to use vertical granite or sloped granite curbing for this specific type of industrial property would not be appropriate and would unduly burden the applicant while providing no benefit to the public.

3) Because of the particular physical surroundings, shape, or topographical conditions of the specific property involved, a particular and unnecessary hardship to the owner would result, as distinguished from a mere inconvenience, if the strict letter of these regulations are carried out;

   The intent of the curb is outlined above and is appropriate for this particular project which is the existing grounds of the West Concord Substation, limited by its topographical conditions and existing physical surroundings. The requirement to use a more costly curb type will impose a unnecessary hardship on the applicant while providing no benefit to the public.

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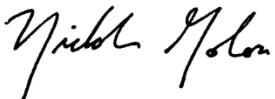
4) Specific circumstances relative to the site plan or conditions of the land where a site plan is proposed indicate that the waiver will properly carry out, or not be contrary to, the spirit and intent of these regulations; and

   The use of BCC is appropriate and not contrary to the spirit and intent of the regulations. The curb as proposed will serve its function as a demarcation of the proposed paved surface and to direct stormwater runoff as proposed.

5) The waivers will not in any manner vary the provisions of the Zoning Ordinance, Master Plan Reports, or Official Map.

   The requested waiver will not in any manner vary the provisions of the Zoning Ordinance, Master Plan or Official Map.

Sincerely,
TFMoran, Inc.



Nicholas Golon, P.E.
Civil Department Manager, Principal

Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
Scientists

September 22, 2025

AnneMarie Skinner, AICP– City Planner
Concord City Hall
41 Green Street
Concord, NH 03301

RE: Waiver Request – Section 20.06 Solid Waste Facility Screening
Section 26.02 Mechanical Equipment Screening
Section 26.03 Screening of Outside Storage
Unitil West Concord Substation Rebuild
1 – 7 McGuire Street, Concord, NH 03301
Tax Map 494Z Lot 44

On behalf of our Client, Unitil Energy Systems, Inc. (Unitil), we respectfully request a waiver from Sections 20.06, 26.02, and 26.03 of the City of Concord Site Plan Regulations, to not provide screening of outdoor storage areas, and/or electrical infrastructure equipment and the provision to provide would provide no benefit to the applicant or the public.

As noted elsewhere in the application, the project consists of retiring vintage substation equipment and installing new current technology to meet the growing electrical demand in the Concord area and provide further redundancy for service reliability. In order to accommodate the substation relocation on the subject lot, an existing pole storage area will be relocated, and stormwater management areas will be incorporated.

Waiver Justification:

1) The granting of the waiver will not be detrimental to the public safety, health, or welfare or injurious to other property;

   Compliance with the specific Site Plan Regulations identified herein would unduly burden the Applicant while providing little or no benefit to the public as vegetation and/or opaque fencing located in such close proximity to overhead lines and the substation fence poses a health and safety risk to both the line workers responsible for maintaining the lines and the public in general, as it would impede on the required clear distance to provide proper insulation and prevent a potential electric arc. In addition to safety concerns, the intent of the regulations is to shield views of unsightly materials from the Public Right-of-Way (ROW) and abutting parcels. As the majority of abutting uses consist of commercial spaces and the residential abutters will be shielded by existing vegetation and/or buildings, granting the requested waivers will have no impact on the public safety, health or welfare.

2) The conditions upon which the request for a waiver is based are unique to the property for which the waiver is sought and are not applicable generally to other property;

   The project is limited in scope and located along a portion of McGuire Street which has access via an existing easement along the front of the property. The existing use of the parcel to support an essential public utility has been established and relocating the substation to another portion of the parcel will not significantly change the character of the area.

3) Because of the particular physical surroundings, shape, or topographical conditions of the specific property involved, a particular and unnecessary hardship to the owner would result, as distinguished from a mere inconvenience, if the strict letter of these regulations are carried out;

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Strict conformance with the Site Plan Regulations will impose an unnecessary hardship on the Applicant while providing little or no benefit to the public as vegetation and/or opaque fencing located in such close proximity to overhead lines and the substation fence poses a health and safety risk as denoted above.

4) Specific circumstances relative to the site plan or conditions of the land where a site plan is proposed indicate that the waiver will properly carry out, or not be contrary to, the spirit and intent of these regulations; and

   The proposed substation relocation has been designed to meet the growing electrical demand in the Concord area and provide further redundancy for service reliability to Unitil's customers. Granting the waiver will support this goal and therefore will not be contrary to the spirit and intent of the regulations.

5) The waivers will not in any manner vary the provisions of the Zoning Ordinance, Master Plan Reports, or Official Map.

   The requested waiver will not in any manner vary the provisions of the Zoning Ordinance, Master Plan or Official Map.

Sincerely,
TFMoran, Inc.

Jeremy Belanger

Jeremy Belanger, P.E.
Senior Project Engineer

STORMWATER MANAGEMENT REPORT

Unitil West Concord Substation Relocation

1-7 McGuire Street

Concord, NH 03301

Tax Map 494Z Lot 44

Prepared On:
August 20, 2025

Prepared for:
Unitil Energy Systems, Inc.
30 Energy Way
Exeter, NH 03833

TFM Project Number:
96159-01

Prepared by:

TFM®
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Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
Scientists

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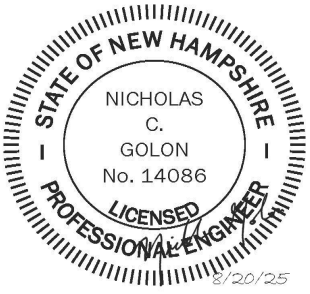

Unitil West Concord Substation Relocation

1-7 McGuire Street, Concord, NH 03301
Tax Map 494Z Lot 44
August 20, 2025

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PART 1

Executive Summary

Unitil Energy Systems, Inc. (Unitil) is proposing to relocate the existing West Concord Substation from the current location to the southern portion of the parcel. The existing substation is in need of electrical upgrades to accommodate current and future load growth of residents and businesses of West Concord. The existing Unitil Facility is located at 1-7 McGuire Street, Tax Map 494Z, Lot 44.

An open and closed drainage system is proposed to attenuate, convey, and treat stormwater runoff from the area of proposed re development. The site will be designed with a series of underdrains within the substation yard and sheet flow to a curb break in the paved storage yard. Two (2) sediment forebays and one (1) filtration basin will provide pretreatment/treatment and manage runoff for this project.

The system has been designed to maintain peak flows during all storm conditions up to and including the 100-year storm event.

- Best Management Practices are proposed to manage the stormwater from the development and provide treatment, recharge and maintain existing flow rates leaving the site.
    - One (1) proposed filtration basin system will collect and recharge stormwater from proposed impervious surfaces on the site. This basin is required to provide pre-treatment prior to stormwater entering the main cell of the basin. The proposed forebay allows sediment to settle out of the stormwater. Filtration basins remove pollutants, reduce the peak rates of flow, and flow volume by allowing evaporation and infiltration of the stormwater. The stormwater receives treatment as it percolates through the 18 inches of filter media as specified by Env-Wq 1508.08(k)(4). Infiltration below the filter media also provides groundwater recharge.
- The Water Quality Volume (WQV) has been met by providing the required storage below the lowest outlet in the basin.

Description of Project

Unitil is proposing to relocate the existing West Concord Substation from the current location to the southern portion of the parcel. The existing substation is in need of electrical upgrades to accommodate current and future load growth of residents and businesses of West Concord. The existing Unitil Facility is located at 1-7 McGuire Street,.

The subject parcel is located at 1-7 McGuire Street, Tax Map 494Z, Lot 44, in the City of Concord, NH. Underlying zoning designations include Industrial (IN) and City Shoreland Overlay Zoning Districts. The site is currently occupied by the existing Unitil Facility, comprised of office and garage facilities, paved and gravel storage yards, the existing West Concord Substation, access, parking and a central undeveloped portion of land. The site contains an existing sewer easement in favor of the NH State Prison, and several existing access and utility easements for electrical support.

The site is abutted by vacant parcel to the north, the State of NH Department of Corrections Warehouse, residential and commercial properties, and McGuire Street to the west, commercial development to the south, and Boston & Maine Corporation property and the Merrimack River to the east.

Existing drain flow paths will be maintained within the area of redevelopment, generally flowing to the east and ultimately the Merrimack River.

The existing parcel currently consists of a combination of gravel, varying qualities of grasses, wooded vegetation and sewer utilities within the area of work. Photographs of existing site features can be found in Section 2 of this report.

An open and closed drainage system is proposed to attenuate, convey, and treat stormwater runoff from the area of proposed re development. The site will be designed with a series of underdrains within the substation yard and sheet flow to a curb break in the paved storage yard. Two (2) sediment forebays and one (1) filtration basin will provide pretreatment/treatment and manage runoff for this project.

Existing drainage discharge points will be maintained throughout the site. The proposed filtration basin with sediment forebay will be utilized to maintain peak runoff flows and volume in post-development conditions.

The site is approximately 8.7± acres, of which approximately 2.0± acres will be disturbed as part of the proposed redevelopment.

A NHDES Alteration of Terrain (AoT) Permit, NHDES Shoreland Permit-By-Notification (PBN), and local approval will be required for the redevelopment project.

The objectives for the post-development drainage design are to use best management practices to attenuate flows, provide pretreatment and treatment to collected stormwater runoff and maintain groundwater recharge.

The intent of this report is: 1) to analyze the rate of runoff from the site for the pre-development conditions and for the post-development conditions. The drainage system will be designed to maintain the current peak rate of runoff from the site, and 2) to provide storm water treatment and recharge for the runoff from the development prior to discharging runoff from the site in accordance with the requirements of the NHDES Alteration of Terrain and the City of Concord.

Storm Water Methodology

Pre-Development Conditions

The existing lot is approximately 8.7± acres, of which approximately 2.0± acres will be disturbed as part of the proposed redevelopment.

The site is abutted by vacant parcel to the north, the State of NH Department of Corrections Warehouse, residential and commercial properties, and McGuire Street to the west, commercial development to the south, and Boston & Maine Corporation property and the Merrimack River to the east. Access to the site is via existing paved and gravel drives along McGuire Street.

The project area contains varying degrees of elevation change, with the general topography sloping west to east. The existing pole storage yard contains minimal elevational change prior to a steep decline in elevation on the eastern side of the site. Between the storage yard and Until Facility there is an existing depression decreasing in elevation from 290 along McGuire Street to 256 along the eastern property line. The existing groundcover consists of a combination of gravel, varying qualities of grasses, and wooded vegetation within the area of work.

Evaluation points (Point-of-Interest, POI) have been defined by abutting parcels with identifying HydroCAD Links as follows:

- POI-1: Abutting Parcel Lot 743Z-10-2;
- POI-2: Abutting Parcel Lot 743Z-10-2;
- POI-3: Abutting Parcel Lot 582Z-1;
- POI-4: Abutting Parcel Lot 582Z-1;
- POI-5: Abutting Parcel Lot 582Z-1; and
- POI-6: Abutting Parcel Lot 494Z-32.;

NRCS Soil Survey mapping was referenced for the subject property which resulted in hydrologic soils group type “B” soils. No wetlands are located within the limits of work.

To model the site drainage, the HydroCAD Version 10.20-6a program has been used. The software is based on the SCS TR-20 technique used for modeling the hydrology and hydraulics of stormwater runoff. The 2-year, 10-year, 25-year, 50-year, and 100-year storm events are included per the requirements of the NHDES AoT and the City of Concord.

Post-Development Conditions

The relocated substation proposes to utilize the area of the existing gravel pole storage yard, provide paved storage and access from McGuire Street. In addition to the relocated substation yard there are proposed access, storage and stormwater management improvements proposed under this project.

Stormwater runoff from the proposed area of redevelopment will be conveyed via an open and closed drainage system to attenuate, convey, and treat runoff. The site will be designed with a series of underdrains within the substation yard and sheet flow to a curb break in the paved storage yard. Two (2) sediment forebays and one (1) filtration basin will provide pretreatment/treatment and manage runoff for this project. This will allow for removal of pollutants and infiltration of stormwater prior to recharge to the aquifer. A riprap weir has been provided to attenuate discharge from the basin, which will discharge to the existing flow path in the central depression of the site.

The objectives for the post-development drainage design is to use best management practices to attenuate the flow, provide treatment to collected stormwater and propose groundwater recharge.

All pre-development evaluation points have been analyzed in the post-development conditions. The post-development drainage model represents the site divided into multiple subcatchments based on the layout of the proposed stormwater management system. There is no proposed increase in discharge from the site up to and including the 100-year storm event.

Groundwater Recharge

The required Groundwater Recharge (GRV) for the Type A soils that have been replaced by impervious cover per the AoT regulations has been provided within the proposed filtration system, below the lowest outlet orifice. Supporting calculations have been provided on the GRV and Best Management Practices (BMP) Worksheets included in Section 3 of this report.

Stormwater Treatment

Best Management Practices are proposed to manage the stormwater from the area of redevelopment and provide treatment, recharge and maintain existing flow rates leaving the site.

The proposed filtration system is designed to maintain existing recharge rates and to preserve groundwater levels. Pollutant removal is achieved as stormwater percolates through the existing subsurface material of the filtration basin. Pretreatment will be provided prior to stormwater entering the main cell of the basin by sediment forebays, which allow sediment to settle out of the stormwater.

The Water Quality Volume (WQV) is fully detained within the proposed filtration basin providing the stormwater treatment.

Test pits and infiltration testing were performed as part of the project design to identify Estimated Seasonal High-Water Table (ESHWT) and subgrade Infiltration Rates. The infiltration rates used in these calculations are based on those values obtained, with a factor of safety of 2 per AoT regulations.

The stormwater receives treatment as it percolates through the 18 inches of filter media as specified by Env-Wq 1508.08(k)(4). Infiltration below the filter media also provides groundwater recharge. Filter media specifications have been included on the Site Plan Detail Sheets.

Erosion Control Measures

Erosion Control Measures are found on the Site Preparation and Stormwater Management Plans within the Site Plan Set. The erosion control and construction sequence notes on the Notes Sheets contain specifications for stabilizing disturbed areas and limiting the length of time these areas are exposed.

Temporary Erosion Control Measures

Silt sock is proposed along the edges and downslope of site work to prevent sediment from discharging from the project area. A stabilized construction entrance is proposed at the driveway entrance to keep sediment from being tracked onto the street during construction. Erosion protection is proposed around the filtration basin area to protect the drainage practices during construction until the site has stabilized, and flow can be directed to the basin.

Permanent Erosion Control Measures

A combination of open and closed drainage system is proposed on the site to capture the runoff from the project. Areas of concentrated flow will be stabilized with riprap and discharged to centralized stable discharge points. Areas disturbed during construction which will not be impervious or stabilized with riprap in post-development conditions will be loam and seeded to restore the areas upon completion of construction.

Flood Protection

Examination of the Flood Insurance Rate Map for Merrimack County, New Hampshire (All Jurisdictions), Map Number 33013C0531E, Effective Date April 19, 2010, indicates that the subject parcel is not located within a Flood Hazard Area.

Conclusion

Peak Rate Flows

There is no increase in the peak rate of runoff or volume at the discharge points from the project site.

FLOW (CFS)	2-YR		10-YR		25-YR		50-YR		100-YR	
	PRE	POST	PRE	POST	PRE	POST	PRE	POST	PRE	POST
POI-1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
POI-2	9.2	9.2	15.9	14.5	21.7	18.8	27.3	23.0	34.2	28.7
POI-3	0.5	0.0	0.8	0.0	1.0	0.0	1.3	0.0	1.6	0.0
POI-4	0.0	0.0	0.1	0.0	0.2	0.0	0.2	0.0	0.3	0.0
POI-5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
POI-6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

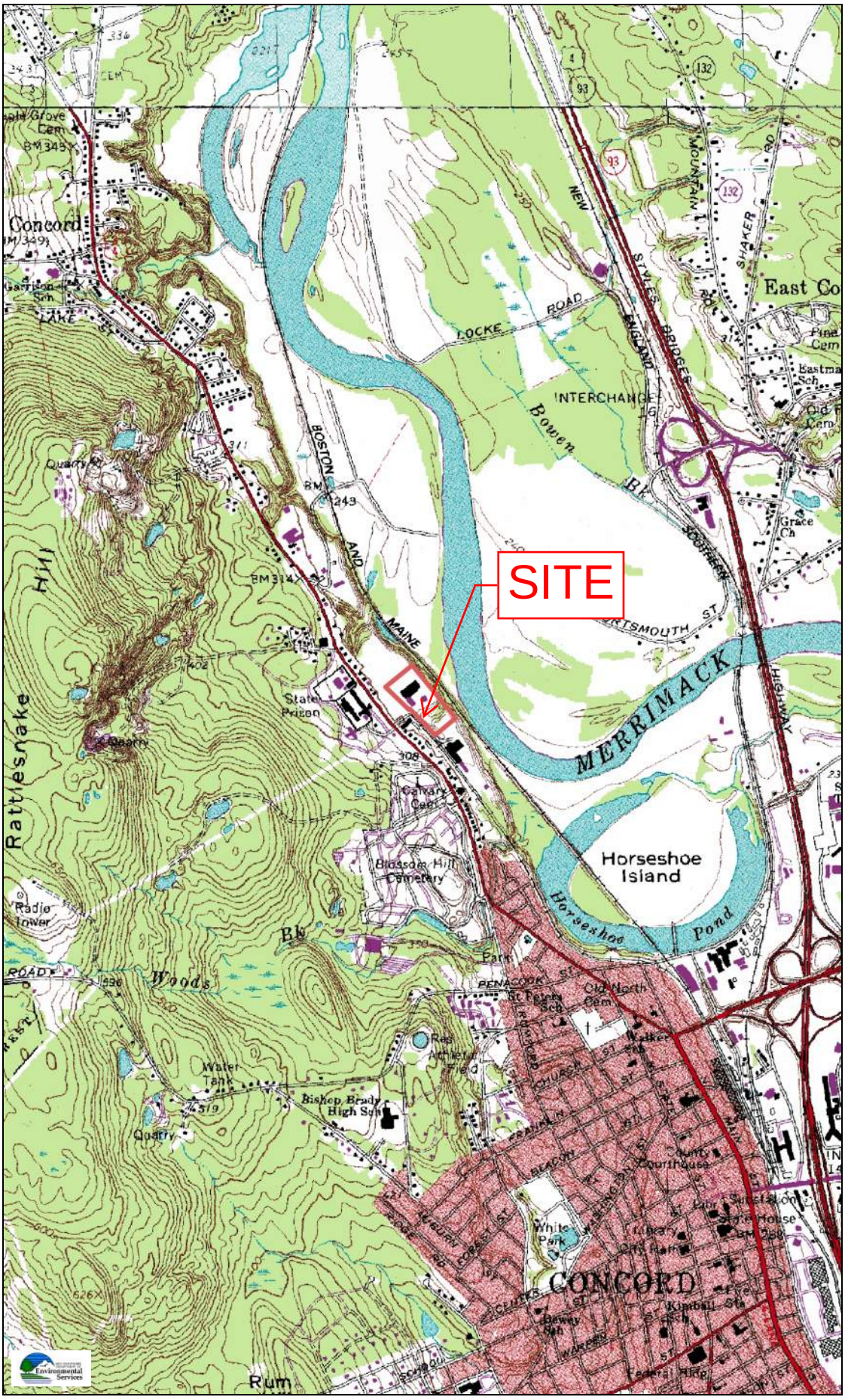
Volume (cf)	2-YR		10-YR		25-YR		50-YR		100-YR	
	PRE	POST	PRE	POST	PRE	POST	PRE	POST	PRE	POST
POI-1	0	0	48	48	217	217	468	468	858	858
POI-2	35,523	32,168	61,543	51,915	83,719	73,683	105,504	95,917	132,042	123,017
POI-3	1,479	0	2,546	0	3,399	0	4,206	0	5,161	0
POI-4	159	0	360	0	540	0	721	0	943	0
POI-5	0	0	25	0	84	0	166	0	290	0
POI-6	0	0	0	0	0	0	1	1	4	4

Treatment

The filtration basin system, with pretreatment forebay, has been designed to provide adequate treatment for stormwater runoff associated with the proposed redevelopment.

PART 2

96159-00 - Unitil West Concord - USGS Map



Legend

- State
- County
- Town Boundaries

Map Scale

1: 24,000

Map Generated: 9/13/2023

Notes

Prepared by: TFMoran, Inc.

NHDES Surface Water Impairments

6/16/2025, 3:11:12 PM

Surface Waters with Impairments with Quarter Mile Buffer

1:5,000

0 0.03 0.06 0.12 mi

0 0.05 0.1 0.2 km

Unitil West Concord SS NHDES AoT Screening Layers

6/16/2025, 4:38:27 PM

1:2,500

- Remediation Sites
- Designated Rivers Quarter Mile Buffer
- Parcels

0 0.02 0.04 0.09 mi

0 0.04 0.07 0.14 km

Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community, NHDRA, Axiomatic, Inc.

TFM PN 96519-01

New Hampshire Natural Heritage Bureau
NHB DataCheck Results Letter

To: Jeremy Belanger
48 Consitution Dr
Bedford, NH 03110

From: NH Natural Heritage Bureau

Date: 5/12/2025 (This letter is valid through 5/12/2026)

Re: Review by NH Natural Heritage Bureau of request dated 5/12/2025

Permit Types: Shoreland Standard Permit
Concord
Stormwater Pollution Prevention

NHB ID: NHB25-1423

Applicant: Jeremy Belanger

Location: Concord
Tax Map: 494Z, Tax Lot: 44
Address: 1-7 McGuire Street

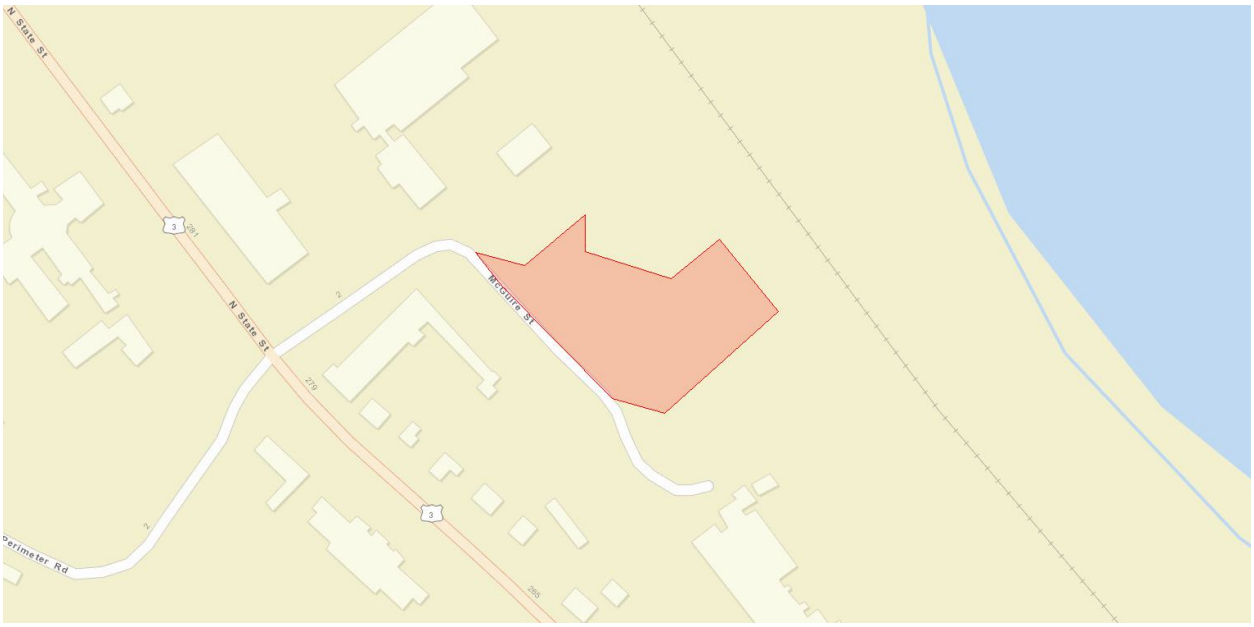
Proj. Description: The project proposes to relocate the existing Unitil West Concord Substation and pole storage yard at the above noted property. In addition to the substation and storage yard, the scope includes access, utility, and stormwater management area improvements. Based on historic aerial imagery, plans of record, and subsurface test pit investigations it appears the proposed area of work lies entirely within areas of prior disturbance.

The NH Natural Heritage database has been checked for records of rare species and exemplary natural communities near the area mapped below. The species considered include those listed as Threatened or Endangered by either the state of New Hampshire or the federal government. We currently have no recorded occurrences for sensitive species near this project area.

A negative result (no record in our database) does not mean that a sensitive species is not present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

Based on the information submitted, no further consultation with the NH Fish and Game Department pursuant to Fis 1004 is required.

MAP OF PROJECT BOUNDARIES FOR: NHB25-1423



Department of Natural and Cultural Resources
Division of Forests and Lands
(603) 271-2214 fax: 271-6488

DNCR/NHB
172 Pembroke Rd.
Concord NH 03301

United States Department of Agriculture

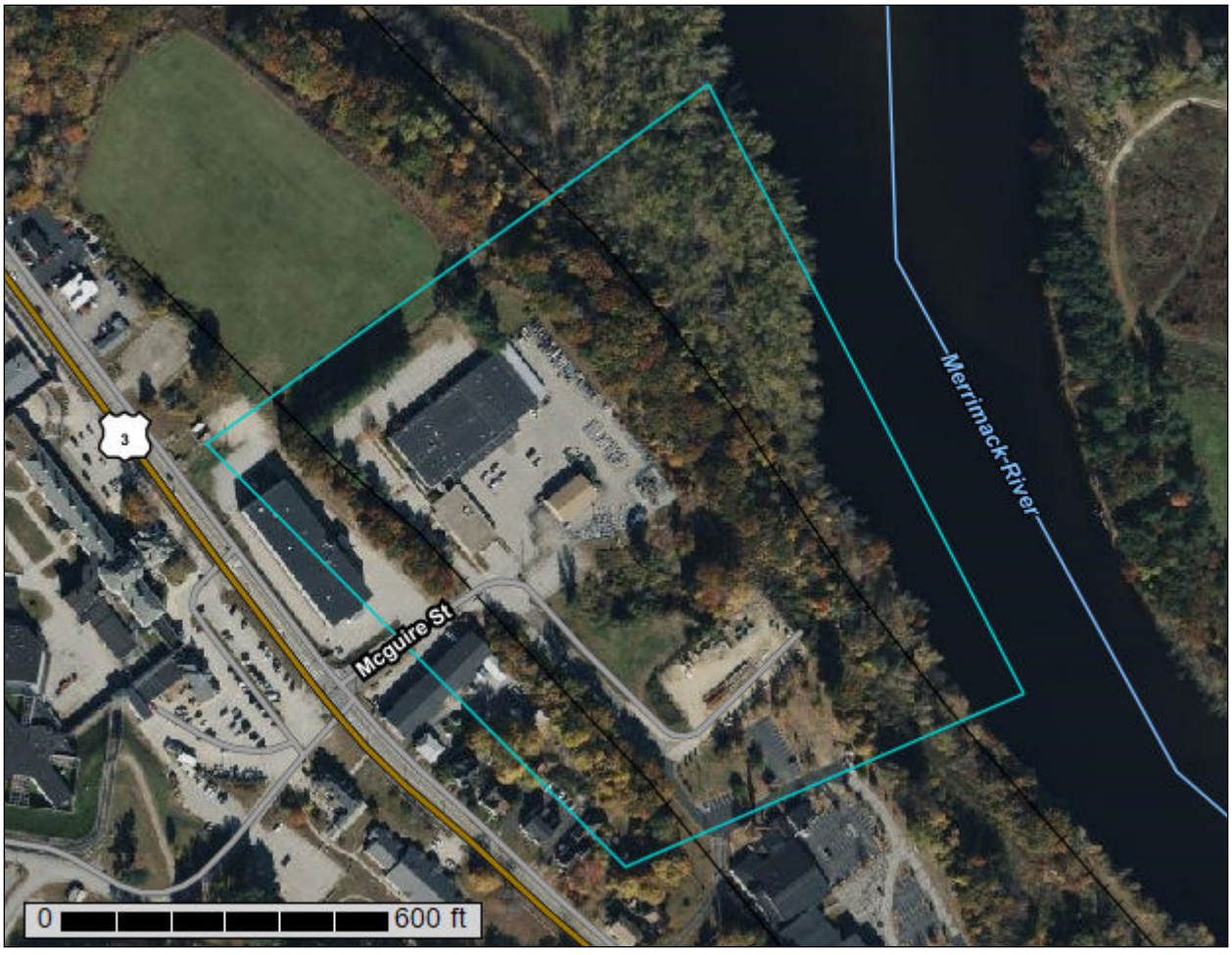
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Merrimack and Belknap Counties, New Hampshire

UNITIL WEST CONCORD SUBSTATION



June 12, 2025

Custom Soil Resource Report
Soil Map

Map Scale: 1:3,690 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
6A	Saco mucky silt loam, 0 to 2 percent slopes, frequently flooded	0.0	0.1%
26E	Windsor loamy sand, 15 to 60 percent slopes	5.0	19.7%
401A	Occum very fine sandy loam, 0 to 3 percent slopes, occasionally flooded	2.4	9.5%
598B	Windsor-Urban land complex, 0 to 8 percent slopes	15.6	61.0%
W	Water	2.5	9.7%
Totals for Area of Interest		**25.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Merrimack and Belknap Counties, New Hampshire

6A—Saco mucky silt loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 9dm3
Elevation: 200 to 790 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 52 degrees F
Frost-free period: 90 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Saco, frequently flooded, and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Saco, Frequently Flooded

Setting

Landform: Flood plains
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy and/or coarse-loamy alluvium derived from granite, gneiss or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
H1 - 2 to 8 inches: mucky silt loam
H2 - 8 to 35 inches: silt loam
H3 - 35 to 65 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: B/D
Ecological site: F144AY016MA - Very Wet Low Floodplain
Hydric soil rating: Yes

Minor Components

Rippowam

Percent of map unit: 10 percent
Landform: Flood plains

Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: Yes

Timakwa

Percent of map unit: 10 percent
Landform: Bogs
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Pootatuck

Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

26E—Windsor loamy sand, 15 to 60 percent slopes

Map Unit Setting

National map unit symbol: 2w2ws
Elevation: 0 to 760 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Windsor and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor

Setting

Landform: Dunes, deltas, outwash terraces, outwash plains
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: loamy sand
Bw - 3 to 25 inches: loamy sand
C - 25 to 65 inches: sand

Properties and qualities

Slope: 15 to 60 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Hinckley

Percent of map unit: 10 percent
Landform: Eskers, deltas, kames, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Deerfield

Percent of map unit: 5 percent
Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

401A—Occum very fine sandy loam, 0 to 3 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 9dkn
Elevation: 200 to 1,000 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 100 to 160 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Occum, occasionally flooded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Occum, Occasionally Flooded

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite, gneiss or schist

Typical profile

H1 - 0 to 9 inches: very fine sandy loam
H2 - 9 to 17 inches: fine sandy loam
H3 - 17 to 29 inches: sandy loam
H4 - 29 to 65 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Ecological site: F144AY010NH - Sandy High Floodplain
Hydric soil rating: No

Minor Components

Suncook

Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Pootatuck

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Occum, frequently flooded

Percent of map unit: 3 percent

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Occum, protected

Percent of map unit: 2 percent
Landform: Flood plains
Hydric soil rating: No

Agawam

Percent of map unit: 2 percent
Landform: Terraces
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

598B—Windsor-Urban land complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2w2wq
Elevation: 0 to 920 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Windsor and similar soils: 45 percent
Urban land: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor

Setting

Landform: Dunes, deltas, outwash terraces, outwash plains
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

A - 0 to 3 inches: loamy sand
Bw - 3 to 25 inches: loamy sand
C - 25 to 65 inches: sand

Properties and qualities

Slope: 0 to 8 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Description of Urban Land

Typical profile

M - 0 to 10 inches: cemented material

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: Unranked

Minor Components

Udorthents

Percent of map unit: 10 percent
Landform: Dunes, deltas, outwash terraces, outwash plains
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Eskers, deltas, kames, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Deerfield

Percent of map unit: 5 percent
Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

W—Water

Map Unit Setting

National map unit symbol: wm74
Elevation: 200 to 2,610 feet
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

UNITIL WEST CONCORD SS AERIAL MAP

6/17/2025, 3:30:38 PM

1:10,000

0 0.07 0.15 0.3 mi

0 0.13 0.25 0.5 km

Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community, NHDRA, Axiomatic, Inc., Maxar

TFM PN 96519-01

National Flood Hazard Layer FIRMette

FEMA

71°33'34"W 43°13'52"N

71°32'57"W 43°13'26"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/14/2023 at 10:44 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
Scientists

Unitil West Concord Substation – Site Photographs

Photo 1

Existing Unitil Facility and paved storage yard.

Photo 2

Existing Unitil Facility and paved storage yard.

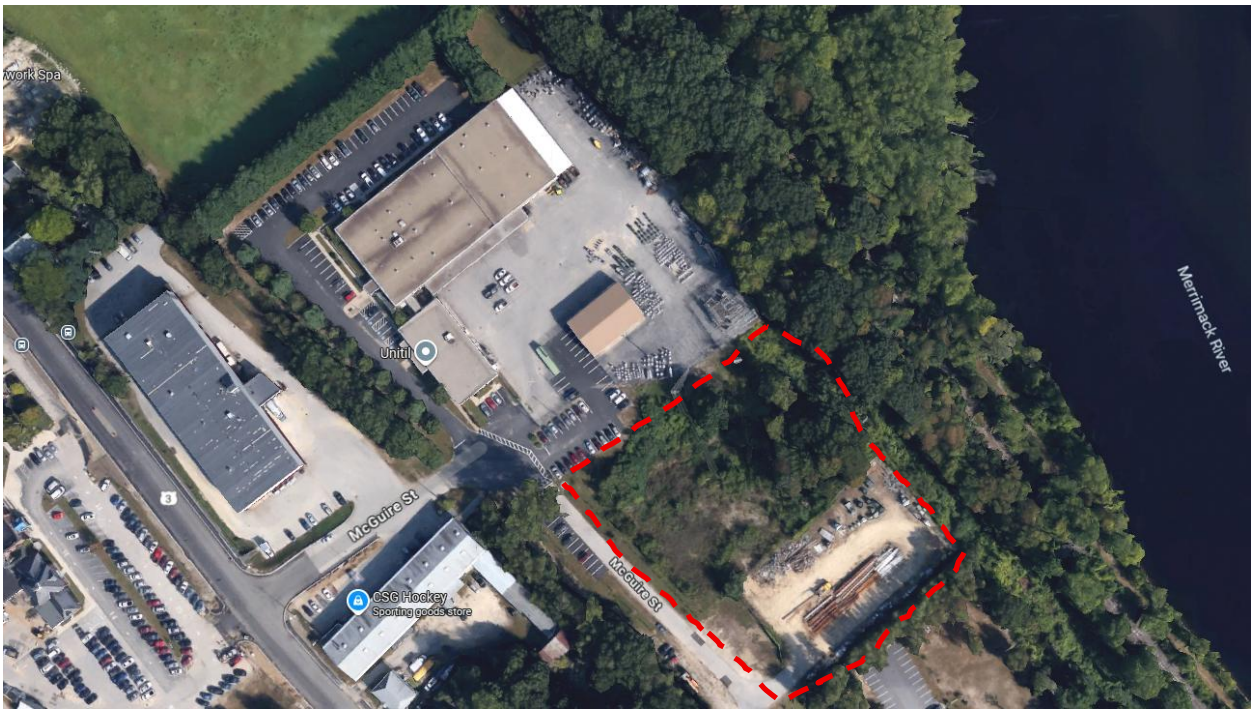
Photo 3

Existing Unitil West Concord Substation (right) and area of proposed relocation (left).

Photo 4

Existing pole storage yard in area of proposed substation relocation.

Photo 5



Google Earth Aerial view of approximate area of redevelopment shown in red, Tax Map 494Z, Lot 44.

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Metadata for Point

Smoothing	Yes
State	
Location	
Latitude	43.227 degrees North
Longitude	71.555 degrees West
Elevation	80 feet
Date/Time	Mon Jun 16 2025 15:39:21 GMT-0400 (Eastern Daylight Time)

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.26	0.39	0.49	0.64	0.80	1.01	**1yr**	0.69	0.98	1.17	1.47	1.86	2.36	2.56	**1yr**	2.09	2.46	2.89	3.59	4.11	**1yr**
2yr	0.31	0.48	0.60	0.79	1.00	1.25	**2yr**	0.86	1.15	1.45	1.81	2.25	2.81	3.14	**2yr**	2.49	3.02	3.50	4.18	4.77	**2yr**
5yr	0.37	0.58	0.73	0.98	1.25	1.58	**5yr**	1.08	1.45	1.83	2.28	2.83	3.49	3.97	**5yr**	3.09	3.82	4.41	5.18	5.88	**5yr**
10yr	0.42	0.66	0.84	1.14	1.48	1.89	**10yr**	1.28	1.72	2.19	2.72	3.36	4.12	4.75	**10yr**	3.65	4.57	5.27	6.11	6.90	**10yr**
25yr	0.50	0.79	1.01	1.39	1.85	2.38	**25yr**	1.60	2.16	2.76	3.44	4.22	5.13	6.03	**25yr**	4.54	5.79	6.66	7.59	8.51	**25yr**
50yr	0.57	0.91	1.17	1.63	2.20	2.84	**50yr**	1.90	2.57	3.30	4.10	5.02	6.07	7.22	**50yr**	5.37	6.94	7.96	8.95	9.99	**50yr**
100yr	0.65	1.05	1.35	1.91	2.61	3.39	**100yr**	2.25	3.05	3.95	4.90	5.97	7.17	8.65	**100yr**	6.35	8.32	9.51	10.56	11.72	**100yr**
200yr	0.74	1.21	1.57	2.25	3.09	4.04	**200yr**	2.67	3.64	4.72	5.84	7.09	8.49	10.37	**200yr**	7.51	9.97	11.36	12.46	13.75	**200yr**
500yr	0.89	1.47	1.91	2.78	3.88	5.10	**500yr**	3.35	4.58	5.96	7.37	8.91	10.61	13.18	**500yr**	9.39	12.68	14.40	15.53	17.01	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.21	0.33	0.40	0.54	0.66	0.88	**1yr**	0.57	0.87	1.03	1.37	1.59	1.99	2.41	**1yr**	1.76	2.31	2.64	3.27	3.83	**1yr**
2yr	0.30	0.47	0.57	0.78	0.96	1.14	**2yr**	0.83	1.12	1.30	1.72	2.20	2.74	3.04	**2yr**	2.42	2.92	3.40	4.06	4.65	**2yr**
5yr	0.34	0.53	0.66	0.90	1.15	1.36	**5yr**	0.99	1.33	1.53	1.99	2.56	3.27	3.68	**5yr**	2.90	3.54	4.11	4.85	5.52	**5yr**
10yr	0.38	0.58	0.72	1.01	1.31	1.54	**10yr**	1.13	1.51	1.73	2.23	2.86	3.75	4.27	**10yr**	3.32	4.10	4.73	5.53	6.30	**10yr**
25yr	0.44	0.66	0.82	1.18	1.55	1.80	**25yr**	1.34	1.76	2.04	2.58	3.33	4.49	5.17	**25yr**	3.98	4.97	5.69	6.60	7.49	**25yr**
50yr	0.48	0.73	0.91	1.31	1.76	2.02	**50yr**	1.52	1.97	2.32	2.90	3.74	5.16	5.97	**50yr**	4.57	5.74	6.53	7.55	8.56	**50yr**
100yr	0.54	0.81	1.02	1.47	2.01	2.28	**100yr**	1.74	2.23	2.63	3.25	4.20	5.92	6.91	**100yr**	5.24	6.65	7.51	8.63	9.77	**100yr**
200yr	0.59	0.89	1.13	1.64	2.29	2.54	**200yr**	1.97	2.49	2.97	3.64	4.72	6.82	7.99	**200yr**	6.03	7.68	8.62	9.88	11.14	**200yr**
500yr	0.69	1.02	1.32	1.91	2.72	2.95	**500yr**	2.35	2.88	3.51	4.24	5.52	8.20	9.69	**500yr**	7.26	9.32	10.30	11.85	13.31	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.29	0.45	0.55	0.73	0.90	1.09	**1yr**	0.78	1.06	1.20	1.59	1.98	2.51	2.74	**1yr**	2.23	2.64	3.14	3.83	4.35	**1yr**
2yr	0.33	0.50	0.62	0.84	1.03	1.24	**2yr**	0.89	1.21	1.40	1.83	2.33	2.89	3.24	**2yr**	2.56	3.11	3.62	4.30	4.93	**2yr**
5yr	0.41	0.63	0.78	1.07	1.36	1.59	**5yr**	1.17	1.55	1.80	2.31	2.93	3.71	4.27	**5yr**	3.29	4.11	4.74	5.51	6.26	**5yr**
10yr	0.49	0.75	0.93	1.30	1.68	1.94	**10yr**	1.45	1.90	2.19	2.74	3.49	4.50	5.27	**10yr**	3.98	5.07	5.84	6.65	7.54	**10yr**
25yr	0.63	0.95	1.19	1.69	2.23	2.54	**25yr**	1.92	2.48	2.83	3.46	4.39	5.79	6.97	**25yr**	5.13	6.71	7.69	8.54	9.63	**25yr**
50yr	0.75	1.14	1.42	2.04	2.75	3.12	**50yr**	2.37	3.05	3.44	4.14	5.23	7.02	8.62	**50yr**	6.21	8.29	9.48	10.33	11.59	**50yr**
100yr	0.91	1.38	1.72	2.49	3.42	3.83	**100yr**	2.95	3.75	4.18	4.94	6.23	8.52	10.67	**100yr**	7.54	10.26	11.71	12.49	13.96	**100yr**
200yr	1.10	1.65	2.09	3.03	4.23	4.71	**200yr**	3.65	4.61	5.09	5.91	7.44	10.33	13.19	**200yr**	9.14	12.69	14.48	15.11	16.80	**200yr**
500yr	1.42	2.11	2.72	3.95	5.62	6.22	**500yr**	4.85	6.08	6.61	7.49	9.41	13.34	17.49	**500yr**	11.80	16.82	19.18	19.44	21.47	**500yr**

Powered by ACIS Northeast Regional Climate Center

PART 3

GROUNDWATER RECHARGE VOLUME (GRV)
(Env-Wq 1504.12)

0.73	ac	Area of HSG A soil that was replaced by impervious cover	0.40"
-	ac	Area of HSG B soil that was replaced by impervious cover	0.25"
-	ac	Area of HSG C soil that was replaced by impervious cover	0.10"
-	ac	Area of HSG D soil or impervious cover that was replaced by impervious cover	0.0"
0.40	inches	Rd = Weighted groundwater recharge depth	
0.2908	ac-in	GRV = AI * Rd	
1,056	cf	GRV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
	← Y/N	Is a stage-storage table attached showing that the GRV can be stored below the lowest invert of the outlet structure (if applicable)? Multiple stormwater control measures may be used to meet the GRV requirements.	

Provide calculations/discussion below showing that the project meets the groundwater recharge requirements (Env-Wq 1507.04):

Filtration Basin #1 = 12,061 CF

Calculated by J. Belanger, PE 6/18/25

FILTRATION PRACTICE DESIGN CRITERIA
(Env-Wq 1508.08)

Type/Node Name: **FILTRATION BASIN #1 (FB #1)**

Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable.

YES		Check if you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.08(a).	
2.70	ac	A = Area draining to the practice	
1.87	ac	A_I = Impervious area draining to the practice	
0.69	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.67	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
1.81	ac-in	WQV= 1" x Rv x A	
6,586	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
1,647	cf	25% x WQV (check calc for sediment forebay volume)	
4,940	cf	75% x WQV (check calc for surface sand filter volume)	
FOREBAYS		Method of Pretreatment? (not required for clean or roof runoff)	
1,542	cf	V_{SED} = Sediment forebay volume, if used for pretreatment	**≥ 25%WQV**
Calculate time to drain if system IS NOT underdrained:			
2,685	sf	A_{SA} = Surface area of the practice	
2.25	iph	$Ksat_{DESIGN}$ = Design infiltration rate[1]	
		If Ksat (prior to factor of safety) is < 0.50 iph, has an underdrain been provided?	
	Yes/No	(Use the calculations below)	
13.1	hours	T_{DRAIN} = Drain time = V / (A_{SA} * I_{DESIGN})	**≤ 72-hrs**
Calculate time to drain if system IS underdrained:			
	ft	E_{WQV} = Elevation of WQV (attach stage-storage table)	
	cfs	Q_{WQV} = Discharge at the E_{WQV} (attach stage-discharge table)	
-	hours	T_{DRAIN} = Drain time = 2WQV/Q_{WQV}	**≤ 72-hrs**
282.00	feet	E_{FC} = Elevation of the bottom of the filter course material[2]	
	feet	E_{UD} = Invert elevation of the underdrain (UD), if applicable	
274.50	feet	E_{SHWT} = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
274.50	feet	E_{ROCK} = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
282.00	feet	$D_{FC\ to\ UD}$ = Depth to UD from the bottom of the filter course	**≥ 1'**
7.50	feet	$D_{FC\ to\ ROCK}$ = Depth to bedrock from the bottom of the filter course	**≥ 1'**
7.50	feet	$D_{FC\ to\ SHWT}$ = Depth to SHWT from the bottom of the filter course	**≥ 1'**
285.81	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
286.00	ft	Elevation of the top of the practice	
YES		50 peak elevation ≤ Elevation of the top of the practice	**← yes**
If a surface sand filter or underground sand filter is proposed:			
YES	ac	Drainage Area check.	**< 10 ac**
	cf	V = Volume of storage[3] (attach a stage-storage table)	**≥ 75%WQV**
	inches	D_{FC} = Filter course thickness	**18", or 24" if within GPA**
Sheet		Note what sheet in the plan set contains the filter course specification.	
	Yes/No	Access grate provided?	**← yes**

If a bioretention area is proposed:			
YES	ac	Drainage Area no larger than 5 ac?	**← yes**
12,061	cf	V = Volume of storage[3] (attach a stage-storage table)	**≥ WQV**
18.0	inches	D_{FC} = Filter course thickness	**18", or 24" if within GPA**
Sheet	D-03	Note what sheet in the plan set contains the filter course specification	
3.0	:1	Pond side slopes	**≥ 3:1**
Sheet	D-03	Note what sheet in the plan set contains the planting plans and surface cover	
If porous pavement is proposed:			
		Type of pavement proposed (Concrete? Asphalt? Pavers? Etc.)	
	acres	A_{SA} = Surface area of the pervious pavement	
	:1	Ratio of the contributing area to the pervious surface area	**≤ 5:1**
	inches	D_{FC} = Filter course thickness	**12", or 18" if within GPA mod. 304.1 (see spec)**
Sheet		Note what sheet in the plan set contains the filter course spec.	

1. Rate of the limiting layer (either the filter course or the underlying soil). $Ksat_{design}$ includes factor of safey. See Env-Wq 1504.14 for guidance on determining the infiltration rate.

2. See lines 34, 40 and 48 for required depths of filter media.

3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet stucture, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes: Gravel considered impervious for analysis.

Existing impervious areas from PS-08 excluded from forebay sizing. See Forebay Sizing BMP Worksheets for proposed forebay sizing.

TP #1 & IT #1 used for analysis.

Calculated by J. Belanger, PE 8/20/25

Stage-Area-Storage for Pond FB #1: FILT. BASIN #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
282.00	2,685	0
282.05	2,685	54
282.10	2,685	107
282.15	2,685	161
282.20	2,685	215
282.25	2,685	269
282.30	2,685	322
282.35	2,685	376
282.40	2,685	430
282.45	2,685	483
282.50	2,685	537
282.55	2,685	591
282.60	2,685	644
282.65	2,685	698
282.70	2,685	752
282.75	2,685	806
282.80	2,685	940
282.85	2,685	1,074
282.90	2,685	1,208
282.95	2,685	1,342
283.00	2,685	1,477
283.05	2,685	1,611
283.10	2,685	1,745
283.15	2,685	1,879
283.20	2,685	2,014
283.25	2,685	2,148
283.30	2,685	2,282
283.35	2,685	2,417
283.40	2,685	2,551
283.45	2,685	2,685
283.50	2,685	2,819
283.55	2,781	2,956
283.60	2,878	3,097
283.65	2,974	3,244
283.70	3,070	3,395
283.75	3,167	3,551
283.80	3,263	3,711
283.85	3,359	3,877
283.90	3,455	4,047
283.95	3,552	4,223
284.00	3,648	4,403
284.05	3,751	4,587
284.10	3,855	4,778
284.15	3,958	4,973
284.20	4,061	5,173
284.25	4,165	5,379
284.30	4,268	5,590
284.35	4,371	5,806
284.40	4,475	6,027
284.45	4,578	6,253
284.50	4,682	6,485
284.55	4,785	6,722
284.60	4,888	6,963
284.65	4,992	7,210
284.70	5,095	7,463
284.75	5,198	7,720
284.80	5,302	7,982
284.85	5,405	8,250
284.90	5,508	8,523
284.95	5,612	8,801
285.00	5,715	9,084
285.05	5,763	9,371
285.10	5,811	9,660
285.15	5,859	9,952
285.20	5,906	10,246
285.25	5,954	10,543
285.30	6,002	10,842
285.35	6,050	11,143
285.40	6,098	11,447
285.45	6,146	11,753
285.50	6,194	12,061
285.55	6,241	12,372
285.60	6,289	12,685
285.65	6,337	13,001
285.70	6,385	13,319
285.75	6,433	13,639
285.80	6,481	13,962
285.85	6,528	14,287
285.90	6,576	14,615
285.95	6,624	14,945
286.00	**6,672**	**15,278**

RIPRAP WEIR

FILTRATION PRACTICE DESIGN CRITERIA
(Env-Wq 1508.08)

Type/Node Name: **FOREBAY #1**

Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable.

YES		Check if you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.08(a).	
0.52	ac	A = Area draining to the practice	
0.52	ac	A_I = Impervious area draining to the practice	
1.00	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.95	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.49	ac-in	WQV= 1" x Rv x A	
1,786	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
447	cf	25% x WQV (check calc for sediment forebay volume)	
1,340	cf	75% x WQV (check calc for surface sand filter volume)	
FOREBAY		Method of Pretreatment? (not required for clean or roof runoff)	
511	cf	V_{SED} = Sediment forebay volume, if used for pretreatment	**≥ 25%WQV**
Calculate time to drain if system IS NOT underdrained:			
	sf	A_{SA} = Surface area of the practice	
	iph	$Ksat_{DESIGN}$ = Design infiltration rate[1]	
		If Ksat (prior to factor of safety) is < 0.50 iph, has an underdrain been provided?	
	Yes/No	(Use the calculations below)	
-	hours	T_{DRAIN} = Drain time = V / (A_{SA} * I_{DESIGN})	**≤ 72-hrs**
Calculate time to drain if system IS underdrained:			
	ft	E_{WQV} = Elevation of WQV (attach stage-storage table)	
	cfs	Q_{WQV} = Discharge at the E_{WQV} (attach stage-discharge table)	
-	hours	T_{DRAIN} = Drain time = 2WQV/Q_{WQV}	**≤ 72-hrs**
	feet	E_{FC} = Elevation of the bottom of the filter course material[2]	
	feet	E_{UD} = Invert elevation of the underdrain (UD), if applicable	
	feet	E_{SHWT} = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
	feet	E_{ROCK} = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
-	feet	$D_{FC\ to\ UD}$ = Depth to UD from the bottom of the filter course	**≥ 1'**
-	feet	$D_{FC\ to\ ROCK}$ = Depth to bedrock from the bottom of the filter course	**≥ 1'**
-	feet	$D_{FC\ to\ SHWT}$ = Depth to SHWT from the bottom of the filter course	**≥ 1'**
	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
	ft	Elevation of the top of the practice	
-		50 peak elevation ≤ Elevation of the top of the practice	**← yes**
If a surface sand filter or underground sand filter is proposed:			
YES	ac	Drainage Area check.	**< 10 ac**
	cf	V = Volume of storage[3] (attach a stage-storage table)	**≥ 75%WQV**
	inches	D_{FC} = Filter course thickness	**18", or 24" if within GPA**
Sheet		Note what sheet in the plan set contains the filter course specification.	
	Yes/No	Access grate provided?	**← yes**

If a bioretention area is proposed:			
YES	ac	Drainage Area no larger than 5 ac?	**← yes**
	cf	V = Volume of storage[3] (attach a stage-storage table)	**≥ WQV**
	inches	D_{FC} = Filter course thickness	**18", or 24" if within GPA**
Sheet		Note what sheet in the plan set contains the filter course specification	
	:1	Pond side slopes	**> 3:1**
Sheet		Note what sheet in the plan set contains the planting plans and surface cover	
If porous pavement is proposed:			
		Type of pavement proposed (Concrete? Asphalt? Pavers? Etc.)	
	acres	A_{SA} = Surface area of the pervious pavement	
	:1	Ratio of the contributing area to the pervious surface area	**≤ 5:1**
	inches	D_{FC} = Filter course thickness	**12", or 18" if within GPA mod. 304.1 (see spec)**
Sheet		Note what sheet in the plan set contains the filter course spec.	

1. Rate of the limiting layer (either the filter course or the underlying soil). $Ksat_{design}$ includes factor of safey. See Env-Wq 1504.14 for guidance on determining the infiltration rate.

2. See lines 34, 40 and 48 for required depths of filter media.

3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet stucture, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes: Gravel considered impervious for analysis.

Calculated by J. Belanger, PE 6/18/25

FILTRATION PRACTICE DESIGN CRITERIA
(Env-Wq 1508.08)

Type/Node Name: **FOREBAY #2**

Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable.

YES		Check if you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.08(a).	
1.55	ac	A = Area draining to the practice	
1.08	ac	A_I = Impervious area draining to the practice	
0.69	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.68	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
1.05	ac-in	WQV= 1" x Rv x A	
3,807	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
952	cf	25% x WQV (check calc for sediment forebay volume)	
2,855	cf	75% x WQV (check calc for surface sand filter volume)	
FOREBAY		Method of Pretreatment? (not required for clean or roof runoff)	
1,031	cf	V_{SED} = Sediment forebay volume, if used for pretreatment	**≥ 25%WQV**
Calculate time to drain if system IS NOT underdrained:			
	sf	A_{SA} = Surface area of the practice	
	iph	$Ksat_{DESIGN}$ = Design infiltration rate[1]	
		If Ksat (prior to factor of safety) is < 0.50 iph, has an underdrain been provided?	
	Yes/No	(Use the calculations below)	
-	hours	T_{DRAIN} = Drain time = V / (A_{SA} * I_{DESIGN})	**≤ 72-hrs**
Calculate time to drain if system IS underdrained:			
	ft	E_{WQV} = Elevation of WQV (attach stage-storage table)	
	cfs	Q_{WQV} = Discharge at the E_{WQV} (attach stage-discharge table)	
-	hours	T_{DRAIN} = Drain time = 2WQV/Q_{WQV}	**≤ 72-hrs**
	feet	E_{FC} = Elevation of the bottom of the filter course material[2]	
	feet	E_{UD} = Invert elevation of the underdrain (UD), if applicable	
	feet	E_{SHWT} = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
	feet	E_{ROCK} = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
-	feet	$D_{FC\ to\ UD}$ = Depth to UD from the bottom of the filter course	**≥ 1'**
-	feet	$D_{FC\ to\ ROCK}$ = Depth to bedrock from the bottom of the filter course	**≥ 1'**
-	feet	$D_{FC\ to\ SHWT}$ = Depth to SHWT from the bottom of the filter course	**≥ 1'**
	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
	ft	Elevation of the top of the practice	
-		50 peak elevation ≤ Elevation of the top of the practice	**← yes**
If a surface sand filter or underground sand filter is proposed:			
YES	ac	Drainage Area check.	**< 10 ac**
	cf	V = Volume of storage[3] (attach a stage-storage table)	**≥ 75%WQV**
	inches	D_{FC} = Filter course thickness	**18", or 24" if within GPA**
Sheet		Note what sheet in the plan set contains the filter course specification.	
	Yes/No	Access grate provided?	**← yes**

If a bioretention area is proposed:			
YES	ac	Drainage Area no larger than 5 ac?	**← yes**
	cf	V = Volume of storage[3] (attach a stage-storage table)	**≥ WQV**
	inches	D_{FC} = Filter course thickness	**18", or 24" if within GPA**
Sheet		Note what sheet in the plan set contains the filter course specification	
	:1	Pond side slopes	**≥ 3:1**
Sheet		Note what sheet in the plan set contains the planting plans and surface cover	
If porous pavement is proposed:			
		Type of pavement proposed (Concrete? Asphalt? Pavers? Etc.)	
	acres	A_{SA} = Surface area of the pervious pavement	
	:1	Ratio of the contributing area to the pervious surface area	**≤ 5:1**
	inches	D_{FC} = Filter course thickness	**12", or 18" if within GPA mod. 304.1 (see spec)**
Sheet		Note what sheet in the plan set contains the filter course spec.	

1. Rate of the limiting layer (either the filter course or the underlying soil). $Ksat_{design}$ includes factor of safey. See Env-Wq 1504.14 for guidance on determining the infiltration rate.

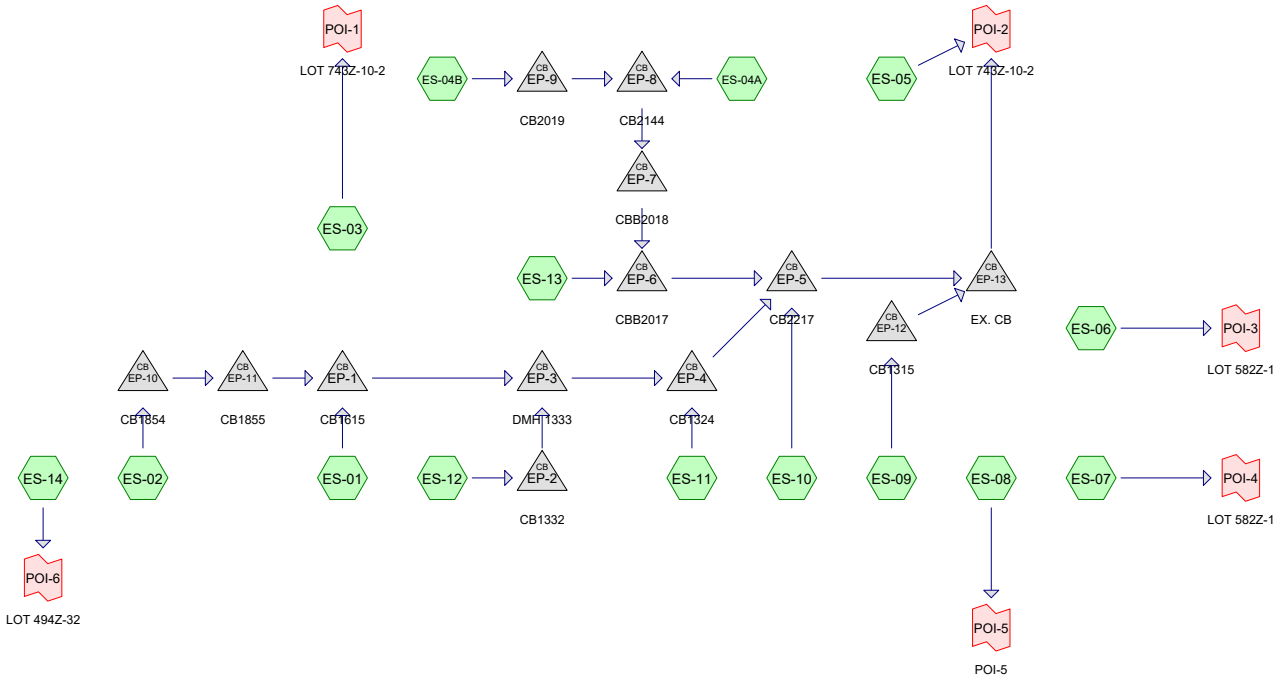
2. See lines 34, 40 and 48 for required depths of filter media.

3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet stucture, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes:

Calculated by J. Belanger, PE 6/18/25

PART 4



Subcat Reach Pond Link

Routing Diagram for 96159-01 PRE-DEV_2025-06-13
Prepared by T F Moran Inc
HydroCAD® 10.20-6a s/n 00866 © 2024 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
125,771	39	>75% Grass cover, Good, HSG A (ES-01, ES-02, ES-03, ES-05, ES-06, ES-07, ES-08, ES-09, ES-10, ES-11, ES-12)
14,907	96	Gravel surface, HSG A (ES-04A, ES-05, ES-06, ES-07, ES-08)
175,573	98	Paved parking, HSG A (ES-01, ES-02, ES-04A, ES-05, ES-09, ES-10, ES-11, ES-12, ES-13)
45,180	98	Roofs, HSG A (ES-04A, ES-04B, ES-05)
15,725	30	Woods, Good, HSG A (ES-01, ES-02, ES-03, ES-05, ES-08, ES-14)
377,156	**75**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
377,156	HSG A	ES-01, ES-02, ES-03, ES-04A, ES-04B, ES-05, ES-06, ES-07, ES-08, ES-09, ES-10, ES-11, ES-12, ES-13, ES-14
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
377,156		**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ES-01: Runoff Area=14,738 sf 70.29% Impervious Runoff Depth>1.11"
Flow Length=144' Tc=8.0 min CN=80 Runoff=0.4 cfs 1,360 cf

Subcatchment ES-02: Runoff Area=32,767 sf 55.28% Impervious Runoff Depth>0.65"
Flow Length=174' Tc=7.2 min CN=71 Runoff=0.5 cfs 1,782 cf

Subcatchment ES-03: Runoff Area=13,698 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=116' Tc=12.0 min CN=38 Runoff=0.0 cfs 0 cf

Subcatchment ES-04A: Runoff Area=51,778 sf 99.61% Impervious Runoff Depth>2.58"
Tc=6.0 min CN=98 Runoff=3.2 cfs 11,121 cf

Subcatchment ES-04B: Runoff Area=38,284 sf 100.00% Impervious Runoff Depth>2.58"
Tc=6.0 min CN=98 Runoff=2.3 cfs 8,223 cf

Subcatchment ES-05: Runoff Area=152,100 sf 34.26% Impervious Runoff Depth>0.27"
Flow Length=470' Tc=12.3 min CN=60 Runoff=0.4 cfs 3,377 cf

Subcatchment ES-06: Runoff Area=10,763 sf 0.00% Impervious Runoff Depth>1.65"
Tc=6.0 min CN=88 Runoff=0.5 cfs 1,479 cf

Subcatchment ES-07: Runoff Area=2,930 sf 0.00% Impervious Runoff Depth>0.65"
Tc=6.0 min CN=71 Runoff=0.0 cfs 159 cf

Subcatchment ES-08: Runoff Area=3,838 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=40 Runoff=0.0 cfs 0 cf

Subcatchment ES-09: Runoff Area=13,991 sf 94.66% Impervious Runoff Depth>2.26"
Tc=6.0 min CN=95 Runoff=0.8 cfs 2,638 cf

Subcatchment ES-10: Runoff Area=13,089 sf 94.95% Impervious Runoff Depth>2.26"
Tc=6.0 min CN=95 Runoff=0.7 cfs 2,468 cf

Subcatchment ES-11: Runoff Area=954 sf 18.97% Impervious Runoff Depth>0.06"
Flow Length=43' Tc=6.1 min CN=50 Runoff=0.0 cfs 5 cf

Subcatchment ES-12: Runoff Area=13,078 sf 72.76% Impervious Runoff Depth>1.23"
Tc=6.0 min CN=82 Runoff=0.4 cfs 1,340 cf

Subcatchment ES-13: Runoff Area=14,936 sf 100.00% Impervious Runoff Depth>2.58"
Tc=6.0 min CN=98 Runoff=0.9 cfs 3,208 cf

Subcatchment ES-14: Runoff Area=212 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=35' Slope=0.0100 '/' Tc=13.1 min CN=30 Runoff=0.0 cfs 0 cf

Pond EP-1: CB1615 Peak Elev=293.65' Inflow=0.9 cfs 3,142 cf
12.0" Round Culvert n=0.012 L=154.1' S=0.0042 '/' Outflow=0.9 cfs 3,142 cf

Pond EP-10: CB1854 Peak Elev=293.67' Inflow=0.5 cfs 1,782 cf
12.0" Round Culvert n=0.012 L=90.7' S=0.0078 '/' Outflow=0.5 cfs 1,782 cf

Pond EP-11: CB1855 Peak Elev=293.66' Inflow=0.5 cfs 1,782 cf
12.0" Round Culvert n=0.012 L=130.4' S=0.0082 '/' Outflow=0.5 cfs 1,782 cf

Pond EP-12: CB1315 Peak Elev=285.66' Inflow=0.8 cfs 2,638 cf
12.0" Round Culvert n=0.012 L=105.0' S=0.0571 '/' Outflow=0.8 cfs 2,638 cf

Pond EP-13: EX. CB Peak Elev=283.86' Inflow=9.2 cfs 32,146 cf
12.0" Round Culvert n=0.012 L=266.7' S=0.0768 '/' Outflow=9.2 cfs 32,146 cf

Pond EP-2: CB1332 Peak Elev=293.62' Inflow=0.4 cfs 1,340 cf
8.0" Round Culvert n=0.012 L=7.9' S=0.2671 '/' Outflow=0.4 cfs 1,340 cf

Pond EP-3: DMH 1333 Peak Elev=293.60' Inflow=1.3 cfs 4,482 cf
10.0" Round Culvert n=0.012 L=89.0' S=0.0031 '/' Outflow=1.3 cfs 4,482 cf

Pond EP-4: CB1324 Peak Elev=293.40' Inflow=1.3 cfs 4,487 cf
10.0" Round Culvert n=0.012 L=109.1' S=0.0164 '/' Outflow=1.3 cfs 4,487 cf

Pond EP-5: CB2217 Peak Elev=293.04' Inflow=8.4 cfs 29,508 cf
12.0" Round Culvert n=0.012 L=160.3' S=0.0058 '/' Outflow=8.4 cfs 29,508 cf

Pond EP-6: CBB2017 Peak Elev=295.32' Inflow=6.4 cfs 22,553 cf
12.0" Round Culvert n=0.012 L=82.5' S=0.0342 '/' Outflow=6.4 cfs 22,553 cf

Pond EP-7: CBB2018 Peak Elev=296.41' Inflow=5.5 cfs 19,344 cf
12.0" Round Culvert n=0.012 L=96.2' S=0.0082 '/' Outflow=5.5 cfs 19,344 cf

Pond EP-8: CB2144 Peak Elev=297.21' Inflow=5.5 cfs 19,344 cf
12.0" Round Culvert n=0.012 L=110.3' S=0.0067 '/' Outflow=5.5 cfs 19,344 cf

Pond EP-9: CB2019 Peak Elev=297.33' Inflow=2.3 cfs 8,223 cf
12.0" Round Culvert n=0.012 L=142.0' S=0.0077 '/' Outflow=2.3 cfs 8,223 cf

Link POI-1: LOT 743Z-10-2 Inflow=0.0 cfs 0 cf
Primary=0.0 cfs 0 cf

Link POI-2: LOT 743Z-10-2 Inflow=9.2 cfs 35,523 cf
Primary=9.2 cfs 35,523 cf

Link POI-3: LOT 582Z-1 Inflow=0.5 cfs 1,479 cf
Primary=0.5 cfs 1,479 cf

Link POI-4: LOT 582Z-1 Inflow=0.0 cfs 159 cf
Primary=0.0 cfs 159 cf

Link POI-5: POI-5 Inflow=0.0 cfs 0 cf
Primary=0.0 cfs 0 cf

Link POI-6: LOT 494Z-32 Inflow=0.0 cfs 0 cf
Primary=0.0 cfs 0 cf

Total Runoff Area = 377,156 sf Runoff Volume = 37,161 cf Average Runoff Depth = 1.18"
41.47% Pervious = 156,403 sf 58.53% Impervious = 220,753 sf

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ES-01: Runoff Area=14,738 sf 70.29% Impervious Runoff Depth>2.14"
Flow Length=144' Tc=8.0 min CN=80 Runoff=0.8 cfs 2,626 cf

Subcatchment ES-02: Runoff Area=32,767 sf 55.28% Impervious Runoff Depth>1.47"
Flow Length=174' Tc=7.2 min CN=71 Runoff=1.2 cfs 4,027 cf

Subcatchment ES-03: Runoff Area=13,698 sf 0.00% Impervious Runoff Depth>0.04"
Flow Length=116' Tc=12.0 min CN=38 Runoff=0.0 cfs 48 cf

Subcatchment ES-04A: Runoff Area=51,778 sf 99.61% Impervious Runoff Depth>3.88"
Tc=6.0 min CN=98 Runoff=4.7 cfs 16,752 cf

Subcatchment ES-04B: Runoff Area=38,284 sf 100.00% Impervious Runoff Depth>3.88"
Tc=6.0 min CN=98 Runoff=3.5 cfs 12,386 cf

Subcatchment ES-05: Runoff Area=152,100 sf 34.26% Impervious Runoff Depth>0.82"
Flow Length=470' Tc=12.3 min CN=60 Runoff=2.2 cfs 10,375 cf

Subcatchment ES-06: Runoff Area=10,763 sf 0.00% Impervious Runoff Depth>2.84"
Tc=6.0 min CN=88 Runoff=0.8 cfs 2,546 cf

Subcatchment ES-07: Runoff Area=2,930 sf 0.00% Impervious Runoff Depth>1.48"
Tc=6.0 min CN=71 Runoff=0.1 cfs 360 cf

Subcatchment ES-08: Runoff Area=3,838 sf 0.00% Impervious Runoff Depth>0.08"
Tc=6.0 min CN=40 Runoff=0.0 cfs 25 cf

Subcatchment ES-09: Runoff Area=13,991 sf 94.66% Impervious Runoff Depth>3.55"
Tc=6.0 min CN=95 Runoff=1.2 cfs 4,136 cf

Subcatchment ES-10: Runoff Area=13,089 sf 94.95% Impervious Runoff Depth>3.55"
Tc=6.0 min CN=95 Runoff=1.1 cfs 3,869 cf

Subcatchment ES-11: Runoff Area=954 sf 18.97% Impervious Runoff Depth>0.37"
Flow Length=43' Tc=6.1 min CN=50 Runoff=0.0 cfs 29 cf

Subcatchment ES-12: Runoff Area=13,078 sf 72.76% Impervious Runoff Depth>2.30"
Tc=6.0 min CN=82 Runoff=0.8 cfs 2,511 cf

Subcatchment ES-13: Runoff Area=14,936 sf 100.00% Impervious Runoff Depth>3.88"
Tc=6.0 min CN=98 Runoff=1.3 cfs 4,832 cf

Subcatchment ES-14: Runoff Area=212 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=35' Slope=0.0100 '/' Tc=13.1 min CN=30 Runoff=0.0 cfs 0 cf

Pond EP-1: CB1615 Peak Elev=325.37' Inflow=2.0 cfs 6,653 cf
12.0" Round Culvert n=0.012 L=154.1' S=0.0042 '/' Outflow=2.0 cfs 6,653 cf

Pond EP-10: CB1854 Peak Elev=325.45' Inflow=1.2 cfs 4,027 cf
12.0" Round Culvert n=0.012 L=90.7' S=0.0078 '/' Outflow=1.2 cfs 4,027 cf

Pond EP-11: CB1855 Peak Elev=325.42' Inflow=1.2 cfs 4,027 cf
12.0" Round Culvert n=0.012 L=130.4' S=0.0082 '/' Outflow=1.2 cfs 4,027 cf

Pond EP-12: CB1315 Peak Elev=303.79' Inflow=1.2 cfs 4,136 cf
12.0" Round Culvert n=0.012 L=105.0' S=0.0571 '/' Outflow=1.2 cfs 4,136 cf

Pond EP-13: EX. CB Peak Elev=303.68' Inflow=14.5 cfs 51,169 cf
12.0" Round Culvert n=0.012 L=266.7' S=0.0768 '/' Outflow=14.5 cfs 51,169 cf

Pond EP-2: CB1332 Peak Elev=325.24' Inflow=0.8 cfs 2,511 cf
8.0" Round Culvert n=0.012 L=7.9' S=0.2671 '/' Outflow=0.8 cfs 2,511 cf

Pond EP-3: DMH 1333 Peak Elev=325.19' Inflow=2.8 cfs 9,164 cf
10.0" Round Culvert n=0.012 L=89.0' S=0.0031 '/' Outflow=2.8 cfs 9,164 cf

Pond EP-4: CB1324 Peak Elev=324.42' Inflow=2.8 cfs 9,193 cf
10.0" Round Culvert n=0.012 L=109.1' S=0.0164 '/' Outflow=2.8 cfs 9,193 cf

Pond EP-5: CB2217 Peak Elev=322.98' Inflow=13.3 cfs 47,033 cf
12.0" Round Culvert n=0.012 L=160.3' S=0.0058 '/' Outflow=13.3 cfs 47,033 cf

Pond EP-6: CBB2017 Peak Elev=327.12' Inflow=9.5 cfs 33,971 cf
12.0" Round Culvert n=0.012 L=82.5' S=0.0342 '/' Outflow=9.5 cfs 33,971 cf

Pond EP-7: CBB2018 Peak Elev=329.03' Inflow=8.1 cfs 29,138 cf
12.0" Round Culvert n=0.012 L=96.2' S=0.0082 '/' Outflow=8.1 cfs 29,138 cf

Pond EP-8: CB2144 Peak Elev=330.53' Inflow=8.1 cfs 29,138 cf
12.0" Round Culvert n=0.012 L=110.3' S=0.0067 '/' Outflow=8.1 cfs 29,138 cf

Pond EP-9: CB2019 Peak Elev=330.77' Inflow=3.5 cfs 12,386 cf
12.0" Round Culvert n=0.012 L=142.0' S=0.0077 '/' Outflow=3.5 cfs 12,386 cf

Link POI-1: LOT 743Z-10-2 Inflow=0.0 cfs 48 cf
Primary=0.0 cfs 48 cf

Link POI-2: LOT 743Z-10-2 Inflow=15.9 cfs 61,543 cf
Primary=15.9 cfs 61,543 cf

Link POI-3: LOT 582Z-1 Inflow=0.8 cfs 2,546 cf
Primary=0.8 cfs 2,546 cf

Link POI-4: LOT 582Z-1 Inflow=0.1 cfs 360 cf
Primary=0.1 cfs 360 cf

Link POI-5: POI-5 Inflow=0.0 cfs 25 cf
Primary=0.0 cfs 25 cf

Link POI-6: LOT 494Z-32 Inflow=0.0 cfs 0 cf
Primary=0.0 cfs 0 cf

Total Runoff Area = 377,156 sf Runoff Volume = 64,522 cf Average Runoff Depth = 2.05"
41.47% Pervious = 156,403 sf 58.53% Impervious = 220,753 sf

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ES-01: Runoff Area=14,738 sf 70.29% Impervious Runoff Depth>3.00"
Flow Length=144' Tc=8.0 min CN=80 Runoff=1.1 cfs 3,688 cf

Subcatchment ES-02: Runoff Area=32,767 sf 55.28% Impervious Runoff Depth>2.21"
Flow Length=174' Tc=7.2 min CN=71 Runoff=1.8 cfs 6,041 cf

Subcatchment ES-03: Runoff Area=13,698 sf 0.00% Impervious Runoff Depth>0.19"
Flow Length=116' Tc=12.0 min CN=38 Runoff=0.0 cfs 217 cf

Subcatchment ES-04A: Runoff Area=51,778 sf 99.61% Impervious Runoff Depth>4.89"
Tc=6.0 min CN=98 Runoff=5.8 cfs 21,100 cf

Subcatchment ES-04B: Runoff Area=38,284 sf 100.00% Impervious Runoff Depth>4.89"
Tc=6.0 min CN=98 Runoff=4.3 cfs 15,601 cf

Subcatchment ES-05: Runoff Area=152,100 sf 34.26% Impervious Runoff Depth>1.37"
Flow Length=470' Tc=12.3 min CN=60 Runoff=4.1 cfs 17,407 cf

Subcatchment ES-06: Runoff Area=10,763 sf 0.00% Impervious Runoff Depth>3.79"
Tc=6.0 min CN=88 Runoff=1.0 cfs 3,399 cf

Subcatchment ES-07: Runoff Area=2,930 sf 0.00% Impervious Runoff Depth>2.21"
Tc=6.0 min CN=71 Runoff=0.2 cfs 540 cf

Subcatchment ES-08: Runoff Area=3,838 sf 0.00% Impervious Runoff Depth>0.26"
Tc=6.0 min CN=40 Runoff=0.0 cfs 84 cf

Subcatchment ES-09: Runoff Area=13,991 sf 94.66% Impervious Runoff Depth>4.55"
Tc=6.0 min CN=95 Runoff=1.5 cfs 5,300 cf

Subcatchment ES-10: Runoff Area=13,089 sf 94.95% Impervious Runoff Depth>4.55"
Tc=6.0 min CN=95 Runoff=1.4 cfs 4,958 cf

Subcatchment ES-11: Runoff Area=954 sf 18.97% Impervious Runoff Depth>0.74"
Flow Length=43' Tc=6.1 min CN=50 Runoff=0.0 cfs 59 cf

Subcatchment ES-12: Runoff Area=13,078 sf 72.76% Impervious Runoff Depth>3.19"
Tc=6.0 min CN=82 Runoff=1.1 cfs 3,480 cf

Subcatchment ES-13: Runoff Area=14,936 sf 100.00% Impervious Runoff Depth>4.89"
Tc=6.0 min CN=98 Runoff=1.7 cfs 6,086 cf

Subcatchment ES-14: Runoff Area=212 sf 0.00% Impervious Runoff Depth>0.01"
Flow Length=35' Slope=0.0100 '/' Tc=13.1 min CN=30 Runoff=0.0 cfs 0 cf

Pond EP-1: CB1615 Peak Elev=372.95' Inflow=2.9 cfs 9,729 cf
12.0" Round Culvert n=0.012 L=154.1' S=0.0042 '/' Outflow=2.9 cfs 9,729 cf

Pond EP-10: CB1854 Peak Elev=373.11' Inflow=1.8 cfs 6,041 cf
12.0" Round Culvert n=0.012 L=90.7' S=0.0078 '/' Outflow=1.8 cfs 6,041 cf

Pond EP-11: CB1855 Peak Elev=373.05' Inflow=1.8 cfs 6,041 cf
12.0" Round Culvert n=0.012 L=130.4' S=0.0082 '/' Outflow=1.8 cfs 6,041 cf

Pond EP-12: CB1315 Peak Elev=334.33' Inflow=1.5 cfs 5,300 cf
12.0" Round Culvert n=0.012 L=105.0' S=0.0571 '/' Outflow=1.5 cfs 5,300 cf

Pond EP-13: EX. CB Peak Elev=334.16' Inflow=18.7 cfs 66,312 cf
12.0" Round Culvert n=0.012 L=266.7' S=0.0768 '/' Outflow=18.7 cfs 66,312 cf

Pond EP-2: CB1332 Peak Elev=372.67' Inflow=1.1 cfs 3,480 cf
8.0" Round Culvert n=0.012 L=7.9' S=0.2671 '/' Outflow=1.1 cfs 3,480 cf

Pond EP-3: DMH 1333 Peak Elev=372.57' Inflow=4.0 cfs 13,209 cf
10.0" Round Culvert n=0.012 L=89.0' S=0.0031 '/' Outflow=4.0 cfs 13,209 cf

Pond EP-4: CB1324 Peak Elev=371.04' Inflow=4.0 cfs 13,268 cf
10.0" Round Culvert n=0.012 L=109.1' S=0.0164 '/' Outflow=4.0 cfs 13,268 cf

Pond EP-5: CB2217 Peak Elev=368.07' Inflow=17.2 cfs 61,012 cf
12.0" Round Culvert n=0.012 L=160.3' S=0.0058 '/' Outflow=17.2 cfs 61,012 cf

Pond EP-6: CBB2017 Peak Elev=374.34' Inflow=11.8 cfs 42,787 cf
12.0" Round Culvert n=0.012 L=82.5' S=0.0342 '/' Outflow=11.8 cfs 42,787 cf

Pond EP-7: CBB2018 Peak Elev=377.20' Inflow=10.1 cfs 36,700 cf
12.0" Round Culvert n=0.012 L=96.2' S=0.0082 '/' Outflow=10.1 cfs 36,700 cf

Pond EP-8: CB2144 Peak Elev=379.44' Inflow=10.1 cfs 36,700 cf
12.0" Round Culvert n=0.012 L=110.3' S=0.0067 '/' Outflow=10.1 cfs 36,700 cf

Pond EP-9: CB2019 Peak Elev=379.81' Inflow=4.3 cfs 15,601 cf
12.0" Round Culvert n=0.012 L=142.0' S=0.0077 '/' Outflow=4.3 cfs 15,601 cf

Link POI-1: LOT 743Z-10-2 Inflow=0.0 cfs 217 cf
Primary=0.0 cfs 217 cf

Link POI-2: LOT 743Z-10-2 Inflow=21.7 cfs 83,719 cf
Primary=21.7 cfs 83,719 cf

Link POI-3: LOT 582Z-1 Inflow=1.0 cfs 3,399 cf
Primary=1.0 cfs 3,399 cf

Link POI-4: LOT 582Z-1 Inflow=0.2 cfs 540 cf
Primary=0.2 cfs 540 cf

Link POI-5: POI-5 Inflow=0.0 cfs 84 cf
Primary=0.0 cfs 84 cf

Link POI-6: LOT 494Z-32 Inflow=0.0 cfs 0 cf
Primary=0.0 cfs 0 cf

Total Runoff Area = 377,156 sf Runoff Volume = 87,960 cf Average Runoff Depth = 2.80"
41.47% Pervious = 156,403 sf 58.53% Impervious = 220,753 sf

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ES-01: Runoff Area=14,738 sf 70.29% Impervious Runoff Depth>3.84"
Flow Length=144' Tc=8.0 min CN=80 Runoff=1.4 cfs 4,716 cf

Subcatchment ES-02: Runoff Area=32,767 sf 55.28% Impervious Runoff Depth>2.95"
Flow Length=174' Tc=7.2 min CN=71 Runoff=2.5 cfs 8,060 cf

Subcatchment ES-03: Runoff Area=13,698 sf 0.00% Impervious Runoff Depth>0.41"
Flow Length=116' Tc=12.0 min CN=38 Runoff=0.0 cfs 468 cf

Subcatchment ES-04A: Runoff Area=51,778 sf 99.61% Impervious Runoff Depth>5.83"
Tc=6.0 min CN=98 Runoff=6.9 cfs 25,148 cf

Subcatchment ES-04B: Runoff Area=38,284 sf 100.00% Impervious Runoff Depth>5.83"
Tc=6.0 min CN=98 Runoff=5.1 cfs 18,594 cf

Subcatchment ES-05: Runoff Area=152,100 sf 34.26% Impervious Runoff Depth>1.96"
Flow Length=470' Tc=12.3 min CN=60 Runoff=6.1 cfs 24,866 cf

Subcatchment ES-06: Runoff Area=10,763 sf 0.00% Impervious Runoff Depth>4.69"
Tc=6.0 min CN=88 Runoff=1.3 cfs 4,206 cf

Subcatchment ES-07: Runoff Area=2,930 sf 0.00% Impervious Runoff Depth>2.95"
Tc=6.0 min CN=71 Runoff=0.2 cfs 721 cf

Subcatchment ES-08: Runoff Area=3,838 sf 0.00% Impervious Runoff Depth>0.52"
Tc=6.0 min CN=40 Runoff=0.0 cfs 166 cf

Subcatchment ES-09: Runoff Area=13,991 sf 94.66% Impervious Runoff Depth>5.48"
Tc=6.0 min CN=95 Runoff=1.8 cfs 6,386 cf

Subcatchment ES-10: Runoff Area=13,089 sf 94.95% Impervious Runoff Depth>5.48"
Tc=6.0 min CN=95 Runoff=1.7 cfs 5,975 cf

Subcatchment ES-11: Runoff Area=954 sf 18.97% Impervious Runoff Depth>1.18"
Flow Length=43' Tc=6.1 min CN=50 Runoff=0.0 cfs 93 cf

Subcatchment ES-12: Runoff Area=13,078 sf 72.76% Impervious Runoff Depth>4.05"
Tc=6.0 min CN=82 Runoff=1.4 cfs 4,412 cf

Subcatchment ES-13: Runoff Area=14,936 sf 100.00% Impervious Runoff Depth>5.83"
Tc=6.0 min CN=98 Runoff=2.0 cfs 7,254 cf

Subcatchment ES-14: Runoff Area=212 sf 0.00% Impervious Runoff Depth>0.08"
Flow Length=35' Slope=0.0100 '/' Tc=13.1 min CN=30 Runoff=0.0 cfs 1 cf

Pond EP-1: CB1615 Peak Elev=428.10' Inflow=3.9 cfs 12,776 cf
12.0" Round Culvert n=0.012 L=154.1' S=0.0042 '/' Outflow=3.9 cfs 12,776 cf

Pond EP-10: CB1854 Peak Elev=428.38' Inflow=2.5 cfs 8,060 cf
12.0" Round Culvert n=0.012 L=90.7' S=0.0078 '/' Outflow=2.5 cfs 8,060 cf

Pond EP-11: CB1855 Peak Elev=428.27' Inflow=2.5 cfs 8,060 cf
12.0" Round Culvert n=0.012 L=130.4' S=0.0082 '/' Outflow=2.5 cfs 8,060 cf

Pond EP-12: CB1315 Peak Elev=370.17' Inflow=1.8 cfs 6,386 cf
12.0" Round Culvert n=0.012 L=105.0' S=0.0571 '/' Outflow=1.8 cfs 6,386 cf

Pond EP-13: EX. CB Peak Elev=369.92' Inflow=22.7 cfs 80,639 cf
12.0" Round Culvert n=0.012 L=266.7' S=0.0768 '/' Outflow=22.7 cfs 80,639 cf

Pond EP-2: CB1332 Peak Elev=427.61' Inflow=1.4 cfs 4,412 cf
8.0" Round Culvert n=0.012 L=7.9' S=0.2671 '/' Outflow=1.4 cfs 4,412 cf

Pond EP-3: DMH 1333 Peak Elev=427.46' Inflow=5.2 cfs 17,188 cf
10.0" Round Culvert n=0.012 L=89.0' S=0.0031 '/' Outflow=5.2 cfs 17,188 cf

Pond EP-4: CB1324 Peak Elev=424.92' Inflow=5.2 cfs 17,281 cf
10.0" Round Culvert n=0.012 L=109.1' S=0.0164 '/' Outflow=5.2 cfs 17,281 cf

Pond EP-5: CB2217 Peak Elev=419.93' Inflow=20.9 cfs 74,252 cf
12.0" Round Culvert n=0.012 L=160.3' S=0.0058 '/' Outflow=20.9 cfs 74,252 cf

Pond EP-6: CBB2017 Peak Elev=428.74' Inflow=14.0 cfs 50,996 cf
12.0" Round Culvert n=0.012 L=82.5' S=0.0342 '/' Outflow=14.0 cfs 50,996 cf

Pond EP-7: CBB2018 Peak Elev=432.73' Inflow=12.0 cfs 43,742 cf
12.0" Round Culvert n=0.012 L=96.2' S=0.0082 '/' Outflow=12.0 cfs 43,742 cf

Pond EP-8: CB2144 Peak Elev=435.87' Inflow=12.0 cfs 43,742 cf
12.0" Round Culvert n=0.012 L=110.3' S=0.0067 '/' Outflow=12.0 cfs 43,742 cf

Pond EP-9: CB2019 Peak Elev=436.39' Inflow=5.1 cfs 18,594 cf
12.0" Round Culvert n=0.012 L=142.0' S=0.0077 '/' Outflow=5.1 cfs 18,594 cf

Link POI-1: LOT 743Z-10-2 Inflow=0.0 cfs 468 cf
Primary=0.0 cfs 468 cf

Link POI-2: LOT 743Z-10-2 Inflow=27.3 cfs 105,505 cf
Primary=27.3 cfs 105,505 cf

Link POI-3: LOT 582Z-1 Inflow=1.3 cfs 4,206 cf
Primary=1.3 cfs 4,206 cf

Link POI-4: LOT 582Z-1 Inflow=0.2 cfs 721 cf
Primary=0.2 cfs 721 cf

Link POI-5: POI-5 Inflow=0.0 cfs 166 cf
Primary=0.0 cfs 166 cf

Link POI-6: LOT 494Z-32 Inflow=0.0 cfs 1 cf
Primary=0.0 cfs 1 cf

Total Runoff Area = 377,156 sf Runoff Volume = 111,067 cf Average Runoff Depth = 3.53"
41.47% Pervious = 156,403 sf 58.53% Impervious = 220,753 sf

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ES-01: Runoff Area=14,738 sf 70.29% Impervious Runoff Depth>4.85"
Flow Length=144' Tc=8.0 min CN=80 Runoff=1.8 cfs 5,952 cf

Subcatchment ES-02: Runoff Area=32,767 sf 55.28% Impervious Runoff Depth>3.86"
Flow Length=174' Tc=7.2 min CN=71 Runoff=3.2 cfs 10,547 cf

Subcatchment ES-03: Runoff Area=13,698 sf 0.00% Impervious Runoff Depth>0.75"
Flow Length=116' Tc=12.0 min CN=38 Runoff=0.1 cfs 858 cf

Subcatchment ES-04A: Runoff Area=51,778 sf 99.61% Impervious Runoff Depth>6.93"
Tc=6.0 min CN=98 Runoff=8.2 cfs 29,887 cf

Subcatchment ES-04B: Runoff Area=38,284 sf 100.00% Impervious Runoff Depth>6.93"
Tc=6.0 min CN=98 Runoff=6.0 cfs 22,098 cf

Subcatchment ES-05: Runoff Area=152,100 sf 34.26% Impervious Runoff Depth>2.72"
Flow Length=470' Tc=12.3 min CN=60 Runoff=8.7 cfs 34,442 cf

Subcatchment ES-06: Runoff Area=10,763 sf 0.00% Impervious Runoff Depth>5.75"
Tc=6.0 min CN=88 Runoff=1.6 cfs 5,161 cf

Subcatchment ES-07: Runoff Area=2,930 sf 0.00% Impervious Runoff Depth>3.86"
Tc=6.0 min CN=71 Runoff=0.3 cfs 943 cf

Subcatchment ES-08: Runoff Area=3,838 sf 0.00% Impervious Runoff Depth>0.91"
Tc=6.0 min CN=40 Runoff=0.1 cfs 290 cf

Subcatchment ES-09: Runoff Area=13,991 sf 94.66% Impervious Runoff Depth>6.57"
Tc=6.0 min CN=95 Runoff=2.2 cfs 7,661 cf

Subcatchment ES-10: Runoff Area=13,089 sf 94.95% Impervious Runoff Depth>6.57"
Tc=6.0 min CN=95 Runoff=2.0 cfs 7,167 cf

Subcatchment ES-11: Runoff Area=954 sf 18.97% Impervious Runoff Depth>1.76"
Flow Length=43' Tc=6.1 min CN=50 Runoff=0.0 cfs 140 cf

Subcatchment ES-12: Runoff Area=13,078 sf 72.76% Impervious Runoff Depth>5.07"
Tc=6.0 min CN=82 Runoff=1.7 cfs 5,527 cf

Subcatchment ES-13: Runoff Area=14,936 sf 100.00% Impervious Runoff Depth>6.93"
Tc=6.0 min CN=98 Runoff=2.4 cfs 8,621 cf

Subcatchment ES-14: Runoff Area=212 sf 0.00% Impervious Runoff Depth>0.24"
Flow Length=35' Slope=0.0100 '/' Tc=13.1 min CN=30 Runoff=0.0 cfs 4 cf

Pond EP-1: CB1615 Peak Elev=507.06' Inflow=5.0 cfs 16,498 cf
12.0" Round Culvert n=0.012 L=154.1' S=0.0042 '/' Outflow=5.0 cfs 16,498 cf

Pond EP-10: CB1854 Peak Elev=507.52' Inflow=3.2 cfs 10,547 cf
12.0" Round Culvert n=0.012 L=90.7' S=0.0078 '/' Outflow=3.2 cfs 10,547 cf

Pond EP-11: CB1855 Peak Elev=507.34' Inflow=3.2 cfs 10,547 cf
12.0" Round Culvert n=0.012 L=130.4' S=0.0082 '/' Outflow=3.2 cfs 10,547 cf

Pond EP-12: CB1315 Peak Elev=421.21' Inflow=2.2 cfs 7,661 cf
12.0" Round Culvert n=0.012 L=105.0' S=0.0571 '/' Outflow=2.2 cfs 7,661 cf

Pond EP-13: EX. CB Peak Elev=420.87' Inflow=27.4 cfs 97,601 cf
12.0" Round Culvert n=0.012 L=266.7' S=0.0768 '/' Outflow=27.4 cfs 97,601 cf

Pond EP-2: CB1332 Peak Elev=506.25' Inflow=1.7 cfs 5,527 cf
8.0" Round Culvert n=0.012 L=7.9' S=0.2671 '/' Outflow=1.7 cfs 5,527 cf

Pond EP-3: DMH 1333 Peak Elev=506.03' Inflow=6.7 cfs 22,026 cf
10.0" Round Culvert n=0.012 L=89.0' S=0.0031 '/' Outflow=6.7 cfs 22,026 cf

Pond EP-4: CB1324 Peak Elev=501.95' Inflow=6.7 cfs 22,166 cf
10.0" Round Culvert n=0.012 L=109.1' S=0.0164 '/' Outflow=6.7 cfs 22,166 cf

Pond EP-5: CB2217 Peak Elev=493.87' Inflow=25.2 cfs 89,940 cf
12.0" Round Culvert n=0.012 L=160.3' S=0.0058 '/' Outflow=25.2 cfs 89,940 cf

Pond EP-6: CBB2017 Peak Elev=506.18' Inflow=16.6 cfs 60,607 cf
12.0" Round Culvert n=0.012 L=82.5' S=0.0342 '/' Outflow=16.6 cfs 60,607 cf

Pond EP-7: CBB2018 Peak Elev=511.75' Inflow=14.2 cfs 51,985 cf
12.0" Round Culvert n=0.012 L=96.2' S=0.0082 '/' Outflow=14.2 cfs 51,985 cf

Pond EP-8: CB2144 Peak Elev=516.13' Inflow=14.2 cfs 51,985 cf
12.0" Round Culvert n=0.012 L=110.3' S=0.0067 '/' Outflow=14.2 cfs 51,985 cf

Pond EP-9: CB2019 Peak Elev=516.85' Inflow=6.0 cfs 22,098 cf
12.0" Round Culvert n=0.012 L=142.0' S=0.0077 '/' Outflow=6.0 cfs 22,098 cf

Link POI-1: LOT 743Z-10-2 Inflow=0.1 cfs 858 cf
Primary=0.1 cfs 858 cf

Link POI-2: LOT 743Z-10-2 Inflow=34.2 cfs 132,043 cf
Primary=34.2 cfs 132,043 cf

Link POI-3: LOT 582Z-1 Inflow=1.6 cfs 5,161 cf
Primary=1.6 cfs 5,161 cf

Link POI-4: LOT 582Z-1 Inflow=0.3 cfs 943 cf
Primary=0.3 cfs 943 cf

Link POI-5: POI-5 Inflow=0.1 cfs 290 cf
Primary=0.1 cfs 290 cf

Link POI-6: LOT 494Z-32 Inflow=0.0 cfs 4 cf
Primary=0.0 cfs 4 cf

Total Runoff Area = 377,156 sf Runoff Volume = 139,299 cf Average Runoff Depth = 4.43"
41.47% Pervious = 156,403 sf 58.53% Impervious = 220,753 sf

Summary for Subcatchment ES-01:

Runoff = 0.8 cfs @ 12.12 hrs, Volume= 2,626 cf, Depth> 2.14"
Routed to Pond EP-1 : CB1615

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
176	30	Woods, Good, HSG A
4,203	39	>75% Grass cover, Good, HSG A
10,359	98	Paved parking, HSG A
14,738	80	Weighted Average
4,379		29.71% Pervious Area
10,359		70.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	5	0.0200	0.04		**Sheet Flow, WOODS** Woods: Light underbrush n= 0.400 P2= 2.81"
5.2	59	0.0400	0.19		**Sheet Flow, GRASS** Grass: Short n= 0.150 P2= 2.81"
0.7	80	0.0100	2.03		**Shallow Concentrated Flow, PAVED** Paved Kv= 20.3 fps
8.0	144	Total			

Summary for Subcatchment ES-02:

Runoff = 1.2 cfs @ 12.11 hrs, Volume= 4,027 cf, Depth> 1.47"
Routed to Pond EP-10 : CB1854

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
3,178	30	Woods, Good, HSG A
11,475	39	>75% Grass cover, Good, HSG A
18,114	98	Paved parking, HSG A
32,767	71	Weighted Average
14,653		44.72% Pervious Area
18,114		55.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	14	0.0400	0.06		**Sheet Flow, WOODS** Woods: Light underbrush n= 0.400 P2= 2.81"
2.5	26	0.0500	0.18		**Sheet Flow, GRASS** Grass: Short n= 0.150 P2= 2.81"
1.1	134	0.0100	2.03		**Shallow Concentrated Flow, PAVED** Paved Kv= 20.3 fps
7.2	174	Total			

Summary for Subcatchment ES-03:

Runoff = 0.0 cfs @ 15.75 hrs, Volume= 48 cf, Depth> 0.04"
Routed to Link POI-1 : LOT 743Z-10-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
2,117	30	Woods, Good, HSG A
11,581	39	>75% Grass cover, Good, HSG A
13,698	38	Weighted Average
13,698		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	45	0.0400	0.08		**Sheet Flow, WOODS** Woods: Light underbrush n= 0.400 P2= 2.81"
2.4	22	0.0400	0.16		**Sheet Flow, GRASS** Grass: Short n= 0.150 P2= 2.81"
0.4	49	0.0800	1.98		**Shallow Concentrated Flow, GRASS** Short Grass Pasture Kv= 7.0 fps
12.0	116	Total			

Summary for Subcatchment ES-04A:

Runoff = 4.7 cfs @ 12.09 hrs, Volume= 16,752 cf, Depth> 3.88"
Routed to Pond EP-8 : CB2144

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
46,679	98	Paved parking, HSG A
4,896	98	Roofs, HSG A
203	96	Gravel surface, HSG A
51,778	98	Weighted Average
203		0.39% Pervious Area
51,575		99.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 4A**

Summary for Subcatchment ES-04B:

Runoff = 3.5 cfs @ 12.09 hrs, Volume= 12,386 cf, Depth> 3.88"
Routed to Pond EP-9 : CB2019

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
38,284	98	Roofs, HSG A
38,284		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, ROOF**

Summary for Subcatchment ES-05:

Runoff = 2.2 cfs @ 12.21 hrs, Volume= 10,375 cf, Depth> 0.82"
Routed to Link POI-2 : LOT 743Z-10-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
3,727	96	Gravel surface, HSG A
2,000	98	Roofs, HSG A
86,336	39	>75% Grass cover, Good, HSG A
9,920	30	Woods, Good, HSG A
50,117	98	Paved parking, HSG A
152,100	60	Weighted Average
99,983		65.74% Pervious Area
52,117		34.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	10	0.0200	0.81		**Sheet Flow, GRAVEL** Smooth surfaces n= 0.011 P2= 2.81"
9.1	84	0.0200	0.15		**Sheet Flow, GRASS** Grass: Short n= 0.150 P2= 2.81"
1.9	245	0.0900	2.10		**Shallow Concentrated Flow, GRASS** Short Grass Pasture Kv= 7.0 fps
0.2	18	0.0600	1.22		**Shallow Concentrated Flow, WOODS** Woodland Kv= 5.0 fps
0.9	113	0.1000	2.21		**Shallow Concentrated Flow, GRASS** Short Grass Pasture Kv= 7.0 fps
12.3	470	Total			

Summary for Subcatchment ES-06:

Runoff = 0.8 cfs @ 12.09 hrs, Volume= 2,546 cf, Depth> 2.84"
Routed to Link POI-3 : LOT 582Z-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
9,225	96	Gravel surface, HSG A
1,538	39	>75% Grass cover, Good, HSG A
10,763	88	Weighted Average
10,763		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6A**

Summary for Subcatchment ES-07:

Runoff = 0.1 cfs @ 12.10 hrs, Volume= 360 cf, Depth> 1.48"
Routed to Link POI-4 : LOT 582Z-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
1,261	39	>75% Grass cover, Good, HSG A
1,669	96	Gravel surface, HSG A
2,930	71	Weighted Average
2,930		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 7A**

Summary for Subcatchment ES-08:

Runoff = 0.0 cfs @ 15.00 hrs, Volume= 25 cf, Depth> 0.08"
Routed to Link POI-5 : POI-5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
122	30	Woods, Good, HSG A
3,633	39	>75% Grass cover, Good, HSG A
83	96	Gravel surface, HSG A
3,838	40	Weighted Average
3,838		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 8A**

Summary for Subcatchment ES-09:

Runoff = 1.2 cfs @ 12.09 hrs, Volume= 4,136 cf, Depth> 3.55"
Routed to Pond EP-12 : CB1315

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
747	39	>75% Grass cover, Good, HSG A
13,244	98	Paved parking, HSG A
13,991	95	Weighted Average
747		5.34% Pervious Area
13,244		94.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 9A**

Summary for Subcatchment ES-10:

Runoff = 1.1 cfs @ 12.09 hrs, Volume= 3,869 cf, Depth> 3.55"
Routed to Pond EP-5 : CB2217

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
12,428	98	Paved parking, HSG A
661	39	>75% Grass cover, Good, HSG A
13,089	95	Weighted Average
661		5.05% Pervious Area
12,428		94.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 10A**

Summary for Subcatchment ES-11:

Runoff = 0.0 cfs @ 12.30 hrs, Volume= 29 cf, Depth> 0.37"
Routed to Pond EP-4 : CB1324

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
181	98	Paved parking, HSG A
773	39	>75% Grass cover, Good, HSG A
954	50	Weighted Average
773		81.03% Pervious Area
181		18.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	30	0.0100	0.09		**Sheet Flow, GRASS** Grass: Short n= 0.150 P2= 2.81"
0.3	10	0.0100	0.62		**Sheet Flow, GRAVEL** Smooth surfaces n= 0.011 P2= 2.81"
0.5	3	0.0400	0.10		**Sheet Flow, GRASS** Grass: Short n= 0.150 P2= 2.81"
6.1	43	Total			

Summary for Subcatchment ES-12:

Runoff = 0.8 cfs @ 12.09 hrs, Volume= 2,511 cf, Depth> 2.30"
Routed to Pond EP-2 : CB1332

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
9,515	98	Paved parking, HSG A
3,563	39	>75% Grass cover, Good, HSG A
13,078	82	Weighted Average
3,563		27.24% Pervious Area
9,515		72.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 12A**

Summary for Subcatchment ES-13:

Runoff = 1.3 cfs @ 12.09 hrs, Volume= 4,832 cf, Depth> 3.88"
Routed to Pond EP-6 : CBB2017

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
14,936	98	Paved parking, HSG A
14,936		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 13A**

Summary for Subcatchment ES-14:

[45] Hint: Runoff=Zero

Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"
Routed to Link POI-6 : LOT 494Z-32

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
212	30	Woods, Good, HSG A
212		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	35	0.0100	0.04		**Sheet Flow, WOODS** Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Pond EP-1: CB1615

[58] Hint: Peaked 34.56' above defined flood level
[80] Warning: Exceeded Pond EP-11 by 15.23' @ 12.25 hrs (11.0 cfs 5,671 cf)

Inflow Area = 47,505 sf, 59.94% Impervious, Inflow Depth > 1.68" for 10-yr event
Inflow = 2.0 cfs @ 12.11 hrs, Volume= 6,653 cf
Outflow = 2.0 cfs @ 12.11 hrs, Volume= 6,653 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.0 cfs @ 12.11 hrs, Volume= 6,653 cf
Routed to Pond EP-3 : DMH 1333

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 325.37' @ 12.27 hrs
Flood Elev= 290.81'

Device	Routing	Invert	Outlet Devices
#1	Primary	285.02'	**12.0" Round 12" RCP** L= 154.1' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 285.02' / 284.37' S= 0.0042 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 12.11 hrs HW=289.73' TW=298.29' (Dynamic Tailwater)
↑—**1=12" RCP** (Controls 0.0 cfs)

Summary for Pond EP-10: CB1854

[58] Hint: Peaked 34.77' above defined flood level

Inflow Area = 32,767 sf, 55.28% Impervious, Inflow Depth > 1.47" for 10-yr event
Inflow = 1.2 cfs @ 12.11 hrs, Volume= 4,027 cf
Outflow = 1.2 cfs @ 12.11 hrs, Volume= 4,027 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.2 cfs @ 12.11 hrs, Volume= 4,027 cf
Routed to Pond EP-11 : CB1855

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 325.45' @ 12.37 hrs
Flood Elev= 290.68'

Device	Routing	Invert	Outlet Devices
#1	Primary	287.43'	**12.0" Round 12" RCP** L= 90.7' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 287.43' / 286.72' S= 0.0078 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=1.1 cfs @ 12.11 hrs HW=288.00' TW=287.18' (Dynamic Tailwater)
1=12" RCP (Outlet Controls 1.1 cfs @ 3.51 fps)

Summary for Pond EP-11: CB1855

[58] Hint: Peaked 34.86' above defined flood level
[80] Warning: Exceeded Pond EP-10 by 15.24' @ 12.30 hrs (12.4 cfs 5,860 cf)

Inflow Area = 32,767 sf, 55.28% Impervious, Inflow Depth > 1.47" for 10-yr event
Inflow = 1.2 cfs @ 12.11 hrs, Volume= 4,027 cf
Outflow = 1.2 cfs @ 12.11 hrs, Volume= 4,027 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.2 cfs @ 12.11 hrs, Volume= 4,027 cf
Routed to Pond EP-1 : CB1615

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 325.42' @ 12.32 hrs
Flood Elev= 290.56'

Device	Routing	Invert	Outlet Devices
#1	Primary	286.37'	**12.0" Round 12" RCP** L= 130.4' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 286.37' / 285.30' S= 0.0082 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 12.11 hrs HW=287.18' TW=289.51' (Dynamic Tailwater)
1=12" RCP (Controls 0.0 cfs)

Summary for Pond EP-12: CB1315

[58] Hint: Peaked 13.26' above defined flood level

Inflow Area = 13,991 sf, 94.66% Impervious, Inflow Depth > 3.55" for 10-yr event
Inflow = 1.2 cfs @ 12.09 hrs, Volume= 4,136 cf
Outflow = 1.2 cfs @ 12.09 hrs, Volume= 4,136 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.2 cfs @ 12.09 hrs, Volume= 4,136 cf
Routed to Pond EP-13 : EX. CB

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 303.79' @ 12.14 hrs
Flood Elev= 290.53'

Device	Routing	Invert	Outlet Devices
#1	Primary	285.21'	**12.0" Round 12" RCP** L= 105.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 285.21' / 279.21' S= 0.0571 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 12.09 hrs HW=293.36' TW=301.41' (Dynamic Tailwater)
1=12" RCP (Controls 0.0 cfs)

Summary for Pond EP-13: EX. CB

[58] Hint: Peaked 26.68' above defined flood level
[80] Warning: Exceeded Pond EP-12 by 10.05' @ 12.05 hrs (9.6 cfs 3,216 cf)

Inflow Area = 193,615 sf, 87.10% Impervious, Inflow Depth > 3.17" for 10-yr event
Inflow = 14.5 cfs @ 12.09 hrs, Volume= 51,169 cf
Outflow = 14.5 cfs @ 12.09 hrs, Volume= 51,169 cf, Atten= 0%, Lag= 0.0 min
Primary = 14.5 cfs @ 12.09 hrs, Volume= 51,169 cf
Routed to Link POI-2 : LOT 743Z-10-2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 303.68' @ 12.09 hrs
Flood Elev= 277.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	277.49'	**12.0" Round 12" RCP** L= 266.7' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 277.49' / 257.00' S= 0.0768 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=14.2 cfs @ 12.09 hrs HW=301.92' TW=0.00' (Dynamic Tailwater)
1=12" RCP (Barrel Controls 14.2 cfs @ 18.10 fps)

Summary for Pond EP-2: CB1332

[58] Hint: Peaked 34.22' above defined flood level

Inflow Area = 13,078 sf, 72.76% Impervious, Inflow Depth > 2.30" for 10-yr event
Inflow = 0.8 cfs @ 12.09 hrs, Volume= 2,511 cf
Outflow = 0.8 cfs @ 12.09 hrs, Volume= 2,511 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.8 cfs @ 12.09 hrs, Volume= 2,511 cf
Routed to Pond EP-3 : DMH 1333

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 325.24' @ 12.27 hrs
Flood Elev= 291.02'

Device	Routing	Invert	Outlet Devices
#1	Primary	286.48'	**8.0" Round 8" RCP** L= 7.9' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 286.48' / 284.37' S= 0.2671 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.35 sf

Primary OutFlow Max=0.0 cfs @ 12.09 hrs HW=287.38' TW=293.25' (Dynamic Tailwater)
1=8" RCP (Controls 0.0 cfs)

Summary for Pond EP-3: DMH 1333

[58] Hint: Peaked 33.92' above defined flood level
[80] Warning: Exceeded Pond EP-1 by 15.08' @ 12.20 hrs (10.3 cfs 5,428 cf)
[80] Warning: Exceeded Pond EP-2 by 15.31' @ 12.20 hrs (6.6 cfs 3,255 cf)

Inflow Area = 60,583 sf, 62.70% Impervious, Inflow Depth > 1.82" for 10-yr event
Inflow = 2.8 cfs @ 12.11 hrs, Volume= 9,164 cf
Outflow = 2.8 cfs @ 12.11 hrs, Volume= 9,164 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.8 cfs @ 12.11 hrs, Volume= 9,164 cf
Routed to Pond EP-4 : CB1324

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 325.19' @ 12.22 hrs
Flood Elev= 291.27'

Device	Routing	Invert	Outlet Devices
#1	Primary	283.33'	**10.0" Round 10" RCP** L= 89.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 283.33' / 283.05' S= 0.0031 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.55 sf

Primary OutFlow Max=0.0 cfs @ 12.11 hrs HW=296.46' TW=309.52' (Dynamic Tailwater)
1=10" RCP (Controls 0.0 cfs)

Summary for Pond EP-4: CB1324

[58] Hint: Peaked 32.85' above defined flood level
[80] Warning: Exceeded Pond EP-3 by 14.48' @ 12.15 hrs (7.8 cfs 4,179 cf)

Inflow Area = 61,537 sf, 62.03% Impervious, Inflow Depth > 1.79" for 10-yr event
Inflow = 2.8 cfs @ 12.11 hrs, Volume= 9,193 cf
Outflow = 2.8 cfs @ 12.11 hrs, Volume= 9,193 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.8 cfs @ 12.11 hrs, Volume= 9,193 cf
Routed to Pond EP-5 : CB2217

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 324.42' @ 12.17 hrs
Flood Elev= 291.57'

Device	Routing	Invert	Outlet Devices
#1	Primary	283.03'	**10.0" Round 10" RCP** L= 109.1' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 283.03' / 281.24' S= 0.0164 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.55 sf

Primary OutFlow Max=0.0 cfs @ 12.11 hrs HW=309.54' TW=321.16' (Dynamic Tailwater)
1=10" RCP (Controls 0.0 cfs)

Summary for Pond EP-5: CB2217

[58] Hint: Peaked 31.91' above defined flood level
[80] Warning: Exceeded Pond EP-4 by 14.26' @ 12.10 hrs (7.2 cfs 3,886 cf)
[80] Warning: Exceeded Pond EP-6 by 8.13' @ 12.10 hrs (9.3 cfs 4,071 cf)

Inflow Area = 179,624 sf, 86.51% Impervious, Inflow Depth > 3.14" for 10-yr event
Inflow = 13.3 cfs @ 12.09 hrs, Volume= 47,033 cf
Outflow = 13.3 cfs @ 12.09 hrs, Volume= 47,033 cf, Atten= 0%, Lag= 0.0 min
Primary = 13.3 cfs @ 12.09 hrs, Volume= 47,033 cf
Routed to Pond EP-13 : EX. CB

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 322.98' @ 12.12 hrs
Flood Elev= 291.07'

Device	Routing	Invert	Outlet Devices
#1	Primary	280.14'	**12.0" Round 12" RCP** L= 160.3' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 280.14' / 279.21' S= 0.0058 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=10.6 cfs @ 12.09 hrs HW=318.40' TW=301.97' (Dynamic Tailwater)
1=12" RCP (Outlet Controls 10.6 cfs @ 13.52 fps)

Summary for Pond EP-6: CBB2017

[58] Hint: Peaked 36.11' above defined flood level
[80] Warning: Exceeded Pond EP-7 by 9.10' @ 12.15 hrs (9.4 cfs 4,632 cf)

Inflow Area = 104,998 sf, 99.81% Impervious, Inflow Depth > 3.88" for 10-yr event
Inflow = 9.5 cfs @ 12.09 hrs, Volume= 33,971 cf
Outflow = 9.5 cfs @ 12.09 hrs, Volume= 33,971 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.5 cfs @ 12.09 hrs, Volume= 33,971 cf
Routed to Pond EP-5 : CB2217

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 327.12' @ 12.16 hrs
Flood Elev= 291.01'

Device	Routing	Invert	Outlet Devices
#1	Primary	283.79'	**12.0" Round 12" RCP** L= 82.5' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 283.79' / 280.97' S= 0.0342 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 12.09 hrs HW=309.18' TW=316.93' (Dynamic Tailwater)
1=12" RCP (Controls 0.0 cfs)

Summary for Pond EP-7: CBB2018

[58] Hint: Peaked 38.03' above defined flood level
[80] Warning: Exceeded Pond EP-8 by 8.89' @ 12.20 hrs (8.9 cfs 4,034 cf)

Inflow Area = 90,062 sf, 99.77% Impervious, Inflow Depth > 3.88" for 10-yr event
Inflow = 8.1 cfs @ 12.09 hrs, Volume= 29,138 cf
Outflow = 8.1 cfs @ 12.09 hrs, Volume= 29,138 cf, Atten= 0%, Lag= 0.0 min
Primary = 8.1 cfs @ 12.09 hrs, Volume= 29,138 cf
Routed to Pond EP-6 : CBB2017

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 329.03' @ 12.21 hrs
Flood Elev= 291.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	284.96'	**12.0" Round 12" RCP** L= 96.2' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 284.96' / 284.17' S= 0.0082 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 12.09 hrs HW=302.19' TW=309.18' (Dynamic Tailwater)
1=12" RCP (Controls 0.0 cfs)

Summary for Pond EP-8: CB2144

[58] Hint: Peaked 39.58' above defined flood level
[80] Warning: Exceeded Pond EP-9 by 10.16' @ 12.25 hrs (8.7 cfs 7,056 cf)

Inflow Area = 90,062 sf, 99.77% Impervious, Inflow Depth > 3.88" for 10-yr event
Inflow = 8.1 cfs @ 12.09 hrs, Volume= 29,138 cf
Outflow = 8.1 cfs @ 12.09 hrs, Volume= 29,138 cf, Atten= 0%, Lag= 0.0 min
Primary = 8.1 cfs @ 12.09 hrs, Volume= 29,138 cf
Routed to Pond EP-7 : CBB2018

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 330.53' @ 12.26 hrs
Flood Elev= 290.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	285.93'	**12.0" Round 12" RCP** L= 110.3' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 285.93' / 285.19' S= 0.0067 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 12.09 hrs HW=300.15' TW=302.19' (Dynamic Tailwater)
1=12" RCP (Controls 0.0 cfs)

Summary for Pond EP-9: CB2019

[58] Hint: Peaked 40.36' above defined flood level

Inflow Area = 38,284 sf,100.00% Impervious, Inflow Depth > 3.88" for 10-yr event
Inflow = 3.5 cfs @ 12.09 hrs, Volume= 12,386 cf
Outflow = 3.5 cfs @ 12.09 hrs, Volume= 12,386 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.5 cfs @ 12.09 hrs, Volume= 12,386 cf
Routed to Pond EP-8 : CB2144

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 330.77' @ 12.31 hrs
Flood Elev= 290.41'

Device	Routing	Invert	Outlet Devices
#1	Primary	287.33'	**12.0" Round 12" RCP** L= 142.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 287.33' / 286.24' S= 0.0077 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 12.09 hrs HW=295.21' TW=300.15' (Dynamic Tailwater)
1=12" RCP (Controls 0.0 cfs)

Summary for Link POI-1: LOT 743Z-10-2

Inflow Area = 13,698 sf, 0.00% Impervious, Inflow Depth > 0.04" for 10-yr event
Inflow = 0.0 cfs @ 15.75 hrs, Volume= 48 cf
Primary = 0.0 cfs @ 15.75 hrs, Volume= 48 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link POI-2: LOT 743Z-10-2

Inflow Area = 345,715 sf, 63.85% Impervious, Inflow Depth > 2.14" for 10-yr event
Inflow = 15.9 cfs @ 12.10 hrs, Volume= 61,543 cf
Primary = 15.9 cfs @ 12.10 hrs, Volume= 61,543 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link POI-3: LOT 582Z-1

Inflow Area = 10,763 sf, 0.00% Impervious, Inflow Depth > 2.84" for 10-yr event
Inflow = 0.8 cfs @ 12.09 hrs, Volume= 2,546 cf
Primary = 0.8 cfs @ 12.09 hrs, Volume= 2,546 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link POI-4: LOT 582Z-1

Inflow Area = 2,930 sf, 0.00% Impervious, Inflow Depth > 1.48" for 10-yr event
Inflow = 0.1 cfs @ 12.10 hrs, Volume= 360 cf
Primary = 0.1 cfs @ 12.10 hrs, Volume= 360 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link POI-5: POI-5

Inflow Area = 3,838 sf, 0.00% Impervious, Inflow Depth > 0.08" for 10-yr event
Inflow = 0.0 cfs @ 15.00 hrs, Volume= 25 cf
Primary = 0.0 cfs @ 15.00 hrs, Volume= 25 cf, Atten= 0%, Lag= 0.0 min

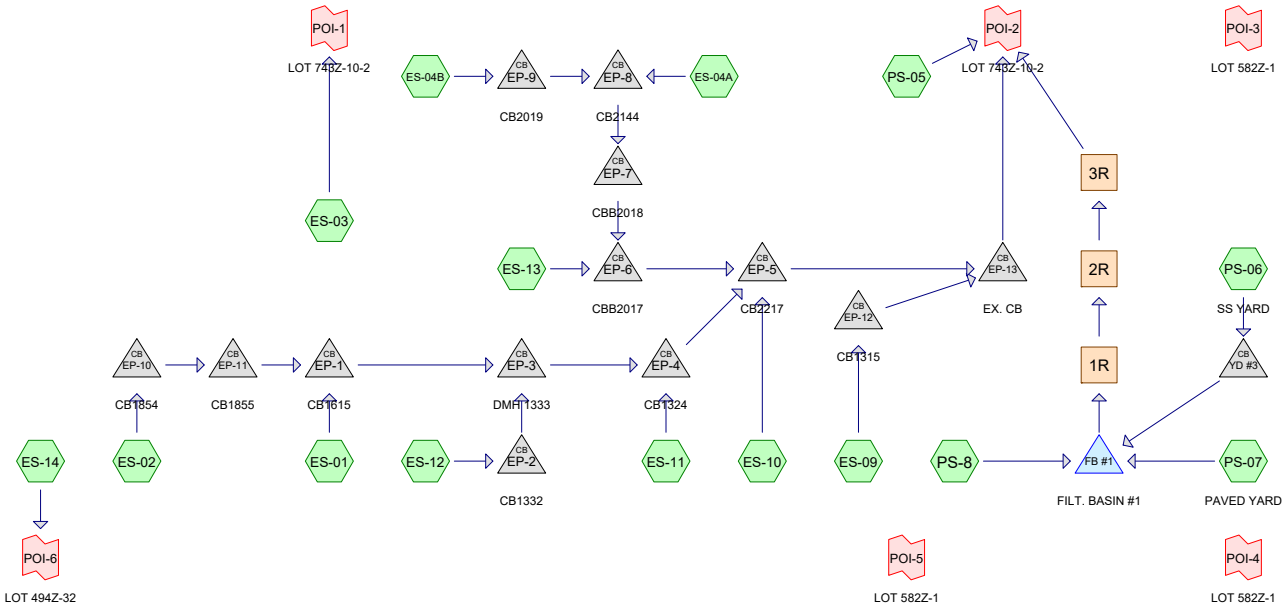
Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link POI-6: LOT 494Z-32

Inflow Area = 212 sf, 0.00% Impervious, Inflow Depth = 0.00" for 10-yr event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

PART 5



Subcat Reach Pond Link

Routing Diagram for 96159-01 POST-DEV_2025-08-20
Prepared by T F Moran Inc
HydroCAD® 10.20-6a s/n 00866 © 2024 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
106,149	39	>75% Grass cover, Good, HSG A (ES-01, ES-02, ES-03, ES-09, ES-10, ES-11, ES-12, PS-05, PS-07, PS-8)
23,906	96	Gravel surface, HSG A (PS-05, PS-06)
187,031	98	Paved parking, HSG A (ES-01, ES-02, ES-04A, ES-09, ES-10, ES-11, ES-12, ES-13, PS-05, PS-07, PS-8)
45,180	98	Roofs, HSG A (ES-04A, ES-04B, PS-8)
14,890	30	Woods, Good, HSG A (ES-01, ES-02, ES-03, ES-14, PS-05)
377,156	**79**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
377,156	HSG A	ES-01, ES-02, ES-03, ES-04A, ES-04B, ES-09, ES-10, ES-11, ES-12, ES-13, ES-14, PS-05, PS-06, PS-07, PS-8
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
377,156		**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ES-01: Runoff Area=14,738 sf 70.29% Impervious Runoff Depth>1.11"
Flow Length=144' Tc=8.0 min CN=80 Runoff=0.4 cfs 1,360 cf

Subcatchment ES-02: Runoff Area=32,767 sf 55.28% Impervious Runoff Depth>0.65"
Flow Length=174' Tc=7.2 min CN=71 Runoff=0.5 cfs 1,782 cf

Subcatchment ES-03: Runoff Area=13,698 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=116' Tc=12.0 min CN=38 Runoff=0.0 cfs 0 cf

Subcatchment ES-04A: Runoff Area=51,778 sf 100.00% Impervious Runoff Depth>2.58"
Tc=6.0 min CN=98 Runoff=3.2 cfs 11,121 cf

Subcatchment ES-04B: Runoff Area=38,284 sf 100.00% Impervious Runoff Depth>2.58"
Tc=6.0 min CN=98 Runoff=2.3 cfs 8,223 cf

Subcatchment ES-09: Runoff Area=13,991 sf 94.66% Impervious Runoff Depth>2.26"
Tc=6.0 min CN=95 Runoff=0.8 cfs 2,638 cf

Subcatchment ES-10: Runoff Area=13,089 sf 94.95% Impervious Runoff Depth>2.26"
Tc=6.0 min CN=95 Runoff=0.7 cfs 2,468 cf

Subcatchment ES-11: Runoff Area=954 sf 18.97% Impervious Runoff Depth>0.06"
Flow Length=43' Tc=6.1 min CN=50 Runoff=0.0 cfs 5 cf

Subcatchment ES-12: Runoff Area=13,078 sf 72.76% Impervious Runoff Depth>1.23"
Tc=6.0 min CN=82 Runoff=0.4 cfs 1,340 cf

Subcatchment ES-13: Runoff Area=14,936 sf 100.00% Impervious Runoff Depth>2.58"
Tc=6.0 min CN=98 Runoff=0.9 cfs 3,208 cf

Subcatchment ES-14: Runoff Area=212 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=35' Slope=0.0100 '/' Tc=13.1 min CN=30 Runoff=0.0 cfs 0 cf

Subcatchment PS-05: Runoff Area=51,896 sf 8.94% Impervious Runoff Depth>0.01"
Flow Length=184' Tc=9.1 min CN=44 Runoff=0.0 cfs 23 cf

Subcatchment PS-06: SS YARD Runoff Area=22,573 sf 0.00% Impervious Runoff Depth>2.36"
Tc=6.0 min CN=96 Runoff=1.3 cfs 4,446 cf

Subcatchment PS-07: PAVED YARD Runoff Area=67,663 sf 69.47% Impervious Runoff Depth>1.11"
Flow Length=221' Tc=8.3 min CN=80 Runoff=1.8 cfs 6,245 cf

Subcatchment PS-8: Runoff Area=27,499 sf 42.63% Impervious Runoff Depth>0.39"
Flow Length=214' Tc=10.1 min CN=64 Runoff=0.2 cfs 887 cf

Reach 1R: Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.0 cfs 0 cf
n=0.050 L=73.7' S=0.2374 '/' Capacity=4,600.6 cfs Outflow=0.0 cfs 0 cf

Reach 2R: Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.0 cfs 0 cf
n=0.050 L=109.0' S=0.0367 '/' Capacity=1,808.6 cfs Outflow=0.0 cfs 0 cf

Reach 3R: Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.0 cfs 0 cf
n=0.050 L=42.8' S=0.1619 '/' Capacity=3,799.1 cfs Outflow=0.0 cfs 0 cf

Pond EP-1: CB1615 Peak Elev=293.65' Inflow=0.9 cfs 3,142 cf
12.0" Round Culvert n=0.012 L=154.1' S=0.0042 '/' Outflow=0.9 cfs 3,142 cf

Pond EP-10: CB1854 Peak Elev=293.67' Inflow=0.5 cfs 1,782 cf
12.0" Round Culvert n=0.012 L=90.7' S=0.0078 '/' Outflow=0.5 cfs 1,782 cf

Pond EP-11: CB1855 Peak Elev=293.66' Inflow=0.5 cfs 1,782 cf
12.0" Round Culvert n=0.012 L=130.4' S=0.0082 '/' Outflow=0.5 cfs 1,782 cf

Pond EP-12: CB1315 Peak Elev=285.66' Inflow=0.8 cfs 2,638 cf
12.0" Round Culvert n=0.012 L=105.0' S=0.0571 '/' Outflow=0.8 cfs 2,638 cf

Pond EP-13: EX. CB Peak Elev=283.86' Inflow=9.2 cfs 32,146 cf
12.0" Round Culvert n=0.012 L=266.7' S=0.0768 '/' Outflow=9.2 cfs 32,146 cf

Pond EP-2: CB1332 Peak Elev=293.62' Inflow=0.4 cfs 1,340 cf
8.0" Round Culvert n=0.012 L=7.9' S=0.2671 '/' Outflow=0.4 cfs 1,340 cf

Pond EP-3: DMH 1333 Peak Elev=293.60' Inflow=1.3 cfs 4,482 cf
10.0" Round Culvert n=0.012 L=89.0' S=0.0031 '/' Outflow=1.3 cfs 4,482 cf

Pond EP-4: CB1324 Peak Elev=293.40' Inflow=1.3 cfs 4,487 cf
10.0" Round Culvert n=0.012 L=109.1' S=0.0164 '/' Outflow=1.3 cfs 4,487 cf

Pond EP-5: CB2217 Peak Elev=293.04' Inflow=8.4 cfs 29,508 cf
12.0" Round Culvert n=0.012 L=160.3' S=0.0058 '/' Outflow=8.4 cfs 29,508 cf

Pond EP-6: CBB2017 Peak Elev=295.32' Inflow=6.4 cfs 22,553 cf
12.0" Round Culvert n=0.012 L=82.5' S=0.0342 '/' Outflow=6.4 cfs 22,553 cf

Pond EP-7: CBB2018 Peak Elev=296.41' Inflow=5.5 cfs 19,344 cf
12.0" Round Culvert n=0.012 L=96.2' S=0.0082 '/' Outflow=5.5 cfs 19,344 cf

Pond EP-8: CB2144 Peak Elev=297.21' Inflow=5.5 cfs 19,344 cf
12.0" Round Culvert n=0.012 L=110.3' S=0.0067 '/' Outflow=5.5 cfs 19,344 cf

Pond EP-9: CB2019 Peak Elev=297.33' Inflow=2.3 cfs 8,223 cf
12.0" Round Culvert n=0.012 L=142.0' S=0.0077 '/' Outflow=2.3 cfs 8,223 cf

Pond FB #1: FILT. BASIN #1 Peak Elev=284.25' Storage=5,374 cf Inflow=3.2 cfs 11,578 cf
Discarded=0.2 cfs 9,159 cf Primary=0.0 cfs 0 cf Outflow=0.2 cfs 9,159 cf

Pond YD #3: Peak Elev=285.98' Inflow=1.3 cfs 4,446 cf
12.0" Round Culvert n=0.012 L=137.0' S=0.0051 '/' Outflow=1.3 cfs 4,446 cf

Link POI-1: LOT 743Z-10-2 Inflow=0.0 cfs 0 cf
Primary=0.0 cfs 0 cf

Link POI-2: LOT 743Z-10-2 Inflow=9.2 cfs 32,168 cf
Primary=9.2 cfs 32,168 cf

Link POI-3: LOT 582Z-1
Primary=0.0 cfs 0 cf

Link POI-4: LOT 582Z-1
Primary=0.0 cfs 0 cf

Link POI-5: LOT 582Z-1
Primary=0.0 cfs 0 cf

Link POI-6: LOT 494Z-32 Inflow=0.0 cfs 0 cf
Primary=0.0 cfs 0 cf

Total Runoff Area = 377,156 sf Runoff Volume = 43,747 cf Average Runoff Depth = 1.39"
38.43% Pervious = 144,945 sf 61.57% Impervious = 232,211 sf

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ES-01: Runoff Area=14,738 sf 70.29% Impervious Runoff Depth>2.14"
Flow Length=144' Tc=8.0 min CN=80 Runoff=0.8 cfs 2,626 cf

Subcatchment ES-02: Runoff Area=32,767 sf 55.28% Impervious Runoff Depth>1.47"
Flow Length=174' Tc=7.2 min CN=71 Runoff=1.2 cfs 4,027 cf

Subcatchment ES-03: Runoff Area=13,698 sf 0.00% Impervious Runoff Depth>0.04"
Flow Length=116' Tc=12.0 min CN=38 Runoff=0.0 cfs 48 cf

Subcatchment ES-04A: Runoff Area=51,778 sf 100.00% Impervious Runoff Depth>3.88"
Tc=6.0 min CN=98 Runoff=4.7 cfs 16,752 cf

Subcatchment ES-04B: Runoff Area=38,284 sf 100.00% Impervious Runoff Depth>3.88"
Tc=6.0 min CN=98 Runoff=3.5 cfs 12,386 cf

Subcatchment ES-09: Runoff Area=13,991 sf 94.66% Impervious Runoff Depth>3.55"
Tc=6.0 min CN=95 Runoff=1.2 cfs 4,136 cf

Subcatchment ES-10: Runoff Area=13,089 sf 94.95% Impervious Runoff Depth>3.55"
Tc=6.0 min CN=95 Runoff=1.1 cfs 3,869 cf

Subcatchment ES-11: Runoff Area=954 sf 18.97% Impervious Runoff Depth>0.37"
Flow Length=43' Tc=6.1 min CN=50 Runoff=0.0 cfs 29 cf

Subcatchment ES-12: Runoff Area=13,078 sf 72.76% Impervious Runoff Depth>2.30"
Tc=6.0 min CN=82 Runoff=0.8 cfs 2,511 cf

Subcatchment ES-13: Runoff Area=14,936 sf 100.00% Impervious Runoff Depth>3.88"
Tc=6.0 min CN=98 Runoff=1.3 cfs 4,832 cf

Subcatchment ES-14: Runoff Area=212 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=35' Slope=0.0100 '/' Tc=13.1 min CN=30 Runoff=0.0 cfs 0 cf

Subcatchment PS-05: Runoff Area=51,896 sf 8.94% Impervious Runoff Depth>0.17"
Flow Length=184' Tc=9.1 min CN=44 Runoff=0.0 cfs 746 cf

Subcatchment PS-06: SS YARD Runoff Area=22,573 sf 0.00% Impervious Runoff Depth>3.66"
Tc=6.0 min CN=96 Runoff=2.0 cfs 6,878 cf

Subcatchment PS-07: PAVED YARD Runoff Area=67,663 sf 69.47% Impervious Runoff Depth>2.14"
Flow Length=221' Tc=8.3 min CN=80 Runoff=3.5 cfs 12,056 cf

Subcatchment PS-8: Runoff Area=27,499 sf 42.63% Impervious Runoff Depth>1.04"
Flow Length=214' Tc=10.1 min CN=64 Runoff=0.6 cfs 2,379 cf

Reach 1R: Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.0 cfs 0 cf
n=0.050 L=73.7' S=0.2374 '/' Capacity=4,600.6 cfs Outflow=0.0 cfs 0 cf

Reach 2R: Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.0 cfs 0 cf
n=0.050 L=109.0' S=0.0367 '/' Capacity=1,808.6 cfs Outflow=0.0 cfs 0 cf

Reach 3R: Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.0 cfs 0 cf
n=0.050 L=42.8' S=0.1619 '/' Capacity=3,799.1 cfs Outflow=0.0 cfs 0 cf

Pond EP-1: CB1615 Peak Elev=325.37' Inflow=2.0 cfs 6,653 cf
12.0" Round Culvert n=0.012 L=154.1' S=0.0042 '/' Outflow=2.0 cfs 6,653 cf

Pond EP-10: CB1854 Peak Elev=325.45' Inflow=1.2 cfs 4,027 cf
12.0" Round Culvert n=0.012 L=90.7' S=0.0078 '/' Outflow=1.2 cfs 4,027 cf

Pond EP-11: CB1855 Peak Elev=325.42' Inflow=1.2 cfs 4,027 cf
12.0" Round Culvert n=0.012 L=130.4' S=0.0082 '/' Outflow=1.2 cfs 4,027 cf

Pond EP-12: CB1315 Peak Elev=303.79' Inflow=1.2 cfs 4,136 cf
12.0" Round Culvert n=0.012 L=105.0' S=0.0571 '/' Outflow=1.2 cfs 4,136 cf

Pond EP-13: EX. CB Peak Elev=303.68' Inflow=14.5 cfs 51,169 cf
12.0" Round Culvert n=0.012 L=266.7' S=0.0768 '/' Outflow=14.5 cfs 51,169 cf

Pond EP-2: CB1332 Peak Elev=325.24' Inflow=0.8 cfs 2,511 cf
8.0" Round Culvert n=0.012 L=7.9' S=0.2671 '/' Outflow=0.8 cfs 2,511 cf

Pond EP-3: DMH 1333 Peak Elev=325.19' Inflow=2.8 cfs 9,164 cf
10.0" Round Culvert n=0.012 L=89.0' S=0.0031 '/' Outflow=2.8 cfs 9,164 cf

Pond EP-4: CB1324 Peak Elev=324.42' Inflow=2.8 cfs 9,193 cf
10.0" Round Culvert n=0.012 L=109.1' S=0.0164 '/' Outflow=2.8 cfs 9,193 cf

Pond EP-5: CB2217 Peak Elev=322.98' Inflow=13.3 cfs 47,033 cf
12.0" Round Culvert n=0.012 L=160.3' S=0.0058 '/' Outflow=13.3 cfs 47,033 cf

Pond EP-6: CBB2017 Peak Elev=327.12' Inflow=9.5 cfs 33,971 cf
12.0" Round Culvert n=0.012 L=82.5' S=0.0342 '/' Outflow=9.5 cfs 33,971 cf

Pond EP-7: CBB2018 Peak Elev=329.03' Inflow=8.1 cfs 29,138 cf
12.0" Round Culvert n=0.012 L=96.2' S=0.0082 '/' Outflow=8.1 cfs 29,138 cf

Pond EP-8: CB2144 Peak Elev=330.53' Inflow=8.1 cfs 29,138 cf
12.0" Round Culvert n=0.012 L=110.3' S=0.0067 '/' Outflow=8.1 cfs 29,138 cf

Pond EP-9: CB2019 Peak Elev=330.77' Inflow=3.5 cfs 12,386 cf
12.0" Round Culvert n=0.012 L=142.0' S=0.0077 '/' Outflow=3.5 cfs 12,386 cf

Pond FB #1: FILT. BASIN #1 Peak Elev=285.39' Storage=11,403 cf Inflow=6.0 cfs 21,313 cf
Discarded=0.3 cfs 14,712 cf Primary=0.0 cfs 0 cf Outflow=0.3 cfs 14,712 cf

Pond YD #3: Peak Elev=286.18' Inflow=2.0 cfs 6,878 cf
12.0" Round Culvert n=0.012 L=137.0' S=0.0051 '/' Outflow=2.0 cfs 6,878 cf

Link POI-1: LOT 743Z-10-2 Inflow=0.0 cfs 48 cf
Primary=0.0 cfs 48 cf

Link POI-2: LOT 743Z-10-2 Inflow=14.5 cfs 51,915 cf
Primary=14.5 cfs 51,915 cf

Link POI-3: LOT 582Z-1
Primary=0.0 cfs 0 cf

Link POI-4: LOT 582Z-1
Primary=0.0 cfs 0 cf

Link POI-5: LOT 582Z-1
Primary=0.0 cfs 0 cf

Link POI-6: LOT 494Z-32 Inflow=0.0 cfs 0 cf
Primary=0.0 cfs 0 cf

Total Runoff Area = 377,156 sf Runoff Volume = 73,276 cf Average Runoff Depth = 2.33"
38.43% Pervious = 144,945 sf 61.57% Impervious = 232,211 sf

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ES-01: Runoff Area=14,738 sf 70.29% Impervious Runoff Depth>3.00"
Flow Length=144' Tc=8.0 min CN=80 Runoff=1.1 cfs 3,688 cf

Subcatchment ES-02: Runoff Area=32,767 sf 55.28% Impervious Runoff Depth>2.21"
Flow Length=174' Tc=7.2 min CN=71 Runoff=1.8 cfs 6,041 cf

Subcatchment ES-03: Runoff Area=13,698 sf 0.00% Impervious Runoff Depth>0.19"
Flow Length=116' Tc=12.0 min CN=38 Runoff=0.0 cfs 217 cf

Subcatchment ES-04A: Runoff Area=51,778 sf 100.00% Impervious Runoff Depth>4.89"
Tc=6.0 min CN=98 Runoff=5.8 cfs 21,100 cf

Subcatchment ES-04B: Runoff Area=38,284 sf 100.00% Impervious Runoff Depth>4.89"
Tc=6.0 min CN=98 Runoff=4.3 cfs 15,601 cf

Subcatchment ES-09: Runoff Area=13,991 sf 94.66% Impervious Runoff Depth>4.55"
Tc=6.0 min CN=95 Runoff=1.5 cfs 5,300 cf

Subcatchment ES-10: Runoff Area=13,089 sf 94.95% Impervious Runoff Depth>4.55"
Tc=6.0 min CN=95 Runoff=1.4 cfs 4,958 cf

Subcatchment ES-11: Runoff Area=954 sf 18.97% Impervious Runoff Depth>0.74"
Flow Length=43' Tc=6.1 min CN=50 Runoff=0.0 cfs 59 cf

Subcatchment ES-12: Runoff Area=13,078 sf 72.76% Impervious Runoff Depth>3.19"
Tc=6.0 min CN=82 Runoff=1.1 cfs 3,480 cf

Subcatchment ES-13: Runoff Area=14,936 sf 100.00% Impervious Runoff Depth>4.89"
Tc=6.0 min CN=98 Runoff=1.7 cfs 6,086 cf

Subcatchment ES-14: Runoff Area=212 sf 0.00% Impervious Runoff Depth>0.01"
Flow Length=35' Slope=0.0100 '/' Tc=13.1 min CN=30 Runoff=0.0 cfs 0 cf

Subcatchment PS-05: Runoff Area=51,896 sf 8.94% Impervious Runoff Depth>0.43"
Flow Length=184' Tc=9.1 min CN=44 Runoff=0.2 cfs 1,880 cf

Subcatchment PS-06: SS YARD Runoff Area=22,573 sf 0.00% Impervious Runoff Depth>4.66"
Tc=6.0 min CN=96 Runoff=2.5 cfs 8,764 cf

Subcatchment PS-07: PAVED YARD Runoff Area=67,663 sf 69.47% Impervious Runoff Depth>3.00"
Flow Length=221' Tc=8.3 min CN=80 Runoff=5.0 cfs 16,930 cf

Subcatchment PS-8: Runoff Area=27,499 sf 42.63% Impervious Runoff Depth>1.66"
Flow Length=214' Tc=10.1 min CN=64 Runoff=1.0 cfs 3,808 cf

Reach 1R: Avg. Flow Depth=0.09' Max Vel=2.95 fps Inflow=1.6 cfs 5,491 cf
n=0.050 L=73.7' S=0.2374 '/' Capacity=4,600.6 cfs Outflow=1.6 cfs 5,491 cf

Reach 2R: Avg. Flow Depth=0.16' Max Vel=1.59 fps Inflow=1.6 cfs 5,491 cf
n=0.050 L=109.0' S=0.0367 '/' Capacity=1,808.6 cfs Outflow=1.6 cfs 5,491 cf

Reach 3R: Avg. Flow Depth=0.10' Max Vel=2.58 fps Inflow=1.6 cfs 5,491 cf
n=0.050 L=42.8' S=0.1619 '/' Capacity=3,799.1 cfs Outflow=1.6 cfs 5,491 cf

Pond EP-1: CB1615 Peak Elev=372.95' Inflow=2.9 cfs 9,729 cf
12.0" Round Culvert n=0.012 L=154.1' S=0.0042 '/' Outflow=2.9 cfs 9,729 cf

Pond EP-10: CB1854 Peak Elev=373.11' Inflow=1.8 cfs 6,041 cf
12.0" Round Culvert n=0.012 L=90.7' S=0.0078 '/' Outflow=1.8 cfs 6,041 cf

Pond EP-11: CB1855 Peak Elev=373.05' Inflow=1.8 cfs 6,041 cf
12.0" Round Culvert n=0.012 L=130.4' S=0.0082 '/' Outflow=1.8 cfs 6,041 cf

Pond EP-12: CB1315 Peak Elev=334.33' Inflow=1.5 cfs 5,300 cf
12.0" Round Culvert n=0.012 L=105.0' S=0.0571 '/' Outflow=1.5 cfs 5,300 cf

Pond EP-13: EX. CB Peak Elev=334.16' Inflow=18.7 cfs 66,312 cf
12.0" Round Culvert n=0.012 L=266.7' S=0.0768 '/' Outflow=18.7 cfs 66,312 cf

Pond EP-2: CB1332 Peak Elev=372.67' Inflow=1.1 cfs 3,480 cf
8.0" Round Culvert n=0.012 L=7.9' S=0.2671 '/' Outflow=1.1 cfs 3,480 cf

Pond EP-3: DMH 1333 Peak Elev=372.57' Inflow=4.0 cfs 13,209 cf
10.0" Round Culvert n=0.012 L=89.0' S=0.0031 '/' Outflow=4.0 cfs 13,209 cf

Pond EP-4: CB1324 Peak Elev=371.04' Inflow=4.0 cfs 13,268 cf
10.0" Round Culvert n=0.012 L=109.1' S=0.0164 '/' Outflow=4.0 cfs 13,268 cf

Pond EP-5: CB2217 Peak Elev=368.07' Inflow=17.2 cfs 61,012 cf
12.0" Round Culvert n=0.012 L=160.3' S=0.0058 '/' Outflow=17.2 cfs 61,012 cf

Pond EP-6: CBB2017 Peak Elev=374.34' Inflow=11.8 cfs 42,787 cf
12.0" Round Culvert n=0.012 L=82.5' S=0.0342 '/' Outflow=11.8 cfs 42,787 cf

Pond EP-7: CBB2018 Peak Elev=377.20' Inflow=10.1 cfs 36,700 cf
12.0" Round Culvert n=0.012 L=96.2' S=0.0082 '/' Outflow=10.1 cfs 36,700 cf

Pond EP-8: CB2144 Peak Elev=379.44' Inflow=10.1 cfs 36,700 cf
12.0" Round Culvert n=0.012 L=110.3' S=0.0067 '/' Outflow=10.1 cfs 36,700 cf

Pond EP-9: CB2019 Peak Elev=379.81' Inflow=4.3 cfs 15,601 cf
12.0" Round Culvert n=0.012 L=142.0' S=0.0077 '/' Outflow=4.3 cfs 15,601 cf

Pond FB #1: FILT. BASIN #1 Peak Elev=285.66' Storage=13,089 cf Inflow=8.3 cfs 29,502 cf
Discarded=0.3 cfs 15,898 cf Primary=1.6 cfs 5,491 cf Outflow=2.0 cfs 21,389 cf

Pond YD #3: Peak Elev=286.34' Inflow=2.5 cfs 8,764 cf
12.0" Round Culvert n=0.012 L=137.0' S=0.0051 '/' Outflow=2.5 cfs 8,764 cf

Link POI-1: LOT 743Z-10-2 Inflow=0.0 cfs 217 cf
Primary=0.0 cfs 217 cf

Link POI-2: LOT 743Z-10-2 Inflow=18.8 cfs 73,683 cf
Primary=18.8 cfs 73,683 cf

Link POI-3: LOT 582Z-1
Primary=0.0 cfs 0 cf

Link POI-4: LOT 582Z-1
Primary=0.0 cfs 0 cf

Link POI-5: LOT 582Z-1
Primary=0.0 cfs 0 cf

Link POI-6: LOT 494Z-32 Inflow=0.0 cfs 0 cf
Primary=0.0 cfs 0 cf

Total Runoff Area = 377,156 sf Runoff Volume = 97,911 cf Average Runoff Depth = 3.12"
38.43% Pervious = 144,945 sf 61.57% Impervious = 232,211 sf

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ES-01: Runoff Area=14,738 sf 70.29% Impervious Runoff Depth>3.84"
Flow Length=144' Tc=8.0 min CN=80 Runoff=1.4 cfs 4,716 cf

Subcatchment ES-02: Runoff Area=32,767 sf 55.28% Impervious Runoff Depth>2.95"
Flow Length=174' Tc=7.2 min CN=71 Runoff=2.5 cfs 8,060 cf

Subcatchment ES-03: Runoff Area=13,698 sf 0.00% Impervious Runoff Depth>0.41"
Flow Length=116' Tc=12.0 min CN=38 Runoff=0.0 cfs 468 cf

Subcatchment ES-04A: Runoff Area=51,778 sf 100.00% Impervious Runoff Depth>5.83"
Tc=6.0 min CN=98 Runoff=6.9 cfs 25,148 cf

Subcatchment ES-04B: Runoff Area=38,284 sf 100.00% Impervious Runoff Depth>5.83"
Tc=6.0 min CN=98 Runoff=5.1 cfs 18,594 cf

Subcatchment ES-09: Runoff Area=13,991 sf 94.66% Impervious Runoff Depth>5.48"
Tc=6.0 min CN=95 Runoff=1.8 cfs 6,386 cf

Subcatchment ES-10: Runoff Area=13,089 sf 94.95% Impervious Runoff Depth>5.48"
Tc=6.0 min CN=95 Runoff=1.7 cfs 5,975 cf

Subcatchment ES-11: Runoff Area=954 sf 18.97% Impervious Runoff Depth>1.18"
Flow Length=43' Tc=6.1 min CN=50 Runoff=0.0 cfs 93 cf

Subcatchment ES-12: Runoff Area=13,078 sf 72.76% Impervious Runoff Depth>4.05"
Tc=6.0 min CN=82 Runoff=1.4 cfs 4,412 cf

Subcatchment ES-13: Runoff Area=14,936 sf 100.00% Impervious Runoff Depth>5.83"
Tc=6.0 min CN=98 Runoff=2.0 cfs 7,254 cf

Subcatchment ES-14: Runoff Area=212 sf 0.00% Impervious Runoff Depth>0.08"
Flow Length=35' Slope=0.0100 '/' Tc=13.1 min CN=30 Runoff=0.0 cfs 1 cf

Subcatchment PS-05: Runoff Area=51,896 sf 8.94% Impervious Runoff Depth>0.76"
Flow Length=184' Tc=9.1 min CN=44 Runoff=0.5 cfs 3,296 cf

Subcatchment PS-06: SS YARD Runoff Area=22,573 sf 0.00% Impervious Runoff Depth>5.59"
Tc=6.0 min CN=96 Runoff=3.0 cfs 10,522 cf

Subcatchment PS-07: PAVED YARD Runoff Area=67,663 sf 69.47% Impervious Runoff Depth>3.84"
Flow Length=221' Tc=8.3 min CN=80 Runoff=6.4 cfs 21,650 cf

Subcatchment PS-8: Runoff Area=27,499 sf 42.63% Impervious Runoff Depth>2.31"
Flow Length=214' Tc=10.1 min CN=64 Runoff=1.4 cfs 5,290 cf

Reach 1R: Avg. Flow Depth=0.16' Max Vel=4.16 fps Inflow=4.4 cfs 11,983 cf
n=0.050 L=73.7' S=0.2374 '/' Capacity=4,600.6 cfs Outflow=4.4 cfs 11,983 cf

Reach 2R: Avg. Flow Depth=0.28' Max Vel=2.26 fps Inflow=4.4 cfs 11,983 cf
n=0.050 L=109.0' S=0.0367 '/' Capacity=1,808.6 cfs Outflow=4.4 cfs 11,983 cf

Reach 3R: Avg. Flow Depth=0.18' Max Vel=3.65 fps Inflow=4.4 cfs 11,983 cf
n=0.050 L=42.8' S=0.1619 '/' Capacity=3,799.1 cfs Outflow=4.4 cfs 11,983 cf

Pond EP-1: CB1615 Peak Elev=428.10' Inflow=3.9 cfs 12,776 cf
12.0" Round Culvert n=0.012 L=154.1' S=0.0042 '/' Outflow=3.9 cfs 12,776 cf

Pond EP-10: CB1854 Peak Elev=428.38' Inflow=2.5 cfs 8,060 cf
12.0" Round Culvert n=0.012 L=90.7' S=0.0078 '/' Outflow=2.5 cfs 8,060 cf

Pond EP-11: CB1855 Peak Elev=428.27' Inflow=2.5 cfs 8,060 cf
12.0" Round Culvert n=0.012 L=130.4' S=0.0082 '/' Outflow=2.5 cfs 8,060 cf

Pond EP-12: CB1315 Peak Elev=370.17' Inflow=1.8 cfs 6,386 cf
12.0" Round Culvert n=0.012 L=105.0' S=0.0571 '/' Outflow=1.8 cfs 6,386 cf

Pond EP-13: EX. CB Peak Elev=369.92' Inflow=22.7 cfs 80,639 cf
12.0" Round Culvert n=0.012 L=266.7' S=0.0768 '/' Outflow=22.7 cfs 80,639 cf

Pond EP-2: CB1332 Peak Elev=427.61' Inflow=1.4 cfs 4,412 cf
8.0" Round Culvert n=0.012 L=7.9' S=0.2671 '/' Outflow=1.4 cfs 4,412 cf

Pond EP-3: DMH 1333 Peak Elev=427.46' Inflow=5.2 cfs 17,188 cf
10.0" Round Culvert n=0.012 L=89.0' S=0.0031 '/' Outflow=5.2 cfs 17,188 cf

Pond EP-4: CB1324 Peak Elev=424.92' Inflow=5.2 cfs 17,281 cf
10.0" Round Culvert n=0.012 L=109.1' S=0.0164 '/' Outflow=5.2 cfs 17,281 cf

Pond EP-5: CB2217 Peak Elev=419.93' Inflow=20.9 cfs 74,252 cf
12.0" Round Culvert n=0.012 L=160.3' S=0.0058 '/' Outflow=20.9 cfs 74,252 cf

Pond EP-6: CBB2017 Peak Elev=428.74' Inflow=14.0 cfs 50,996 cf
12.0" Round Culvert n=0.012 L=82.5' S=0.0342 '/' Outflow=14.0 cfs 50,996 cf

Pond EP-7: CBB2018 Peak Elev=432.73' Inflow=12.0 cfs 43,742 cf
12.0" Round Culvert n=0.012 L=96.2' S=0.0082 '/' Outflow=12.0 cfs 43,742 cf

Pond EP-8: CB2144 Peak Elev=435.87' Inflow=12.0 cfs 43,742 cf
12.0" Round Culvert n=0.012 L=110.3' S=0.0067 '/' Outflow=12.0 cfs 43,742 cf

Pond EP-9: CB2019 Peak Elev=436.39' Inflow=5.1 cfs 18,594 cf
12.0" Round Culvert n=0.012 L=142.0' S=0.0077 '/' Outflow=5.1 cfs 18,594 cf

Pond FB #1: FILT. BASIN #1 Peak Elev=285.81' Storage=14,045 cf Inflow=10.6 cfs 37,462 cf
Discarded=0.3 cfs 16,498 cf Primary=4.4 cfs 11,983 cf Outflow=4.8 cfs 28,480 cf

Pond YD #3: Peak Elev=286.73' Inflow=3.0 cfs 10,522 cf
12.0" Round Culvert n=0.012 L=137.0' S=0.0051 '/' Outflow=3.0 cfs 10,522 cf

Link POI-1: LOT 743Z-10-2 Inflow=0.0 cfs 468 cf
Primary=0.0 cfs 468 cf

Link POI-2: LOT 743Z-10-2 Inflow=23.0 cfs 95,917 cf
Primary=23.0 cfs 95,917 cf

Link POI-3: LOT 582Z-1
Primary=0.0 cfs 0 cf

Link POI-4: LOT 582Z-1
Primary=0.0 cfs 0 cf

Link POI-5: LOT 582Z-1
Primary=0.0 cfs 0 cf

Link POI-6: LOT 494Z-32 Inflow=0.0 cfs 1 cf
Primary=0.0 cfs 1 cf

Total Runoff Area = 377,156 sf Runoff Volume = 121,865 cf Average Runoff Depth = 3.88"
38.43% Pervious = 144,945 sf 61.57% Impervious = 232,211 sf

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ES-01: Runoff Area=14,738 sf 70.29% Impervious Runoff Depth>4.85"
Flow Length=144' Tc=8.0 min CN=80 Runoff=1.8 cfs 5,952 cf

Subcatchment ES-02: Runoff Area=32,767 sf 55.28% Impervious Runoff Depth>3.86"
Flow Length=174' Tc=7.2 min CN=71 Runoff=3.2 cfs 10,547 cf

Subcatchment ES-03: Runoff Area=13,698 sf 0.00% Impervious Runoff Depth>0.75"
Flow Length=116' Tc=12.0 min CN=38 Runoff=0.1 cfs 858 cf

Subcatchment ES-04A: Runoff Area=51,778 sf 100.00% Impervious Runoff Depth>6.93"
Tc=6.0 min CN=98 Runoff=8.2 cfs 29,887 cf

Subcatchment ES-04B: Runoff Area=38,284 sf 100.00% Impervious Runoff Depth>6.93"
Tc=6.0 min CN=98 Runoff=6.0 cfs 22,098 cf

Subcatchment ES-09: Runoff Area=13,991 sf 94.66% Impervious Runoff Depth>6.57"
Tc=6.0 min CN=95 Runoff=2.2 cfs 7,661 cf

Subcatchment ES-10: Runoff Area=13,089 sf 94.95% Impervious Runoff Depth>6.57"
Tc=6.0 min CN=95 Runoff=2.0 cfs 7,167 cf

Subcatchment ES-11: Runoff Area=954 sf 18.97% Impervious Runoff Depth>1.76"
Flow Length=43' Tc=6.1 min CN=50 Runoff=0.0 cfs 140 cf

Subcatchment ES-12: Runoff Area=13,078 sf 72.76% Impervious Runoff Depth>5.07"
Tc=6.0 min CN=82 Runoff=1.7 cfs 5,527 cf

Subcatchment ES-13: Runoff Area=14,936 sf 100.00% Impervious Runoff Depth>6.93"
Tc=6.0 min CN=98 Runoff=2.4 cfs 8,621 cf

Subcatchment ES-14: Runoff Area=212 sf 0.00% Impervious Runoff Depth>0.24"
Flow Length=35' Slope=0.0100 '/' Tc=13.1 min CN=30 Runoff=0.0 cfs 4 cf

Subcatchment PS-05: Runoff Area=51,896 sf 8.94% Impervious Runoff Depth>1.23"
Flow Length=184' Tc=9.1 min CN=44 Runoff=1.1 cfs 5,316 cf

Subcatchment PS-06: SS YARD Runoff Area=22,573 sf 0.00% Impervious Runoff Depth>6.69"
Tc=6.0 min CN=96 Runoff=3.5 cfs 12,583 cf

Subcatchment PS-07: PAVED YARD Runoff Area=67,663 sf 69.47% Impervious Runoff Depth>4.85"
Flow Length=221' Tc=8.3 min CN=80 Runoff=8.0 cfs 27,323 cf

Subcatchment PS-8: Runoff Area=27,499 sf 42.63% Impervious Runoff Depth>3.13"
Flow Length=214' Tc=10.1 min CN=64 Runoff=2.0 cfs 7,161 cf

Reach 1R: Avg. Flow Depth=0.25' Max Vel=5.23 fps Inflow=8.6 cfs 20,100 cf
n=0.050 L=73.7' S=0.2374 '/' Capacity=4,600.6 cfs Outflow=8.7 cfs 20,100 cf

Reach 2R: Avg. Flow Depth=0.43' Max Vel=2.84 fps Inflow=8.7 cfs 20,100 cf
n=0.050 L=109.0' S=0.0367 '/' Capacity=1,808.6 cfs Outflow=9.0 cfs 20,100 cf

Reach 3R: Avg. Flow Depth=0.28' Max Vel=4.67 fps Inflow=9.0 cfs 20,100 cf
n=0.050 L=42.8' S=0.1619 '/' Capacity=3,799.1 cfs Outflow=9.1 cfs 20,100 cf

Pond EP-1: CB1615 Peak Elev=507.06' Inflow=5.0 cfs 16,498 cf
12.0" Round Culvert n=0.012 L=154.1' S=0.0042 '/' Outflow=5.0 cfs 16,498 cf

Pond EP-10: CB1854 Peak Elev=507.52' Inflow=3.2 cfs 10,547 cf
12.0" Round Culvert n=0.012 L=90.7' S=0.0078 '/' Outflow=3.2 cfs 10,547 cf

Pond EP-11: CB1855 Peak Elev=507.34' Inflow=3.2 cfs 10,547 cf
12.0" Round Culvert n=0.012 L=130.4' S=0.0082 '/' Outflow=3.2 cfs 10,547 cf

Pond EP-12: CB1315 Peak Elev=421.21' Inflow=2.2 cfs 7,661 cf
12.0" Round Culvert n=0.012 L=105.0' S=0.0571 '/' Outflow=2.2 cfs 7,661 cf

Pond EP-13: EX. CB Peak Elev=420.87' Inflow=27.4 cfs 97,601 cf
12.0" Round Culvert n=0.012 L=266.7' S=0.0768 '/' Outflow=27.4 cfs 97,601 cf

Pond EP-2: CB1332 Peak Elev=506.25' Inflow=1.7 cfs 5,527 cf
8.0" Round Culvert n=0.012 L=7.9' S=0.2671 '/' Outflow=1.7 cfs 5,527 cf

Pond EP-3: DMH 1333 Peak Elev=506.03' Inflow=6.7 cfs 22,026 cf
10.0" Round Culvert n=0.012 L=89.0' S=0.0031 '/' Outflow=6.7 cfs 22,026 cf

Pond EP-4: CB1324 Peak Elev=501.95' Inflow=6.7 cfs 22,166 cf
10.0" Round Culvert n=0.012 L=109.1' S=0.0164 '/' Outflow=6.7 cfs 22,166 cf

Pond EP-5: CB2217 Peak Elev=493.87' Inflow=25.2 cfs 89,940 cf
12.0" Round Culvert n=0.012 L=160.3' S=0.0058 '/' Outflow=25.2 cfs 89,940 cf

Pond EP-6: CBB2017 Peak Elev=506.18' Inflow=16.6 cfs 60,607 cf
12.0" Round Culvert n=0.012 L=82.5' S=0.0342 '/' Outflow=16.6 cfs 60,607 cf

Pond EP-7: CBB2018 Peak Elev=511.75' Inflow=14.2 cfs 51,985 cf
12.0" Round Culvert n=0.012 L=96.2' S=0.0082 '/' Outflow=14.2 cfs 51,985 cf

Pond EP-8: CB2144 Peak Elev=516.13' Inflow=14.2 cfs 51,985 cf
12.0" Round Culvert n=0.012 L=110.3' S=0.0067 '/' Outflow=14.2 cfs 51,985 cf

Pond EP-9: CB2019 Peak Elev=516.85' Inflow=6.0 cfs 22,098 cf
12.0" Round Culvert n=0.012 L=142.0' S=0.0077 '/' Outflow=6.0 cfs 22,098 cf

Pond FB #1: FILT. BASIN #1 Peak Elev=285.96' Storage=15,043 cf Inflow=13.2 cfs 47,067 cf
Discarded=0.3 cfs 17,106 cf Primary=8.6 cfs 20,100 cf Outflow=8.9 cfs 37,207 cf

Pond YD #3: Peak Elev=287.22' Inflow=3.5 cfs 12,583 cf
12.0" Round Culvert n=0.012 L=137.0' S=0.0051 '/' Outflow=3.5 cfs 12,583 cf

Link POI-1: LOT 743Z-10-2 Inflow=0.1 cfs 858 cf
Primary=0.1 cfs 858 cf

Link POI-2: LOT 743Z-10-2 Inflow=28.7 cfs 123,017 cf
Primary=28.7 cfs 123,017 cf

Link POI-3: LOT 582Z-1
Primary=0.0 cfs 0 cf

Link POI-4: LOT 582Z-1
Primary=0.0 cfs 0 cf

Link POI-5: LOT 582Z-1
Primary=0.0 cfs 0 cf

Link POI-6: LOT 494Z-32 Inflow=0.0 cfs 4 cf
Primary=0.0 cfs 4 cf

Total Runoff Area = 377,156 sf Runoff Volume = 150,845 cf Average Runoff Depth = 4.80"
38.43% Pervious = 144,945 sf 61.57% Impervious = 232,211 sf

Summary for Subcatchment ES-01:

Runoff = 0.8 cfs @ 12.12 hrs, Volume= 2,626 cf, Depth> 2.14"
Routed to Pond EP-1 : CB1615

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
176	30	Woods, Good, HSG A
4,203	39	>75% Grass cover, Good, HSG A
10,359	98	Paved parking, HSG A
14,738	80	Weighted Average
4,379		29.71% Pervious Area
10,359		70.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	5	0.0200	0.04		**Sheet Flow, WOODS** Woods: Light underbrush n= 0.400 P2= 2.81"
5.2	59	0.0400	0.19		**Sheet Flow, GRASS** Grass: Short n= 0.150 P2= 2.81"
0.7	80	0.0100	2.03		**Shallow Concentrated Flow, PAVED** Paved Kv= 20.3 fps
8.0	144	Total			

Summary for Subcatchment ES-02:

Runoff = 1.2 cfs @ 12.11 hrs, Volume= 4,027 cf, Depth> 1.47"
Routed to Pond EP-10 : CB1854

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
3,178	30	Woods, Good, HSG A
11,475	39	>75% Grass cover, Good, HSG A
18,114	98	Paved parking, HSG A
32,767	71	Weighted Average
14,653		44.72% Pervious Area
18,114		55.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	14	0.0400	0.06		**Sheet Flow, WOODS** Woods: Light underbrush n= 0.400 P2= 2.81"
2.5	26	0.0500	0.18		**Sheet Flow, GRASS** Grass: Short n= 0.150 P2= 2.81"
1.1	134	0.0100	2.03		**Shallow Concentrated Flow, PAVED** Paved Kv= 20.3 fps
7.2	174	Total			

Summary for Subcatchment ES-03:

Runoff = 0.0 cfs @ 15.75 hrs, Volume= 48 cf, Depth> 0.04"
Routed to Link POI-1 : LOT 743Z-10-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
2,117	30	Woods, Good, HSG A
11,581	39	>75% Grass cover, Good, HSG A
13,698	38	Weighted Average
13,698		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	45	0.0400	0.08		**Sheet Flow, WOODS** Woods: Light underbrush n= 0.400 P2= 2.81"
2.4	22	0.0400	0.16		**Sheet Flow, GRASS** Grass: Short n= 0.150 P2= 2.81"
0.4	49	0.0800	1.98		**Shallow Concentrated Flow, GRASS** Short Grass Pasture Kv= 7.0 fps
12.0	116	Total			

Summary for Subcatchment ES-04A:

Runoff = 4.7 cfs @ 12.09 hrs, Volume= 16,752 cf, Depth> 3.88"
Routed to Pond EP-8 : CB2144

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
46,882	98	Paved parking, HSG A
4,896	98	Roofs, HSG A
51,778	98	Weighted Average
51,778		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 4A**

Summary for Subcatchment ES-04B:

Runoff = 3.5 cfs @ 12.09 hrs, Volume= 12,386 cf, Depth> 3.88"
Routed to Pond EP-9 : CB2019

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
38,284	98	Roofs, HSG A
38,284		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, ROOF**

Summary for Subcatchment ES-09:

Runoff = 1.2 cfs @ 12.09 hrs, Volume= 4,136 cf, Depth> 3.55"
Routed to Pond EP-12 : CB1315

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
747	39	>75% Grass cover, Good, HSG A
13,244	98	Paved parking, HSG A
13,991	95	Weighted Average
747		5.34% Pervious Area
13,244		94.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 9A**

Summary for Subcatchment ES-10:

Runoff = 1.1 cfs @ 12.09 hrs, Volume= 3,869 cf, Depth> 3.55"
Routed to Pond EP-5 : CB2217

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
12,428	98	Paved parking, HSG A
661	39	>75% Grass cover, Good, HSG A
13,089	95	Weighted Average
661		5.05% Pervious Area
12,428		94.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 10A**

Summary for Subcatchment ES-11:

Runoff = 0.0 cfs @ 12.30 hrs, Volume= 29 cf, Depth> 0.37"
Routed to Pond EP-4 : CB1324

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
181	98	Paved parking, HSG A
773	39	>75% Grass cover, Good, HSG A
954	50	Weighted Average
773		81.03% Pervious Area
181		18.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	30	0.0100	0.09		**Sheet Flow, GRASS** Grass: Short n= 0.150 P2= 2.81"
0.3	10	0.0100	0.62		**Sheet Flow, GRAVEL** Smooth surfaces n= 0.011 P2= 2.81"
0.5	3	0.0400	0.10		**Sheet Flow, GRASS** Grass: Short n= 0.150 P2= 2.81"
6.1	43	Total			

Summary for Subcatchment ES-12:

Runoff = 0.8 cfs @ 12.09 hrs, Volume= 2,511 cf, Depth> 2.30"
Routed to Pond EP-2 : CB1332

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
9,515	98	Paved parking, HSG A
3,563	39	>75% Grass cover, Good, HSG A
13,078	82	Weighted Average
3,563		27.24% Pervious Area
9,515		72.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 12A**

Summary for Subcatchment ES-13:

Runoff = 1.3 cfs @ 12.09 hrs, Volume= 4,832 cf, Depth> 3.88"
Routed to Pond EP-6 : CBB2017

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
14,936	98	Paved parking, HSG A
14,936		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 13A**

Summary for Subcatchment ES-14:

[45] Hint: Runoff=Zero

Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"
Routed to Link POI-6 : LOT 494Z-32

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
212	30	Woods, Good, HSG A
212		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	35	0.0100	0.04		**Sheet Flow, WOODS** Woods: Light underbrush n= 0.400 P2= 2.81"

Summary for Subcatchment PS-05:

Runoff = 0.0 cfs @ 12.51 hrs, Volume= 746 cf, Depth> 0.17"
Routed to Link POI-2 : LOT 743Z-10-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
1,333	96	Gravel surface, HSG A
4,641	98	Paved parking, HSG A
36,715	39	>75% Grass cover, Good, HSG A
9,207	30	Woods, Good, HSG A
51,896	44	Weighted Average
47,255		91.06% Pervious Area
4,641		8.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	93	0.2700	0.20		**Sheet Flow, WOODS** Woods: Light underbrush n= 0.400 P2= 2.81"
0.8	7	0.0700	0.15		**Sheet Flow, GRASS** Grass: Short n= 0.150 P2= 2.81"
0.7	84	0.0900	2.10		**Shallow Concentrated Flow, GRASS** Short Grass Pasture Kv= 7.0 fps
9.1	184	Total			

Summary for Subcatchment PS-06: SS YARD

Runoff = 2.0 cfs @ 12.09 hrs, Volume= 6,878 cf, Depth> 3.66"
Routed to Pond YD #3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
22,573	96	Gravel surface, HSG A
22,573		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Calc'd Tc<6 Mins**

Summary for Subcatchment PS-07: PAVED YARD

Runoff = 3.5 cfs @ 12.12 hrs, Volume= 12,056 cf, Depth> 2.14"
Routed to Pond FB #1 : FILT. BASIN #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
20,656	39	>75% Grass cover, Good, HSG A
47,007	98	Paved parking, HSG A
67,663	80	Weighted Average
20,656		30.53% Pervious Area
47,007		69.47% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	16	0.0100	0.08		**Sheet Flow, GRASS** Grass: Short n= 0.150 P2= 2.81"
1.1	60	0.0100	0.88		**Sheet Flow, PAVED** Smooth surfaces n= 0.011 P2= 2.81"
2.8	24	0.0300	0.14		**Sheet Flow, GRASS** Grass: Short n= 0.150 P2= 2.81"
0.1	11	0.0700	1.85		**Shallow Concentrated Flow, GRASS** Short Grass Pasture Kv= 7.0 fps
1.0	100	0.0100	1.61		**Shallow Concentrated Flow, GRAVEL** Unpaved Kv= 16.1 fps
0.1	10	0.1500	2.71		**Shallow Concentrated Flow, GRASS** Short Grass Pasture Kv= 7.0 fps
8.3	221	Total			

Summary for Subcatchment PS-8:

Runoff = 0.6 cfs @ 12.16 hrs, Volume= 2,379 cf, Depth> 1.04"
Routed to Pond FB #1 : FILT. BASIN #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.12"

Area (sf)	CN	Description
2,000	98	Roofs, HSG A
15,775	39	>75% Grass cover, Good, HSG A
9,724	98	Paved parking, HSG A
27,499	64	Weighted Average
15,775		57.37% Pervious Area
11,724		42.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	43	0.0100	0.10		**Sheet Flow, GRASS** Grass: Short n= 0.150 P2= 2.81"
0.4	22	0.0200	0.95		**Sheet Flow, PAVED** Smooth surfaces n= 0.011 P2= 2.81"
1.8	25	0.1000	0.23		**Sheet Flow, GRASS** Grass: Short n= 0.150 P2= 2.81"
0.1	10	0.0500	1.17		**Sheet Flow, GRAVEL** Smooth surfaces n= 0.011 P2= 2.81"
0.6	80	0.0200	2.28		**Shallow Concentrated Flow, GRAVEL** Unpaved Kv= 16.1 fps
0.2	34	0.1500	2.71		**Shallow Concentrated Flow, GRASS** Short Grass Pasture Kv= 7.0 fps
10.1	214	Total			

Summary for Reach 1R:

Inflow Area = 117,735 sf, 49.88% Impervious, Inflow Depth = 0.00" for 10-yr event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach 2R :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 6.00' Flow Area= 144.0 sf, Capacity= 4,600.6 cfs

6.00' x 6.00' deep channel, n= 0.050 Scattered brush, heavy weeds
Side Slope Z-value= 3.0 '/' Top Width= 42.00'
Length= 73.7' Slope= 0.2374 '/'
Inlet Invert= 285.50', Outlet Invert= 268.00'

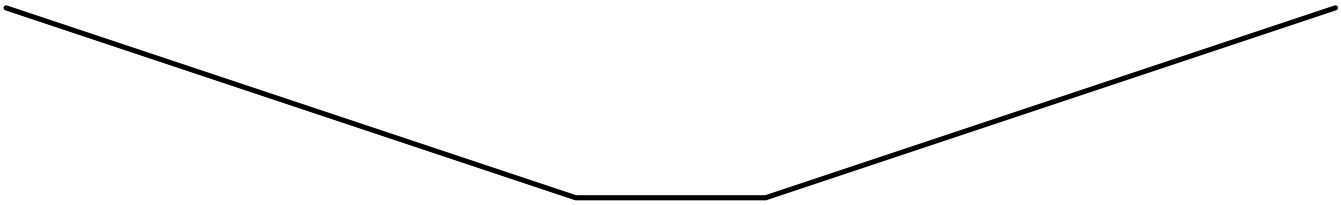
Summary for Reach 2R:

Inflow Area = 117,735 sf, 49.88% Impervious, Inflow Depth = 0.00" for 10-yr event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach 3R :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 6.00' Flow Area= 144.0 sf, Capacity= 1,808.6 cfs

6.00' x 6.00' deep channel, n= 0.050 Scattered brush, heavy weeds
Side Slope Z-value= 3.0 '/' Top Width= 42.00'
Length= 109.0' Slope= 0.0367 '/'
Inlet Invert= 268.00', Outlet Invert= 264.00'



Summary for Reach 3R:

Inflow Area = 117,735 sf, 49.88% Impervious, Inflow Depth = 0.00" for 10-yr event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Routed to Link POI-2 : LOT 743Z-10-2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 6.00' Flow Area= 144.0 sf, Capacity= 3,799.1 cfs

6.00' x 6.00' deep channel, n= 0.050 Scattered brush, heavy weeds
Side Slope Z-value= 3.0 '/' Top Width= 42.00'
Length= 42.8' Slope= 0.1619 '/'
Inlet Invert= 264.00', Outlet Invert= 257.07'

Summary for Pond EP-1: CB1615

[58] Hint: Peaked 34.56' above defined flood level
[80] Warning: Exceeded Pond EP-11 by 15.23' @ 12.25 hrs (11.0 cfs 5,671 cf)

Inflow Area = 47,505 sf, 59.94% Impervious, Inflow Depth > 1.68" for 10-yr event
Inflow = 2.0 cfs @ 12.11 hrs, Volume= 6,653 cf
Outflow = 2.0 cfs @ 12.11 hrs, Volume= 6,653 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.0 cfs @ 12.11 hrs, Volume= 6,653 cf
Routed to Pond EP-3 : DMH 1333

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 325.37' @ 12.27 hrs
Flood Elev= 290.81'

Device	Routing	Invert	Outlet Devices
#1	Primary	285.02'	**12.0" Round 12" RCP**
			L= 154.1' RCP, square edge headwall, Ke= 0.500

Inlet / Outlet Invert= 285.02' / 284.37' S= 0.0042 '/' Cc= 0.900
n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 12.11 hrs HW=289.73' TW=298.29' (Dynamic Tailwater)
1=12" RCP (Controls 0.0 cfs)

Summary for Pond EP-10: CB1854

[58] Hint: Peaked 34.77' above defined flood level

Inflow Area = 32,767 sf, 55.28% Impervious, Inflow Depth > 1.47" for 10-yr event
Inflow = 1.2 cfs @ 12.11 hrs, Volume= 4,027 cf
Outflow = 1.2 cfs @ 12.11 hrs, Volume= 4,027 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.2 cfs @ 12.11 hrs, Volume= 4,027 cf
Routed to Pond EP-11 : CB1855

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 325.45' @ 12.37 hrs
Flood Elev= 290.68'

Device	Routing	Invert	Outlet Devices
#1	Primary	287.43'	**12.0" Round 12" RCP**
			L= 90.7' RCP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 287.43' / 286.72' S= 0.0078 '/' Cc= 0.900
			n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=1.1 cfs @ 12.11 hrs HW=288.00' TW=287.18' (Dynamic Tailwater)
1=12" RCP (Outlet Controls 1.1 cfs @ 3.51 fps)

Summary for Pond EP-11: CB1855

[58] Hint: Peaked 34.86' above defined flood level
[80] Warning: Exceeded Pond EP-10 by 15.24' @ 12.30 hrs (12.4 cfs 5,860 cf)

Inflow Area = 32,767 sf, 55.28% Impervious, Inflow Depth > 1.47" for 10-yr event
Inflow = 1.2 cfs @ 12.11 hrs, Volume= 4,027 cf
Outflow = 1.2 cfs @ 12.11 hrs, Volume= 4,027 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.2 cfs @ 12.11 hrs, Volume= 4,027 cf
Routed to Pond EP-1 : CB1615

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 325.42' @ 12.32 hrs
Flood Elev= 290.56'

Device	Routing	Invert	Outlet Devices
#1	Primary	286.37'	**12.0" Round 12" RCP**
			L= 130.4' RCP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 286.37' / 285.30' S= 0.0082 '/' Cc= 0.900
			n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 12.11 hrs HW=287.18' TW=289.51' (Dynamic Tailwater)
1=12" RCP (Controls 0.0 cfs)

Summary for Pond EP-12: CB1315

[58] Hint: Peaked 13.26' above defined flood level

Inflow Area = 13,991 sf, 94.66% Impervious, Inflow Depth > 3.55" for 10-yr event
Inflow = 1.2 cfs @ 12.09 hrs, Volume= 4,136 cf
Outflow = 1.2 cfs @ 12.09 hrs, Volume= 4,136 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.2 cfs @ 12.09 hrs, Volume= 4,136 cf
Routed to Pond EP-13 : EX. CB

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 303.79' @ 12.14 hrs
Flood Elev= 290.53'

Device	Routing	Invert	Outlet Devices
#1	Primary	285.21'	**12.0" Round 12" RCP** L= 105.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 285.21' / 279.21' S= 0.0571 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 12.09 hrs HW=293.36' TW=301.41' (Dynamic Tailwater)
1=12" RCP (Controls 0.0 cfs)

Summary for Pond EP-13: EX. CB

[58] Hint: Peaked 17.50' above defined flood level
[80] Warning: Exceeded Pond EP-12 by 10.05' @ 12.05 hrs (9.6 cfs 3,216 cf)

Inflow Area = 193,615 sf, 87.20% Impervious, Inflow Depth > 3.17" for 10-yr event
Inflow = 14.5 cfs @ 12.09 hrs, Volume= 51,169 cf
Outflow = 14.5 cfs @ 12.09 hrs, Volume= 51,169 cf, Atten= 0%, Lag= 0.0 min
Primary = 14.5 cfs @ 12.09 hrs, Volume= 51,169 cf
Routed to Link POI-2 : LOT 743Z-10-2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 303.68' @ 12.09 hrs
Flood Elev= 286.18'

Device	Routing	Invert	Outlet Devices
#1	Primary	277.49'	**12.0" Round 12" RCP** L= 266.7' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 277.49' / 257.00' S= 0.0768 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=14.2 cfs @ 12.09 hrs HW=301.92' TW=0.00' (Dynamic Tailwater)
1=12" RCP (Barrel Controls 14.2 cfs @ 18.10 fps)

Summary for Pond EP-2: CB1332

[58] Hint: Peaked 34.22' above defined flood level

Inflow Area = 13,078 sf, 72.76% Impervious, Inflow Depth > 2.30" for 10-yr event
Inflow = 0.8 cfs @ 12.09 hrs, Volume= 2,511 cf
Outflow = 0.8 cfs @ 12.09 hrs, Volume= 2,511 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.8 cfs @ 12.09 hrs, Volume= 2,511 cf
Routed to Pond EP-3 : DMH 1333

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 325.24' @ 12.27 hrs
Flood Elev= 291.02'

Device	Routing	Invert	Outlet Devices
#1	Primary	286.48'	**8.0" Round 8" RCP** L= 7.9' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 286.48' / 284.37' S= 0.2671 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.35 sf

Primary OutFlow Max=0.0 cfs @ 12.09 hrs HW=287.38' TW=293.25' (Dynamic Tailwater)
↑—**1=8" RCP** (Controls 0.0 cfs)

Summary for Pond EP-3: DMH 1333

[58] Hint: Peaked 33.92' above defined flood level
[80] Warning: Exceeded Pond EP-1 by 15.08' @ 12.20 hrs (10.3 cfs 5,428 cf)
[80] Warning: Exceeded Pond EP-2 by 15.31' @ 12.20 hrs (6.6 cfs 3,255 cf)

Inflow Area = 60,583 sf, 62.70% Impervious, Inflow Depth > 1.82" for 10-yr event
Inflow = 2.8 cfs @ 12.11 hrs, Volume= 9,164 cf
Outflow = 2.8 cfs @ 12.11 hrs, Volume= 9,164 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.8 cfs @ 12.11 hrs, Volume= 9,164 cf
Routed to Pond EP-4 : CB1324

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 325.19' @ 12.22 hrs
Flood Elev= 291.27'

Device	Routing	Invert	Outlet Devices
#1	Primary	283.33'	**10.0" Round 10" RCP** L= 89.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 283.33' / 283.05' S= 0.0031 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.55 sf

Primary OutFlow Max=0.0 cfs @ 12.11 hrs HW=296.46' TW=309.52' (Dynamic Tailwater)
↑—**1=10" RCP** (Controls 0.0 cfs)

Summary for Pond EP-4: CB1324

[58] Hint: Peaked 32.85' above defined flood level
[80] Warning: Exceeded Pond EP-3 by 14.48' @ 12.15 hrs (7.8 cfs 4,179 cf)

Inflow Area = 61,537 sf, 62.03% Impervious, Inflow Depth > 1.79" for 10-yr event
Inflow = 2.8 cfs @ 12.11 hrs, Volume= 9,193 cf
Outflow = 2.8 cfs @ 12.11 hrs, Volume= 9,193 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.8 cfs @ 12.11 hrs, Volume= 9,193 cf
Routed to Pond EP-5 : CB2217

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 324.42' @ 12.17 hrs
Flood Elev= 291.57'

Device	Routing	Invert	Outlet Devices
#1	Primary	283.03'	**10.0" Round 10" RCP** L= 109.1' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 283.03' / 281.24' S= 0.0164 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.55 sf

Primary OutFlow Max=0.0 cfs @ 12.11 hrs HW=309.54' TW=321.16' (Dynamic Tailwater)
1=10" RCP (Controls 0.0 cfs)

Summary for Pond EP-5: CB2217

[58] Hint: Peaked 31.91' above defined flood level
[80] Warning: Exceeded Pond EP-4 by 14.26' @ 12.10 hrs (7.2 cfs 3,886 cf)
[80] Warning: Exceeded Pond EP-6 by 8.13' @ 12.10 hrs (9.3 cfs 4,071 cf)

Inflow Area = 179,624 sf, 86.62% Impervious, Inflow Depth > 3.14" for 10-yr event
Inflow = 13.3 cfs @ 12.09 hrs, Volume= 47,033 cf
Outflow = 13.3 cfs @ 12.09 hrs, Volume= 47,033 cf, Atten= 0%, Lag= 0.0 min
Primary = 13.3 cfs @ 12.09 hrs, Volume= 47,033 cf
Routed to Pond EP-13 : EX. CB

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 322.98' @ 12.12 hrs
Flood Elev= 291.07'

Device	Routing	Invert	Outlet Devices
#1	Primary	280.14'	**12.0" Round 12" RCP** L= 160.3' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 280.14' / 279.21' S= 0.0058 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=10.6 cfs @ 12.09 hrs HW=318.40' TW=301.97' (Dynamic Tailwater)
1=12" RCP (Outlet Controls 10.6 cfs @ 13.52 fps)

Summary for Pond EP-6: CBB2017

[58] Hint: Peaked 36.11' above defined flood level
[80] Warning: Exceeded Pond EP-7 by 9.10' @ 12.15 hrs (9.4 cfs 4,632 cf)

Inflow Area = 104,998 sf,100.00% Impervious, Inflow Depth > 3.88" for 10-yr event
Inflow = 9.5 cfs @ 12.09 hrs, Volume= 33,971 cf
Outflow = 9.5 cfs @ 12.09 hrs, Volume= 33,971 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.5 cfs @ 12.09 hrs, Volume= 33,971 cf
Routed to Pond EP-5 : CB2217

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 327.12' @ 12.16 hrs
Flood Elev= 291.01'

Device	Routing	Invert	Outlet Devices
#1	Primary	283.79'	**12.0" Round 12" RCP** L= 82.5' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 283.79' / 280.97' S= 0.0342 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 12.09 hrs HW=309.18' TW=316.93' (Dynamic Tailwater)
1=12" RCP (Controls 0.0 cfs)

Summary for Pond EP-7: CBB2018

[58] Hint: Peaked 38.03' above defined flood level
[80] Warning: Exceeded Pond EP-8 by 8.89' @ 12.20 hrs (8.9 cfs 4,034 cf)

Inflow Area = 90,062 sf,100.00% Impervious, Inflow Depth > 3.88" for 10-yr event
Inflow = 8.1 cfs @ 12.09 hrs, Volume= 29,138 cf
Outflow = 8.1 cfs @ 12.09 hrs, Volume= 29,138 cf, Atten= 0%, Lag= 0.0 min
Primary = 8.1 cfs @ 12.09 hrs, Volume= 29,138 cf
Routed to Pond EP-6 : CBB2017

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 329.03' @ 12.21 hrs
Flood Elev= 291.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	284.96'	**12.0" Round 12" RCP** L= 96.2' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 284.96' / 284.17' S= 0.0082 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 12.09 hrs HW=302.19' TW=309.18' (Dynamic Tailwater)
1=12" RCP (Controls 0.0 cfs)

Summary for Pond EP-8: CB2144

[58] Hint: Peaked 39.58' above defined flood level
[80] Warning: Exceeded Pond EP-9 by 10.16' @ 12.25 hrs (8.7 cfs 7,056 cf)

Inflow Area = 90,062 sf,100.00% Impervious, Inflow Depth > 3.88" for 10-yr event
Inflow = 8.1 cfs @ 12.09 hrs, Volume= 29,138 cf
Outflow = 8.1 cfs @ 12.09 hrs, Volume= 29,138 cf, Atten= 0%, Lag= 0.0 min
Primary = 8.1 cfs @ 12.09 hrs, Volume= 29,138 cf
Routed to Pond EP-7 : CBB2018

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 330.53' @ 12.26 hrs
Flood Elev= 290.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	285.93'	**12.0" Round 12" RCP** L= 110.3' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 285.93' / 285.19' S= 0.0067 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 12.09 hrs HW=300.15' TW=302.19' (Dynamic Tailwater)
1=12" RCP (Controls 0.0 cfs)

Summary for Pond EP-9: CB2019

[58] Hint: Peaked 40.36' above defined flood level

Inflow Area = 38,284 sf,100.00% Impervious, Inflow Depth > 3.88" for 10-yr event
Inflow = 3.5 cfs @ 12.09 hrs, Volume= 12,386 cf
Outflow = 3.5 cfs @ 12.09 hrs, Volume= 12,386 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.5 cfs @ 12.09 hrs, Volume= 12,386 cf
Routed to Pond EP-8 : CB2144

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 330.77' @ 12.31 hrs
Flood Elev= 290.41'

Device	Routing	Invert	Outlet Devices
#1	Primary	287.33'	**12.0" Round 12" RCP** L= 142.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 287.33' / 286.24' S= 0.0077 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 12.09 hrs HW=295.21' TW=300.15' (Dynamic Tailwater)
1=12" RCP (Controls 0.0 cfs)

Summary for Pond FB #1: FILT. BASIN #1

Inflow Area = 117,735 sf, 49.88% Impervious, Inflow Depth > 2.17" for 10-yr event
Inflow = 6.0 cfs @ 12.11 hrs, Volume= 21,313 cf
Outflow = 0.3 cfs @ 15.17 hrs, Volume= 14,712 cf, Atten= 95%, Lag= 183.8 min
Discarded = 0.3 cfs @ 15.17 hrs, Volume= 14,712 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Reach 1R :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 285.39' @ 15.17 hrs Surf.Area= 6,091 sf Storage= 11,403 cf
Flood Elev= 286.00' Surf.Area= 6,672 sf Storage= 15,278 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 191.1 min (1,007.2 - 816.1)

Volume	Invert	Avail.Storage	Storage Description
#1	282.00'	0 cf	**FOREBAY #1 (0% VOIDS) (Prismatic)** Listed below (Recalc) -Impervious 511 cf Overall x 0.0% Voids
#2	283.00'	0 cf	**FOREBAY #2 (0% VOIDS) (Prismatic)** Listed below (Recalc) -Impervious 1,031 cf Overall x 0.0% Voids
#3	282.00'	15,278 cf	**FILTRATION BASIN #1 (18" FILTER MEDIA) (Prismatic)** Listed below (Rec
		15,278 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
282.00	92	0	0
283.00	241	167	167
284.00	448	345	511

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
283.00	253	0	0
284.00	501	377	377
285.00	806	654	1,031

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
282.00	2,685	0.0	0	0
282.75	2,685	40.0	806	806
283.50	2,685	100.0	2,014	2,819
284.00	3,648	100.0	1,583	4,403
285.00	5,715	100.0	4,682	9,084
286.00	6,672	100.0	6,194	15,278

Device	Routing	Invert	Outlet Devices
#1	Primary	285.50'	**12.0' long x 9.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.46 2.55 2.70 2.69 2.68 2.68 2.67 2.64 2.64 2.64 2.65 2.64 2.65 2.65 2.66 2.67 2.69

#2 Discarded 282.00' **2.250 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.3 cfs @ 15.17 hrs HW=285.39' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.3 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=282.00' TW=285.50' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

Summary for Pond YD #3:

Inflow Area = 22,573 sf, 0.00% Impervious, Inflow Depth > 3.66" for 10-yr event
Inflow = 2.0 cfs @ 12.09 hrs, Volume= 6,878 cf
Outflow = 2.0 cfs @ 12.09 hrs, Volume= 6,878 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.0 cfs @ 12.09 hrs, Volume= 6,878 cf
Routed to Pond FB #1 : FILT. BASIN #1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 286.18' @ 12.09 hrs
Flood Elev= 291.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	285.30'	**12.0" Round 12" HDPE CULVERT** L= 137.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 285.30' / 284.60' S= 0.0051 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.9 cfs @ 12.09 hrs HW=286.16' TW=283.95' (Dynamic Tailwater)
1=12" HDPE CULVERT (Barrel Controls 1.9 cfs @ 3.60 fps)

Summary for Link POI-1: LOT 743Z-10-2

Inflow Area = 13,698 sf, 0.00% Impervious, Inflow Depth > 0.04" for 10-yr event
Inflow = 0.0 cfs @ 15.75 hrs, Volume= 48 cf
Primary = 0.0 cfs @ 15.75 hrs, Volume= 48 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link POI-2: LOT 743Z-10-2

Inflow Area = 363,246 sf, 63.93% Impervious, Inflow Depth > 1.72" for 10-yr event
Inflow = 14.5 cfs @ 12.09 hrs, Volume= 51,915 cf
Primary = 14.5 cfs @ 12.09 hrs, Volume= 51,915 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link POI-3: LOT 582Z-1

[43] Hint: Has no inflow (Outflow=Zero)

Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link POI-4: LOT 582Z-1

[43] Hint: Has no inflow (Outflow=Zero)

Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link POI-5: LOT 582Z-1

[43] Hint: Has no inflow (Outflow=Zero)

Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link POI-6: LOT 494Z-32

Inflow Area = 212 sf, 0.00% Impervious, Inflow Depth = 0.00" for 10-yr event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

PART 6

RIPRAP CALCULATIONS

Unitil West Concord Substation Relocation
1-7 McGuire Street
Concord, NH 03301
DATE: August 20, 2025
Project No.: 96159-01

OUTLET	Do (ft.)	Q25 (cfs)	Tw (ft.)	La (ft.)	Wup (ft.)	Wdn (ft.)	d50 (in.)*
FES #1 (Into FB #2)	1.00	2.5	1.1	14.5	3.0	8.8	6.0
Paved Flume (Into FB #1)	4.00	5.0	0.2	29.1	12.0	41.1	6.0
Filtration Basin #1 Weir	12.00	0.0	0.0	84.0	36.0	120.0	6.0

*Note:6"min.

Notes:

1 Use NHDOT Class C Stone
2 Depth of Stone to be 12" min. or 1.5 times d50 - which ever is larger
3 Actual riprap dimensions may vary from calculations. See Plans.

Calculations

1. 'When Tw < 0.5Do at pipe outlet:
La = 1.8Q/Do^3/2 + 7Do
Wup = 3Do
Wdn = 3Do + La
d50 = (0.02Q^4/3)/(TwDo)

2. When Tw > or = 0.5Do at pipe outlet:
La = 3Q/Do^3/2 + 7Do
Wup = 3Do
Wdn = 3Do + 0.4La
d50 = (0.02Q^4/3)/(TwDo)

Where:
Tw is the tailwater depth at the outlet of the pipe or channel
Do is the diameter of the pipe or the width of channel
Q is the discharge from the pipe of channel
La is the length of apron
Wup is the upstream width of apron
Wdn is the downstream width of apron
d50 is the median stone diameter

PART 7

Infiltration Feasibility Report

Unitil West Concord Substation Relocation

1-7 McGuire Street, Concord, NH 03301
Tax Map 494Z Lot 44
August 20, 2025

Table of Contents

(a) Location of Practice

This project proposes to relocate the existing Unitil West Concord Substation, and construct access, storage, and stormwater improvements.

An open and closed drainage system is proposed to attenuate, convey, and treat stormwater runoff from the area of proposed re development. The site will be designed with a series of underdrains within the substation yard and sheet flow to a curb break in the paved storage yard. Two (2) sediment forebays and one (1) filtration basin will provide pretreatment/treatment and manage runoff for this project.

(b) Existing Topography at Location of Practice

The existing lot is a total of 8.66± acres of which approximately 2.02± acres will be disturbed as part of the proposed substation replacement. This area of disturbance is located entirely within an area of prior disturbance.

The project area contains varying degrees of elevation change, with the general topography sloping west to east. The existing pole storage yard contains minimal elevational change prior to a steep decline in elevation on the eastern side of the site. Between the storage yard and Until Facility there is an existing depression decreasing in elevation from 290 along McGuire Street to 256 along the eastern property line. The existing groundcover consists of a combination of gravel, varying qualities of grasses, and wooded vegetation within the area of work.

(c) Test Pit Locations

Three (3) test pits were performed by Christopher Danforth, CWS, on May 2, 2025. The test pit locations are shown on the Plans in Section (j).

All Test Pits were utilized for stormwater management design.

(d) Seasonal High-Water Table and Bedrock Elevations

Test Pit #1:
Existing Surface Elev 281.5
ESHWT: None observed @ 84” (Elev 274.5)
Seeps: Low volume seeps at 24”
Roots: Observed to 36”
No refusal @ 84” (Elev 274.5)

Test Pit #2:
Existing Surface Elev 284.0
1 foot of gravel fill over more than 8 feet of unsuitable materials including wood waste, stumps, and concrete construction debris.
No refusal @ 108” (Elev 275.0)

Test Pit #3:
Existing Surface Elev 286.0
ESHWT: Observed @ 40” (Elev 282.7)
Roots: Observed to 36”
No seeps @ 80”
No refusal @ 80” (Elev 279.3)

(e) Profile Descriptions

See the test pit logs in Section (j) showing the soil information.

(f) Soils in Area of Proposed Practice

The soil series in the area of the proposed practices are shown on the NRCS Soils Report found in Section (j).

(g) Number and Location of Test Locations

Infiltration testing was conducted with an Amoozemeter in the area of the proposed infiltration practices. See memo and log in section (j).

(h) Date Data was collected:

Test Pits #1, #2, and #3
Date: May 2, 2025
Performed by: Christopher Danforth

Infiltration Test
Date: May 2, 2025
Performed by: Christopher Danforth

Town/State: Concord, NH
TFM Project Name: Unitil West Concord Substation

(i) Summary of Design Infiltration Results

Infiltration testing was conducted with an Amoozemeter in the area of the proposed infiltration practices. Field Data Sheets in section (j). The design infiltration rate used in the drainage model was calculated using measured infiltration rates with a factor of safety of 2.

(j) Attachments

a. USDA NRCS Soils Report
b. Test Pit Logs
c. Infiltration Test Memos & Amoozemeter Field Data Sheets
d. Plan of Proposed Practices

United States Department of Agriculture

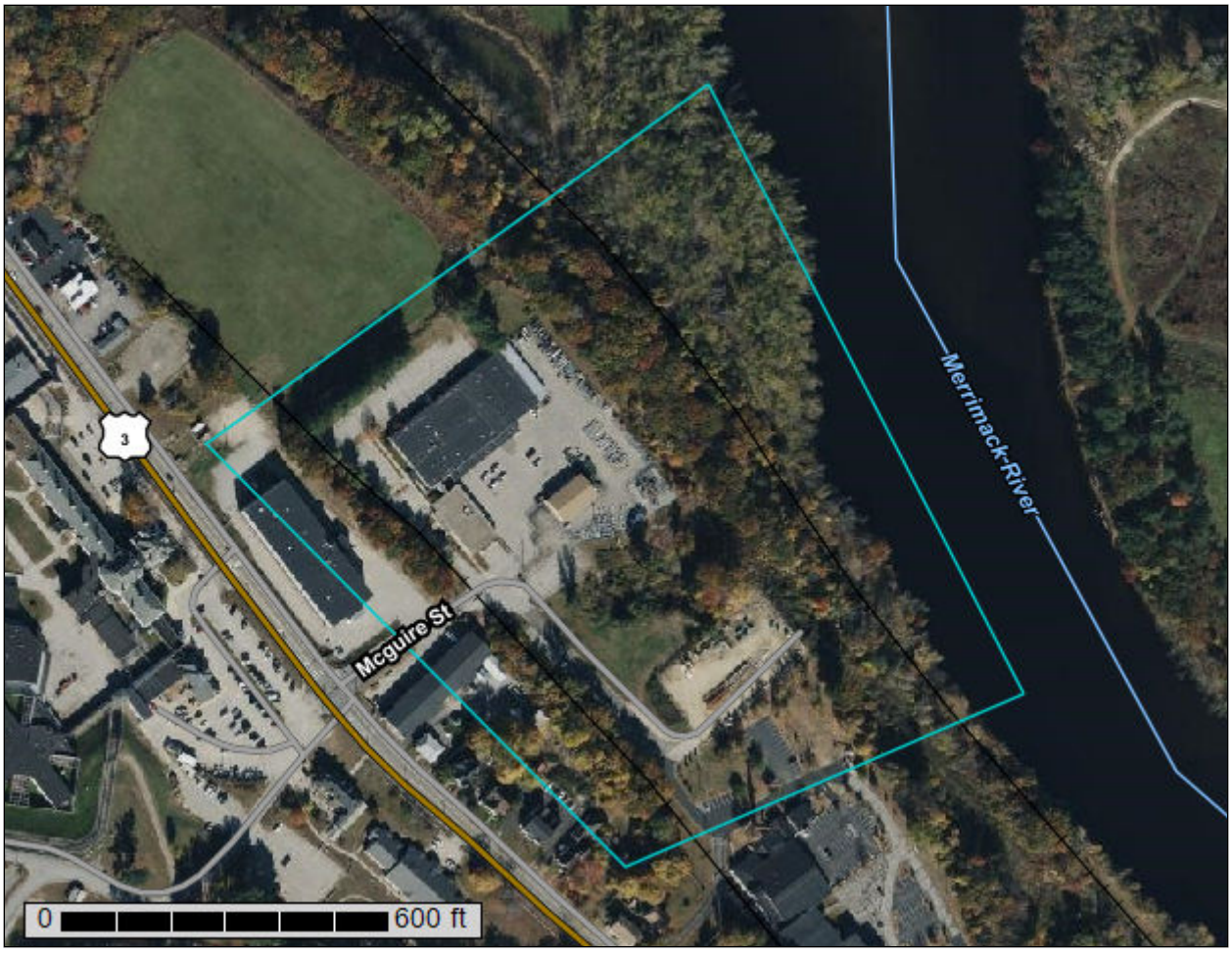
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Merrimack and Belknap Counties, New Hampshire

UNITIL WEST CONCORD SUBSTATION



June 12, 2025

Custom Soil Resource Report
Soil Map

Map Scale: 1:3,690 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
6A	Saco mucky silt loam, 0 to 2 percent slopes, frequently flooded	0.0	0.1%
26E	Windsor loamy sand, 15 to 60 percent slopes	5.0	19.7%
401A	Occum very fine sandy loam, 0 to 3 percent slopes, occasionally flooded	2.4	9.5%
598B	Windsor-Urban land complex, 0 to 8 percent slopes	15.6	61.0%
W	Water	2.5	9.7%
Totals for Area of Interest		**25.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Merrimack and Belknap Counties, New Hampshire

6A—Saco mucky silt loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 9dm3
Elevation: 200 to 790 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 52 degrees F
Frost-free period: 90 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Saco, frequently flooded, and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Saco, Frequently Flooded

Setting

Landform: Flood plains
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy and/or coarse-loamy alluvium derived from granite, gneiss or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
H1 - 2 to 8 inches: mucky silt loam
H2 - 8 to 35 inches: silt loam
H3 - 35 to 65 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: B/D
Ecological site: F144AY016MA - Very Wet Low Floodplain
Hydric soil rating: Yes

Minor Components

Rippowam

Percent of map unit: 10 percent
Landform: Flood plains

Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: Yes

Timakwa

Percent of map unit: 10 percent
Landform: Bogs
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Pootatuck

Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

26E—Windsor loamy sand, 15 to 60 percent slopes

Map Unit Setting

National map unit symbol: 2w2ws
Elevation: 0 to 760 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Windsor and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor

Setting

Landform: Dunes, deltas, outwash terraces, outwash plains
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: loamy sand
Bw - 3 to 25 inches: loamy sand
C - 25 to 65 inches: sand

Properties and qualities

Slope: 15 to 60 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Hinckley

Percent of map unit: 10 percent
Landform: Eskers, deltas, kames, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Deerfield

Percent of map unit: 5 percent
Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

401A—Occum very fine sandy loam, 0 to 3 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 9dkn
Elevation: 200 to 1,000 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 100 to 160 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Occum, occasionally flooded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Occum, Occasionally Flooded

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite, gneiss or schist

Typical profile

H1 - 0 to 9 inches: very fine sandy loam
H2 - 9 to 17 inches: fine sandy loam
H3 - 17 to 29 inches: sandy loam
H4 - 29 to 65 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Ecological site: F144AY010NH - Sandy High Floodplain
Hydric soil rating: No

Minor Components

Suncook

Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Pootatuck

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Occum, frequently flooded

Percent of map unit: 3 percent

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Occum, protected

Percent of map unit: 2 percent
Landform: Flood plains
Hydric soil rating: No

Agawam

Percent of map unit: 2 percent
Landform: Terraces
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

598B—Windsor-Urban land complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2w2wq
Elevation: 0 to 920 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Windsor and similar soils: 45 percent
Urban land: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor

Setting

Landform: Dunes, deltas, outwash terraces, outwash plains
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

A - 0 to 3 inches: loamy sand
Bw - 3 to 25 inches: loamy sand
C - 25 to 65 inches: sand

Properties and qualities

Slope: 0 to 8 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Description of Urban Land

Typical profile

M - 0 to 10 inches: cemented material

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: Unranked

Minor Components

Udorthents

Percent of map unit: 10 percent
Landform: Dunes, deltas, outwash terraces, outwash plains
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Eskers, deltas, kames, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Deerfield

Percent of map unit: 5 percent
Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

W—Water

Map Unit Setting

National map unit symbol: wm74
Elevation: 200 to 2,610 feet
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

TEST PIT REPORT

for

Unitil Energy Systems
West Concord Substation

1-7 McGuire Street
Concord, NH

PREPARED FOR

Unitil Energy Systems, Inc
96159.01

PREPARED BY

TFMoran, Inc.
48 Constitution Drive
Bedford, NH 03110

May 2, 2025

Test Pit #1 5/2/2025

0-20”	5YR 2.5/2 Dark Reddish Brown, Organic, construction debris, decayed wood/stumps, artifacts
20-30”	**FILL** 2.5Y 5/2 Grayish Brown, Sandy Loam, Massive Friable with inclusions 2.5Y 6/3 Fine Sandy Loam, Subangular, Blocky, Friable
30-39”	2.5Y 6/4 Light Yellowish Brown, Medium Sand, Single Grain, Loose, (Buried B1 layer)
39-84	2.5Y 6/6 Olive Yellow, Medium Sand, Single Grain Loose, Friable. (Buried B2 layer)

ESHWT: None Obs @ 84
Seeps: low volume seeps at 24”
Roots: obs to 36”
No Refusal @ 84”

Test Pit #2 5/2/2025

1 foot of gravel fill over more than 8 feet of unsuitable materials including wood waste, stumps and concrete construction debris.

Test Pit #3 5/2/2025

0-8”	10YR 3/4 Dark Yellowish Brown, construction debris, decayed wood/stumps, artifacts
8-22”	7.5YR 5/6 Strong Brown, Loamy Sand, Granular, Friable
22-43”	2.5Y 5/4 Light Olive Brown, Fine Sandy Loam, Sub-angular, Blocky Firm in place.
43-50”	2.5Y 6/4 Light Yellowish Brown, Very Fine Sandy Loam, Sub-angular, Blocky, Firm
50-80”	2.5Y 5/4 Light Olive Brown, Fine Sandy Loam Sub Angular, Blocky, Firm.

Redox Concentrations at 40” 10YR 5/8, Concentrations, Common Distinct.

ESHWT Obs @ 40”
Roots to 36”
No Seeps At 80”
No Refusal @ 80”

Test Pit #1

Test Pit #2

Test Pit #3

Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
Planners

Infiltration Test Field Report

Date: May 2, 2025 Job #: 96159-01 Unitil W. Concord Substation

Client: Unitil Energy Systems Equipment: Amoozemeter

Investigator: Chris Danforth Location: 1-7 McGuire St, Concord, NH 03301

Purpose: Infiltration test of representative soils in area of potential stormwater management areas

Results

See Amoozemeter Data Calculation Sheet for individual measurements.

IT #	Infiltration Rate (in/hr)
IT#1.1	7.38
IT#1.2	4.23
IT#1.3	2.04
Average	4.55
Average w/ FS = 2	**2.25**
IT#3.1	9.45
IT#3.2	5.93
IT#3.3	14.72
Average	10.03
Average w/ FS = 2	**5.00**

Notes

Stormwater:

Infiltration results at Infiltration Test #1 with a Factor of Safety of 2 to be used for proposed stormwater management area.

Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
Scientists

Amoozemeter Field Data Sheet

DATE: May 2, 2025		Project: 96159.01 Unitil West Concord Substation	
LOCATION: 1-7 McGuire Street, Concord, NH	**TEST PIT 1**	Weather Conditions	50°F Overcast/rain
TEST BY: Chris Danforth			
SOIL MAP UNIT: (598B) Windsor-Urban Complex		NOTES: Test Pit located in Gully	
HORIZON: B/ C			
Site Condition: Developed Urban Property/Stump Dump			
SOIL LOG RECORDED: **Test Pit #1**			

SETUP CALCULATIONS	Sample Round 1	Sample Round 2	Sample Round 3	Sample Round 4
D- Bottom of Hole to Ref line	30cm	30cm	30	30
H - DEPTH OF H20 IN HOLE	<15cm	23cm	20cm	25cm
Coefficient A	n/a	0.000558	0.000690	0.00491
Test Depth Below Grade	48"	24"	24"	24"

Amoozemeter Data Calculation Sheet				Unitil West Concord Substation 96159.01					5/2/2025
TP#1								Ksat	Ksat
Drop in Water		Time	Min./hr.	Outflow C.F.		Outflow Q		(cm/hr)	(in/hr)
Sample Set 1: Rate of infiltration in soils as 48" exceeds instrument capability									
Sample Set 2 Coefficient A = 0.000558 @24" BG									
4.500		1	0.016667	120		32400		18.07920	7.11779528
4.500		1	0.016667	120		32400		18.07920	7.11779528
4.800		1	0.016667	120		34560		19.28448	7.59231496
4.700		1	0.016667	120		33840		18.88272	7.43414173
4.800		1	0.016667	120		34560		19.28448	7.59231496
4.700		1	0.016667	120		33840		18.88272	7.43414173
							Average	**18.74880**	**7.38141732**
							Stand Dev	0.54891	0.21610577
Sample Set 3 Coefficient A = 0.000690 @ 24" BG									
2.500		1	0.016667	120		18000		12.42000	4.88976378
2.500		1	0.016667	120		18000		12.42000	4.88976378
2.000		1	0.016667	120		14400		9.93600	3.91181102
2.000		1	0.016667	120		14400		9.93600	3.91181102
2.000		1	0.016667	120		14400		9.93600	3.91181102
2.000		1	0.016667	120		14400		9.93600	3.91181102
							Average	**10.76400**	**4.23779528**
							Stand Dev	1.282732	0.50501263
Sample Set 4 Coefficient A =0.000491 @ 24" BG									
2.000		1	0.016667	120		14400		7.0704	2.78362205
1.200		1	0.016667	120		8640		4.24224	1.67017323
1.300		1	0.016667	120		9360		4.59576	1.80935433
1.400		1	0.016667	120		10080		4.94928	1.94853543
1.400		1	0.016667	120		10080		4.94928	1.94853543
1.500		1	0.016667	120		10800		5.3028	2.08771654
							Average	**5.18496**	**2.04132283**
							Stand Dev	0.991538	0.39036929

Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
Scientists

Amoozemeter Field Data Sheet

DATE: May 2, 2025	**TEST PIT 3**	Project: 96159.01 Unitil West Concord Substation	
LOCATION: 1-7 McGuire Street, Concord, NH		Weather Conditions	50°F Overcast/rain
TEST BY: Chris Danforth			
SOIL MAP UNIT: (598B) Windsor-Urban Complex		NOTES: Test Pit Located upslope of debris fill	
HORIZON: B			
Site Condition: Developed Urban Property/Fill			
SOIL LOG RECORDED: **Test Pit #3**			

SETUP CALCULATIONS	Sample Round 1	Sample Round 2	Sample Round 3
D- Bottom of Hole to Ref line	30	30	30
H - DEPTH OF H20 IN HOLE	20cm	24cm	15cm
Coefficient A	0.000690	0.000523	0.001056
Test Depth Below Grade	32	32"	32"

Amoozemeter Data Calculation Sheet				Unitil West Concord Substation 96159.01					5/2/2025
TP#3								Ksat	Ksat
Drop in Water		Time	Min./hr.	Outflow C.F.		Outflow Q		(cm/hr)	(in/hr)
Sample Set 1 Coefficient A = 0.000690 @32" BG									
5.400		1	0.016667	120		38880		26.82720	10.5618898
4.600		1	0.016667	120		33120		22.85280	8.99716535
4.200		1	0.016667	120		30240		20.86560	8.21480315
5.600		1	0.016667	120		40320		27.82080	10.9530709
4.400		1	0.016667	120		31680		21.85920	8.60598425
4.800		1	0.016667	120		34560		23.84640	9.38834646
							Average	**24.01200**	**9.45354331**
							Stand Dev	2.769038	1.21832662
Sample Set 2 Coefficient A = 0.000523 @ 32" BG									
4.20		1	0.016667	120		30240		15.81552	6.22658268
3.80		1	0.016667	120		27360		14.30928	5.6335748
4.00		1	0.016667	120		28800		15.06240	5.93007874
3.50		1	0.016667	120		25200		13.17960	5.1888189
4.00		1	0.016667	120		28800		15.06240	5.93007874
4.50		1	0.016667	120		32400		16.94520	6.67133858
							Average	**15.06240**	**5.93007874**
							Stand Dev	1.28252	0.50492801
Sample Set 3 Coefficient A = 0.001056 @ 32" BG									
4.300		1	0.016667	120		30960		32.69376	12.8715591
4.700		1	0.016667	120		33840		35.73504	14.0689134
5.000		1	0.016667	120		36000		38.01600	14.9669291
5.500		1	0.016667	120		39600		41.81760	16.463622
5.000		1	0.016667	120		36000		38.01600	14.9669291
5.000		1	0.016667	120		36000		38.01600	14.9669291
							Average	**37.38240**	**14.7174803**
							Stand Dev	3.019023	1.18859156

PART 8

Inspection & Maintenance Manual

Unitil West Concord Substation Relocation

1-7 McGuire Street, Concord, NH 03301
Tax Map 494Z Lot 44
August 20, 2025

Table of Contents

Description of Project

Unitil is proposing to relocate the existing West Concord Substation from the current location to the southern portion of the parcel. The existing substation is in need of electrical upgrades to accommodate current and future load growth of residents and businesses of West Concord. The existing Unitil Facility is located at 1-7 McGuire Street,.

The subject parcel is located at 1-7 McGuire Street, Tax Map 494Z, Lot 44, in the City of Concord, NH. Underlying zoning designations include Industrial (IN) and City Shoreland Overlay Zoning Districts. The site is currently occupied by the existing Unitil Facility, comprised of office and garage facilities, paved and gravel storage yards, the existing West Concord Substation, access, parking and a central undeveloped portion of land. The site contains an existing sewer easement in favor of the NH State Prison, and several existing access and utility easements for electrical support.

The site is abutted by vacant parcel to the north, the State of NH Department of Corrections Warehouse, residential and commercial properties, and McGuire Street to the west, commercial development to the south, and Boston & Maine Corporation property and the Merrimack River to the east.

An open and closed drainage system is proposed to attenuate, convey, and treat stormwater runoff from the area of proposed re development. The site will be designed with a series of underdrains within the substation yard and sheet flow to a curb break in the paved storage yard. Two (2) sediment forebays and one (1) filtration basin will provide pretreatment/treatment and manage runoff for this project.

Responsible Party

Operator: Unitil Energy Systems, Inc.

Address: 30 Energy Way, Exeter, NH 03833

Contact: Nathan Sherwood, PE, sherwood@unitil.com, (603) 773-6476

Stormwater Practices – Schedule of Maintenance

The following practices shall be inspected twice annually, once following snowmelt (spring), and once following leaf-drop (fall):

- Sediment Forebays
- Filtration Basin
- Catch Basins

The following practices shall be inspected annually following snowmelt (spring):

- Culverts
- Flared End Sections
- Riprap Aprons

Stormwater Practices – Maintenance Guidelines

Treatment Practices
(Inspected twice a year)

Filtration Basin
Maintenance Requirements:

- To be inspected twice annually, once following snowmelt (spring) and once following leaf-drop (fall);
- Removal of debris from inlet and outlet structures;
- Removal of accumulated sediment;
- Periodic mowing of embankments;
- Removal of woody vegetation from embankments;
- Inspection and repair of embankments; and
- If a filtration system does not drain within 72-hours following a rainfall event, then a qualified professional should assess the condition of the facility to determine measures required to restore infiltration function, including but not limited to removal of accumulated sediments or reconstruction of the filtration basin bottom.

Pretreatment Practices
(Inspected twice a year)

Sediment Forebay
Maintenance Requirements:

- To be inspected at least twice annually, once following snowmelt and once following leaf-drop and cleaned as indicated by inspection;
- Conduct periodic mowing of embankments (two times per year) to control growth of woody vegetation on embankments;
- Remove debris from outlet structure;
- Remove and dispose of accumulated sediment; and
- Install and maintain a staff gage or other measuring device to indicate depth of sediment accumulation and the level at which clean-out is required. It shall be cleaned out when sediment fills half the sump depth (minimum sump depth is 2 feet when clear).

Conveyance Practices
(Inspections As Noted)

Culverts
Maintenance Requirements:

- To be inspected at least twice annually, once following snow-melt (spring) and once following leaf drop (fall) and cleaned as indicated by inspection.
- Inspect the culvert inlet, outlet, and structure.
- Remove accumulated sediments greater than 2 inches in depth and debris at the inlet, at the outlet, and within the conduit.
- Repair any erosion damage at the culvert's inlet and outlet.

Catch Basin
Maintenance Requirements:

- To be inspection a least twice annually, once following snow-melt and once following leaf-drop and cleaned as indicated by inspection;
- Sediment should be removed annually and when it approaches half the sump depth; and

- If floating hydrocarbons are observed during an inspection, the material should be removed immediately by skimming, absorbent materials, or other method and disposed of in conformance with applicable state and federal regulations.

Flared End Section
Maintenance Requirements:

- At least once annually, inspect for the accumulation of sediment and debris and for signs of erosion along embankments;
- Remove debris whenever observed during inspection; and
- Remove sediment when accumulation exceeds 25% of channel depth.

Riprap Apron
Maintenance Requirements:

- Inspect at least once annually for damage and deterioration; and
- Repair damages immediately.

Control of Invasive Plants

During maintenance activities, check for the presence of invasive plants. If invasive plants are found, they shall be controlled and removed in a safe manner as described on the following pages.

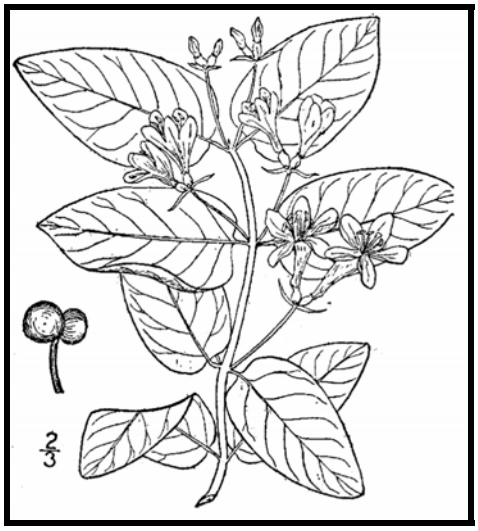
Invasive plants are introduced, alien, or non-native plants, which have been moved by people from their native habitat to a new area. Some exotic plants are imported for human use such as landscaping, erosion control or food crops. They also can arrive as “hitchhikers” among shipments of other plants, seeds, packing materials or fresh produce. Invasive plants can cause harm by:

- Becoming weedy and overgrown;
- Killing established shade trees;
- Obstructing pipes and drainage systems
- Forming dense beds in water
- Lowering water levels in lakes, streams, and wetlands
- Destroying natural communities
- Promoting erosion on stream banks and hillsides
- Resisting control except by hazardous chemicals.

University of New Hampshire Cooperative Extension

Methods for Disposing Non-Native Invasive Plants

Prepared by the Invasives Species Outreach Group, volunteers interested in helping people control invasive plants. Assistance provided by the Piscataquog Land Conservancy and the NH Invasives Species Committee. Edited by Karen Bennett, Extension Forestry Professor and Specialist.



Tatarian honeysuckle
Lonicera tatarica
USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown. 1913. *An illustrated flora of the northern United States, Canada and the British Possessions*. Vol. 3: 282.

Non-native invasive plants crowd out natives in natural and managed landscapes. They cost taxpayers billions of dollars each year from lost agricultural and forest crops, decreased biodiversity, impacts to natural resources and the environment, and the cost to control and eradicate them.

Invasive plants grow well even in less than desirable conditions such as sandy soils along roadsides, shaded wooded areas, and in wetlands. In ideal conditions, they grow and spread even faster. There are many ways to remove these non-native invasives, but once removed, care is needed to dispose the removed plant material so the plants don't grow where disposed.

Knowing how a particular plant reproduces indicates its method of spread and helps determine the appropriate disposal method. Most are spread by seed and are dispersed by wind, water, animals, or people. Some reproduce by vegetative means from pieces of stems or roots forming new plants. Others spread through both seed and vegetative means.

Because movement and disposal of viable plant parts is restricted (see NH Regulations), viable invasive parts can't be brought to most transfer stations in the state. Check with your transfer station to see if there is an approved, designated area for invasives disposal. This fact sheet gives recommendations for rendering plant parts non-viable.

Control of invasives is beyond the scope of this fact sheet. For information about control visit www.nhinvasives.org or contact your UNH Cooperative Extension office.

New Hampshire Regulations

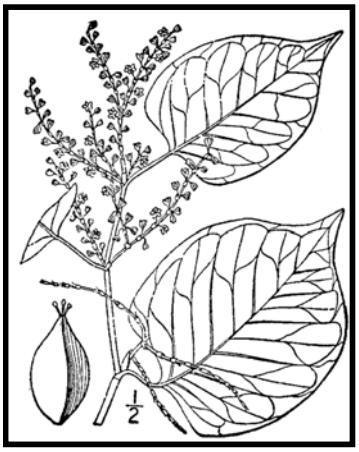
Prohibited invasive species shall only be disposed of in a manner that renders them nonliving and nonviable. (Agr. 3802.04)

No person shall collect, transport, import, export, move, buy, sell, distribute, propagate or transplant any living and viable portion of any plant species, which includes all of their cultivars and varieties, listed in Table 3800.1 of the New Hampshire prohibited invasive species list. (Agr 3802.01)

How and When to Dispose of Invasives?

To prevent seed from spreading remove invasive plants before seeds are set (produced). Some plants continue to grow, flower and set seed even after pulling or cutting. Seeds can remain viable in the ground for many years. If the plant has flowers or seeds, place the flowers and seeds in a heavy plastic bag "head first" at the weeding site and transport to the disposal site. The following are general descriptions of disposal methods. See the chart for recommendations by species.

Burning: Large woody branches and trunks can be used as firewood or burned in piles. For outside burning, a written fire permit from the local forest fire warden is required unless the ground is covered in snow. Brush larger than 5 inches in diameter can't be burned. Invasive plants with easily airborne seeds like black swallow-wort with mature seed pods (indicated by their brown color) shouldn't be burned as the seeds may disperse by the hot air created by the fire.



Japanese knotweed
Polygonum cuspidatum
USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown. 1913. *An illustrated flora of the northern United States, Canada and the British Possessions*. Vol. 1: 676.

Bagging (solarization): Use this technique with softer-tissue plants. Use heavy black or clear plastic bags (contractor grade), making sure that no parts of the plants poke through. Allow the bags to sit in the sun for several weeks and on dark pavement for the best effect.

Tarping and Drying: Pile material on a sheet of plastic and cover with a tarp, fastening the tarp to the ground and monitoring it for escapes. Let the material dry for several weeks, or until it is clearly nonviable.

Chipping: Use this method for woody plants that don't reproduce vegetatively.

Burying: This is risky, but can be done with watchful diligence. Lay thick plastic in a deep pit before placing the cut up plant material in the hole. Place the material away from the edge of the plastic before covering it with more heavy plastic. Eliminate as much air as possible and toss in soil to weight down the material in the pit. Note that the top of the buried material should be at least three feet underground. Japanese knotweed should be at least 5 feet underground!

Drowning: Fill a large barrel with water and place soft-tissue plants in the water. Check after a few weeks and look for rotted plant material (roots, stems, leaves, flowers). Well-rotted plant material may be composted. A word of caution- seeds may still be viable after using this method. Do this before seeds are set. This method isn't used often. Be prepared for an awful stink!

Composting: Invasive plants can take root in compost. Don't compost any invasives unless you know there is no viable (living) plant material left. Use one of the above techniques (bagging, tarping, drying, chipping, or drowning) to render the plants nonviable before composting. Closely examine the plant before composting and avoid composting seeds.

Be diligent looking for seedlings for *years* in areas where removal and disposal took place.

Suggested Disposal Methods for Non-Native Invasive Plants

This table provides information concerning the disposal of removed invasive plant material. If the infestation is treated with herbicide and left in place, these guidelines don't apply. Don't bring invasives to a local transfer station, unless there is a designated area for their disposal, or they have been rendered non-viable. This listing includes wetland and upland plants from the New Hampshire Prohibited Invasive Species List. The disposal of aquatic plants isn't addressed.

<table>
<tr><th>Woody Plants</th><th>Method of Reproducing</th><th>Methods of Disposal</th></tr>
<tr><td rowspan="2">Norway maple
(Acer platanoides)
European barberry
(Berberis vulgaris)
Japanese barberry
(Berberis thunbergii)
autumn olive
(Elaeagnus umbellata)
burning bush
(Euonymus alatus)
Morrow's honeysuckle
(Lonicera morrowii)
Tatarian honeysuckle
(Lonicera tatarica)
showy bush honeysuckle
(Lonicera x bella)
common buckthorn
(Rhamnus cathartica)
glossy buckthorn
(Frangula alnus)</td><td rowspan="2">Fruit and Seeds
  </td><td>Prior to fruit/seed ripening
Seedlings and small plants
▪ Pull or cut and leave on site with roots exposed. No special care needed.
Larger plants
▪ Use as firewood.
▪ Make a brush pile.
▪ Chip.
▪ Burn.</td></tr>
<tr><td>After fruit/seed is ripe
Don't remove from site.
▪ Burn.
▪ Make a covered brush pile.
▪ Chip once all fruit has dropped from branches.
▪ Leave resulting chips on site and monitor.</td></tr>
<tr><td rowspan="2">oriental bittersweet
(Celastrus orbiculatus)
multiflora rose
(Rosa multiflora)</td><td rowspan="2">Fruits, Seeds, Plant Fragments
  </td><td>Prior to fruit/seed ripening
Seedlings and small plants
▪ Pull or cut and leave on site with roots exposed. No special care needed.
Larger plants
▪ Make a brush pile.
▪ Burn.</td></tr>
<tr><td>After fruit/seed is ripe
Don't remove from site.
▪ Burn.
▪ Make a covered brush pile.
▪ Chip – only after material has fully dried (1 year) and all fruit has dropped from branches. Leave resulting chips on site and monitor.</td></tr>
</table>

<table>
<tr><th>Non-Woody Plants</th><th>Method of Reproducing</th><th>Methods of Disposal</th></tr>
<tr><td rowspan="2">garlic mustard
(Alliaria petiolata)
spotted knapweed
(Centaurea maculosa)
▪ Sap of related knapweed can cause skin irritation and tumors. Wear gloves when handling.
black swallow-wort
(Cynanchum nigrum)
▪ May cause skin rash. Wear gloves and long sleeves when handling.
pale swallow-wort
(Cynanchum rossicum)
giant hogweed
(Heracleum mantegazzianum)
▪ Can cause major skin rash. Wear gloves and long sleeves when handling.
dame’s rocket
(Hesperis matronalis)
perennial pepperweed
(Lepidium latifolium)
purple loosestrife
(Lythrum salicaria)
Japanese stilt grass
(Microstegium vimineum)
mile-a-minute weed
(Polygonum perfoliatum)</td><td rowspan="2">Fruits and Seeds
  </td><td>Prior to flowering
Depends on scale of infestation
Small infestation
▪ Pull or cut plant and leave on site with roots exposed.

Large infestation
▪ Pull or cut plant and pile. (You can pile onto or cover with plastic sheeting).
▪ Monitor. Remove any re-sprouting material.</td></tr>
<tr><td>During and following flowering
Do nothing until the following year or remove flowering heads and bag and let rot.

Small infestation
▪ Pull or cut plant and leave on site with roots exposed.

Large infestation
▪ Pull or cut plant and pile remaining material. (You can pile onto plastic or cover with plastic sheeting).
▪ Monitor. Remove any re-sprouting material.</td></tr>
<tr><td>common reed
(Phragmites australis)
Japanese knotweed
(Polygonum cuspidatum)
Bohemian knotweed
(Polygonum x bohemicum)</td><td>Fruits, Seeds, Plant Fragments
Primary means of spread in these species is by plant parts. Although all care should be given to preventing the dispersal of seed during control activities, the presence of seed doesn’t materially influence disposal activities.</td><td>Small infestation
▪ Bag all plant material and let rot.
▪ Never pile and use resulting material as compost.
▪ Burn.

Large infestation
▪ Remove material to unsuitable habitat (dry, hot and sunny or dry and shaded location) and scatter or pile.
▪ Monitor and remove any sprouting material.
▪ Pile, let dry, and burn.</td></tr>
</table>

January 2010

Inspection & Maintenance Log

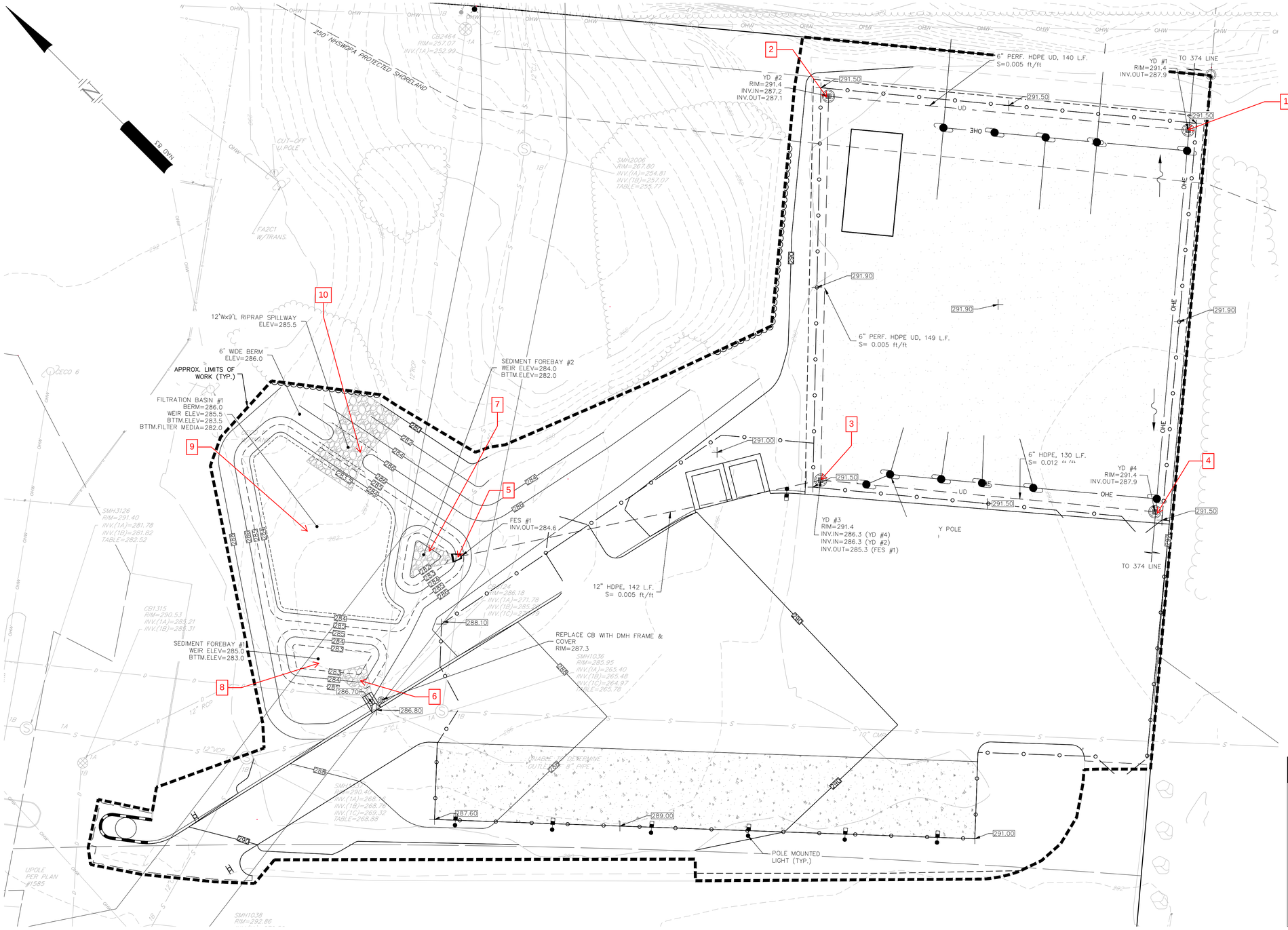
Date	Inspector	BMPs checked	Maintenance Required

Inspection Checklist

Date:	**Project Name:** **Unitil West Concord Substation** 1-7 McGuire Street Concord, NH 03301
Inspector's Name/Title:	
Inspector's Contact Information:	
☐ 1st Yearly Inspection ☐ 2nd Yearly Inspection	BMP's to be inspected: All BMP's to be inspected: Treatment and Pretreatment Practices

	BMP* **Refer to following Inspection & Maintenance Plan for BMP location**	Maintenance Required	Corrective Action Needed and Notes
1	Yard Drain #1	☐ Yes ☐ No	
2	Yard Drain #2	☐ Yes ☐ No	
3	Yard Drain #3	☐ Yes ☐ No	
4	Yard Drain #4	☐ Yes ☐ No	
5	FES #1 & Riprap Apron	☐ Yes ☐ No	
6	Paved Flume & Riprap Apron	☐ Yes ☐ No	
7	Sediment Forebay #1	☐ Yes ☐ No	
8	Sediment Forebay #2	☐ Yes ☐ No	
9	Filtration Basin #1	☐ Yes ☐ No	
10	Riprap Spillway	☐ Yes ☐ No	
11	Other	☐ Yes ☐ No	

*Best Management Practices
**Photographs of BMPs shall be included as part of the required Inspections
***Copies of Inspection & Maintenance Records shall be provided to NHDES AoT Bureau upon request



NOTES

1. SEE GRADING NOTES ON SHEET C-02.
2. SEE UTILITY NOTES ON SHEET C-02.

Unitil

SITE DEVELOPMENT PLANS

TAX MAP 494Z LOT 44

GRADING, DRAINAGE & UTILITY PLAN

UNITIL WEST CONCORD SUBSTATION

1-7 MCGUIRE STREET, CONCORD, NH 03301

OWNED BY/PREPARED FOR

UNITIL ENERGY SYSTEMS, INC.

SCALE: 1"=20' **JULY 28, 2025**

DIG SAFE
CALL BEFORE YOU DIG
CONTACT DIG SAFE 72 BUSINESS HOURS PRIOR TO CONSTRUCTION

HORIZONTAL SCALE 1"=20'
20 10 0 20

REV	DATE	DESCRIPTION	DR	CK

TFM
Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
Scientists
48 Constitution Drive
Bedford, NH 03110
Phone (603) 472-4488
Fax (603) 472-9747
www.tfmoran.com

FILE	96159-01	DR		FB		C-07
		CK		CADFILE	96159-01 DESIGN_LAYOUT_	

PART 9

LEGEND

- PROPERTY LINE
- LIMITS OF DRAINAGE SUBCATCHMENT
- SOIL GROUP BREAKLINE
- FLOW PATH (Tc LINE)
- REACH
- POI-1 — POINT OF INTEREST
- ES-1 — SUBCATCHMENT AREA
- EP-1 — POND, CULVERT, OR CATCH BASIN
- ER-1 — REACH

NOTES

1. SOILS SHOWN ARE FROM THE SOIL SURVEY OF MERRIMACK COUNTY, NH, EASTERN PART, PREPARED BY USDA–NATIONAL RESOURCE CONSERVATION SERVICES.

SOIL LEGEND
(PER USDA NRCS WEB SOIL SURVEY)

SYMBOL	DESCRIPTION	HYDROLOGIC SOIL GROUP	DRAINAGE CLASS
598B	WINDSOR–URBAN LAND COMPLEX 0–8% SLOPES	A	EXCESSIVELY

HORIZONTAL SCALE 1"=40'
40 20 0 40

Unitil

SITE DEVELOPMENT PLANS

TAX MAP 494Z LOT 44

PRE-DEVELOPMENT DRAINAGE PLAN

UNITIL WEST CONCORD SUBSTATION

1-7 MCGUIRE STREET, CONCORD, NH 03301

OWNED BY/PREPARED FOR

UNITIL ENERGY SYSTEMS, INC.

SCALE: 1"=40'

AUGUST 20, 2025

REV	DATE	DESCRIPTION	DR	CK

TFM
Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
Scientists

48 Constitution Drive
Bedford, NH 03110
Phone (603) 472-4488
Fax (603) 472-9747
www.tfmoran.com

FILE	96159-01	DR		FB		DA-01
		CK		CADFILE	96159-01 DRAINAGE	

LEGEND

- PROPERTY LINE
- LIMITS OF DRAINAGE SUBCATCHMENT
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SYMBOL	DESCRIPTION	HYDROLOGIC SOIL GROUP	DRAINAGE CLASS
598B	WINDSOR–URBAN LAND COMPLEX 0–8% SLOPES	A	EXCESSIVELY

HORIZONTAL SCALE 1"=40'
40 20 0 40

REV	DATE	DESCRIPTION	DR	CK

Unitil

SITE DEVELOPMENT PLANS

TAX MAP 494Z LOT 44

POST-DEVELOPMENT DRAINAGE PLAN

UNITIL WEST CONCORD SUBSTATION

1-7 MCGUIRE STREET, CONCORD, NH 03301

OWNED BY/PREPARED FOR

UNITIL ENERGY SYSTEMS, INC.

SCALE: 1"=40' **AUGUST 20, 2025**

TFM
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FILE	96159-01	DR		FB		DA-02
		CK		CADFILE	96159-01 DRAINAGE	

LEGEND

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LEGEND

- HYDROLOGIC SOIL GROUP A
- IMPERVIOUS COVER

NOTES

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SOIL LEGEND
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SYMBOL	DESCRIPTION	HYDROLOGIC SOIL GROUP	DRAINAGE CLASS
598B	WINDSOR–URBAN LAND COMPLEX 0–8% SLOPES	A	EXCESSIVELY

HORIZONTAL SCALE 1"=40'
40 20 0 40

Unitil

SITE DEVELOPMENT PLANS

TAX MAP 494Z LOT 44

PRE-DEVELOPMENT COLORED SOILS PLANS

UNITIL WEST CONCORD SUBSTATION

1-7 MCGUIRE STREET, CONCORD, NH 03301

OWNED BY/PREPARED FOR

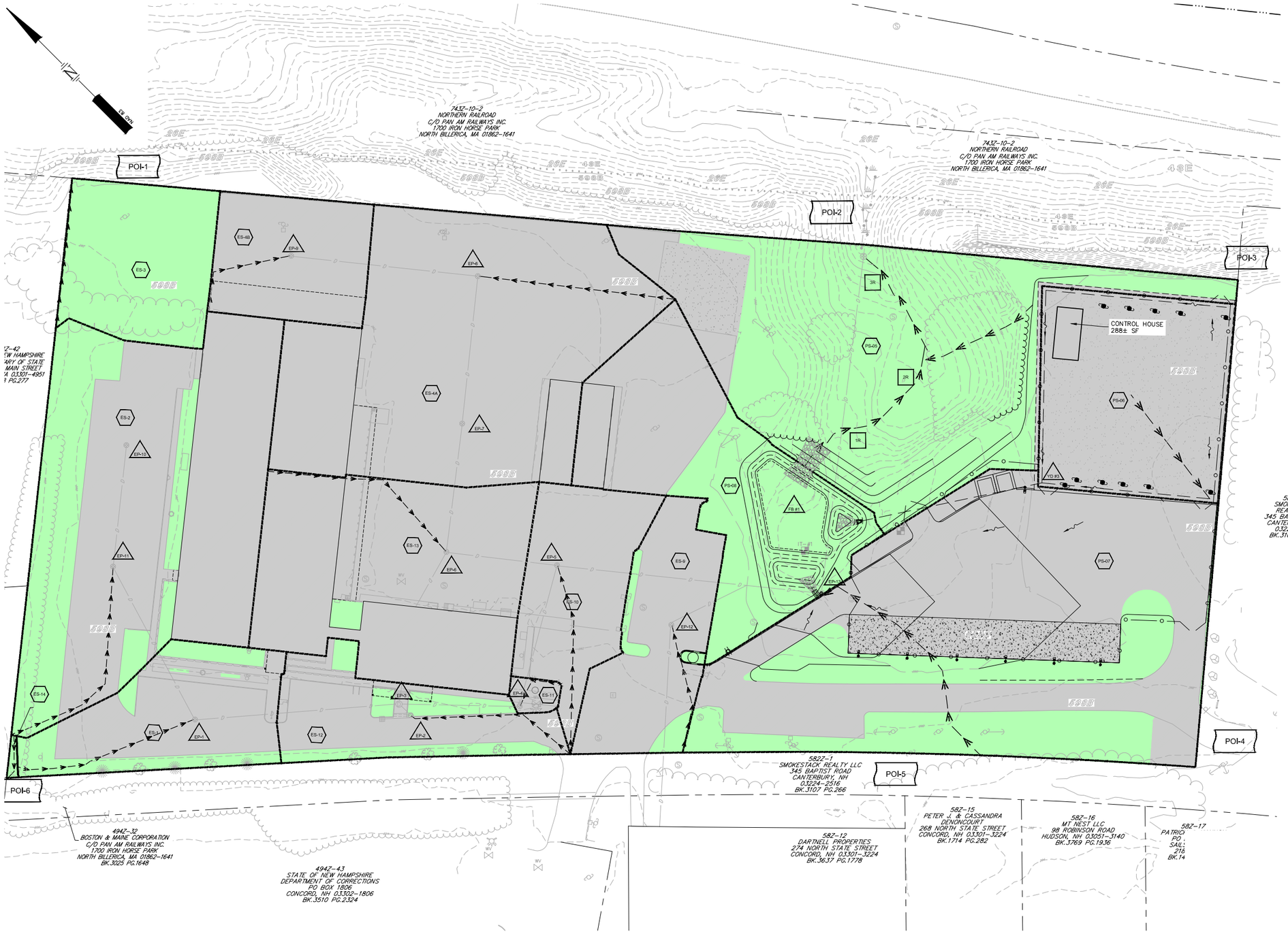
UNITIL ENERGY SYSTEMS, INC.
30 ENERGY WAY, EXETER, NH 03833

SCALE: 1"=40' **AUGUST 20, 2025**

REV	DATE	DESCRIPTION	DR	CK

TFM
Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
Scientists
48 Constitution Drive
Bedford, NH 03110
Phone (603) 472-4488
Fax (603) 472-9747
www.tfmoran.com

FILE	DR		FB		
96159-01	CK		CADFILE	96159-01 DRAINAGE	HSG-01



LEGEND

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LEGEND

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(PER USDA NRCS WEB SOIL SURVEY)

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598B	WINDSOR–URBAN LAND COMPLEX 0–8% SLOPES	A	EXCESSIVELY

HORIZONTAL SCALE 1"=40'
40 20 0 40

REV	DATE	DESCRIPTION	DR	CK

Unitil

SITE DEVELOPMENT PLANS

TAX MAP 494Z LOT 44

POST-DEVELOPMENT COLORED SOILS PLANS

UNITIL WEST CONCORD SUBSTATION

1-7 MCGUIRE STREET, CONCORD, NH 03301

OWNED BY/PREPARED FOR

UNITIL ENERGY SYSTEMS, INC.
30 ENERGY WAY, EXETER, NH 03833

SCALE: 1"=40' **AUGUST 20, 2025**

TFM
Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
Scientists

48 Constitution Drive
Bedford, NH 03110
Phone (603) 472-4488
Fax (603) 472-9747
www.tfmoran.com

FILE	96159-01	DR		FB		HSG-02
		CK		CADFILE	96159-01 DRAINAGE	

ALTERATION OF TERRAIN PERMIT APPLICATION

Water Division / Land Resources Management

Check the status of your application

RSA / Rule: RSA 485-A:17, Env-Wq 1500

Administrative Use Only	Administrative Use Only	Administrative Use Only	File Number:
			Check No.
			Amount:
			Initials:

1. APPLICANT INFORMATION (INTENDED PERMIT HOLDER)			
Applicant Name: Unitil Energy Systems, Inc.	Contact Name: Nathan Sherwood, P.E.		
Email: sherwood@unitil.com	Daytime Telephone: 603-773-6476		
Mailing Address: 30 Energy Way			
Town/City: Exeter	State: NH	ZIP Code: 03833	
2. APPLICANT'S AGENT INFORMATION If none, check here: ☐			
Agent's Name: TFMoran, Inc.	Contact Name: Nicholas Golon, P.E.		
Email: ngolon@tfmoran.com	Daytime Telephone: 603-472-4488		
Address: 48 Constitution Drive			
Town/City: Bedford	State: NH	ZIP Code: 03110	
3. PROPERTY OWNER INFORMATION (IF DIFFERENT FROM APPLICANT) Check here if more than one property owner, and attach additional sheets as necessary: ☐			
Owner's Name: Unitil Energy Systems, Inc.	Contact Name: Nathan Sherwood, P.E.		
Email: sherwood@unitil.com	Daytime Telephone: 603-773-6476		
Mailing Address: 6 Liberty Lane West			
Town/City: Hampton	State: NH	ZIP Code: 03824	
4. PROPERTY OWNER'S AGENT INFORMATION If none, check here: ☐			
Business Name: TFMoran, Inc.	Contact Name: Nicholas Golon, P.E.		
Email: ngolon@tfmoran.com	Daytime Telephone: 603-472-4488		
Address: 48 Constitution Drive			
Town/City: Bedford	State: NH	ZIP Code: 03110	
5. CONSULTANT INFORMATION If none, check here: ☐			
Engineering Firm: TFMoran, Inc.	Contact Name: Nicholas Golon, P.E.		
Email: ngolon@tfmoran.com	Daytime Telephone: 603-472-4488		
Address: 48 Constitution Drive			
Town/City: Bedford	State: NH	ZIP Code: 03110	

6. PROJECT TYPE

☐ Excavation Only ☐ Residential ☐ Commercial ☐ Golf Course ☐ School ☐ Municipal
☐ Agricultural ☐ Land Conversion ■ Other: Utility - Electric Substation

7. PROJECT LOCATION INFORMATION

Project Name: Unitil West Concord Substation Relocation

Street/Road Address: 1-7 McGuire Street

Town/City: Concord, NH	County: Merrimack		
Tax Map: 494Z	Block: N/A	Lot Number: 44	Unit: N/A

Post-development, will the proposed project withdraw from or directly discharge to any of the following? If yes, identify the purpose.

1. Stream or Wetland Purpose:	☐ Yes ■ No	☐ Withdrawal	☐ Discharge
2. Artificial pond created by impounding a stream or wetland Purpose:	☐ Yes ■ No	☐ Withdrawal	☐ Discharge
3. Unlined pond dug into the water table Purpose:	☐ Yes ■ No	☐ Withdrawal	☐ Discharge

Post-development, will the proposed project discharge to:

- Within one-quarter mile of a surface water impaired for phosphorus and/or nitrogen? ■ No ☐ **Yes**
- Within one-quarter mile of a Class A surface water or within the watershed area of an Outstanding Resource Water? ■ No ☐ **Yes**
- Within one-quarter mile of a lake or pond not covered previously? ■ No ☐ **Yes**

Is the project a High Load area? ☐ Yes ■ No
If yes, specify the type of high load land use or activity:

Is the project within a Water Supply Intake Protection Area (WSIPA)? ☐ Yes ■ No
Is the project within a Groundwater Protection Area (GPA)? ☐ Yes ■ No
Will the well setbacks identified in Env-Wq 1508.02 be met? ■ Yes ☐ No
For more details on the restrictions in these areas, read Chapter 3.1 in Volume 2 of the NH Stormwater Manual.

Is any part of the property within the 100-year floodplain? ☐ Yes ■ No
If yes: Cut volume: cubic feet within the 100-year floodplain.
Fill volume: cubic feet within the 100-year floodplain.

■ Project *is* within **¼ mile of a designated river** Name of River: Upper Merrimack River
☐ Project *is not* within ¼ mile of a designated river.

☐ Project *is* within a Coastal/Great Bay Region community.
■ Project *is not* within a Coastal/Great Bay Region community.

8. BRIEF PROJECT DESCRIPTION (PLEASE DO NOT REPLY "SEE ATTACHED")

The project consists of retiring vintage substation equipment and installing new current technology to meet the growing electrical demand in the Concord area and provide further redundancy for service reliability. In order to accommodate the substation relocation on the subject lot, an existing pole storage area will be relocated, and stormwater management areas will be incorporated The project is located at 1-7 McGuire Street, Concord, NH, Tax Map 494Z, Lot 44.

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9. IF APPLICABLE, DESCRIBE ANY WORK STARTED PRIOR TO RECEIVING PERMIT.

N/A

10. ADDITIONAL REQUIRED INFORMATION

A. Date a copy of the application was sent to the municipality, as required by Env-Wq 1503.05(e) (Env-Wq 1503.05(c)(6), requires proof that a completed application form, checklist, plans and specifications, and all other supporting materials have been sent or delivered to the governing body of each municipality in which the project is proposed): 8/20/2025

(Attach proof of delivery)

B. Date a copy of the application was sent to the local river advisory committee, if required by Env-Wq 1503.05(e) (Env-Wq 1503.05(c)(6), requires proof that a completed application form, checklist, plans and specifications, and all other supporting materials have been sent or delivered to the Local River Advisory Committee, if the project is within ¼ mile of a designated river): 8/26/2025

(Attach proof of delivery)

C. Type of plan required: ☐ Land Conversion ■ Detailed Development ☐ Excavation, Grading and Reclamation ☐ Steep Slope

D. Additional plans required: ■ Stormwater Drainage and Hydrologic Soil Groups ☐ Source Control ☐ Chloride Management

E. Total area of disturbance, in square feet 88,325

F. Additional impervious cover as a result of the project, in square feet (use "-"to indicate a net reduction in impervious coverage). +21,213

Total final impervious cover, in square feet 257,676

G. Total undisturbed cover, in square feet 288,800

H. Number of lots proposed: N/A

I. Total length of roadway, in linear feet: 0

J. Name(s) of receiving water(s): Merrimack River

K. Identify all other NHDES permits required for the project. For each, indicate whether an application has been filed and is pending. If the required approval has been issued, provide the permit number, registration date, or approval letter number, as applicable.

Type of Approval	Application Filed?	Pending?	If Issued
1. Water Supply Approval	☐ Yes ☐ No ■ N/A	☐	Permit number:
2. Wetlands Permit	☐ Yes ☐ No ■ N/A	☐	Permit number:
3. Shoreland Permit	☐ Yes ■ No ☐ N/A	☐	Registration date:
4. UIC Registration	☐ Yes ☐ No ■ N/A	☐	Approval letter date:
5. Large/Small Community Well Approval	☐ Yes ☐ No ■ N/A	☐	Permit number:
6. Large Groundwater Withdrawal Permit	☐ Yes ☐ No ☐ N/A	☐	Permit number:
7. Other:	☐ Yes ■ No		

L. List all species identified by the Natural Heritage Bureau as threatened or endangered or of concern:

N/A

M. Using the NHDES OneStop Data Mapper with the Surface Water Impairment layer turned on, list the impairments identified for each receiving water. If no pollutants are listed, enter "N/A."

N/A

N. Did the applicant or applicant's agent have a pre-application meeting with Alteration of Terrain Bureau staff?

☐ Yes ■ No If yes, name of staff member:

O. Will blasting of bedrock be required? ☐ Yes ■ No If yes, estimated quantity of blast rock in cubic yards:
If yes, standard blasting Best Management Practices notes must be placed on the plans.

NOTE: If greater than 5,000 cubic yards of blast rock will be generated, a groundwater monitoring program must be developed and submitted to NHDES. Contact Alteration of Terrain Bureau staff for additional detail.

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11. CHECK ALL APPLICATION ATTACHMENTS THAT APPLY (SUBMIT WITH APPLICATION IN THE ORDER LISTED BELOW)

LOOSE:

- ■ Signed application form, with attached proof(s) of delivery.
- ■ Check for the application fee, calculated using the fee schedule available on the NHDES Land Development page.
- ■ Color copy of a USGS map with the property boundaries outlined (1" = 2,000' scale).
- N/A If the applicant is not the property owner, proof that the applicant will have a legal right to undertake the project on the property if a permit is issued to the applicant.

BOUND, IN A REPORT, IN THE FOLLOWING ORDER:

- ■ Copy of the signed application form and application checklist.
- ■ Copy of the check.
- ■ Copy of the USGS map with the property boundaries outlined (1" = 2,000' scale).
- ■ Narrative of the project with a summary table of the peak discharge rate for the off-site discharge points.
- ■ Printout of NHDES OneStop Mapper with "Surface Water Impairments" layer turned on.
- ■ Printout of NHDES OneStop Mapper with Alteration of Terrain screening layers turned on.
- ■ Printout of Natural Heritage Bureau DataCheck Tool letter and any relevant correspondence with New Hampshire Fish and Game.
- ■ USDA Web Soil Survey Map with project's watershed outlined.
- ■ Aerial photograph (1" = 2,000' scale with the site boundaries outlined).
- ■ Photographs representative of the site.
- ■ Groundwater recharge volume calculations (include one Best Management Practices worksheet per permit application).
- ■ Drainage analysis, stamped by a professional engineer (see "Application Checklist" at the end of this document).
- ■ Riprap apron or other energy dissipation or stability calculations.
- ■ Site Specific Soil Survey report, stamped and with a certification note prepared by the soil scientist that the survey was done in accordance with the Site Specific Soil Mapping standards of the Society of Soil Scientists of Northern New England.
- ■ Infiltration Feasibility Report (example online) [Env-Wq 1503.08(f)(3)].
- N/A Registration and Notification Form for Stormwater Infiltration to Groundwater (UIC Registration-for underground systems only, including drywells and trenches).
- ■ Inspection and maintenance manual with, if applicable, long term maintenance agreements [Env-Wq 1503.08(g)].
- N/A Source control plan.

PLANS:

- ■ One set of design plans on 34 - 36" by 22 - 24" white paper (see Application Checklist for details).
- ■ Pre- and post-development color-coded soil plans on 11" x 17" (see Application Checklist for details).
- ■ Pre- and post-construction drainage area plans on 34 - 36" by 22 - 24" white paper (see Application Checklist for details).

100-YEAR FLOODPLAIN REPORT:

- N/A All information required in Env-Wq 1503.09, submitted as a separate report.

ADDITIONAL INFORMATION RE: NUTRIENTS, CLIMATE

- N/A See Application Checklist (Attachment A) for details.

- ■ **REVIEW APPLICATION FOR COMPLETENESS. CONFIRM INFORMATION LISTED ON THE APPLICATION IS INCLUDED WITH SUBMITTAL.**

12. REQUIRED SIGNATURES

By signing below, I certify that:

- The information contained in or otherwise submitted with this application is true, complete, and not misleading to the best of my knowledge and belief;
- I understand that the submission of false, incomplete, or misleading information constitutes grounds for the department to deny the application, revoke any permit that is granted based on the information, and/or refer the matter to the board of professional engineers established by RSA 310-A:3 if I am a professional engineer; and
- I understand that I am subject to the penalties specified in New Hampshire law for falsification in official matters, currently RSA 641:3.

☐ **APPLICANT** ■ **APPLICANT'S AGENT**:

Signature: Nicholas Golon Date: 8/20/2025

Name (print or type): Nicholas Golon, P.E. Title: Civil Dept. Manager, Principal

☐ PROPERTY OWNER ■ PROPERTY OWNER'S AGENT:

Signature: Nicholas Golon Date: 8/20/2025

Name (print or type): Nicholas Golon, P.E. Title: Civil Dept. Manager, Principal

ALTERATION OF TERRAIN PERMIT ATTACHMENT A: APPLICATION CHECKLIST

Check each box to indicate the item has been provided, or indicate why it does not apply.

DESIGN PLANS

■ Plans printed on 34 - 36" by 22 - 24" white paper.

■ Professional Engineer stamp.

■ Wetland delineation.

■ Temporary erosion control measures.

■ Treatment for all stormwater runoff from impervious surfaces such as roadways (including gravel roadways), parking areas, and nonresidential roof runoff. Guidance on treatment BMPs can be found in Volume 2, Chapter 4 of the New Hampshire Stormwater Management Manual.

■ Pre-existing 2-foot contours.

■ Proposed 2-foot contours.

N/A Drainage easements protecting the drainage/treatment structures.

■ Compliance with state statute governing fill and dredge in wetlands, RSA 482- A. Note that artificial detention in wetlands is prohibited.

■ Compliance with the New Hampshire Shoreland Protection Act, RSA 483-B.

N/A Benching – needed if you have more than 20 feet change in elevation on a 2:1 slope, 30 feet change in elevation on a 3:1 slope, 40 feet change in elevation on a 4:1 slope.

■ Check to see if any proposed ponds require state dam permits.

DETAILS

N/A Typical roadway cross-section.

■ Detention basin with inverts noted on the outlet structure.

N/A Stone berm level spreader.

■ Outlet protection – riprap aprons.

■ A general installation detail for an erosion control blanket.

■ Silt fences or mulch berm.

■ Storm drain inlet protection. Note that since hay bales must be embedded 4 inches into the ground, they are not to be used on hard surfaces such as pavement.

N/A Hay bale barriers.

N/A Stone check dams.

■ Gravel construction exit.

N/A Temporary sediment trap.

■ The treatment BMPs proposed.

N/A Any innovative BMPs proposed.

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CONSTRUCTION SEQUENCE / EROSION CONTROL

■ Note that the project must be managed to meet the requirements and intent of RSA 430:53 and Agr 3800 relative to invasive species.

■ Note that perimeter controls shall be installed prior to earth moving operations.

■ Note that temporary water diversion (swales, basins, etc.) must be used as necessary until areas are stabilized.

■ Note that ponds and swales shall be installed early on in the construction sequence (before rough grading the site).

■ Note that all ditches and swales shall be stabilized prior to directing runoff to them.

■ Note that all roadways and parking lots shall be stabilized within 72 hours of achieving finished grade.

■ Note that all cut and fill slopes shall be seeded or loamed within 72 hours of achieving finished grade

■ Note that all erosion controls shall be inspected weekly AND after every half-inch of rainfall.

■ Note the limits on the open area allowed, see Env-Wq 1505.02 for detailed information.

Example note: The smallest practical area shall be disturbed during construction, but in no case shall exceed 5 acres at any one time before disturbed areas are stabilized.

■ Note the definition of the word “stable.”

Example note: An area shall be considered stable if one of the following has occurred:

- Base course gravels have been installed in areas to be paved.
- A minimum of 85 percent vegetated growth has been established.
- A minimum of 3 inches of non-erosive material such stone or riprap has been installed.
- Or, erosion control blankets have been properly installed.

■ Note the limit of time an area may be exposed.

Example note: All areas shall be stabilized within 45 days of initial disturbance.

■ Provide temporary and permanent seeding specifications. Note that although reed canary grass is listed in the Green Book; it is a problematic species according to the Wetlands Bureau and therefore should not be specified.

■ Provide winter construction notes that meet or exceed our standards.

Standard Winter Notes:

- All proposed vegetated areas that do not exhibit a minimum of 85 percent vegetative growth by October 15, or which are disturbed after October 15, shall be stabilized by seeding and installing erosion control blankets on slopes greater than 3:1, and seeding and placing 3 to 4 tons of mulch per acre, secured with anchored netting, elsewhere. The installation of erosion control blankets or mulch and netting shall not occur over accumulated snow or on frozen ground and shall be completed in advance of thaw or spring melt events.
- All ditches or swales which do not exhibit a minimum of 85 percent vegetative growth by October 15, or which are disturbed after October 15, shall be stabilized temporarily with stone or erosion control blankets appropriate for the design flow conditions.
- After October 15, incomplete road or parking surfaces where work has stopped for the winter season shall be protected with a minimum of 3 inches of crushed gravel per NHDOT item 304.3.

N/A Note at the end of the construction sequence that “Lot disturbance, other than that shown on the approved plans, shall not commence until after the roadway has the base course to design elevation and the associated drainage is complete and stable.” – This note is applicable to single/duplex family subdivisions, when lot development is not part of the permit.

DRAINAGE ANALYSES

Please provide double-side 8 ½" × 11" sheets where possible but, **do not** reduce the text such that more than one page fits on one side.

☐ Professional Engineer stamp.

☐ Rainfall amount obtained from the Northeast Regional Climate Center. Include extreme precipitation table as obtained from this source.

☐ Drainage analyses, in the following order:

- Pre-development analysis: Drainage diagram.
- Pre-development analysis: Area Listing and Soil Listing.
- Pre-development analysis: Node listing 1-year (if applicable), 2-year, 10-year and 50-year.
- Pre-development analysis: Full summary of the 10-year storm.
- Post-development analysis: Drainage diagram.
- Post-development analysis: Area Listing and Soil Listing.
- Post-development analysis: Node listing for the 2-year, 10-year and 50-year.
- Post-development analysis: Full summary of the 10-year storm.

☐ Review the Area Listing and Soil Listing reports

- Hydrologic Soil Groups (HSG) match the HSGs on the soil maps provided.
- There is the same or less HSG A soil area after development (check for each HSG).
- There is the same or less "woods" cover in the post-development.
- Undeveloped land was assumed to be in "good" condition.
- The amount of impervious cover in the analyses is correct.

Note: A good check is to subtract the total impervious area used in the pre-analysis from the total impervious area used in the post-analysis. For residential projects without demolition occurring, a good check is to take this change in impervious area, subtract out the roadway and divide the remaining by the number of houses or units proposed. Do these numbers make sense?

☐ Check the storage input used to model the ponds.

☐ Check to see if the artificial berms pass the 50-year storm, i.e., make sure the constructed berms on ponds are not overtopped.

☐ Check the outlet structure proposed and make sure it matches that modeled.

☐ Check to see if the total areas in the pre and post analyses are same.

☐ Confirm the correct NRCS storm type was modeled (Coos, Carroll and Grafton counties are Type II, all others Type III).

PRE- AND POST-CONSTRUCTION DRAINAGE AREA PLANS

☐ Plans printed on 34 - 36" by 22 - 24" on white paper.

☐ Submit these plans separate from the soil plans.

☐ A north arrow.

☐ A scale.

☐ Labeled subcatchments, reaches and ponds.

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■ Tc lines.

■ A clear delineation of the subcatchment boundaries.

N/A Roadway station numbers.

■ Culverts and other conveyance structures.

PRE- AND POST-CONSTRUCTION COLOR-CODED SOIL PLANS

■ 11" × 17" sheets suitable, as long as it is readable.

■ Submit these plans separate from the drainage area plans.

■ A north arrow.

■ A scale.

N/A Name of the soil scientist who performed the survey and date the soil survey took place.

■ 2-foot contours (5-foot contours if application is for a gravel pit) as well as other surveyed features.

■ Delineation of the soil boundaries and wetland boundaries.

■ Delineation of the subcatchment boundaries.

■ Soil series symbols (e.g., 26).

■ A key or legend identifying each soil series symbol and its associated soil series name (for example: 26 = Windsor).

■ The hydrologic soil group color coding (A = Green, B = yellow, C= orange, D=red, Water=blue, and Impervious = gray).

Please note that excavation projects (including gravel pits) have similar requirements to those above, with the following common exceptions or additions:

N/A Drainage report is not needed if site does not have off-site flow.

N/A 5-foot contours are allowed rather than 2-foot.

N/A No Professional Engineer stamp is needed on the plans.

N/A Add a note to the plans that the applicant must provide NHDES a written update of the project and revised plans documenting the project status every five years from the date of the Alteration of Terrain permit.

N/A Add reclamation notes.

N/A A description of the subsurface conditions to the planned depth of excavation, including the elevation of the location of the Seasonal High Water Table (SHWT), as observed and described by a certified soil scientist, or an individual holding a valid permit as a permitted designer as issued by the department's Subsurface Systems Bureau.

For more resources, refer to the Natural Resources Conservation Service's Vegetating New Hampshire Sand and Gravel Pits publication.

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SHORELAND PERMIT BY NOTIFICATION (PBN) ELIGIBILITY AND CHECKLIST

Water Division / Land Resources Management

Check Application Status

Keep this page for your reference. Do not submit it with your application.

Please confirm that your project meets the qualifications for a Shoreland Permit by Notification (PBN). Note that if a PBN is rejected, there is no process for adjustment, and the fee will not be returned.

ELIGIBILITY

Your project must meet **each** of the following statements to qualify for the simplified PBN process:

- ☒ The project **does not** include work in the water or within the bank of a waterbody, such as a dock, boathouse, or retaining wall; the project is not within the 100-foot tidal buffer zone; and the project does not include beach sand replenishment.
- ☒ The project **does not** impact more than 1,500 square feet or result in a net increase of more than 900 square feet of impervious area. "Project" is defined as the full scope of development activities that are proposed to take place on a parcel of property within 5 years of the application date. These square footage limits do not apply to project types 2, 3, and 4 listed in Section 5.
- ☒ The project **has not** already begun or been completed. After-the-Fact projects must be reviewed as Shoreland Permit Applications.
- ☒ The project **does not** include the modification, expansion, or redevelopment of a nonconforming structure. These projects typically require a More Nearly Conforming Request and review as Shoreland Permit Applications. Note that exceptions **may** apply to some projects involving decks attached to nonconforming primary structures. Contact the Shoreland Program for more information.

Does your project proposal meet **all** statements above?

- ☒ Yes - proceed.
- ☐ No - you must use the standard Shoreland Permit Application form and / or a Wetlands Permit Application form.

UNSURE?

- Check the activities that do not require a shoreland permit.
- Read the Vegetation Management for Water Quality fact sheet and Frequently Asked Questions.
- Email shoreland@des.nh.gov or call (603) 271-2147 to speak with the Inspector of the Day.

INSTRUCTIONS

Mail your complete application form and supporting materials to 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095.

To increase the chances of your PBN being accepted, ensure that you have completed the following:

- ☐ The property owner has read and signed the form and initialed the conditions and certifications in Sections 9 and 10.
- ☐ The notification includes a check with the correct fee, per Section 6.
- ☒ The notification includes photos of each area that will be impacted, per Section 7.
- ☒ The notification includes a complete plan of the proposed work in accordance with Section 8.

WHAT TO EXPECT

The New Hampshire Department of Environmental Services (NHDES) will review your notification within five business days and email (if provided) or mail you a copy of the accepted notification or a notice of rejection.

SHORELAND PERMIT BY NOTIFICATION (PBN) NOTIFICATION FORM

Water Division / Land Resources Management

Check Application Status

RSA/Rule: RSA 483-B/Env-Wq 1400

Administrative Use Only	Administrative Use Only	☐ PBN Accepted, Expires:	
		☐ PBN Rejected	Reviewer's Initials:
		File No.:	Admin's Initials:
		Check No.:	Amount:

This form requests authorization to excavate, fill, or construct new structures within the protected shoreland, which is 250 feet landward of the reference line of public waters, as regulated under RSA 483-B. Refer to the cover sheet to determine your eligibility to use this form instead of a standard Shoreland Permit Application form. By providing your email address, you authorize NHDES to communicate matters relative to this filing electronically, using your email address. Please note that PBNs missing required components will be rejected, and the fee will not be returned.

SECTION 1 - PROPERTY OWNER (RSA 483-B:5-b; Env-Wq 1406.17)			
LAST NAME, FIRST NAME, M.I.: Unitil Energy Systems, Inc. (c/o Nathan Sherwood, PE)			
MAILING ADDRESS: 6 Liberty Lane	TOWN/ CITY: Hampton	STATE: NH	ZIP CODE: 03824
PHONE: 603-773-6476	EMAIL: sherwood@unitil.com		
SECTION 2 - PROJECT LOCATION (RSA 483-B:5-b; Env-Wq 1406.17)			
ADDRESS: 1-7 McGuire Street	TOWN/ CITY: Concord	STATE: NH	ZIP CODE: 03301
WATERBODY NAME: Merrimack River	TAX MAP/ LOT: 494Z-44		
SECTION 3 - CONTRACTOR OR AGENT (Env-Wq 1406.17)			
LAST NAME, FIRST NAME, M.I: Nicholas, Golon			
MAILING ADDRESS: 48 Constitution Drive	TOWN/ CITY: Bedford	STATE: NH	ZIP CODE: 03110
PHONE: 603-472-4488	EMAIL: ngolon@tfmoran.com		
SECTION 4 - PROJECT DESCRIPTION (Env-Wq 1406.17)			

Briefly describe the proposed project. Include square footage of impacts and dimensions of new structures.

Unitil is proposing to relocate the existing West Concord Substation from the current location to the southern portion of the parcel. Approximately 6,645 sf of shoreland impacts will occur as a result of construction.

TOTAL SQUARE FEET OF IMPACT: 6,645 TOTAL SQUARE FEET OF NET CHANGE IN IMPERVIOUS AREA: 5,133

Total impact area is determined by the sum of all areas disturbed by excavation, fill, and construction. Examples include, but are not limited to: constructing new driveways, constructing new structures, removing or replacing structure foundations, grading, and installing a new septic system.

SECTION 5 - PBN CRITERIA (RSA 483-B:5-b; Env-Wq 1406.05)
Check one of the following project type criteria.

☐ 1. This project impacts less than 1,500 square feet in total, with a net increase in impervious area, if any, of no more than 900 square feet. *PBN Impact Limit: 1,500 square feet/ Fee: $400.*

☐ 2. This project is proposed for the purpose of stormwater management improvements, erosion control, or environmental restoration or enhancement. *PBN Impact Limit: None/ Fee: $200.*

☒ 3. The project is for the maintenance, repair, and improvement of public utilities, public roads, and public access facilities. *PBN Impact Limit: None/ Fee: $400.*

☐ 4. The project consists of geotechnical borings, test wells, drinking water wells or is a site remediation project and meets the requirements of Env-Wq 1406.05. *PBN Impact Limit: None / Fee: $400.*

SECTION 6 - FEE (RSA 483-B:5-b; Env-Wq 1406.16)

Consult Section 5 to determine fee. If paying by check or money order, please make payable to "Treasurer - State of New Hampshire". Undated checks **cannot** be accepted. TOTAL FEE: $ 400.00

SECTION 7 - PHOTOS (RSA 483-B:5-b; Env-Wq 1406.16)

☒ Dated photographs of each area proposed to be impacted are required for all projects.

SECTION 8 - PLAN REQUIREMENTS (RSA 483-B:5-b; Env-Wq 1406.16)
Check YES or NO to **all** statements, and review the applicable plan requirements. If your plans do not include the information that is required, your notification will be rejected.

☒ YES	**Required for all projects:** A clear and detailed plan of work depicting, at a minimum, all impact areas, the reference line, and property lines. Plans that are not to scale must show all relevant dimensions and distances from the reference line and dimensions.	
☒ YES ☐ NO	This project proposes an increase in impervious (non-permeable) area. Plans must include the dimensions and locations of *all* existing and proposed impervious surfaces on the lot that are within 250 feet of the reference line. Decks are typically considered impervious.	
☐ YES ☒ NO	< 20%	This project proposes an increase in impervious area, and the total post-construction impervious area on the lot within 250 feet of the reference line will not exceed 20%.
☒ YES ☐ NO	20 – 30%	This project proposes an increase in impervious area such that the total impervious area of the lot within 250 feet of the reference line will be greater than 20% but less than 30%. Plans must include a stormwater management system that will infiltrate increased stormwater runoff from development per RSA 483-B:9, V(g)(2) and in accordance with Env-Wq 1500.
☐ YES ☒ NO	> 30%	This project proposes an increase in impervious area such that the total impervious area on the lot within 250 feet of the reference line will be greater than 30%. Plans must include a stormwater management system designed and certified by a professional engineer to account for all new development, **and** plans must demonstrate how the vegetation point score is met per RSA 483-B:9, V(g)(1,3).
☐ YES ☒ NO	This project proposes impacts within 50 feet of the reference line. Plans and photos must show each area of the waterfront buffer that will be impacted, including groundcover, and calculate the tree and sapling point scores in accordance with the Vegetation Management For Water Quality fact sheet.	
☐ YES ☒ NO	This project proposes impacts between 50 and 150 feet of the reference line. Plans must depict the 25% area of the woodland buffer to be designated and maintained as natural woodland. For more information, please see the Vegetation Management For Water Quality fact sheet.	

☐ YES ■ NO	This project proposes to install or expand an accessory structure, such as a patio or shed, within 50 feet of the reference line. All plans *must* demonstrate that the height, size, and setback limitations for accessory structures will be met. These limitations are described in the Shoreland Accessory Structures fact sheet. The shoreland frontage on this lot is: 385 linear feet. N/A – There is no direct frontage on this lot.
☐ YES ■ NO	This project proposes a pervious (permeable) surface technology. Plans must include the location and type of the surface and a cross-section depicting the construction method, materials, and specifications as to how this surface will be maintained as a pervious technology. The notification must also include a maintenance plan describing how the surfaces will be maintained pervious.

SECTION 9 - CONDITIONS (Env-Wq 1406.20; RSA 483-B:9, V, (d))
Initial each of the required conditions below.

NS 1. Erosion and siltation control measures shall: be installed prior to the start of work; be maintained throughout the project; and remain in place until all disturbed surfaces are stabilized.

NS 2. Erosion and siltation controls shall be appropriate to the size and nature of the project and to the physical characteristics of the site, including slope, soil type, vegetative cover, and proximity to wetlands or surface waters.

NS 3. No person undertaking any activity in the protected shoreland shall cause or contribute to, or allow the activity to cause or contribute to, any violations of the surface water quality standards established in Env-Ws 1700 or successor rules in Env-Wq 1700.

NS 4. Any fill used shall be clean sand, gravel, rock, or other suitable material.

NS 5. For any project where mechanized equipment will be used, orange construction fence shall: be installed prior to the start of work at the limits of the temporary impact area as shown on the plans approved as part of a permit or accepted as part of the permit by notification; be maintained throughout the project; and remain in place until all mechanized equipment has been removed from the site.

SECTION 10 - CERTIFICATIONS (Env-Wq 1406.18)
Initial each of the required certifications below.

NS 1. The property owner shall sign the notification form below.

NS 2. The signature(s) shall constitute certification that: the information provided is true, complete, and not misleading to the knowledge and belief of the signer; the signer understands that any permit by notification obtained based on false, incomplete, or misleading information is not valid; the project as proposed complies with the minimum standards established in RSA 483-B:9, V and will be constructed in strict accordance with the proposal; the signer accepts the responsibility for understanding and maintaining compliance with RSA 483-B and these rules; the signer understands that an accepted shoreland permit by notification shall not exempt the work proposed from other state, local, or federal approvals; the signer understands that incomplete notifications shall be rejected and the notification fee shall not be returned; and the signer is subject to the applicable penalties in RSA 641, *Falsification In Official Matters*.

NS 3. The signature of the property owner certifies that the property owner has authorized the agent to act on the property owner's behalf for purposes of the notification. (☐ Not Applicable)

SECTION 11 - REQUIRED SIGNATURE (RSA 483-B:5-b; Env-Wq 1406.18)

SIGNATURE (OWNER):	PRINT NAME LEGIBLY: Nathan Sherwood	DATE: 9/22/2025
SIGNATURE (AGENT, IF APPLICABLE):	PRINT NAME LEGIBLY: Nicholas Golon	DATE: 9/22/2025