CAVANARO CONSULTING

• Land Use Planning
• Civil Engineering
• Construction Permitting

September 24, 2021

Douglas Golemme, Chair
Rockland Conservation Commission
242 Union Street
Rockland, MA 02301

RE: **Concord Meadows – Proposed Planned Unit Development 365 Concord Street**
Notice of Intent Peer Review MassDEP File No. SE 273-0416

Dear Mr. Golemme:

The purpose of this letter is to address comments received from Mr. Jonathan Niro and Mr. Gary James, P.E. of BETA dated 8/30/21.

Below is a copy of the review comments in normal font followed by our responses in ***bold italics***:

Comments from BETA, dated 8/30/21

ADMINISTRATIVE AND PLAN COMMENTS:

A1. MassDEP has not issued technical comments on this filing as of this writing.

Response: MassDEP has issued a DEP File No. SE 273-0416 on 7/26/21 with no further comments.

A2. The Applicant submitted a fee under both Category 3 (subdivision roadway) and Category 2 (single-family residence) per the WPA fee schedule. However, only seven (7) activities were included under the Category 2 (single-family residence) fee. Eleven (11) single-family homes are located within Buffer Zone to BVW. Provide an updated fee transmittal form and confirm that the Rockland Conservation Commission and the Massachusetts Department of Environmental Protection (MassDEP) receive the remaining owed fees of $1,012.50 and $987.50, respectively.

Response: The applicant has included a revised fee transmittal form and additional fees to MassDEP and the Rockland Conservation Commission under this cover.

A3. The Applicant did not provide the fees required under the Bylaw. The appropriate fees ($1,925.00) should be submitted in accordance with the attached Rockland Conservation Commission fee schedule.

Response: The applicant has included a revised fee transmittal form and additional fees to MassDEP and the Rockland Conservation Commission under this cover.

A4. Provide information on the source of the survey, including the dates and methods used. Indicate the horizontal and vertical datums used and how they were established.

Response: The Plans have been updated with a note specifying the vertical and horizontal datum. The

vertical datum is NAVD 88 and horizontal datum is NAD 83, both were established by a GPS survey unit.

A5. Provide survey benchmarks.

Response: Benchmarks have been added to the existing conditions plan.

A6. Abutting properties have been labeled with Assessor references; however, labels with now/formerly owner names should also be included.

Response: Now / Formerly have been added to the abutting labels.

A7. Provide the Conservation Commission with a summary of where the Project stands in relation to the Planning Board PUD review process.

Response: There were two hearings scheduled for the project. The first hearing was held on 6/22/21. The second hearing was scheduled for 8/24/21 in order to allow the Conservation Commission to provide feedback to the Planning Board after the Conservation hearing initially scheduled for 8/10/21. Peer review for the project was finalized by Mr. Patrick Brennan of Amory Engineers on behalf of the Planning Board on 8/6/21. Due to a lack of quorum, the Planning Board hearing on 8/24/21 did not take place and has been rescheduled for 10/26/21.

A8. Provide the Conservation Commission with proof of abutter notification.

Response: Abutter notifications were mailed on 7/20/21 and again on 8/16/21. Proof of notification was emailed to conservation@rockland-ma.gov and clerkdept@rockland-ma.gov on both occasions and the second notification was also emailed to Karianne Golemme on 8/16/21. Proof of notification for both dates was also emailed to BETA on 9/14/21, and hand delivered to the Commission on 9/14/21.

WETLAND RESOURCE AREAS AND REGULATORY REVIEW
RESOURCE AREA BOUNDARY COMMENTS AND RECOMMENDATIONS

W1. As noted by the Applicant, the intermittent tributary to French Stream that bisects the Site is associated with FEMA Zone AE and Zone A flood hazards. The Applicant should clarify the boundary of the Zone AE, as the noted base flood elevation (BFE) does not appear to correlate with the topography shown.

Response: New FEMA flood maps were released just prior to the submission of the NOI, dated July 7, 2021. These flood maps do not increase jurisdictional area within the locus. The revised plans reflect the latest flood maps.

W2. Determine a BFE for the onsite Zone A to establish an accurate BLSF boundary.

Response: The floodplain Base Flood Elevation (BFE) along French's Stream decreases from north to south. The BFEs along the intermittent stream closest to the proposed PUD were transposed from French's Stream study resulting in BFE 82.0 at the southernmost limit of study along the intermittent stream (behind the existing single family home development). The floodplain that follows the intermittent stream in a southerly direction does not have a specified BFE but it will decrease in elevation as it does along French's Stream. That is, the BFE in the Zone A floodplain along the intermittent stream will decrease in a southerly direction from a maximum BFE of 82.0 at the limit of study. Therefore, we know that the BFE from the limit of study until the south property boundary will be less

than elevation 82.0 which is primarily located within the BVW associated with the intermittent stream where no work is proposed.

The Zone A associated with the intermittent stream which was not studied by FEMA continues south for about 0.5 mile until it meets the area studied by FEMA associated with French's Stream. Determining BFEs for the Zone A would require an extensive study. However, since no work is being proposed below elevation 82.0 along the intermittent stream and we know that BFEs along this stream south of the limit of study will be lower than elevation 82.0, determining BFEs for this Zone A is unnecessary.

W3. Provide justification for the Vernal Pool (CVP #2682) boundary depicted on the plans. During a Site visit on August 25, 2021, BETA observed conditions throughout the entirety of the center of the C Series BVW similar to conditions within the area depicted as a Vernal Pool on the plans. This includes ponding over one (1) foot in depth, a topographic break in slope, water-staining on leaves, and potential attachment sites for Vernal Pool wildlife. An accurate boundary of the Vernal Pool must be established in order to determine the extent of the Bylaw VPRA at the Site.

Response: On September 8, 2021, South River Environmental field delineated the limit of vernal pool habitat associated with the Certified Vernal Pool located closest to the project area within Wetland Series C. The remainder of Wetland Series C does not hold a sufficient volume of water during the breeding season for juveniles of obligate vernal pool breeding species to complete development. The portion of Wetland Series C that is separated from the CVP contained approximately 8 to 10 inches of standing water <u>after</u> upwards of six inches of rainfall during the preceding week and above-average precipitation through the past several months

CONSTRUCTION COMMENTS AND RECOMMENDATIONS

W4. Remove all references to hay bales in the construction sequencing narrative and erosion control details.

Response: All references to hay bales have been removed from the plan set.

W5. Remove references to the Town of Hingham in the construction sequencing narrative.

Response: References have been corrected in the construction sequencing narrative.

W6. Provide distances between stakes and overlap length on the compost filter tube detail and include siltation fencing embedded to a minimum depth of six (6) inches.

Response: The compost filter tube typical detail has been revised as requested.

W7. Section 2 of the construction sequencing plans discusses the potential for vegetation to be mulched onsite. A dense stand of Japanese knotweed (*Fallopia japonica*) was observed adjacent to the existing driveway. Provide an invasive species control plan for the Site.

Response: The restoration site has a low to moderate potential for colonization by non-indigenous species. A qualified botanist or other qualified individual will inspect the restored areas within the Conservation Commission's jurisdiction for invasive species to determine the presence / extent of invasive / opportunistic species within the restoration area. Areas containing significant populations of invasive species including but not limited to Asiatic bittersweet (Celastrus orbicultata), black locust (Robinia

pseudoacacia), multiflora rose (Rosa multiflora) and glossy buckthorn (Frangulus alna) will be identified in the field and documented on applicable site plans. The invasive species control plan will provide for long-term maintenance activities within the buffer zone.

Invasive species management will occur within areas disturbed during construction within the Conservation Commission's jurisdiction but not located within areas of maintained lawn or active landscaping. The invasive species will be cut flush at ground level, and the cuttings will be placed into plastic trash / contractor bags and disposed of at a landfill or transfer station. The owners also request approval for limited direct application of herbicide (Glyphosate or equivalent) on the cut stems by a licensed applicator. No herbicide applications will occur without the prior approval of the Commission.

The applicant proposed to conduct invasive species management for a period of three growing seasons subsequent to the completion of final restoration activities. Invasive species management will be conducted in the same manner as describe above with a combination of mechanical removal and limited herbicide application.

W8. Remove the stockpile/staging area depicted within Buffer Zone per Section 3 of the construction sequencing plan.

Response: Stockpile / staging areas have been moved outside the buffer zone.

W9. Section 7 of the construction sequencing narrative indicates that home sites will be constructed in phases to *"control construction impacts to the Site and also consider current market demands for home sales"*. BETA recommends that the Applicant provide a phasing plan for clearing as well to keep exposed surfaces to a minimum during the construction process.

Response: The Applicant has incorporated erosion controls into the Project design in areas subject to the jurisdiction of the Conservation Commission to ensure that exposed soils do not result in sedimentation or erosion into wetland resource areas. Clearing associated with the Project will be conducted in the following sequence in areas subject to the Commission's jurisdiction:

1. ***Subdivision roadway***
2. ***Areas dedicated for stormwater management***
3. ***Individual house lots***

W10. Provide a seed mixture for the stabilization of the Site.

Response: These three different seed mixtures may be used within areas subject to the Conservation Commission's jurisdiction to stabilize exposed soil.

NEW ENGLAND WETLAND PLANTS, INC

820 WEST STREET, AMHERST, MA 01002
PHONE: 413-548-8000 FAX 413-549-4000
EMAIL: INFO@NEWP.COM WEB ADDRESS: WWW.NEWP.COM

New England Roadside Matrix Upland Seed Mix

Botanical Name	Common Name	Indicator
Elymus virginicus	Virginia Wild Rye	FACW-
Desmodium paniculatum	Panicledleaf Tick Trefoil	
Schizachyrium sccparium	Little Bluestem	FACU
Andropogon gerardii	Big Bluestem	FAC
Festuca rubra	Red Fescue	FACU
Sorghastrum nutans	Indian Grass	UPL
Panicum virgatum	Switch Grass	FAC
Rhus typhina	Staghorn Sumac	
Cornus racemosa	Grey Dogwood	FAC
Cornus amomum	Silky Dogwood	FACW
Oenothera biennis	Evening Primrose	FACU-
Asclepias tuberosa	Butterfly Milkweed	NI
Rudbeckia hirta	Black Eyed Susan	FACU-
Chamaecrista fasciculata	Partridge Pea	FACU
Eupatorium fistulosum (Eutrochium fistulosum)	Hollow-Stem Joe Pye Weed	FACW

PRICE PER LB. $69.00 MIN. QUANITY 1 LBS. **TOTAL:** $69.00 APPLY: 35 LBS/ACRE :1250 sq ft/lb

The New England Roadside Matrix Mixes are designed for use along roads and highways. These mixes are unusual in that tey contain native grasses, wildflowers, and shrubs that are blended together as a native matrix seed mix. In areas that receive frequent mowing, the cold season grasses will dominate, such as those areas closet to the roadway shoulder. In areas farther from the road, which may be mown only once each year, or in hard to mow areas, such as around sign posts, the wildflower component will become dominant.. Along cuts and side slopes which may never be mown, the shrub component will add diversity and beauty to the roadside plantings.it is a particularly appropriate seed mix for roadsides, industrial sites, or cut and fill slopes. These mixes may be applied by hydroseeding, or by mechanical spreader. Always apply on a clean, wed-free seed bed. After sowing, lightly rake or roll the site to improve seed-to-soil contact. Best results are obtained with a mid-late spring seeding.summer seeding will benefit from a light mulching of clean, weed-free straw to conserve soil moisture

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged. Price is $/bulk pound, FOB warehouse, Plus SH and applicable taxes.

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New England Conservation/Wildlife Mix

Botanical Name	Common Name	Indicator
Elymus virginicus	Virginia Wild Rye	FACW-
Schizachyrium scoparium	Little Bluestem	FACU
Andropogon gerardii	Big Bluestem	FAC
Festuca rubra	Red Fescue	FACU
Sorghastrum nutans	Indian Grass	UPL
Panicum virgatum	Switch Grass	FAC
Chamaecrista fasciculata	Partridge Pea	FACU
Desmodium canadense	Showy Tick Trefoil	FAC
Asclepias tuberosa	Butterfly Milkweed	NI
Bidens frondosa	Beggar Ticks	FACW
Eupatorium purpureum (Eutrochium maculatum)	Purple Joe Pye Weed	FAC
Rudbeckia hirta	Black Eyed Susan	FACU-
Aster pilosus (Symphyotrichum pilosum)	Heath (or Hairy) Aster	UPL
Solidago juncea	Early Goldenrod	

PRICE PER LB. $39.50 MIN. QUANITY 2 LBS. **TOTAL:** $79.00 APPLY: 25 LBS/ACRE :1750 sq ft/lb

The New England Conservation/Wildlife Mix provides a permanent cover of grasses, wildflowers, and legumes For both good erosion control and wildlife habitat value. The mix is designed to be a no maintenance seeding, and is appropriate for cut and fill slopes, detention basin side slopes, and disturbed areas adjacent to commercial and residential projects.

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged. Price is $/bulk pound, FOB warehouse, Plus SH and applicable taxes.

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New England Erosion Control/Restoration Mix for Dry Sites

Botanical Name	Common Name	Indicator
Elymus canadensis	Canada Wild Rye	FACU+
Festuca rubra	Red Fescue	FACU
Lolium multiflorum	Annual Ryegrass	
Lolium perenne	Perrenial Ryegrass	
Schizachyrium scoparium	Little Bluestem	FACU
Panicum virgatum	Switch Grass	FAC
Sorghastrum nutans	Indian Grass	UPL

PRICE PER LB. $18.00 MIN. QUANITY 5 LBS. **TOTAL:** $90.00 APPLY: 35 LBS/ACRE :1250 sq ft/lb

The New England Erosion Control/Restoration Mix For Dry Sites provides an appropriate selection of native and naturalized grasses to ensure that dry and recently disturbed sites will be quickly revegetated and the soil surface stabilized. It is an appropriate seed mix for road cuts, pipelines, steeper slopes, and areas requiring quick cover during the ecological restoration process. The mix may be applied by hydro-seeding, by mechanical spreader, or on small sites it can be spread by hand. Lightly rake, or roll to ensure proper soil-seed contact. Best results are obtained with a Spring or late Summer seeding. Late Spring through Mid-Summer seeding will benefit from a light mulching of weed-free straw to conserve moisture. If conditions are drier than usual, watering will be required. Fertilization is not required unless the soils are particularly infertile. Preparation of a clean weed free seed bed is necessary for optimal results.

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged. Price is $/bulk pound, FOB warehouse, Plus SH and applicable taxes.

W11. The erosion control plans state that the areas of proposed stormwater basins will not be traversed by heavy machinery before or after construction. Provide a method for ensuring that this is adhered to.

Response: A note has been added to the Erosion Control Plan and basins will be staked to avoid heavy machinery.

W12. Provide a plan depicting construction-period stormwater controls.

Response: The Erosion Control Plan has been updated to include dewatering and stockpiling erosion control notes.

W13. Provide a detail for the stockpile/staging areas that depicts perimeter erosion controls around the stockpiles.

Response: A note has been added for stockpile areas.

W14. Grading at the Site presents the potential for erosion of steep slopes – for example, the proposed 1.5H:1V slope at the north side of the Site entrance. Provide interim stabilization measures for steep slopes.

Response: Maximum slopes have been reduced to 2':1'. If necessary, steep slopes that will be exposed for more than 14 days will be stabilized using annual rye or an equivalent vegetative cover. Should slopes

require stabilization during active construction, jute matting or equivalent shall be used.

W15. The Applicant should provide a dewatering detail that includes potential upland discharge locations.

Response: Dewatering locations will be determined during construction based on the locations where dewatering is required. No dewatering will occur within the 25-foot no disturbance buffer. All dewatering will be directed through a dewatering structure.

W16. Provide details for the development activities associated with the construction of the roadway at the north end of the C Series BVW. Include detail drawings for the retaining wall and revise all profiles and construction narratives to consider the 12-inch CPP observed in the field.

Response: Infiltration Basin 1 has been relocated outside of the 25' Buffer Zone. The entrance road was moved north and a wall is proposed instead of grading in order to minimize work within the already disturbed 25' Buffer. The erosion control plan has been revised to include a double row of silt sock and construction fencing in the vicinity of the C series wetlands and the 12" CPP pipe. The 12" CPP pipe has been added to the profile.

MITIGATION COMMENTS AND RECOMMENDATIONS

W17. The MassDEP Wetlands Change data layer depicts approximately 7,500 square feet of altered BVW west of the existing dwelling (WC2-251-34). BETA strongly recommends that the Rockland Conservation Commission require full restoration of this area as part of the Project.

Response: This comment was specifically addressed during BETA's review of the wetland boundary during the ANRAD process. The referenced area was included within the approved wetland boundary. There are no regulatory impact thresholds under the Act or Bylaw exceeded by the that would require restoration of this area, and it is not part of the overall Project. Therefore, the applicant does not propose restoration as part of the PUD project, but will leave it to the discretion of the Commission.

W18. BETA understands that a component of the Planning Board PUD review process is to integrate useable open space into the development. A significant portion of the proposed open space consists of Resource Areas including BVW, Bank, and BLSF. Describe the anticipated use and long-term management goals for these open space areas. Common open space should be cited within upland areas to prevent long-term impacts to Resource Areas.

Response: The purpose of a Planned Unit Development is to obtain no more than the maximum number of lots obtainable through a traditional (grid) subdivision but in a manner that would reduce the area of development and maximize areas of open space. The minimum area of open space required for the proposed PUD is 35% of the total land area or 7.4 acres of open space for the 21.2 acre property. Up to 30% of the <u>required</u> open space may be comprised of wetlands. That is, 2.2 acres of the 7.4 acres of open space may be comprised of wetlands in order to satisfy the minimum requirement. Lastly, the Planning Board may reduce the open space requirement.

The proposed PUD will protect 13.4 acres as open space or 63.2% of the entire parcel. The proposed 1.3 acres of recreation area is intended for passive recreation. However, the Planning Board has not made

its final decision on the proposed PUD as of yet.

W19. The Project does not describe any Buffer Zone mitigation for the proposed development, such as a planting plan. Provide a planting plan consisting of native species and the rationale for their selection for the Conservation Commission's review.

Response: Buffer zone mitigation is not required under either the Act or the Bylaw. However, the project proposes to protect 13.4 acres of land (63.2%) as open space of which almost 4 acres are comprised of vegetated wetlands. It is important to mention that the project does not propose any wetland crossings or wetland filling. As a matter of fact, the project proposes to preserve the extensive 8.5 acres of upland located between the BVW associated with the intermittent stream and the BVW associated with French's Stream. Additionally, approximately 6,315 sf of currently developed area within the 25-ft buffer, as identified on the Layout & Grading Plan, shall be restored with native plantings as Buffer Zone mitigation.

WPA PERFORMANCE STANDARDS COMMENTS AND RECOMMENDATIONS

Bordering Vegetated Wetland (310 CMR 10.55)

W20. The proposed roadway construction at the north end of the C Series BVW is likely to involve BVW impacts based on the information provided. Both erosion controls and the footprint of the proposed retaining wall are depicted directly over the BVW boundary. It is presumed that at the least, temporary impacts to BVW will be required in order to construct this wall. Provide the details requested in Comment W16 and demonstrate compliance with 310 CMR 10.55(4)(a)[1].

Response: In an effort to minimize work in the 25' Buffer, the entrance road was relocated north, Infiltration Basin 1 was relocated outside the 25' Buffer and grading was replaced with a retaining wall proposed over an existing area of lawn. No work within the BVW is proposed.

W21. The 12-inch CPP appears to potentially serve as a hydrologic connection between the C Series BVW and BVW complexes to the north. As noted in Comment W16, this pipe has not been considered in the roadway design and it is therefore assumed that the Project has the potential to alter[2] the BVWs associated with the CPP. The presumption of 310 CMR 10.55(3)[3] has not been overcome; therefore, the requested construction details should be provided and compliance with310 CMR 10.55(4)(a)-(b) should be demonstrated.

Response: The Project does not include any modification of the existing 12-inch CPP and, therefore, no

[1] 310 CMR 10.55(4)(a): Where the presumption set forth in 310 CMR 10.55(3) is not overcome, any proposed work in a Bordering Vegetated Wetland shall not destroy or otherwise impair any portion of said area.
[2] 310 CMR 10.04 states that the definition of Alter is to change the condition of any Area Subject to Protection under M.G.L. c. 131, § 40. Examples of alterations include, but are not limited to, the following: (a) the changing of pre-existing drainage characteristics, flushing characteristics, salinity distribution, sedimentation patterns, flow patterns and flood retention areas; (b) the lowering of the water level or water table; (c) the destruction of vegetation; (d) the changing of water temperature, biochemical oxygen demand (BOD), and other physical, biological or chemical characteristics of the receiving water
[3] 310 CMR 10.55(3): Where a proposed activity involves the removing, filling, dredging or altering of a Bordering Vegetated Wetland, the issuing authority shall presume that such area is significant to the interests specified in 310 CMR 10.55(1).

modification of the existing flow regime will occur. There is no proposed alteration of the BVW associated with the Project, and the presumption of 310 CMR 10.55(3) is not applicable. However, the existing pipe shall be inspected and repaired/replaced in-kind, as needed.

Bordering Land Subject to Flooding (310 CMR 10.57)

W22. The NOI application does not discuss impacts to BLSF; however, one (1) area of clearing totaling approximately 155 square feet is proposed. As discussed in Comments W1 and W2, an accurate boundary of BLSF should be determined and any work within BLSF should be qualified and quantified to demonstrate compliance with the Performance Standards at 310 CMR 10.57(4).

Response: The limit of bordering land subject to flooding (100-year floodplain) has been updated based on the most recent FEMA mapping for the project site and in accordance with 310 CMR 10.57(2)(a). Additionally, no work associated with the Project is proposed within BLSF.

BYLAW REGULATORY COMMENTS AND RECOMMENDATIONS

W23. Section 5C. of the Bylaw requires that a No Disturb Zone with a minimum width of 25 feet be maintained around all Resource Areas[4]. Work currently proposed within the 25-foot No Disturb Zone includes grading establishment of backyards, construction of impervious surfaces, and construction of stormwater management features. Provide a No Disturb Zone with a minimum of 25 feet in width as required by the Bylaw.

Response: The Applicant is requesting a waiver of the 25-foot No Disturb Zone associated with the Project. The entrance to the property is constrained by the property boundaries such that an undisturbed 25-foot buffer cannot be maintained. To allow for the clustering of the lots in the front portion of the property, encroachment into the 25-foot buffer zone is required to provide for minimal rear lawn areas for two lots and partial minimal lawn areas for two other lots. The overall proposed work located within the 25-foot no disturbance buffer for rear yard lawn is approximately 2,500 square feet which represents approximately 2% of the overall area of 25-foot buffer zone within the property. Additionally, approximately 1,200 sf of currently developed area within the 25-ft buffer is being reconfigured and slightly reduced for access to the existing dwelling.

To compensate for the impacts to the no-disturb buffer, the applicant is proposing to restore approximately 6,300 sf of currently developed area within the 25-ft buffer around the existing dwelling and adjacent to the existing paved driveway, as well as proposing to protect over 13 acres of the property in perpetuity with over half of that acreage consisting of either 100-foot buffer zone and/or 200-foot Riverfront Area, both of which are areas subject to the Commission's jurisdiction. Should a variance not be granted, the land in the eastern side of the property cannot be protected as the applicant would have to

[4] In order to protect such areas, there shall be a strip of continuous, undisturbed vegetative cover within 25 feet of the specified resource areas shall not be disturbed and treated as a no disturbance area. The Commission therefore may also require that the applicant maintain a strip of continuous, undisturbed vegetative cover within the aforementioned 100-foot or 200-foot area, unless the applicant convinces the Commission that the area or part of it may be disturbed without harm to the values protected by this chapter.

consider the use of that land to meet the lot density requirements to make the Project financially viable.

The purpose of a no disturbance buffer is to ensure the ability of the adjacent wetland resource area to continue to function to protect the interests of the Bylaw and, specifically, wildlife habitat. Long-term impacts due to construction and operation of the Project will be limited to minor clearing of upland forest. The wildlife populations that utilize the project areas will not be permanently adversely affected by the proposed project. While temporary impacts upon food, cover and shelter sources may occur, none of the species located within the project area are specialized in such a way that completion of the Project will inhibit the overall fitness or reproductive output of the populations as a whole. Most species are not dependent on the site to provide all of their habitat requirements. Many of the mammal, bird, reptile and amphibian species are adaptive to changing habitat conditions and possess the capability to expand or shift their home ranges to find alternative sources of food, water and shelter until the habitats become stabilized and restored. The existing habitat within the property will be protected by preserving an abundance of open space to support the indigenous populations of mammals, birds, reptiles, amphibians and fish that currently utilize the site.

The proposed activity within the no disturbance buffer is limited to minor grading and revegetation. There is no proposed new impervious area proposed within the no-disturbance buffer and no direct alteration of the bordering vegetated wetlands. The overall project protects the vast majority of upland buffer associated with the wetlands and maintains wetland habitat connectivity similar to existing conditions. The Project will not result in any alteration of the existing wildlife habitat or hydrology within the wetland, and it will continue to provide those important characteristics such as breeding habitat, feeding habitat, overwintering habitat and a corridor for migratory species in the same manner as existing conditions. The protection of over 13 acres of upland habitat adjacent to the wetland resource areas and restoration of over 6,300 sf of currently altered 25-ft buffer zone result in a net benefit to the ability of the wetland resource areas to protect the interests of the Bylaw.

W24. As discussed in Comment W3, an accurate boundary of the onsite Vernal Pool should be determined. Should the onsite VPRA increase in size due to a modification of this boundary, BETAstrongly recommends that the Conservation Commission either prohibit or strongly limit development within the VPRA in order to maintain transitional upland areas that likely serve as wildlife corridors.

Response: The Project, as currently designed, maintains the majority of the existing available habitat within the VPRA.

W25. The plans do not currently reflect the Bylaw Buffer Zone associated with BLSF. BETA recommends addressing comments related to the BLSF boundary prior to revising the Buffer Zones.

Response: The 25' buffer to the most recent BLSF is reflected on the plans.

STORMWATER MANAGEMENT REVIEW
The Project proposes to use three (3) infiltration basins to treat and attenuate stormwater flows generated at the Site. Runoff from the proposed roadways and a major portion of the driveways will be collected by six (6) catch basins in the roadway. Basins 2 & 3 will be interconnected and will ultimately discharge towards French Stream. Basin 1 will be located adjacent to the Site entrance at Concord Street and will discharge

towards the C Series BVW.

On May 21, 2021, a BETA Professional Engineer visited the site to observe existing conditions and confirm surface types and drainage patterns. BETA generally found the site to be wooded with dense underbrush.The test pits were in the general locations as shown on the plans. Evidence that the soils contain high quantities of fines was observed; therefore, the qualification of onsite soils as "C" soils appears to be appropriate.

GENERAL COMMENTS AND RECOMMENDATIONS

G1. The infiltration basins are each partially located within fifty (50) feet of Resource Areas, contrary to the design setback requirements as provided in Volume 2, Chapter 2 of the MassDEP Stormwater Management Handbook (the Handbook).

Response: Since this is a partial redevelopment project, the intent of the design is to provide as much treatment, peak rate of runoff and volume attenuation as possible. This objective was obtained by locating a small portion of the infiltration basins closer than 50' to the wetlands. The proposed design maximizes overall treatment and stormwater control in a way that benefits wetland health to the maximum extent practicable.

G2. The Water Quality Volume (WQV) used for the design of Basins 1 & 2 is 0.5 inches of runoff from the impervious surfaces. However, based upon the presence of the CVP within the C Series BVW,these areas qualify as Outstanding Resource Waters and the WQV should be one (1) inch. The design calculations for the basins should be adjusted accordingly.

Response: Standard 6 of the Massachusetts Stormwater Handbook requires discharges near or to critical areas to receive 44% TSS pretreatment. Certified vernal pools are considered critical areas. Item 3 in Table CA 2: Standard 6 of Volume 1 Chapter 1 of the Massachusetts Stormwater Handbook states that "Stormwater BMPs must be set back 100' from a certified vernal pool and comply with 310 CMR 10.60 . Proponents must perform a habitat evaluation and demonstrate that the stormwater BMPs meet the performance standard of having no adverse impact on the habitat functions of a certified vernal pool." The CVP located in the C Series BVW was reviewed in 2011 and again on 9/8/2021. The limit of the CVP as reflagged this month is reflected on the revised plans. No work is proposed within at least 125' of the limit of the CVP. The area within at least 125' of the CVP is presently wooded and is proposed to remain untouched. We could not find any reference in the Massachusetts Stormwater Handbook stating that if a CVP is located within a BVW that the entire BVW should be considered a Critical Area.

Massachusetts Surface Water Quality Standards, 314 CMR 4.06 (2) states "Wetlands. Wetlands bordering Class A Outstanding Resource Waters are designated Class A Outstanding Resource Waters. Vernal pools are designated Class B Outstanding Resource Waters. All wetlands bordering other Class B, SB or SA Outstanding Resource Waters are designated as Outstanding Resource Waters to the boundary of the defined area. All other wetlands are designated Class B, High Quality Waters for inland waters and Class SA, High Quality Waters for coastal and marine waters." This subsection of the Massachusetts Surface Water Quality Standards states that a CVP is an ORW and that wetlands bordering OTHER Class B ORWs are also ORWs to the boundary of the defined area. Therefore, 314 CMR 4.06 (2) does not state that if a BVW borders a CVP that the entire BVW shall also become an ORW. Therefore, we do not believe that the entire Series C BVW should be considered an ORW or a

critical area per the Stormwater Standards.

However, if we were to consider the Series C BVW a critical area per the review comments then the stormwater runoff proposed to be directed towards Series C BVW meets Standard 4 for critical areas. The only infiltration basin with an outlet near Series C BVW is Infiltration Basin 1. Infiltration Basin 2 discharges to Infiltration Basin 3 which discharges to the wetland where the intermittent stream is located which is not a critical area. Therefore, the pretreatment provided upstream of Infiltration Basin 1 consisting of deep sump catch basins and forebay provides the 44% TSS pretreatment required for critical areas.

G3. The Applicant has requested a waiver from the Planning Board regulations to provide 2H:1V sideslopes for Basin 1, which is contrary to the Handbook requirement of 3H:1V.

Response: The waiver request was reviewed by the Planning Board and its review engineer.

G4. The design of the basins is not in compliance with Volume 2, Chapter 2 of the Handbook. An emergency low level dewatering trench, a monitoring well, and an emergency spillway are required.

Response: Dewatering trenches were considered during the Planning Board review but its review engineer recommended that we remove them. Emergency spillways have been added to the infiltration basins' outlet structures.

G5. The existing 12-inch CPP under the driveway should be investigated further (see Comment W16), and based upon the findings, accounted for in the drainage calculations.

Response: The 12" Corrugated Plastic Pipe shall be inspected and replaced as needed.

G6. Access to the crest of Basin 2 from the roadway for maintenance access should be designed and shown.

Response: Access has been clarified on the plans.

G7. The inlets into the basins are each level with the bottom of the basins. The lowest outlet will maintain a minimum of twelve (12) inches of standing water in each basin prior to infiltration. The drainage analysis for these pipes incorrectly assumes free discharge rather than a submerged condition. BETA recommends that the inlets be raised a minimum of eight (8) inches (preferably twelve (12) inches) to match the minimum still water level and maintain free discharge

Response: The HydroCAD model was revised to consider transient ponding downstream. This was obtained by using the Dynamic Storage Indicator Method.

G8. There are no easements provided around Basin 2, the piping from the roadway into the basin, or access from the roadway to the basin.

Response: Drainage/ Access easements shall be added to the plans.

G9. A portion of the access around Basin 3 is located on Lots 19 & 20, and no easement is provided in

these areas.

Response: Drainage/ Access easements shall be added to the plans.

G10. Flow towards the Vernal Pool is critical to maintaining their viability from both a water quality and volume perspective. The Applicant appears to have balanced the discharges for the Site in an effort to maintain the water volume and watershed area associated with the Vernal Pool.

Response: No comment.

G11. The calculations indicate that the roof runoff will be infiltrated, yet there are no details or design calculations for the best management practice (BMP) that will be implemented.

Roof runoff was not initially infiltrated but it is now directed to individual drywells.

DEP STORMWATER STANDARDS
The Project was reviewed as it relates to MassDEP's Stormwater Management Standards; BETA offers the following comments:

NO UNTREATED STORMWATER (STANDARD NUMBER 1): No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth. The design proposes to use three (3) infiltration basins to treat the runoff associated with the roadway and a portion of the driveways.

Response: The Redevelopment Checklist in the Massachusetts Stormwater Handbook Volume 2 Chapter 3 for Standard 1 requires answers to the following questions:

Full compliance with Standard 1 is required for new outfalls.

- ***What BMPs are proposed to ensure that all new discharges associated with the discharge are adequately treated? Answer: There are two new outlets that discharge treated stormwater in the direction of the wetlands, namely the outlet from Infiltration Basin 1 and 3. The outlet from Infiltration Basin 2 discharges into Infiltration Basin 3. All Infiltration Basins have forebays and all stormwater from impervious areas receives at least 44% TSS pretreatment prior to entering the Infiltration Basins.***
- ***What BMPs are proposed to ensure that no new discharges cause erosion in wetlands or waters of the Commonwealth? Answer: Stone for pipe ends is called for the outlets from Infiltration Basins 1 and 3 that direct flow toward Series C and Series A BVWs.***
- ***Will the proposed discharge comply with all applicable requirements of the Massachusetts Clean Waters Act and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00? Answer: Yes. Stormwater runoff will receive the 80% TSS removal required prior to entering the wetlands. Moreover, 44% TSS removal pretreatment is also being provided even though there is no discharge within 100' of a Critical Area.***

Existing outfalls shall be brought into compliance with Standard 1 to the maximum extent practicable.

- ***Are there any existing discharges associated with the redevelopment project for which new***

treatment could be provided? Answer: There are no existing outlets but an approximate 5,792 SF area of existing pavement flows untreated to Series C BVW and an approximate 11,952 SF area of pavement flows untreated to Series A BVW.

- ***If so, the proponent shall specify the stormwater BMP retrofit measures that have been considered to ensure that the discharges are adequately treated and indicate the reasons for adopting or rejecting those measures. (See Section entitled "Retrofit of Existing BMPs".) The project proposes to reduce the area of untreated pavement runoff in the direction of the wetlands and increase the distance between the contributing untreated pavement and the wetlands. This is achieved by reducing the total untreated paved driveway area in the direction of Series C BVW from 5,792± SF to 1,155 SF, by providing a stone trench immediately downstream of the pavement and by increasing the distance traveled over ground to this wetland from 15.2'± to 96'±. The total untreated paved driveway area in the direction of Series A BVW will be reduced from 11,952± SF to 8,856± SF and by increasing the distance traveled over ground to the wetland from 1.8'± to 27.2'±.***
- ***What BMPs have been considered to prevent erosion from existing stormwater discharges? Answer: The distance between the untreated paved areas and wetlands was increased by over 6 times toward Series C BVW and over 15 times in the direction of Series A BVW.***

SW1. There are no BMPs provided for the runoff associated with any of the roof areas or those portions of the proposed driveways that are not within the catchment areas of the basins. Provide details for these BMPs.

Response: Roof runoff is now directed to individual drywells and driveways proposed to flow overground toward the wetlands are part of the redevelopment portion of the project. The total area of existing untreated paved driveway directed toward Series C BVW is 5,792 SF and the paved driveway is located as close to the wetlands as 15.2'. The total area of proposed paved driveway directed toward Series C BVW is 1,155 SF, it will be located 96'± away from the wetland and will be treated by an infiltration trench prior to flowing over ground toward Series C BVW. The total area of existing untreated paved driveway directed toward Series A BVW is 11,952 SF and the paved driveway is located as close to the wetlands as 1.8'. The total area of proposed paved driveway and existing paved driveway to remain untreated directed toward Series A BVW is 8,856 SF. Existing pavement has been reduced to maintain a minimum 27.2' distance to the Series A BVW. Therefore, the area of untreated pavement directed to the wetlands has been decreased from existing conditions and the minimum distance from the nearest paved driveway to the BVWs has been increased from existing conditions.

SW2. Provide rip-rap sizing calculations.

Rip-rap sizing shall be provided for the outlet locations.

SW3. The inlet into Basin 1 should be moved to the easterly edge of the basin to maximize contact time in the basin.

The inlet of Basin 1 has been relocated.

POST-DEVELOPMENT PEAK DISCHARGE RATES (STANDARD NUMBER 2): Stormwater management systems must be designed so that post-development peak discharge rates do not exceed pre- development peak discharge rates. The project proposes to mitigate increase to runoff rates

through theinstallation of gravel wetland and detention basins. The Project proposes an overall decrease of peak flowrates in post-development conditions in comparison to the pre-development conditions.

SW4. Update watershed maps to show both existing and proposed contours which will allow BETA to confirm an accurate watershed delineation.

Contours have been added to the watershed maps.

SW5. The total rainfall for the 100-year storm should be seven (7) inches as required by the Act.

The 100-year event has been increased from 6.8" to 7.0" of rainfall.

RECHARGE TO GROUNDWATER (STANDARD NUMBER 3): Loss of annual recharge to groundwater shouldbe minimized through the use of infiltration measures to maximum extent practicable. As shown on the Natural Resource Conservation Service (NRCS) web site, the soils at the Site are Hydrologic Soil Group "C".Test pits conducted onsite indicate that there are layers of higher class soils which will allow the Site to maintain compliance with this standard.

Response: The Redevelopment Checklist in the Massachusetts Stormwater Handbook Volume 2 Chapter 3 for Standard 3 requires answers to the following questions:

Compliance to the Maximum Extent Practicable:

- ***Does the redevelopment design meet Standard 3, comparing post-development to pre-development conditions? Answer: Yes.***
- ***If not, the applicant shall document an analysis of alternative approaches for meeting the Standard?***
- ***What soil types are present on the site? Is the site is comprised solely of C and D soils and bedrock at the land surface? Answer: NRCS Soil Survey classifies the soils on site to be C/D soils. Soils at the entrance to the site are A/D soils and soils in the wetland areas are D soils.***
- ***Does the project include sites where recharge is proposed at or adjacent to an area classified as contaminated, sites where contamination has been capped in place, sites that have an Activity and Use Limitation (AUL) that precludes inducing runoff to the groundwater, pursuant to MGL Chapter 21E and the Massachusetts Contingency Plan 310 CMR 40.0000; sites that are the location of a solid waste landfill as defined in 310 CMR 19.000; or sites where groundwater from the recharge location flows directly toward a solid waste landfill or 21E site? Answer: No.***
- ***Is the stormwater runoff from a land use with a higher potential pollutant load? Answer: No.***
- ***Is the discharge to the ground located within the Zone II or Interim Wellhead Protection Area of a public water supply? Answer: No.***
- ***Does the site have an infiltration rate greater than 2.4 inches per hour? Answer: No.***

Improvements to Existing Conditions:

- ***Does the project increase the required recharge volume over existing (developed) conditions? If so, can the project be redesigned to reduce the required recharge volume by decreasing impervious surfaces (make building higher, put parking under the building, narrower roads,***

sidewalks on only one side of street, etc.) or using low impact development techniques such as porous pavement? Answer: The project has been revised to reduce both the length and width of the paved roadway, provide a sidewalk on only one side of the road, maintaining small proposed building footprints and reduce the length of paved driveways.

- ***Is the project located within a basin or sub-basin that has been categorized as under high or medium stress by the Massachusetts Water Resources Commission, or where there is other evidence that there are rivers and streams experiencing low flow problems? If so, have measures been considered to replace the natural recharge lost as a result of the prior development? Answer: We are unaware of any special categorization by the Massachusetts Water Resources Commission in the area.***
- ***Has the applicant evaluated measures for reducing site runoff? Answer: Peak Rate of Runoff and Volume will be decreased post development in every direction during all design storm events.***

SW6. The calculations assume that the roof runoff and the runoff from the patios will discharge to subsurface structures, but no details or calculations are shown for these systems.

Runoff from most of the dwellings and patios were initially not directed to subsurface structures. Roof runoff is now proposed to be directed to drywells and patios are now proposed to be pervious. A detail of the typical drywell has been added to the plans.

SW7. The static storage provided by the three (3) basins is adequate to meet the standard; however, the analysis only accounts for the increase in pavement surface area. In order to claim the redevelopment credit, provide the analysis required by Standard 7.

All impervious surfaces were included in the initial Required Recharge Volume Calculations. After the first Conservation hearing for the project, the road layout was relocated north to reduce existing pavement within the 25' Buffer to Series C BVW. The following are the current Required Recharge Volume Calculations:

Total Existing Impervious Area = 33,166 SF

Proposed Roof Areas Directed to Drywells = 19x1,550 SF = 29,450 SF
Proposed Impervious Areas Directed to Infiltration Basin 1 = 10,615 SF
Proposed Impervious Areas Directed to Infiltration Basin 2 = 19,290 SF
Proposed Impervious Areas Directed to Infiltration Basin 3 = 15,521 SF
Proposed to Series C BVW = 1,460 SF (1,155 SF is directed to an infiltration trench)
Proposed to Series A BVW = 16,015 SF
Proposed to Series B and F Wetlands = 4,252 SF
Proposed to Street = 492 SF
Total Proposed Impervious Area = 97,095 SF
Impervious areas directed to infiltration systems = 29,450 SF + 1,155 SF + 10,615 SF + 19,290 SF + 15,521 SF = 76,031 SF

Total Increase in Impervious Area = 97,095 SF-33,166 SF = 63,929 SF
C Soils require 0.25" of recharge

Total Required Recharge = (0.25"/12 x 63,929 SF) = 1,332 CF

The storage capacity of each infiltration BMP is listed below:

Drywells for Houses 1-5 and 9-19:
Volume below outlet elevation = 71 CF x 16 = 1,136 CF

Drywells for Houses 6-8:
Volume below outlet elevation = 136 CF x 3 = 408 CF

Infiltration Trench downstream of 1,155 SF of Lot 8 driveway:
0.4 (121' x 2' x 1') = 97 CF

Pond No.1:
Volume below outlet elevation = 1,231 CF

Pond No.2:
Volume below outlet elevation = 4,725 CF

Pond No.3:
Volume below outlet elevation = 3,923 CF

1,136 CF + 408 CF + 97 CF + 1,231 CF + 4,725 CF + 3,923 CF = 11,520 CF >>> 1,332 CF. Therefore, this requirement is met.

In order to confirm that the infiltration systems will drain in 72 hours, the volume under the lowest outlet pipe must be divided by the bottom area of the infiltration system and the infiltration rate as follows:

Pond 1:

$$\frac{\left[\frac{(1231\ ft^3)}{1050\ ft^2}\right]}{\left(0.27\frac{in}{hr}\right)\left(\frac{1\ ft}{12\ in}\right)} = 52.1\ hours$$

52.1 hours < 72 hours; therefore, this requirement is met for this infiltration system.

Pond 2:

$$\frac{\left[\frac{(4,725\ ft^3)}{4123\ ft^2}\right]}{\left(2.41\frac{in}{hr}\right)\left(\frac{1\ ft}{12\ in}\right)} = 5.7\ hours$$

5.7 hours << 72 hours; therefore, this requirement is met for this infiltration system.

Pond 3:

$$\frac{\left[\frac{(3,923\ ft^3)}{3,516\ ft^2}\right]}{\left(0.27\frac{in}{hr}\right)\left(\frac{1\ ft}{12\ in}\right)} = 49.6\ hours$$

49.6 hours < 72 hours; therefore, this requirement is met for this infiltration system.

SW8. Portions of the impervious surfaces at the Site will not flow towards the basins. Document that there is sufficient area tributary to the basins to provide a weighted average sufficient to meet the standards.

Response: The impervious areas proposed to be directed toward the drywells, infiltration trench and infiltration basins total 76,031 SF. Therefore, the total impervious area not being recharged by infiltration systems is 21,064 SF (97,095 SF – 76,031 SF) which is a smaller area that is presently not being recharged on site. If the site were undeveloped and the entire project were new development then all impervious areas would have to be directed toward the infiltration systems or the infiltration systems would have to be seized to infiltrate an adjusted minimum required recharge volume based on the impervious areas directed to them. The project at hand is comprised of new development and redevelopment and it provides in excess of the required recharge volume.

<u>If</u> this project were new development then the adjusted minimum required recharge volume per the Massachusetts Stormwater Handbook Volume 3 Chapter 1 would be as follows:

Total Impervious Area on Site = 97,095 SF
Required Recharge Volume = (0.25"/12 x 97,095 SF) = 2,023 CF
Area Draining to Infiltration Systems = 76,031 SF
Ratio of Total Site Area to Site Area Draining to Infiltration Systems = 97,095 SF / 76,031 SF = 1.28
Adjusted Minimum Required Recharge Volume = 1.28 x 2,023 CF = 2,590 CF

Per the calculation in the response to SW7 the proposed infiltration systems provide 11,520 CF which is over 4 times the adjusted minimum required recharge volume that would be required for new development.

SW9. Five (5) test pits were conducted at the Site. BETA recommends that additional testing be conducted to establish a minimum of two (2) test pits in each basin location as required by the Standards.

Response: Additional test pits were performed on Aug. 31, 2021 and have been added to the Existing Conditions plans.

SW10. The sediment forebay sizing requirement is only 0.1 inches, rather than the entirety of the WQV. The basins should be sized accordingly.

Response: Forebays have been revised accordingly.

SW11. Provide data in the mounding analysis that documents the saturated thickness used in the analysis.

Response: Well information was obtained from three nearby addresses. Using the depth to bedrock from these reports yields an average depth of 28' which is greater than the conservatively assumed 22.5'. An

increase in initial saturated thickness decreases the calculated mounding expected under the infiltration (please see revised calculations in our answer to the next review comment.

MassDEP

Well Completion Report

WELL LOCATION

GPS North: **GPS West:** **Assessors Map:**
Address: 200 Concord Street **Assessors Lot:**
Sub Division: **Permit Number:**
City/Town: ROCKLAND **Date Issued:**
Board Of Health Permit Obtained: NR

Work Performed	Well Type	Drilling Method Overburden	Drilling Method Bedrock
New Well	Domestic	Air Rotary	Air Rotary

ADDITIONAL WELL INFORMATION

Developed:
Disinfected:
Total Well Depth: 200.00
Fracture Enhancement:
Well Seal Type:
Depth to Bedrock: 30.00

PERMANENT PUMP (IF AVAILABLE)

Pump Description:
Type:
Nominal Pump Capacity:
Intake Depth:
Horsepower:
Comments: Chemical and Biological water quality tests made.

CASING

From(ft)	To(ft)	Type	Thickness	Diameter
0.00	46.00	Steel		6

SCREEN

From(ft)	To(ft)	Type	slotsize	Diameter

WELL SEAL / FILTER PACK / ABANDONMENT MATERIAL

From(ft)	To(ft)	Material Description	Purpose

STATIC WATER LEVEL(ALL WELLS)

Date Measured	Depth Below Ground Surface
05/05/1988	15.00

WELL TEST DATA (ALL SECTIONS MANDATORY FOR PRODUCTION WELLS)

Date	Method	Yield(GPM)	Time Pumped (hrs & min)	Pumping Level (Ft. BGS)	Time To Recoover (Hrs & min)	Recovery
05/05/1988	Air Lift	20.00	00:15	200	00:05	66

OVER BURDEN

From(ft)	To(ft)	Lithology	Color	Comment	Water Zone	Loss / Add of Fluid	Drill Stem Drop	Drill Rate
0.00	20.00	Gravel			No			
20.00	30.00	Gravel			No			

BEDROCK

From(ft)	To(ft)	Lithology	Comment	Water Zone	Drill Stem Drop	Extra Large	Drill Rate	Rust Stain	Loss / Add Of Fluid	# of Fract Per Ft
30	130	Granite		No						
130	200	Granite		No						

MassDEP

Well Completion Report

WELL LOCATION

GPS North: **GPS West:** **Assessors Map:**
Address: 268 Concord Street **Assessors Lot:**
Sub Division: **Permit Number:**
City/Town: ROCKLAND **Date Issued:**
Board Of Health Permit Obtained: NR

Work Performed	Well Type	Drilling Method Overburden	Drilling Method Bedrock
New Well	Domestic	Air Rotary	Air Rotary

ADDITIONAL WELL INFORMATION

Developed:
Disinfected:
Total Well Depth: 220.00
Fracture Enhancement:
Well Seal Type:
Depth to Bedrock: 30.00

PERMANENT PUMP (IF AVAILABLE)

Pump Description:
Type:
Nominal Pump Capacity:
Intake Depth:
Horsepower:
Comments: Chemical and Biological water quality tests made.

CASING

From(ft)	To(ft)	Type	Thickness	Diameter
0.00	42.00	Steel		6

SCREEN

From(ft)	To(ft)	Type	slotsize	Diameter

WELL SEAL / FILTER PACK / ABANDONMENT MATERIAL

From(ft)	To(ft)	Material Description	Purpose

STATIC WATER LEVEL(ALL WELLS)

Date Measured	Depth Below Ground Surface
06/08/1988	15.00

WELL TEST DATA (ALL SECTIONS MANDATORY FOR PRODUCTION WELLS)

Date	Method	Yield(GPM)	Time Pumped (hrs & min)	Pumping Level (Ft. BGS)	Time To Recoover (Hrs & min)	Recovery
06/08/1988	Air Lift	50.00	00:15	220	00:05	166

OVER BURDEN

From(ft)	To(ft)	Lithology	Color	Comment	Water Zone	Loss / Add of Fluid	Drill Stem Drop	Drill Rate
0.00	20.00	Gravel			No			
20.00	30.00	Gravel			No			

BEDROCK

From(ft)	To(ft)	Lithology	Comment	Water Zone	Drill Stem Drop	Extra Large	Drill Rate	Rust Stain	Loss / Add Of Fluid	# of Fract Per Ft
30	130	Granite		No						
130	220	Granite		No						

MassDEP

Well Completion Report

WELL LOCATION

GPS North: GPS West: Assessors Map:
Address: 308 Concord Street Assessors Lot:
Sub Division: Permit Number:
City/Town: ROCKLAND Date Issued:
Board Of Health Permit Obtained: NR

Work Performed	Well Type	Drilling Method Overburden	Drilling Method Bedrock
New Well	Domestic	Air Rotary	Air Rotary

ADDITIONAL WELL INFORMATION

Developed:
Disinfected:
Total Well Depth: 280.00
Fracture Enhancement:
Well Seal Type:
Depth to Bedrock: 25.00

PERMANENT PUMP (IF AVAILABLE)

Pump Description:
Type:
Nominal Pump Capacity:
Intake Depth:
Horsepower:
Comments: Chemical and Biological water quality tests made.

CASING

From(ft)	To(ft)	Type	Thickness	Diameter
0.00	33.00	Steel		6

SCREEN

From(ft)	To(ft)	Type	slotsize	Diameter

WELL SEAL / FILTER PACK / ABANDONMENT MATERIAL

From(ft)	To(ft)	Material Description	Purpose

STATIC WATER LEVEL(ALL WELLS)

Date Measured	Depth Below Ground Surface
10/01/1988	16.00

WELL TEST DATA (ALL SECTIONS MANDATORY FOR PRODUCTION WELLS)

Date	Method	Yield(GPM)	Time Pumped (hrs & min)	Pumping Level (Ft. BGS)	Time To Recoover (Hrs & min)	Recovery
08/31/1988	Air Lift	40.00	00:15	280	00:05	133

OVER BURDEN

From(ft)	To(ft)	Lithology	Color	Comment	Water Zone	Loss / Add of Fluid	Drill Stem Drop	Drill Rate
0.00	20.00	Gravel			No			
20.00	25.00	Gravel			No			

BEDROCK

From(ft)	To(ft)	Lithology	Comment	Water Zone	Drill Stem Drop	Extra Large	Drill Rate	Rust Stain	Loss / Add Of Fluid	# of Fract Per Ft
25	125	Granite		No						
125	225	Granite		No						
225	280	Granite		No						

SW12. Since the infiltration throughout the event for each basin is assumed, the duration time for the mounding analysis should include the twelve (12) hours during the event plus the time to dewater.

Response: Mounding analyses have been revised to use 12 hours plus the individual dewatering time for each infiltration basin. Mounding calculations for each basin are still less than 2'.

BASIN 1

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days or inches & hours)

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00

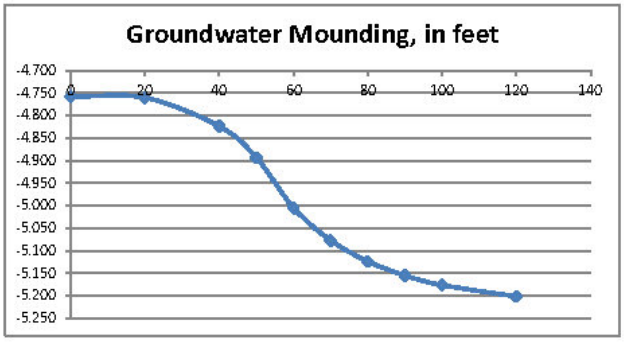
hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Input Values		
0.5360	*R*	Recharge (infiltration) rate (feet/day)
0.170	Sy	Specific yield, Sy (dimensionless, between 0 and 1)
5.36	K	Horizontal hydraulic conductivity, Kh (feet/day)*
55.000	x	1/2 length of basin (x direction, in feet)
6.000	y	1/2 width of basin (y direction, in feet)
2.671	t	duration of infiltration period (days)
28.000	hi(0)	initial thickness of saturated zone (feet)
23.242	h(max)	maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
-4.758	Δh(max)	maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
-4.758	0
-4.760	20
-4.823	40
-4.893	50
-5.005	60
-5.078	70
-5.124	80
-5.155	90
-5.176	100
-5.201	120

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

BASIN 2

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

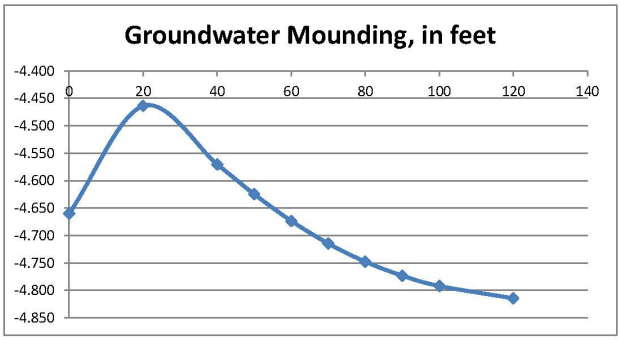
Input Values		use consistent units (e.g. feet & days **or** inches & hours)	**Conversion Table** inch/hour	feet/day
4.7840	*R*	**Recharge (infiltration) rate (feet/day)**	0.67	1.33
0.170	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**		
47.84	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***	2.00	4.00
15.000	**x**	**1/2 length of basin (x direction, in feet)**		
110.000	**y**	**1/2 width of basin (y direction, in feet)**	**hours**	**days**
0.738	**t**	**duration of infiltration period (days)**	36	1.50
28.000	**hi(0)**	**initial thickness of saturated zone (feet)**		

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

23.340	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
-4.660	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
-4.660	**0**
-4.464	**20**
-4.570	**40**
-4.625	**50**
-4.673	**60**
-4.714	**70**
-4.748	**80**
-4.773	**90**
-4.792	**100**
-4.814	**120**

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

BASIN 3

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

Input Values		use consistent units (e.g. feet & days **or** inches & hours)
0.5360	*R*	**Recharge (infiltration) rate (feet/day)**
0.170	Sy	**Specific yield, Sy (dimensionless, between 0 and 1)**
5.36	K	**Horizontal hydraulic conductivity, Kh (feet/day)***
125.000	x	**1/2 length of basin (x direction, in feet)**
17.000	y	**1/2 width of basin (y direction, in feet)**
2.567	t	**duration of infiltration period (days)**
28.000	hi(0)	**initial thickness of saturated zone (feet)**

24.473	h(max)	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
-3.527	Δh(max)	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Conversion Table

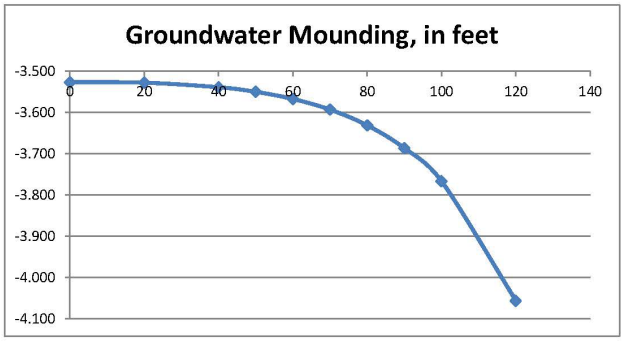
inch/hour	feet/day
0.67	1.33
2.00	4.00

hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
-3.527	0
-3.528	20
-3.539	40
-3.551	50
-3.568	60
-3.594	70
-3.632	80
-3.687	90
-3.767	100
-4.056	120

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

TOTAL SUSPENDED SOLIDS (STANDARD NUMBER 4): For new development, stormwater management systems must be designed to remove 80% of the annual load of Total Suspended Solids (TSS). The proposed design includes the installation of deep sump catch basin, sediment forebay, and pocket wetland.

Response: The Redevelopment Checklist in the Massachusetts Stormwater Handbook Volume 2 Chapter 3 for Standard 4 states that this standard is met when:

a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan and thereafter are implemented and maintained. Answer: The LTPPP includes inspections scheduled to prevent pollution.
b. Stormwater BMPs are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook. Answer: BMPs are sized to treat the WQV.
c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.
Full compliance for any component that is not a redevelopment. Answer: The project is a mixture of redevelopment and new development. All new development elements meet Standard 4 fully.
Full compliance with the long-term pollution plan requirement for new developments and redevelopments. Answer: LTPPP addresses all BMPs.

Compliance to the Maximum Extent Practicable for the other requirements:

- ***Does the redevelopment design provide for treatment of all runoff from existing (as well as new) impervious areas to achieve 80% TSS removal? If 80% TSS removal is not achieved, has the stormwater management system been designed to remove TSS to the maximum extent practicable? Answer: Yes, please refer to answers to comment SW13***
- ***Have the proposed stormwater BMPs been properly sized to capture the prescribed runoff volume?***
    - ***One inch rule applies for discharge***
        - ***within a Zone II or Interim Wellhead Protection Area,***
        - ***near or to another critical area,***
        - ***from a land use with a higher potential pollutant load***
        - ***to the ground where the infiltration rate is greater than 2.4 inches per hour***

  Answer: Yes, please refer to answers to comment SW13
- ***Has adequate pretreatment been proposed?***
    - ***44% TSS Removal Pretreatment Requirement applies if:***
        - ***Stormwater runoff is from a land use with a higher potential pollutant load***
        - ***Stormwater is discharged***
            - ***To the ground within the Zone II or Interim Wellhead Protection Area of a Public Water Supply***
            - ***To the ground with an infiltration rate greater than 2.4 inches per hour***
            - ***Near or to an Outstanding Resource Water, Special Resource Water, Cold-Water Fishery, Shellfish Growing Area, or Bathing Beach.***

  Answer: Yes, please refer to answers to comment SW13

Improvements to Existing Conditions:

- ***Have measures been provided to achieve at least partial compliance with the TSS removal standard? Existing untreated impervious areas have been reduced from 33,166 SF to 21,064 SF.***

Untreated paved areas that drain in the direction of Series A BVW will be reduced from 11,952 SF to 8,856 SF. The minimum distance for pavement runoff toward this wetland will also be increased. Untreated paved areas that drain in the direction of Series B and F BVW will also be reduced from 5,644 SF to 2,664 SF.

SW13. The area tributary to the Vernal Pools qualifies as a Critical Area; therefore, the WQV should be one (1) inch.

Even though we do not believe that there is a discharge proposed near or to a critical area (please our response to comment G2 above), if we were to consider the entire Series C BVW to be an ORW then the project conforms with the 1" WQV in the direction of Infiltration Basin 1 and Infiltration Basin 2, for houses 6-8 and it provides pretreatment to the maximum extent practicable for the 1,155 SF area of paved driveway located 96' away from the Series C BVW which is considered redevelopment.

Compliance Standard 4 is achieved as follows:

Existing Impervious Flowing Untreated To Series C BVW:

Pavement=5,792 SF
Other Impervious=217 SF

Proposed Impervious Flowing To Series C BVW:

Houses 6-8 are 1,550 SF Each
(Assumed to flow toward Critical Area)
WQV = 1"/12(1550 SF) = 130 CF per House
Drywells for Houses 6-8:
Volume below outlet elevation = 136 CF
136 CF>130 CF; therefore Standard 4 is met for this BMP

Proposed Impervious Areas Directed to Infiltration Basin 1 = 10,615 SF
(Assumed to flow toward Critical Area)
WQV = 1"/12(10,615 SF) = 885 CF
Pretreatment upstream of Infiltration Basin 1 consists of deep sump catch basins and a forebay which provide 44% TSS removal.
Volume of Infiltration Basin 1 below the outlet elevation = 1,231 CF
1,231 CF>885 CF; therefore Standard 4 is met for this BMP

1,155 SF of Lot 8 driveway will be directed toward Series C BVW:
(Assumed to flow toward Critical Area)
WQV = 1"/12(1,155 SF) = 96.3 CF
Infiltration Trench provides 97 CF of treatment with driveway sweeping as pretreatment. This BMP provides TSS removal to the maximum extent practicable since it is part of the redevelopment portion of the project. An existing 5,792 area of untreated pavement flows toward Series C BVW. The project proposing to reduce the area of pavement flowing toward this wetland to decrease to 1,155 SF and receive some treatment. Therefore, this BMP has been met to the maximum extent practicable.

Existing Impervious Flowing Untreated To Series A BVW:

Paved Driveway=11,952 SF
Other Impervious=4,820 SF
House=2,457

Proposed Impervious Flowing To Series A BVW:

Proposed Impervious Areas Directed to Infiltration Basin 2 = 19,290 SF
(Assumed to discharge near Critical Area)
WQV = 1"/12(19,290 SF) = 1,608 CF
Pretreatment upstream of Infiltration Basin 1 consists of deep sump catch basins and a forebay which provide 44% TSS removal.
Volume of Infiltration Basin 2 below the outlet elevation = 4,725 CF
4,725 CF>1,608 CF; <u>therefore Standard 4 is met for this BMP</u>

Proposed Impervious Areas Directed to Infiltration Basin 3 = 15,521 SF
(Designed to exceed the WQV for Critical Areas even though it does not discharge to or near a Critical Area)
WQV = 1"/12(15,521 SF) = 1,293 CF
Pretreatment upstream of Infiltration Basin 1 consists of deep sump catch basins and a forebay which provide 44% TSS removal.
Volume of Infiltration Basin 3 below the outlet elevation = 3,923 CF
3,923 CF>1,293 CF; <u>therefore Standard 4 is met for this BMP</u>

Houses 1-5 and 9-19 are 1,550 SF Each
WQV = 0.5"/12(1550 SF) = 65 CF per House
Drywells for Houses 1-5 and 9-19:
Volume below outlet elevation = 71 CF
71 CF>65 CF; <u>therefore Standard 4 is met for this BMP</u>

Proposed Impervious Areas proposed to flow untreated toward Series A BVW
Paved Driveway=8,856 SF
Existing Other Impervious=4,702 SF
Existing House=2,457
This is part of the redevelopment portion of the project. The project proposes to reduce the area of pavement flowing toward this wetland from 11,952 SF to 8,856 SF and reduce other existing impervious from 4,820 SF to 4,702 SF. Additionally, the closest area of existing pavement flowing to Series A BVW will be increased from 1.8' to 27.2'. <u>Therefore, this BMP has been met to the maximum extent practicable.</u>

Existing Impervious Flowing Untreated To Series B and F Wetlands:

Paved Driveway=5,644 SF
Other Impervious=520 SF
House=1,286

Proposed Impervious Flowing Untreated To Series B and F Wetlands:

> ***Paved Driveway=2,664 SF***
> ***Other Impervious=302 SF***
> ***House=1,286***
> ***This is part of the redevelopment portion of the project. The project proposes to reduce the area of pavement flowing toward this wetland from 5,644 SF to 2,664 SF and reduce other existing impervious from 520 SF to 302 SF. Therefore, this BMP has been met to the maximum extent practicable.***

SW14. The pretreatment requirement for the infiltration basins is necessary to achieve the 80% TSS removal rate associated with the basin. One cannot claim the benefit of the pretreatment against the total. Accordingly, for Basins 1 & 2, the TSS removal is only 80% based upon the requirement for 44% pretreatment.

We do not believe that Standard 6 applies to the project. However, 44% TSS removal is provided in the direction of Infiltration Basin 1. We agree that the infiltration basin with forebay provides the 80% TSS removal required to satisfy Standard 4.

SW15. The overall impervious surface area tributary to the catch basins discharging towards Basins 2 & 3 is very close to the 0.25-acre limit for claiming 25% TSS removal. Indicate the overall impervious surface areas tributary to each catch basin and verify that the credit is available at each location.

Catch Basins 3 and 4 treat approximately 0.18 Acres each, Catch Basin 5 treats 0.20 Acres and Catch Basin 6 treats 0.24 Acres. Therefore, all catch basins receive less than the 0.25 Acre maximum to provide 25% TSS removal.

SW16. The calculation for the WQV includes the roof runoff; however, the runoff from the areas tributary to the roadway system for subcatchment areas 3S & 7S is not included in the analysis. Either show the proposed BMPs for these surfaces or include them in the calculations.

Roof runoff is now proposed to be directed to drywells.

HIGHER POTENTIAL POLLUTANT LOADS (STANDARD NUMBER 5): Stormwater discharges from Land Useswith Higher Potential Pollutant Loads (LUHPPLs) require the use of specific stormwater management BMPs. The Project does not propose new LUHPPLs. **This standard is not applicable.**

CRITICAL AREAS (STANDARD NUMBER 6): Stormwater discharges to critical areas must utilize certain stormwater management BMPs approved for critical areas. Stormwater discharges towards the wetlands around the Vernal Pool, which are considered Critical Areas; treatment should be provided as required bythe standards.

Response: The Redevelopment Checklist in the Massachusetts Stormwater Handbook Volume 2 Chapter 3 for Standard 6 requires answers to the following questions to document compliance to the Maximum

Extent Practicable with the pretreatment and treatment requirements of Standard 6:

- ***Does the redevelopment project utilize the pretreatment, treatment and infiltration BMPs approved for discharges near or to critical areas? Answer: It does for all infiltration basins. The 1,155 SF portion of redeveloped driveway is treated to the maximum extent practicable.***
- ***If the redevelopment project does not comply with Standard 6, the applicant shall document an analysis of alternative measures for meeting Standard 6. (See Section on Specific Redevelopment Projects.) Answer: Please see our answer to comment SW13.***

Improvements to Existing Conditions:

- ***Have measures to protect critical areas been considered, including additional pollution prevention measures and structural and non-structural BMPs? Answer: Existing conditions are being improved by not sending any untreated stormwater runoff in the direction of the CVP or Series C BVW.***

Other Requirements

- ***Does the discharge comply with the Massachusetts Clean Waters Act, 314 CMR 3.00, 314 CMR 4.00, and 314 CMR 5.00? Answer: Yes.***

<u>Please Note:</u> We do not believe that the project proposed any discharges to or near critical areas and thus, we do not believe that Standard 6 pertains to the project. Please see our response to comment G2. We have nonetheless explained how the project would comply with the requirements of Standard 6 if Series C BVW were considered to be a critical area in its entirety because there is a CVP within its confines. Please see our responses to comments regarding Standard 4 for details.

REDEVELOPMENT (STANDARD NUMBER 7): Redevelopment of previously developed sites must meet certain Stormwater Management Standards to the maximum extent practicable. In order to determine if a portion of the Project can be claimed as redevelopment, the Redevelopment Checklist from Volume 3, Chapter 1 of the Handbook should be completed and submitted.

Response: The Massachusetts Stormwater Handbook Volume 3 Chapter 1 requires that the redevelopment checklist Please see our answers to the Redevelopment Checklist from Volume 2 Chapter 3 for each of our responses above.

EROSION AND SEDIMENT CONTROLS (STANDARD NUMBER 8): Erosion and sediment controls must be implemented to prevent impacts during construction or land disturbance activities. The Project exceeds one (1) acre of disturbance and will require the filing of a NOI with the Environmental Protection Agency (EPA), which includes the preparation of a Stormwater Pollution Prevention Plan (SWPPP). The erosion control plan with details provided is adequate for the preliminary roadway development. The SWPPP should address erosion control measures as they relate to the development of the houses, driveways, and stormwater improvements.

SW17. BETA recommends that the applicant use storm sacks in the catch basins rather than the hay bale dams shown.

Storm sacks shall be used at all catch basins during construction, as noted on the revised plans.

SW18. Provide a draft SWPPP for review that incorporates recommendations relative to stormwater

provided in Comments W4 through W16.

A copy of the SWPPP shall be provided once an EPA NOI is submitted prior to construction.

OPERATIONS/MAINTENANCE PLAN (STANDARD NUMBER 9): A Long-Term Operation and Maintenance Plan shall be developed and implemented to ensure that stormwater management systems function as designed. This plan should be a stand-alone document that can be part of the Association/Condo document.

SW19. Provide a sample inspection report with the plan.

A sample Inspection Report shall be included in the Long Term Pollution Prevention Plan.

SW20. Catch basin inspections are required four (4) times per year.

Catch basin inspections shall be revised to occur four times per year.

SW21. Infiltration basins should be inspected twice per year. Pretreatment devices associated with the basins should be inspected monthly and after any significant rainfall event.

The Long Term Pollution Prevention Plan shall be revised to include this recommendation.

SW22. Include a map with the Operation and Maintenance Plan to identify and highlight BMP locations to be maintained. Include access to stormwater basins.

A BMP shall be added to the Long Term Pollution Prevention Plan.

SW23. Provide the owner's signature on final document.

The stormwater system's owner shall sign the Long Term Pollution Prevention Plan.

ILLICIT DISCHARGES (STANDARD NUMBER 10): All illicit discharges to the stormwater management system are prohibited. An unsigned Illicit Discharge Compliance Statement was included in the Stormwater Drainage Report**.**

SW24. Provide owner's signature.

The stormwater system's owner shall sign the Illicit Discharge Statement.

We appreciate BETA's thoughtful comments and look forward to presenting these revised materials to you and the Commission at our hearing scheduled on 10/12/21. If any questions arise, please do not hesitate to contact us.

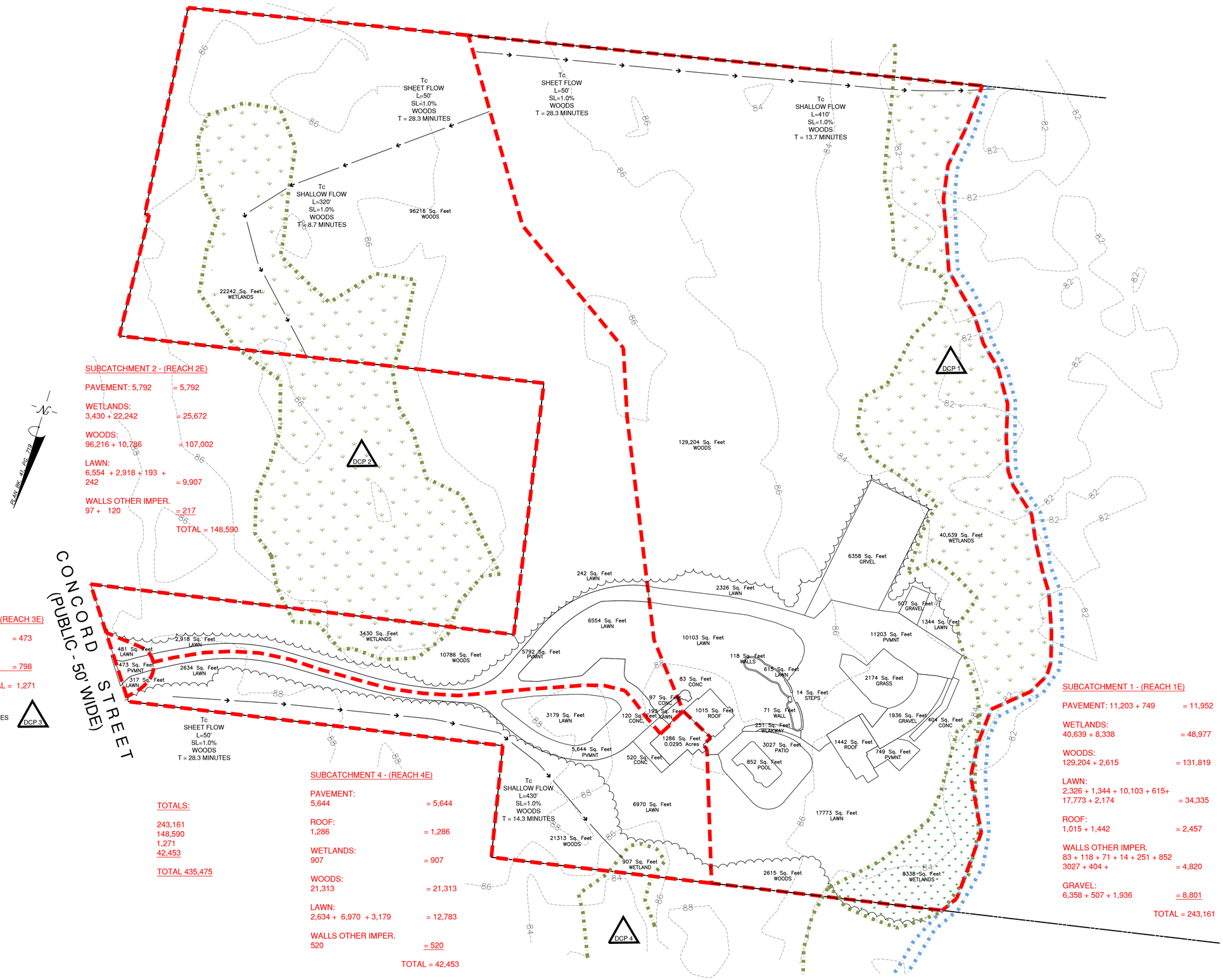
Sincerely,

Cavanaro Consulting, Inc.

John C. Cavanaro, P.E.
Managing Principal

Enclosures

cc: M. Dacey
W. Sullivan
File 19.103



SUBCATCHMENT 2 - (REACH 2E)

PAVEMENT: 5,792 = 5,792

WETLANDS:
3,430 + 22,242 = 25,672

WOODS:
96,216 + 10,786 = 107,002

LAWN:
6,554 + 2,918 + 193 + 242 = 9,907

WALLS OTHER IMPER.
97 + 120 = 217

TOTAL = 148,590

SUBCATCHMENT 3 - (REACH 3E)

PAVEMENT: 473 = 473

LAWN:
481 + 317 = 798

TOTAL = 1,271

Tc
ASSUMED
T = 5.0 MINUTES

SUBCATCHMENT 4 - (REACH 4E)

PAVEMENT:
5,644 = 5,644

ROOF:
1,286 = 1,286

WETLANDS:
907 = 907

WOODS:
21,313 = 21,313

LAWN:
2,634 + 6,970 + 3,179 = 12,783

WALLS OTHER IMPER.
520 = 520

TOTAL = 42,453

TOTALS:

243,161
148,590
1,271
42,453

TOTAL 435,475

SUBCATCHMENT 1 - (REACH 1E)

PAVEMENT: 11,203 + 749 = 11,952

WETLANDS:
40,639 + 8,338 = 48,977

WOODS:
129,204 + 2,615 = 131,819

LAWN:
2,326 + 1,344 + 10,103 + 615 + 17,773 + 2,174 = 34,335

ROOF:
1,015 + 1,442 = 2,457

WALLS OTHER IMPER.
83 + 118 + 71 + 14 + 251 + 852 3027 + 404 + = 4,820

GRAVEL:
6,358 + 507 + 1,936 = 8,801

TOTAL = 243,161

DRAWING REVISIONS

ACTION	DATE	DESCRIPTION
1	9/22/21	CONSERVATION COMMENTS

SURVEY NOTES:

1. ALL RESOURCE AREAS SHOWN HEREON WERE FIELD LOCATED BY CAVANARO CONSULTING IN JANUARY, 2018.

2. RESOURCE AREAS WERE FLAGGED BY SOUTH RIVER ENVIRONMENTAL DECEMBER 2017 AND REVISED BY SAME ON OCTOBER 9, 2018.

3. LOCUS LIES IN F.I.R.M. ZONE A, AE AND X AS SHOWN ON COMMUNITY PANEL NO. 25023C0181J DATED JULY 17, 2012. LOCATION OF ZONE AE TO BE CONFIRMED BY ADDITIONAL TOPOGRAPHY.

WETLANDS NOTES:

1. WETLAND DELINEATION AREAS SHOWN HEREON ARE BASED ON ORDER OF RESOURCE AREA DELINEATION SE 273-0400 ISSUED BY THE TOWN OF ROCKLAND ON JANUARY 11, 2019.

OWNERS OF RECORD:

DANIEL G. & CHRISTINE M. DELPRETE
365 CONCORD STREET
ROCKLAND, MA 02370
ASSESSOR'S PARCEL: 62-35
DEED BOOK:16754, PAGE: 267

DELPRETE REALTY CORP.
365 CONCORD STREET
ROCKLAND, MA 02370
ASSESSOR'S PARCEL: 62-46
BOOK: 28919, PAGE: 257
ASSESSOR'S PARCEL: 62-36
DEED BOOK: 28919, PAGE: 245

DANIEL DELPRETE
365 CONCORD STREET
ROCKLAND, MA 02370
ASSESSOR'S PARCEL: 62-41&42
BOOK: 48716, PAGE: 32
ASSESSOR'S PARCEL: 62-43&44
BOOK: 37548, PAGE: 217

SCALE: 1" = 40'

0' 20' 40' 80' 120'

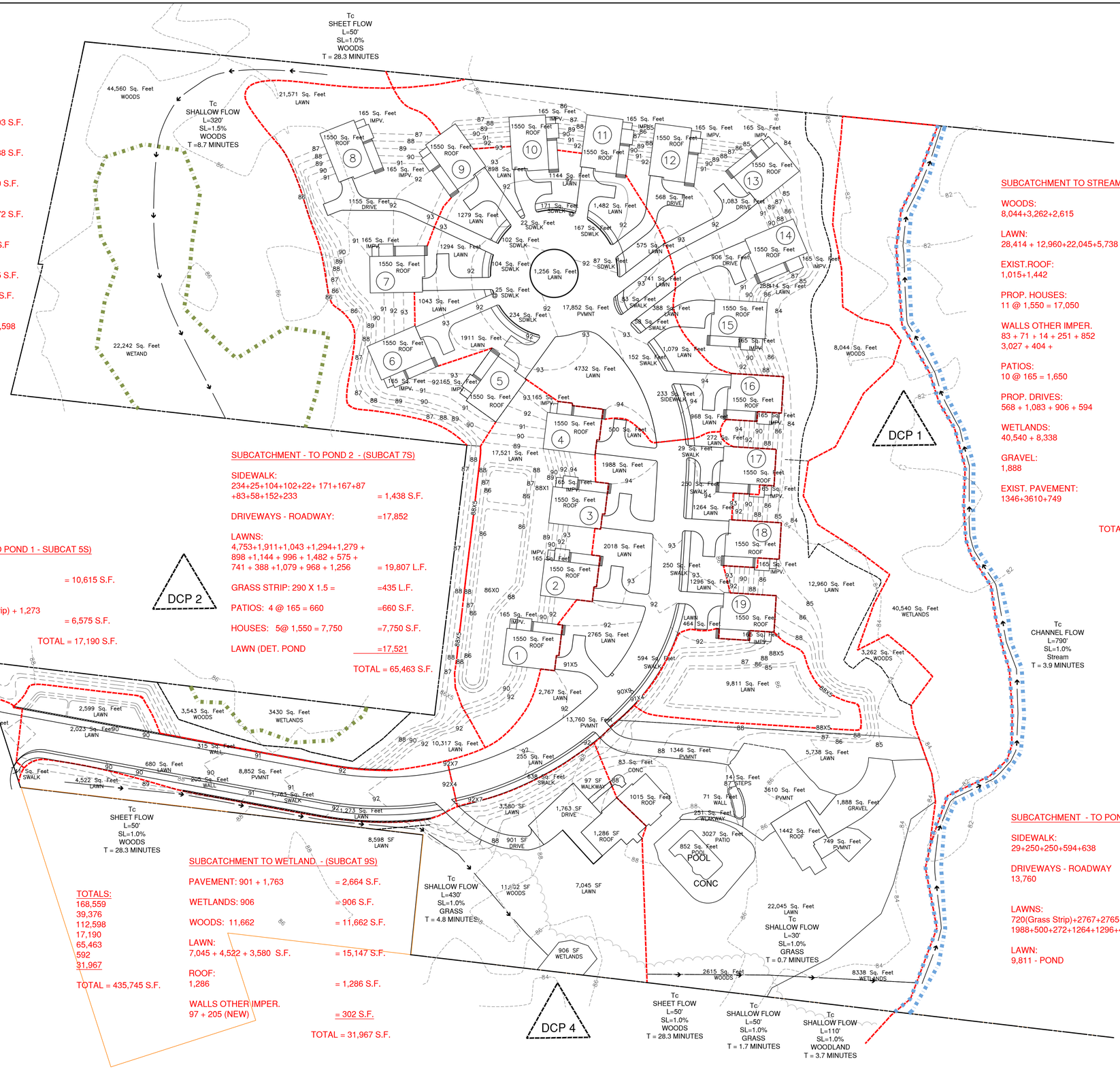
EXISTING CONDITIONS SUBCATCHMENT AREAS

CAVANARO CONSULTING
687 MAIN STREET
P.O. BOX 5175
NORWELL, MASSACHUSETTS 02061
PHONE: 781.659.8187
FAX: 781.659.8186

CONCORD MEADOWS EXISTING CONDITIONS
365 CONCORD STREET
ROCKLAND, MA 02370

PREPARED FOR:
CONROCK LLC
P.O. BOX 1414
DUXBURY, MA 02331

PROJECT NO. : 19.103	DRAWING NO. ECSA
SCALE : AS SHOWN	
DATE : 6/1/21	
DELINEATED BY : JZ	
DRAWN BY : DB/CR	SHEET NO. 1 OF 2
CHECKED BY : BPS	FILENAME: X:\PR\2011\19.103\DWG\2019\PRELIM 2/18/21



SUBCATCHMENT OFFSITE - (SUBCAT 4S)

WOODS:
44,560 + 3,543 = 48,103 S.F.

LAWN:
10,317 + 21,571 = 31,888 S.F.

HOUSES:
3@ 1,550 = 4,650 = 4,650 S.F.

WETLANDS:
22,242 + 3,430 = 25,672 S.F.

PATIOS:
5 @ 165 = = 825 S.F

NEW DRIVE:
1,155 = = 1,155 S.F.

RETAINING WALL = 305 S.F.

TOTAL = 112,598

SUBCATCHMENT - TO POND 2 - (SUBCAT 7S)

SIDEWALK:
234+25+104+102+22+ 171+167+87 +83+58+152+233 = 1,438 S.F.

DRIVEWAYS - ROADWAY: =17,852

LAWNS:
4,753+1,911+1,043 +1,294+1,279 + 898 +1,144 + 996 + 1,482 + 575 + 741 + 388 +1,079 + 968 + 1,256 = 19,807 L.F.

GRASS STRIP: 290 X 1.5 = =435 L.F.

PATIOS: 4 @ 165 = 660 =660 S.F.

HOUSES: 5@ 1,550 = 7,750 =7,750 S.F.

LAWN (DET. POND =17,521

TOTAL = 65,463 S.F.

SUBCATCHMENT TO STREAM - (SUBCAT 10S)

WOODS:
8,044+3,262+2,615 = 13,921

LAWN:
28,414 + 12,960+22,045+5,738 = 69,157

EXIST.ROOF:
1,015+1,442 = 2,457

PROP. HOUSES:
11 @ 1,550 = 17,050 = 17,050

WALLS OTHER IMPER.
83 + 71 + 14 + 251 + 852
3,027 + 404 + = 4,702

PATIOS:
10 @ 165 = 1,650 =1,650

PROP. DRIVES:
568 + 1,083 + 906 + 594 = 3,151

WETLANDS:
40,540 + 8,338 = 48,878

GRAVEL:
1,888 =1,888

EXIST. PAVEMENT:
1346+3610+749 = 5,705

TOTAL = 168,559 S.F.

SUBCATCHMENT TO POND 1 - SUBCAT 5S)

PAVEMENT:
8,852 + 1,763 = 10,615 S.F.

LAWN:
2,023 + 680 (Grass Strip) + 1,273
2,599(Det. pond) = 6,575 S.F.

TOTAL = 17,190 S.F.

SUBCATCHMENT - STREET - (SUBCAT 8S)

PAVEMENT:
451 + 41 = 492 S.F.

LAWN:
100 (Grass Strip) = 100 S.F.

TOTAL = 592 S.F.

SUBCATCHMENT TO WETLAND - (SUBCAT 9S)

PAVEMENT: 901 + 1,763 = 2,664 S.F.

WETLANDS: 906 = 906 S.F.

WOODS: 11,662 = 11,662 S.F.

LAWN:
7,045 + 4,522 + 3,580 S.F. = 15,147 S.F.

ROOF:
1,286 = 1,286 S.F.

WALLS OTHER IMPER.
97 + 205 (NEW) = 302 S.F.

TOTAL = 31,967 S.F.

TOTALS:
168,559
39,376
112,598
17,190
65,463
592
31,967

TOTAL = 435,745 S.F.

SUBCATCHMENT - TO POND 3 - (SUBCAT 3S)

SIDEWALK:
29+250+250+594+638 = 1,761 S.F.

DRIVEWAYS - ROADWAY
13,760 =13,760 S.F.

LAWNS:
720(Grass Strip)+2767+2765+2018+ 1988+500+272+1264+1296+464 =14,044 S.F.

LAWN:
9,811 - POND = 9,811 S.F.

TOTAL = 39,376 S.F.

DRAWING REVISIONS		
1	9/22/21	CONSERVATION COMMENTS
ACTION	DATE	DESCRIPTION

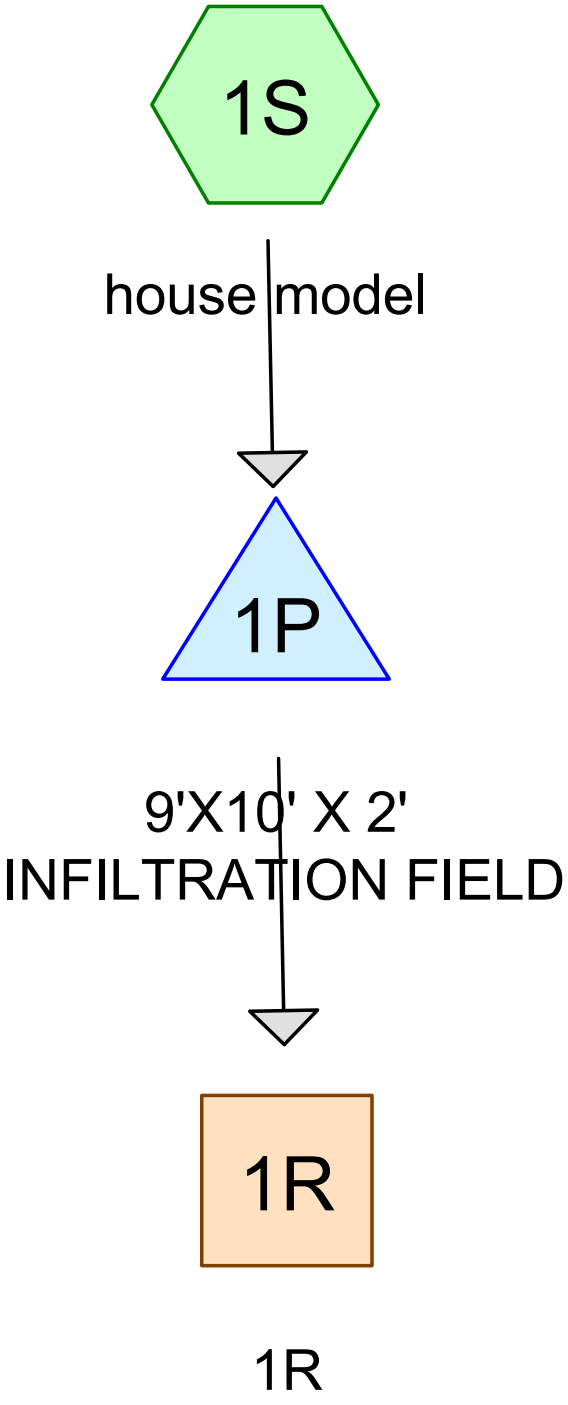
PROPOSED CONDITIONS
SUBCATCHMENT AREAS

CAVANARO CONSULTING
687 MAIN STREET
P.O. BOX 5175
NORWELL, MASSACHUSETTS 02061
PHONE: 781.659.8187
FAX: 781.659.8186

CONCORD MEADOWS
EXISTING CONDITIONS
365 CONCORD STREET
ROCKLAND, MA 02370

PREPARED FOR:
CONROCK LLC
P.O. BOX 1414
DUXBURY, MA 02331

PROJECT NO. : 19.103	DRAWING NO. PCSA
SCALE : AS SHOWN	
DATE : 6/1/21	
DELINEATED BY : JZ	
DRAWN BY : DB/CR	SHEET NO. 2 OF 2
CHECKED BY : BPS	FILENAME: X:\PR\2011\19.103\DWG\2019\PRELIM 2/18/21



Subcat Reach Pond Link

Routing Diagram for Concord ST one house with infiltration 9.21
Prepared by Cavanaro Consulting, Printed 9/23/2021

Time span=0.00-35.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: house model Runoff Area=1,550 sf 100.00% Impervious Runoff Depth=2.97"
Tc=5.0 min CN=98 Runoff=0.11 cfs 383 cf

Reach 1R: 1R Inflow=0.11 cfs 250 cf
Outflow=0.11 cfs 250 cf

Pond 1P: 9'X10' X 2' INFILTRATION FIELD Peak Elev=99.74' Storage=79 cf Inflow=0.11 cfs 383 cf
Discarded=0.00 cfs 96 cf Primary=0.11 cfs 250 cf Outflow=0.11 cfs 345 cf

Total Runoff Area = 1,550 sf Runoff Volume = 383 cf Average Runoff Depth = 2.97"
0.00% Pervious = 0 sf 100.00% Impervious = 1,550 sf

Summary for Subcatchment 1S: house model

Runoff = 0.11 cfs @ 12.07 hrs, Volume= 383 cf, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Event Rainfall=3.20"

	Area (sf)	CN	Description
*	1,550	98	
	1,550		100.00% Impervious Area

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

Summary for Reach 1R: 1R

Inflow Area = 1,550 sf,100.00% Impervious, Inflow Depth = 1.93" for 2 Year Event event
Inflow = 0.11 cfs @ 12.08 hrs, Volume= 250 cf
Outflow = 0.11 cfs @ 12.08 hrs, Volume= 250 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: 9'X10' X 2' INFILTRATION FIELD

Inflow Area = 1,550 sf,100.00% Impervious, Inflow Depth = 2.97" for 2 Year Event event
Inflow = 0.11 cfs @ 12.07 hrs, Volume= 383 cf
Outflow = 0.11 cfs @ 12.08 hrs, Volume= 345 cf, Atten= 2%, Lag= 0.8 min
Discarded = 0.00 cfs @ 12.08 hrs, Volume= 96 cf
Primary = 0.11 cfs @ 12.08 hrs, Volume= 250 cf

Routing by Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 99.74' @ 12.08 hrs Surf.Area= 90 sf Storage= 79 cf

Plug-Flow detention time= 185.8 min calculated for 345 cf (90% of inflow)
Center-of-Mass det. time= 136.5 min (892.0 - 755.5)

Volume	Invert	Avail.Storage	Storage Description
#1	98.00'	61 cf	**Custom Stage Data (Irregular)** Listed below 180 cf Overall - 28 cf Embedded = 152 cf x 40.0% Voids
#2	98.50'	28 cf	**Cultec C-100** x 2 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		89 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
98.00	90	38.0	0	0	90
100.00	90	38.0	180	180	166

Device	Routing	Invert	Outlet Devices
#1	Discarded	98.00'	**0.270 in/hr Exfiltration over Wetted area**
#2	Primary	99.50'	**4.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 12.08 hrs HW=99.74' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.11 cfs @ 12.08 hrs HW=99.74' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.11 cfs @ 1.66 fps)

Time span=0.00-35.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: house model Runoff Area=1,550 sf 100.00% Impervious Runoff Depth=4.36"
Tc=5.0 min CN=98 Runoff=0.17 cfs 564 cf

Reach 1R: 1R Inflow=0.16 cfs 426 cf
Outflow=0.16 cfs 426 cf

Pond 1P: 9'X10' X 2' INFILTRATION FIELD Peak Elev=99.81' Storage=82 cf Inflow=0.17 cfs 564 cf
Discarded=0.00 cfs 100 cf Primary=0.16 cfs 426 cf Outflow=0.16 cfs 525 cf

Total Runoff Area = 1,550 sf Runoff Volume = 564 cf Average Runoff Depth = 4.36"
0.00% Pervious = 0 sf 100.00% Impervious = 1,550 sf

Summary for Subcatchment 1S: house model

Runoff = 0.17 cfs @ 12.07 hrs, Volume= 564 cf, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Event Rainfall=4.60"

	Area (sf)	CN	Description
*	1,550	98	
	1,550		100.00% Impervious Area

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

Summary for Reach 1R: 1R

Inflow Area = 1,550 sf,100.00% Impervious, Inflow Depth = 3.30" for 10 Year Event event
Inflow = 0.16 cfs @ 12.09 hrs, Volume= 426 cf
Outflow = 0.16 cfs @ 12.09 hrs, Volume= 426 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: 9'X10' X 2' INFILTRATION FIELD

Inflow Area = 1,550 sf,100.00% Impervious, Inflow Depth = 4.36" for 10 Year Event event
Inflow = 0.17 cfs @ 12.07 hrs, Volume= 564 cf
Outflow = 0.16 cfs @ 12.09 hrs, Volume= 525 cf, Atten= 2%, Lag= 0.9 min
Discarded = 0.00 cfs @ 12.09 hrs, Volume= 100 cf
Primary = 0.16 cfs @ 12.09 hrs, Volume= 426 cf

Routing by Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 99.81' @ 12.09 hrs Surf.Area= 90 sf Storage= 82 cf

Plug-Flow detention time= 139.3 min calculated for 525 cf (93% of inflow)
Center-of-Mass det. time= 102.1 min (850.6 - 748.5)

Volume	Invert	Avail.Storage	Storage Description
#1	98.00'	61 cf	**Custom Stage Data (Irregular)** Listed below 180 cf Overall - 28 cf Embedded = 152 cf x 40.0% Voids
#2	98.50'	28 cf	**Cultec C-100** x 2 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		89 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
98.00	90	38.0	0	0	90
100.00	90	38.0	180	180	166

Device	Routing	Invert	Outlet Devices
#1	Discarded	98.00'	**0.270 in/hr Exfiltration over Wetted area**
#2	Primary	99.50'	**4.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 12.09 hrs HW=99.81' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.16 cfs @ 12.09 hrs HW=99.81' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.16 cfs @ 1.90 fps)

Time span=0.00-35.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: house model Runoff Area=1,550 sf 100.00% Impervious Runoff Depth=5.36"
Tc=5.0 min CN=98 Runoff=0.20 cfs 693 cf

Reach 1R: 1R Inflow=0.19 cfs 553 cf
Outflow=0.19 cfs 553 cf

Pond 1P: 9'X10' X 2' INFILTRATION FIELD Peak Elev=99.88' Storage=84 cf Inflow=0.20 cfs 693 cf
Discarded=0.00 cfs 102 cf Primary=0.19 cfs 553 cf Outflow=0.20 cfs 654 cf

Total Runoff Area = 1,550 sf Runoff Volume = 693 cf Average Runoff Depth = 5.36"
0.00% Pervious = 0 sf 100.00% Impervious = 1,550 sf

Summary for Subcatchment 1S: house model

Runoff = 0.20 cfs @ 12.07 hrs, Volume= 693 cf, Depth= 5.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Event Rainfall=5.60"

	Area (sf)	CN	Description
*	1,550	98	
	1,550		100.00% Impervious Area

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

Summary for Reach 1R: 1R

Inflow Area = 1,550 sf,100.00% Impervious, Inflow Depth = 4.28" for 25 Year Event event
Inflow = 0.19 cfs @ 12.09 hrs, Volume= 553 cf
Outflow = 0.19 cfs @ 12.09 hrs, Volume= 553 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: 9'X10' X 2' INFILTRATION FIELD

Inflow Area = 1,550 sf,100.00% Impervious, Inflow Depth = 5.36" for 25 Year Event event
Inflow = 0.20 cfs @ 12.07 hrs, Volume= 693 cf
Outflow = 0.20 cfs @ 12.09 hrs, Volume= 654 cf, Atten= 3%, Lag= 1.2 min
Discarded = 0.00 cfs @ 12.09 hrs, Volume= 102 cf
Primary = 0.19 cfs @ 12.09 hrs, Volume= 553 cf

Routing by Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 99.88' @ 12.09 hrs Surf.Area= 90 sf Storage= 84 cf

Plug-Flow detention time= 119.5 min calculated for 654 cf (94% of inflow)
Center-of-Mass det. time= 87.7 min (833.0 - 745.3)

Volume	Invert	Avail.Storage	Storage Description
#1	98.00'	61 cf	**Custom Stage Data (Irregular)** Listed below 180 cf Overall - 28 cf Embedded = 152 cf x 40.0% Voids
#2	98.50'	28 cf	**Cultec C-100** x 2 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		89 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
98.00	90	38.0	0	0	90
100.00	90	38.0	180	180	166

Device	Routing	Invert	Outlet Devices
#1	Discarded	98.00'	**0.270 in/hr Exfiltration over Wetted area**
#2	Primary	99.50'	**4.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 12.09 hrs HW=99.88' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.19 cfs @ 12.09 hrs HW=99.88' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.19 cfs @ 2.23 fps)

Time span=0.00-35.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: house model Runoff Area=1,550 sf 100.00% Impervious Runoff Depth=6.76"
Tc=5.0 min CN=98 Runoff=0.25 cfs 873 cf

Reach 1R: 1R Inflow=0.24 cfs 731 cf
Outflow=0.24 cfs 731 cf

Pond 1P: 9'X10' X 2' INFILTRATION FIELD Peak Elev=100.00' Storage=89 cf Inflow=0.25 cfs 873 cf
Discarded=0.00 cfs 104 cf Primary=0.24 cfs 731 cf Outflow=0.24 cfs 835 cf

Total Runoff Area = 1,550 sf Runoff Volume = 873 cf Average Runoff Depth = 6.76"
0.00% Pervious = 0 sf 100.00% Impervious = 1,550 sf

Summary for Subcatchment 1S: house model

Runoff = 0.25 cfs @ 12.07 hrs, Volume= 873 cf, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Event Rainfall=7.00"

	Area (sf)	CN	Description
*	1,550	98	
	1,550		100.00% Impervious Area

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

Summary for Reach 1R: 1R

Inflow Area = 1,550 sf,100.00% Impervious, Inflow Depth = 5.66" for 100 Year Event event
Inflow = 0.24 cfs @ 12.09 hrs, Volume= 731 cf
Outflow = 0.24 cfs @ 12.09 hrs, Volume= 731 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: 9'X10' X 2' INFILTRATION FIELD

Inflow Area = 1,550 sf,100.00% Impervious, Inflow Depth = 6.76" for 100 Year Event event
Inflow = 0.25 cfs @ 12.07 hrs, Volume= 873 cf
Outflow = 0.24 cfs @ 12.09 hrs, Volume= 835 cf, Atten= 4%, Lag= 1.4 min
Discarded = 0.00 cfs @ 12.09 hrs, Volume= 104 cf
Primary = 0.24 cfs @ 12.09 hrs, Volume= 731 cf

Routing by Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 100.00' @ 12.09 hrs Surf.Area= 90 sf Storage= 89 cf

Plug-Flow detention time= 100.3 min calculated for 835 cf (96% of inflow)
Center-of-Mass det. time= 74.0 min (816.0 - 742.0)

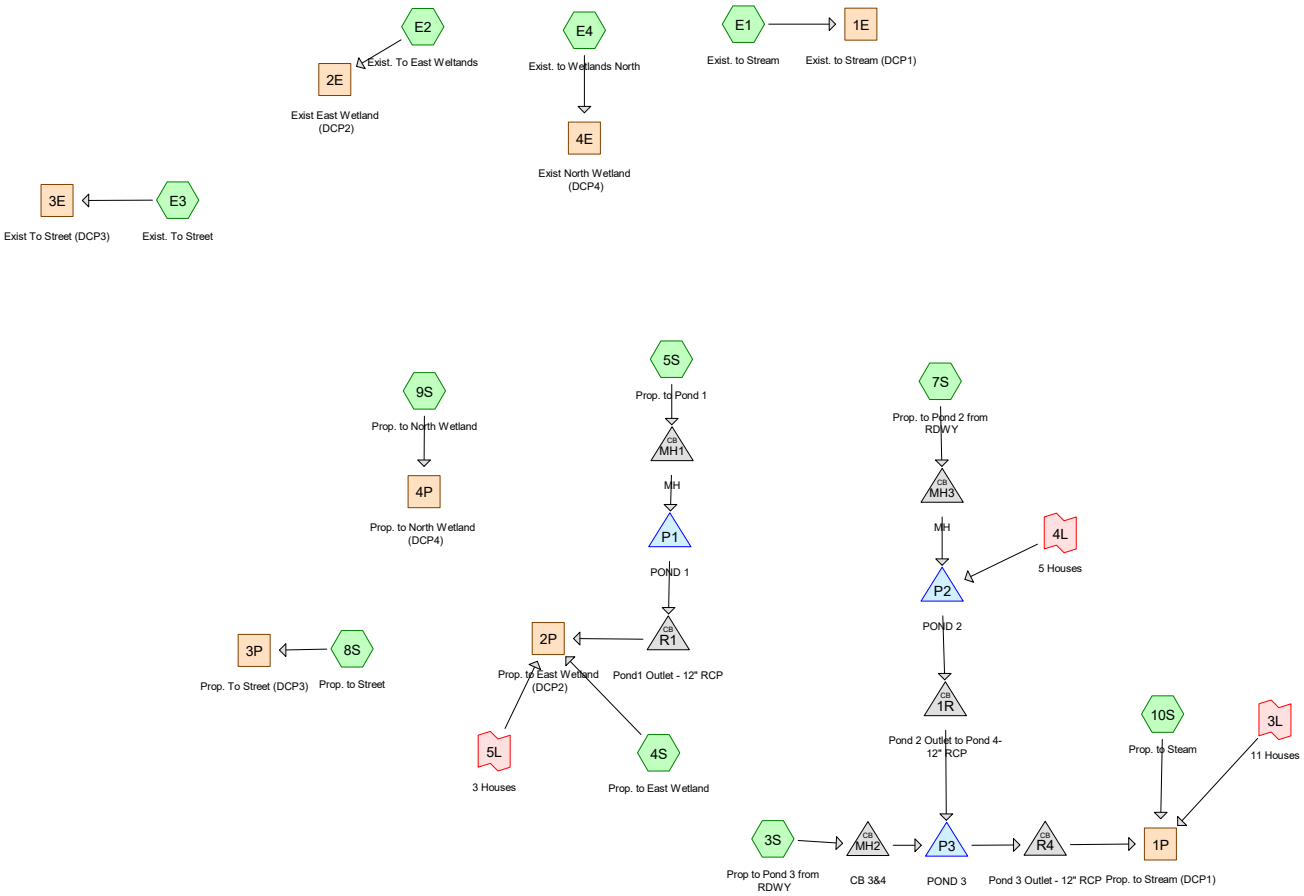
Volume	Invert	Avail.Storage	Storage Description
#1	98.00'	61 cf	**Custom Stage Data (Irregular)** Listed below 180 cf Overall - 28 cf Embedded = 152 cf x 40.0% Voids
#2	98.50'	28 cf	**Cultec C-100** x 2 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		89 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
98.00	90	38.0	0	0	90
100.00	90	38.0	180	180	166

Device	Routing	Invert	Outlet Devices
#1	Discarded	98.00'	**0.270 in/hr Exfiltration over Wetted area**
#2	Primary	99.50'	**4.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 12.09 hrs HW=100.00' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.24 cfs @ 12.09 hrs HW=100.00' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.24 cfs @ 2.76 fps)



Routing Diagram for Concord ST - Rockland 9.22.21
Prepared by Cavanaro Consulting, Printed 9/23/2021

Time span=0.00-35.00 hrs, dt=0.01 hrs, 3501 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 3S: Prop to Pond 3 from Runoff Area=39,376 sf 39.42% Impervious Runoff Depth=1.61"
Tc=5.0 min CN=83 Runoff=1.77 cfs 0.121 af

Subcatchment 4S: Prop. to East Wetland Runoff Area=107,948 sf 25.13% Impervious Runoff Depth=1.27"
Flow Length=370' Tc=37.0 min CN=78 Runoff=1.85 cfs 0.263 af

Subcatchment 5S: Prop. to Pond 1 Runoff Area=17,190 sf 61.75% Impervious Runoff Depth=2.08"
Tc=5.0 min CN=89 Runoff=0.99 cfs 0.068 af

Subcatchment 7S: Prop. to Pond 2 from Runoff Area=57,713 sf 33.42% Impervious Runoff Depth=1.54"
Tc=5.0 min CN=82 Runoff=2.47 cfs 0.170 af

Subcatchment 8S: Prop. to Street Runoff Area=592 sf 83.11% Impervious Runoff Depth=2.54"
Tc=5.0 min CN=94 Runoff=0.04 cfs 0.003 af

Subcatchment 9S: Prop. to North Wetland Runoff Area=31,967 sf 16.14% Impervious Runoff Depth=1.15"
Flow Length=480' Slope=0.0100 '/' Tc=33.1 min CN=76 Runoff=0.52 cfs 0.070 af

Subcatchment 10S: Prop. to Steam Runoff Area=151,509 sf 42.83% Impervious Runoff Depth=1.68"
Flow Length=1,030' Slope=0.0100 '/' Tc=38.3 min CN=84 Runoff=3.45 cfs 0.488 af

Subcatchment E1: Exist. to Stream Runoff Area=243,161 sf 28.05% Impervious Runoff Depth=1.34"
Flow Length=460' Slope=0.0100 '/' Tc=42.0 min CN=79 Runoff=4.12 cfs 0.622 af

Subcatchment E2: Exist. To East Runoff Area=148,590 sf 21.32% Impervious Runoff Depth=1.15"
Flow Length=370' Tc=37.0 min CN=76 Runoff=2.27 cfs 0.327 af

Subcatchment E3: Exist. To Street Runoff Area=1,271 sf 37.21% Impervious Runoff Depth=1.61"
Tc=5.0 min CN=83 Runoff=0.06 cfs 0.004 af

Subcatchment E4: Exist. to Wetlands North Runoff Area=42,453 sf 19.69% Impervious Runoff Depth=1.21"
Flow Length=480' Slope=0.0100 '/' Tc=42.6 min CN=77 Runoff=0.64 cfs 0.098 af

Reach 1E: Exist. to Stream (DCP1) Inflow=4.12 cfs 0.622 af
Outflow=4.12 cfs 0.622 af

Reach 1P: Prop. to Stream (DCP1) Inflow=3.67 cfs 0.551 af
Outflow=3.67 cfs 0.551 af

Reach 2E: Exist East Wetland (DCP2) Inflow=2.27 cfs 0.327 af
Outflow=2.27 cfs 0.327 af

Reach 2P: Prop. to East Wetland (DCP2) Inflow=2.04 cfs 0.308 af
Outflow=2.04 cfs 0.308 af

Reach 3E: Exist To Street (DCP3) Inflow=0.06 cfs 0.004 af
Outflow=0.06 cfs 0.004 af

Reach 3P: Prop. To Street (DCP3) Inflow=0.04 cfs 0.003 af
Outflow=0.04 cfs 0.003 af

Reach 4E: Exist North Wetland (DCP4) Inflow=0.64 cfs 0.098 af
Outflow=0.64 cfs 0.098 af

Reach 4P: Prop. to North Wetland (DCP4) Inflow=0.52 cfs 0.070 af
Outflow=0.52 cfs 0.070 af

Pond 1R: Pond 2 Outlet to Pond 4- 12" RCP Peak Elev=87.00' Inflow=0.00 cfs 0.000 af
12.0" Round Culvert n=0.011 L=210.0' S=0.0095 '/' Outflow=0.00 cfs 0.000 af

Pond MH1: MH Peak Elev=87.72' Inflow=0.99 cfs 0.068 af
15.0" Round Culvert n=0.011 L=55.0' S=0.0091 '/' Outflow=0.99 cfs 0.068 af

Pond MH2: CB 3&4 Peak Elev=86.65' Inflow=1.77 cfs 0.121 af
15.0" Round Culvert n=0.011 L=57.0' S=0.0175 '/' Outflow=1.77 cfs 0.121 af

Pond MH3: MH Peak Elev=88.29' Inflow=2.47 cfs 0.170 af
15.0" Round Culvert n=0.011 L=150.0' S=0.0100 '/' Outflow=2.47 cfs 0.170 af

Pond P1: POND 1 Peak Elev=87.72' Storage=1,536 cf Inflow=0.99 cfs 0.068 af
Discarded=0.01 cfs 0.019 af Primary=0.13 cfs 0.028 af Outflow=0.14 cfs 0.047 af

Pond P2: POND 2 Peak Elev=86.76' Storage=3,460 cf Inflow=3.02 cfs 0.198 af
Discarded=0.28 cfs 0.199 af Primary=0.00 cfs 0.000 af Outflow=0.28 cfs 0.199 af

Pond P3: POND 3 Peak Elev=85.96' Storage=3,769 cf Inflow=1.77 cfs 0.121 af
Discarded=0.03 cfs 0.065 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.065 af

Pond R1: Pond1 Outlet - 12" RCP Peak Elev=86.67' Inflow=0.13 cfs 0.028 af
12.0" Round Culvert n=0.011 L=25.0' S=0.0120 '/' Outflow=0.13 cfs 0.028 af

Pond R4: Pond 3 Outlet - 12" RCP Peak Elev=85.00' Inflow=0.00 cfs 0.000 af
12.0" Round Culvert n=0.011 L=25.0' S=0.0200 '/' Outflow=0.00 cfs 0.000 af

ar Event Outflow **Link** Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce x 11.00 Inflow=0.11 cfs 0.006 af
Area= 0.036 ac 100.00% Imperv. Primary=1.23 cfs 0.063 af

ear Event Outflow **Link** Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce x 5.00 Inflow=0.11 cfs 0.006 af
Area= 0.036 ac 100.00% Imperv. Primary=0.56 cfs 0.029 af

ear Event Outflow **Link** Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce x 3.00 Inflow=0.11 cfs 0.006 af
Area= 0.036 ac 100.00% Imperv. Primary=0.34 cfs 0.017 af

Total Runoff Area = 19.324 ac Runoff Volume = 2.235 af Average Runoff Depth = 1.39"
70.08% Pervious = 13.543 ac 29.92% Impervious = 5.781 ac

Summary for Subcatchment 3S: Prop to Pond 3 from RDWY

Runoff = 1.77 cfs @ 12.08 hrs, Volume= 0.121 af, Depth= 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Event Rainfall=3.20"

	Area (sf)	CN	Description
*	1,761	98	Paved parking, HSG C-Sidewalk
	13,760	98	Paved parking, HSG C
	14,044	74	>75% Grass cover, Good, HSG C
	9,811	74	>75% Grass cover, Good, HSG C
	39,376	83	Weighted Average
	23,855		60.58% Pervious Area
	15,521		39.42% Impervious Area

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

Summary for Subcatchment 4S: Prop. to East Wetland

Runoff = 1.85 cfs @ 12.54 hrs, Volume= 0.263 af, Depth= 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Event Rainfall=3.20"

	Area (sf)	CN	Description
*	25,672	98	Water Surface Wetlands, HSG C
	31,888	74	>75% Grass cover, Good, HSG C
	48,103	70	Woods, Good, HSG C
*	0	98	Houses
*	825	74	Patio
*	1,155	98	driveway
*	305	98	ret wall
	107,948	78	Weighted Average
	80,816		74.87% Pervious Area
	27,132		25.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.20"
8.7	320	0.0150	0.61		**Shallow Concentrated Flow, shallow** Woodland Kv= 5.0 fps
37.0	370	Total			

Summary for Subcatchment 5S: Prop. to Pond 1

Runoff = 0.99 cfs @ 12.07 hrs, Volume= 0.068 af, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Event Rainfall=3.20"

Area (sf)	CN	Description
10,615	98	Paved parking, HSG C
6,575	74	>75% Grass cover, Good, HSG C
17,190	89	Weighted Average
6,575		38.25% Pervious Area
10,615		61.75% Impervious Area

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

Summary for Subcatchment 7S: Prop. to Pond 2 from RDWY

Runoff = 2.47 cfs @ 12.08 hrs, Volume= 0.170 af, Depth= 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Event Rainfall=3.20"

	Area (sf)	CN	Description
*	1,438	98	Paved parking, HSG C - Sidewalk
*	17,852	98	Paved parking, HSG C - rroad-drives
	19,807	74	>75% Grass cover, Good, HSG C
	435	74	>75% Grass cover, Good, HSG C
*	660	74	Patio
	17,521	74	>75% Grass cover, Good, HSG C
	57,713	82	Weighted Average
	38,423		66.58% Pervious Area
	19,290		33.42% Impervious Area

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

Summary for Subcatchment 8S: Prop. to Street

Runoff = 0.04 cfs @ 12.07 hrs, Volume= 0.003 af, Depth= 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Event Rainfall=3.20"

Area (sf)	CN	Description
492	98	Paved parking, HSG C
100	74	>75% Grass cover, Good, HSG C
592	94	Weighted Average
100		16.89% Pervious Area
492		83.11% Impervious Area

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

Summary for Subcatchment 9S: Prop. to North Wetland

Runoff = 0.52 cfs @ 12.48 hrs, Volume= 0.070 af, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Event Rainfall=3.20"

	Area (sf)	CN	Description
*	906	98	Water Surface Wetlands, HSG C
	2,664	98	Paved parking, HSG C
	15,147	74	>75% Grass cover, Good, HSG C
	1,286	98	Roofs, HSG C - infiltrated
*	302	98	walls othe rimp.
	11,662	70	Woods, Good, HSG C
	31,967	76	Weighted Average
	26,809		83.86% Pervious Area
	5,158		16.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
4.8	430	0.0100	1.50		**Shallow Concentrated Flow, shallow** Grassed Waterway Kv= 15.0 fps
33.1	480	Total			

Summary for Subcatchment 10S: Prop. to Steam

Runoff = 3.45 cfs @ 12.55 hrs, Volume= 0.488 af, Depth= 1.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Event Rainfall=3.20"

	Area (sf)	CN	Description
*	48,878	98	Water Surface Wetlands, HSG C
*	3,151	98	Prop Paved parking, HSG C
	69,157	74	>75% Grass cover, Good, HSG C
*	4,702	98	walls othe rimp.
	1,888	87	Dirt roads, HSG C
	13,921	70	Woods, Good, HSG C
*	2,457	98	Exisit,. Roof
*	5,705	98	Exisit. Pavement
*	1,650	74	Prop. Patios
	151,509	84	Weighted Average
	86,616		57.17% Pervious Area
	64,893		42.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.20"
1.7	50	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	30	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.7	110	0.0100	0.50		**Shallow Concentrated Flow, shallow** Woodland Kv= 5.0 fps
3.9	790	0.0100	3.35	20.11	**Channel Flow, Stream** Area= 6.0 sf Perim= 7.0' r= 0.86' n= 0.040 Earth, cobble bottom, clean sides
38.3	1,030	Total			

Summary for Subcatchment E1: Exist. to Stream

Runoff = 4.12 cfs @ 12.60 hrs, Volume= 0.622 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Event Rainfall=3.20"

	Area (sf)	CN	Description
*	48,977	98	Water Surface Wetlands, HSG C
	11,952	98	Paved parking, HSG C
	34,335	74	>75% Grass cover, Good, HSG C
	2,457	98	Roofs, HSG C
*	4,820	98	walls othe rimp.
	8,801	87	Dirt roads, HSG C
	131,819	70	Woods, Good, HSG C
	243,161	79	Weighted Average
	174,955		71.95% Pervious Area
	68,206		28.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
13.7	410	0.0100	0.50		**Shallow Concentrated Flow, shallow - woods** Woodland Kv= 5.0 fps
42.0	460	Total			

Summary for Subcatchment E2: Exist. To East Weltands

Runoff = 2.27 cfs @ 12.54 hrs, Volume= 0.327 af, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Event Rainfall=3.20"

	Area (sf)	CN	Description
*	25,672	98	Water Surface Wetlands, HSG C
	5,792	98	Paved parking, HSG C
	9,907	74	>75% Grass cover, Good, HSG C
*	217	98	walls othe rimp.
	107,002	70	Woods, Good, HSG C
	148,590	76	Weighted Average
	116,909		78.68% Pervious Area
	31,681		21.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
8.7	320	0.0150	0.61		**Shallow Concentrated Flow, shallow - woods** Woodland Kv= 5.0 fps
37.0	370	Total			

Summary for Subcatchment E3: Exist. To Street

Runoff = 0.06 cfs @ 12.08 hrs, Volume= 0.004 af, Depth= 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Event Rainfall=3.20"

Area (sf)	CN	Description
473	98	Paved parking, HSG C
798	74	>75% Grass cover, Good, HSG C
1,271	83	Weighted Average
798		62.79% Pervious Area
473		37.21% Impervious Area

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

Summary for Subcatchment E4: Exist. to Wetlands North

Runoff = 0.64 cfs @ 12.63 hrs, Volume= 0.098 af, Depth= 1.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Event Rainfall=3.20"

	Area (sf)	CN	Description
*	907	98	Water Surface Wetlands, HSG C
	5,644	98	Paved parking, HSG C
	12,783	74	>75% Grass cover, Good, HSG C
*	520	98	walls othe rimp.
	21,313	70	Woods, Good, HSG C
	1,286	98	Roofs, HSG C
	42,453	77	Weighted Average
	34,096		80.31% Pervious Area
	8,357		19.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
14.3	430	0.0100	0.50		**Shallow Concentrated Flow, shallow - woods** Woodland Kv= 5.0 fps
42.6	480	Total			

Summary for Reach 1E: Exist. to Stream (DCP1)

Inflow Area = 5.582 ac, 28.05% Impervious, Inflow Depth = 1.34" for 2 Year Event event
Inflow = 4.12 cfs @ 12.60 hrs, Volume= 0.622 af
Outflow = 4.12 cfs @ 12.60 hrs, Volume= 0.622 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 1P: Prop. to Stream (DCP1)

Inflow Area = 5.778 ac, 40.84% Impervious, Inflow Depth = 1.14" for 2 Year Event event
Inflow = 3.67 cfs @ 12.51 hrs, Volume= 0.551 af
Outflow = 3.67 cfs @ 12.51 hrs, Volume= 0.551 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 2E: Exist East Wetland (DCP2)

Inflow Area = 3.411 ac, 21.32% Impervious, Inflow Depth = 1.15" for 2 Year Event event
Inflow = 2.27 cfs @ 12.54 hrs, Volume= 0.327 af
Outflow = 2.27 cfs @ 12.54 hrs, Volume= 0.327 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 2P: Prop. to East Wetland (DCP2)

Inflow Area = 2.908 ac, 31.02% Impervious, Inflow Depth = 1.27" for 2 Year Event event
Inflow = 2.04 cfs @ 12.54 hrs, Volume= 0.308 af
Outflow = 2.04 cfs @ 12.54 hrs, Volume= 0.308 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 3E: Exist To Street (DCP3)

Inflow Area = 0.029 ac, 37.21% Impervious, Inflow Depth = 1.61" for 2 Year Event event
Inflow = 0.06 cfs @ 12.08 hrs, Volume= 0.004 af
Outflow = 0.06 cfs @ 12.08 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 3P: Prop. To Street (DCP3)

Inflow Area = 0.014 ac, 83.11% Impervious, Inflow Depth = 2.54" for 2 Year Event event
Inflow = 0.04 cfs @ 12.07 hrs, Volume= 0.003 af
Outflow = 0.04 cfs @ 12.07 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 4E: Exist North Wetland (DCP4)

Inflow Area = 0.975 ac, 19.69% Impervious, Inflow Depth = 1.21" for 2 Year Event event
Inflow = 0.64 cfs @ 12.63 hrs, Volume= 0.098 af
Outflow = 0.64 cfs @ 12.63 hrs, Volume= 0.098 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 4P: Prop. to North Wetland (DCP4)

Inflow Area = 0.734 ac, 16.14% Impervious, Inflow Depth = 1.15" for 2 Year Event event
Inflow = 0.52 cfs @ 12.48 hrs, Volume= 0.070 af
Outflow = 0.52 cfs @ 12.48 hrs, Volume= 0.070 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Pond 1R: Pond 2 Outlet to Pond 4- 12" RCP

Inflow Area = 1.360 ac, 35.17% Impervious, Inflow Depth = 0.00" for 2 Year Event event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 87.00' @ 0.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	87.00'	**12.0" Round Culvert** L= 210.0' Ke= 0.500 Inlet / Outlet Invert= 87.00' / 85.00' S= 0.0095 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=87.00' TW=85.00' (Dynamic Tailwater)
↑**1=Culvert** (Controls 0.00 cfs)

Summary for Pond MH1: MH

Inflow Area = 0.395 ac, 61.75% Impervious, Inflow Depth = 2.08" for 2 Year Event event
Inflow = 0.99 cfs @ 12.07 hrs, Volume= 0.068 af
Outflow = 0.99 cfs @ 12.07 hrs, Volume= 0.068 af, Atten= 0%, Lag= 0.0 min
Primary = 0.99 cfs @ 12.07 hrs, Volume= 0.068 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 87.72' @ 12.57 hrs
Flood Elev= 89.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	87.00'	**15.0" Round Culvert** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 87.00' / 86.50' S= 0.0091 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf

Primary OutFlow Max=0.95 cfs @ 12.07 hrs HW=87.56' TW=87.25' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 0.95 cfs @ 2.64 fps)

Summary for Pond MH2: CB 3&4

Inflow Area = 0.904 ac, 39.42% Impervious, Inflow Depth = 1.61" for 2 Year Event event
Inflow = 1.77 cfs @ 12.08 hrs, Volume= 0.121 af
Outflow = 1.77 cfs @ 12.08 hrs, Volume= 0.121 af, Atten= 0%, Lag= 0.0 min
Primary = 1.77 cfs @ 12.08 hrs, Volume= 0.121 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 86.65' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	**15.0" Round Culvert** L= 57.0' Ke= 0.500 Inlet / Outlet Invert= 86.00' / 85.00' S= 0.0175 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf

Primary OutFlow Max=1.76 cfs @ 12.08 hrs HW=86.65' TW=85.34' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 1.76 cfs @ 2.74 fps)

Summary for Pond MH3: MH

Inflow Area = 1.325 ac, 33.42% Impervious, Inflow Depth = 1.54" for 2 Year Event event
Inflow = 2.47 cfs @ 12.08 hrs, Volume= 0.170 af
Outflow = 2.47 cfs @ 12.08 hrs, Volume= 0.170 af, Atten= 0%, Lag= 0.0 min
Primary = 2.47 cfs @ 12.08 hrs, Volume= 0.170 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 88.29' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	87.50'	**15.0" Round Culvert** L= 150.0' Ke= 0.500 Inlet / Outlet Invert= 87.50' / 86.00' S= 0.0100 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf

Primary OutFlow Max=2.46 cfs @ 12.08 hrs HW=88.29' TW=86.33' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 2.46 cfs @ 3.02 fps)

Summary for Pond P1: POND 1

Inflow Area = 0.395 ac, 61.75% Impervious, Inflow Depth = 2.08" for 2 Year Event event
Inflow = 0.99 cfs @ 12.07 hrs, Volume= 0.068 af
Outflow = 0.14 cfs @ 12.58 hrs, Volume= 0.047 af, Atten= 86%, Lag= 30.4 min
Discarded = 0.01 cfs @ 12.58 hrs, Volume= 0.019 af
Primary = 0.13 cfs @ 12.58 hrs, Volume= 0.028 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 87.72' @ 12.58 hrs Surf.Area= 1,419 sf Storage= 1,536 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 249.5 min (1,059.7 - 810.2)

Volume	Invert	Avail.Storage	Storage Description
#1	86.50'	5,410 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
86.50	1,050	200.0	0	0	1,050
87.00	1,255	210.0	575	575	1,392
88.00	1,486	221.0	1,369	1,944	1,826
89.00	1,730	233.0	1,606	3,551	2,316
90.00	1,991	245.0	1,859	5,410	2,831

Device	Routing	Invert	Outlet Devices
#1	Primary	87.50'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	86.50'	**0.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.58 hrs HW=87.72' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.13 cfs @ 12.58 hrs HW=87.72' TW=86.67' (Dynamic Tailwater)
1=Orifice/Grate (Orifice Controls 0.13 cfs @ 1.59 fps)

Summary for Pond P2: POND 2

Inflow Area = 1.360 ac, 35.17% Impervious, Inflow Depth = 1.75" for 2 Year Event event
Inflow = 3.02 cfs @ 12.08 hrs, Volume= 0.198 af
Outflow = 0.28 cfs @ 13.02 hrs, Volume= 0.199 af, Atten= 91%, Lag= 56.8 min
Discarded = 0.28 cfs @ 13.02 hrs, Volume= 0.199 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 86.76' @ 13.02 hrs Surf.Area= 5,039 sf Storage= 3,460 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 113.7 min (941.9 - 828.2)

Volume	Invert	Avail.Storage	Storage Description
#1	86.00'	18,021 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
86.00	4,123	395.0	0	0	4,123
87.00	5,353	416.0	4,725	4,725	5,538
88.00	6,647	437.0	5,988	10,713	7,026
89.00	7,990	460.0	7,308	18,021	8,727

Device	Routing	Invert	Outlet Devices
#1	Primary	87.00'	**5.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	86.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.28 cfs @ 13.02 hrs HW=86.76' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.28 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=86.00' TW=87.00' (Dynamic Tailwater)
1=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond P3: POND 3

Inflow Area = 2.264 ac, 36.86% Impervious, Inflow Depth = 0.64" for 2 Year Event event
Inflow = 1.77 cfs @ 12.08 hrs, Volume= 0.121 af
Outflow = 0.03 cfs @ 19.34 hrs, Volume= 0.065 af, Atten= 98%, Lag= 435.7 min
Discarded = 0.03 cfs @ 19.34 hrs, Volume= 0.065 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 85.96' @ 19.34 hrs Surf.Area= 4,314 sf Storage= 3,769 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 514.4 min (1,346.4 - 832.0)

Volume	Invert	Avail.Storage	Storage Description
#1	85.00'	17,729 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
85.00	3,516	295.0	0	0	3,516
86.00	4,345	332.0	3,923	3,923	5,389
87.00	5,282	365.0	4,806	8,729	7,252
88.00	6,220	385.0	5,745	14,474	8,503
88.50	6,805	400.0	3,255	17,729	9,460

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	85.00'	**0.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.03 cfs @ 19.34 hrs HW=85.96' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=85.00' TW=85.00' (Dynamic Tailwater)
1=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond R1: Pond1 Outlet - 12" RCP

Inflow Area = 0.395 ac, 61.75% Impervious, Inflow Depth = 0.85" for 2 Year Event event
Inflow = 0.13 cfs @ 12.58 hrs, Volume= 0.028 af
Outflow = 0.13 cfs @ 12.58 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min
Primary = 0.13 cfs @ 12.58 hrs, Volume= 0.028 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 86.67' @ 12.58 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	86.50'	**12.0" Round Culvert** L= 25.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 86.50' / 86.20' S= 0.0120 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.13 cfs @ 12.58 hrs HW=86.67' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.13 cfs @ 1.42 fps)

Summary for Pond R4: Pond 3 Outlet - 12" RCP

Inflow Area = 2.264 ac, 36.86% Impervious, Inflow Depth = 0.00" for 2 Year Event event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 85.00' @ 0.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	85.00'	**12.0" Round Culvert** L= 25.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 85.00' / 84.50' S= 0.0200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=85.00' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)

Summary for Link 3L: 11 Houses

Inflow Area = 0.036 ac,100.00% Impervious, Inflow Depth = 1.93" for 2 Year Event event
Inflow = 0.11 cfs @ 12.08 hrs, Volume= 0.006 af
Primary = 1.23 cfs @ 12.08 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 11.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

2 Year Event Outflow Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce

Summary for Link 4L: 5 Houses

Inflow Area = 0.036 ac,100.00% Impervious, Inflow Depth = 1.93" for 2 Year Event event
Inflow = 0.11 cfs @ 12.08 hrs, Volume= 0.006 af
Primary = 0.56 cfs @ 12.08 hrs, Volume= 0.029 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 5.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

2 Year Event Outflow Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce

Summary for Link 5L: 3 Houses

Inflow Area = 0.036 ac,100.00% Impervious, Inflow Depth = 1.93" for 2 Year Event event
Inflow = 0.11 cfs @ 12.08 hrs, Volume= 0.006 af
Primary = 0.34 cfs @ 12.08 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 3.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

2 Year Event Outflow Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce

Time span=0.00-35.00 hrs, dt=0.01 hrs, 3501 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 3S: Prop to Pond 3 from Runoff Area=39,376 sf 39.42% Impervious Runoff Depth=2.81"
Tc=5.0 min CN=83 Runoff=3.09 cfs 0.212 af

Subcatchment 4S: Prop. to East Wetland Runoff Area=107,948 sf 25.13% Impervious Runoff Depth=2.38"
Flow Length=370' Tc=37.0 min CN=78 Runoff=3.53 cfs 0.491 af

Subcatchment 5S: Prop. to Pond 1 Runoff Area=17,190 sf 61.75% Impervious Runoff Depth=3.39"
Tc=5.0 min CN=89 Runoff=1.59 cfs 0.111 af

Subcatchment 7S: Prop. to Pond 2 from Runoff Area=57,713 sf 33.42% Impervious Runoff Depth=2.72"
Tc=5.0 min CN=82 Runoff=4.38 cfs 0.301 af

Subcatchment 8S: Prop. to Street Runoff Area=592 sf 83.11% Impervious Runoff Depth=3.91"
Tc=5.0 min CN=94 Runoff=0.06 cfs 0.004 af

Subcatchment 9S: Prop. to North Wetland Runoff Area=31,967 sf 16.14% Impervious Runoff Depth=2.21"
Flow Length=480' Slope=0.0100 '/' Tc=33.1 min CN=76 Runoff=1.02 cfs 0.135 af

Subcatchment 10S: Prop. to Steam Runoff Area=151,509 sf 42.83% Impervious Runoff Depth=2.91"
Flow Length=1,030' Slope=0.0100 '/' Tc=38.3 min CN=84 Runoff=5.95 cfs 0.843 af

Subcatchment E1: Exist. to Stream Runoff Area=243,161 sf 28.05% Impervious Runoff Depth=2.46"
Flow Length=460' Slope=0.0100 '/' Tc=42.0 min CN=79 Runoff=7.72 cfs 1.145 af

Subcatchment E2: Exist. To East Runoff Area=148,590 sf 21.32% Impervious Runoff Depth=2.21"
Flow Length=370' Tc=37.0 min CN=76 Runoff=4.50 cfs 0.628 af

Subcatchment E3: Exist. To Street Runoff Area=1,271 sf 37.21% Impervious Runoff Depth=2.81"
Tc=5.0 min CN=83 Runoff=0.10 cfs 0.007 af

Subcatchment E4: Exist. to Wetlands North Runoff Area=42,453 sf 19.69% Impervious Runoff Depth=2.29"
Flow Length=480' Slope=0.0100 '/' Tc=42.6 min CN=77 Runoff=1.24 cfs 0.186 af

Reach 1E: Exist. to Stream (DCP1) Inflow=7.72 cfs 1.145 af
Outflow=7.72 cfs 1.145 af

Reach 1P: Prop. to Stream (DCP1) Inflow=6.38 cfs 1.053 af
Outflow=6.38 cfs 1.053 af

Reach 2E: Exist East Wetland (DCP2) Inflow=4.50 cfs 0.628 af
Outflow=4.50 cfs 0.628 af

Reach 2P: Prop. to East Wetland (DCP2) Inflow=4.12 cfs 0.590 af
Outflow=4.12 cfs 0.590 af

Reach 3E: Exist To Street (DCP3) Inflow=0.10 cfs 0.007 af
Outflow=0.10 cfs 0.007 af

Reach 3P: Prop. To Street (DCP3) Inflow=0.06 cfs 0.004 af
Outflow=0.06 cfs 0.004 af

Reach 4E: Exist North Wetland (DCP4) Inflow=1.24 cfs 0.186 af
Outflow=1.24 cfs 0.186 af

Reach 4P: Prop. to North Wetland (DCP4) Inflow=1.02 cfs 0.135 af
Outflow=1.02 cfs 0.135 af

Pond 1R: Pond 2 Outlet to Pond 4- 12" RCP Peak Elev=87.23' Inflow=0.18 cfs 0.031 af
12.0" Round Culvert n=0.011 L=210.0' S=0.0095 '/' Outflow=0.18 cfs 0.031 af

Pond MH1: MH Peak Elev=88.09' Inflow=1.59 cfs 0.111 af
15.0" Round Culvert n=0.011 L=55.0' S=0.0091 '/' Outflow=1.59 cfs 0.111 af

Pond MH2: CB 3&4 Peak Elev=86.91' Inflow=3.09 cfs 0.212 af
15.0" Round Culvert n=0.011 L=57.0' S=0.0175 '/' Outflow=3.09 cfs 0.212 af

Pond MH3: MH Peak Elev=88.67' Inflow=4.38 cfs 0.301 af
15.0" Round Culvert n=0.011 L=150.0' S=0.0100 '/' Outflow=4.38 cfs 0.301 af

Pond P1: POND 1 Peak Elev=88.07' Storage=2,056 cf Inflow=1.59 cfs 0.111 af
Discarded=0.01 cfs 0.020 af Primary=0.54 cfs 0.070 af Outflow=0.55 cfs 0.090 af

Pond P2: POND 2 Peak Elev=87.33' Storage=6,578 cf Inflow=5.18 cfs 0.350 af
Discarded=0.32 cfs 0.319 af Primary=0.18 cfs 0.031 af Outflow=0.50 cfs 0.350 af

Pond P3: POND 3 Peak Elev=86.45' Storage=5,985 cf Inflow=3.09 cfs 0.243 af
Discarded=0.04 cfs 0.073 af Primary=0.22 cfs 0.103 af Outflow=0.26 cfs 0.176 af

Pond R1: Pond1 Outlet - 12" RCP Peak Elev=86.87' Inflow=0.54 cfs 0.070 af
12.0" Round Culvert n=0.011 L=25.0' S=0.0120 '/' Outflow=0.54 cfs 0.070 af

Pond R4: Pond 3 Outlet - 12" RCP Peak Elev=85.23' Inflow=0.22 cfs 0.103 af
12.0" Round Culvert n=0.011 L=25.0' S=0.0200 '/' Outflow=0.22 cfs 0.103 af

ar Event Outflow **Link** Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce x 11.00 Inflow=0.16 cfs 0.010 af
Area= 0.036 ac 100.00% Imperv. Primary=1.77 cfs 0.108 af

ear Event Outflow **Link** Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce x 5.00 Inflow=0.16 cfs 0.010 af
Area= 0.036 ac 100.00% Imperv. Primary=0.81 cfs 0.049 af

ear Event Outflow **Link** Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce x 3.00 Inflow=0.16 cfs 0.010 af
Area= 0.036 ac 100.00% Imperv. Primary=0.48 cfs 0.029 af

Total Runoff Area = 19.324 ac Runoff Volume = 4.063 af Average Runoff Depth = 2.52"
70.08% Pervious = 13.543 ac 29.92% Impervious = 5.781 ac

Summary for Subcatchment 3S: Prop to Pond 3 from RDWY

Runoff = 3.09 cfs @ 12.07 hrs, Volume= 0.212 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Event Rainfall=4.60"

	Area (sf)	CN	Description
*	1,761	98	Paved parking, HSG C-Sidewalk
	13,760	98	Paved parking, HSG C
	14,044	74	>75% Grass cover, Good, HSG C
	9,811	74	>75% Grass cover, Good, HSG C
	39,376	83	Weighted Average
	23,855		60.58% Pervious Area
	15,521		39.42% Impervious Area

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

Summary for Subcatchment 4S: Prop. to East Wetland

Runoff = 3.53 cfs @ 12.53 hrs, Volume= 0.491 af, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Event Rainfall=4.60"

	Area (sf)	CN	Description
*	25,672	98	Water Surface Wetlands, HSG C
	31,888	74	>75% Grass cover, Good, HSG C
	48,103	70	Woods, Good, HSG C
*	0	98	Houses
*	825	74	Patio
*	1,155	98	driveway
*	305	98	ret wall
	107,948	78	Weighted Average
	80,816		74.87% Pervious Area
	27,132		25.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.20"
8.7	320	0.0150	0.61		**Shallow Concentrated Flow, shallow** Woodland Kv= 5.0 fps
37.0	370	Total			

Summary for Subcatchment 5S: Prop. to Pond 1

Runoff = 1.59 cfs @ 12.07 hrs, Volume= 0.111 af, Depth= 3.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Event Rainfall=4.60"

Area (sf)	CN	Description
10,615	98	Paved parking, HSG C
6,575	74	>75% Grass cover, Good, HSG C
17,190	89	Weighted Average
6,575		38.25% Pervious Area
10,615		61.75% Impervious Area

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

Summary for Subcatchment 7S: Prop. to Pond 2 from RDWY

Runoff = 4.38 cfs @ 12.07 hrs, Volume= 0.301 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Event Rainfall=4.60"

	Area (sf)	CN	Description
*	1,438	98	Paved parking, HSG C - Sidewalk
*	17,852	98	Paved parking, HSG C - rroad-drives
	19,807	74	>75% Grass cover, Good, HSG C
	435	74	>75% Grass cover, Good, HSG C
*	660	74	Patio
	17,521	74	>75% Grass cover, Good, HSG C
	57,713	82	Weighted Average
	38,423		66.58% Pervious Area
	19,290		33.42% Impervious Area

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

Summary for Subcatchment 8S: Prop. to Street

Runoff = 0.06 cfs @ 12.07 hrs, Volume= 0.004 af, Depth= 3.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Event Rainfall=4.60"

Area (sf)	CN	Description
492	98	Paved parking, HSG C
100	74	>75% Grass cover, Good, HSG C
592	94	Weighted Average
100		16.89% Pervious Area
492		83.11% Impervious Area

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

Summary for Subcatchment 9S: Prop. to North Wetland

Runoff = 1.02 cfs @ 12.47 hrs, Volume= 0.135 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Event Rainfall=4.60"

	Area (sf)	CN	Description
*	906	98	Water Surface Wetlands, HSG C
	2,664	98	Paved parking, HSG C
	15,147	74	>75% Grass cover, Good, HSG C
	1,286	98	Roofs, HSG C - infiltrated
*	302	98	walls othe rimp.
	11,662	70	Woods, Good, HSG C
	31,967	76	Weighted Average
	26,809		83.86% Pervious Area
	5,158		16.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
4.8	430	0.0100	1.50		**Shallow Concentrated Flow, shallow** Grassed Waterway Kv= 15.0 fps
33.1	480	Total			

Summary for Subcatchment 10S: Prop. to Steam

Runoff = 5.95 cfs @ 12.52 hrs, Volume= 0.843 af, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Event Rainfall=4.60"

	Area (sf)	CN	Description
*	48,878	98	Water Surface Wetlands, HSG C
*	3,151	98	Prop Paved parking, HSG C
	69,157	74	>75% Grass cover, Good, HSG C
*	4,702	98	walls othe rimp.
	1,888	87	Dirt roads, HSG C
	13,921	70	Woods, Good, HSG C
*	2,457	98	Exisit,. Roof
*	5,705	98	Exisit. Pavement
*	1,650	74	Prop. Patios
	151,509	84	Weighted Average
	86,616		57.17% Pervious Area
	64,893		42.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.20"
1.7	50	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	30	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.7	110	0.0100	0.50		**Shallow Concentrated Flow, shallow** Woodland Kv= 5.0 fps
3.9	790	0.0100	3.35	20.11	**Channel Flow, Stream** Area= 6.0 sf Perim= 7.0' r= 0.86' n= 0.040 Earth, cobble bottom, clean sides
38.3	1,030	Total			

Summary for Subcatchment E1: Exist. to Stream

Runoff = 7.72 cfs @ 12.56 hrs, Volume= 1.145 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Event Rainfall=4.60"

	Area (sf)	CN	Description
*	48,977	98	Water Surface Wetlands, HSG C
	11,952	98	Paved parking, HSG C
	34,335	74	>75% Grass cover, Good, HSG C
	2,457	98	Roofs, HSG C
*	4,820	98	walls othe rimp.
	8,801	87	Dirt roads, HSG C
	131,819	70	Woods, Good, HSG C
	243,161	79	Weighted Average
	174,955		71.95% Pervious Area
	68,206		28.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
13.7	410	0.0100	0.50		**Shallow Concentrated Flow, shallow - woods** Woodland Kv= 5.0 fps
42.0	460	Total			

Summary for Subcatchment E2: Exist. To East Weltands

Runoff = 4.50 cfs @ 12.54 hrs, Volume= 0.628 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Event Rainfall=4.60"

	Area (sf)	CN	Description
*	25,672	98	Water Surface Wetlands, HSG C
	5,792	98	Paved parking, HSG C
	9,907	74	>75% Grass cover, Good, HSG C
*	217	98	walls othe rimp.
	107,002	70	Woods, Good, HSG C
	148,590	76	Weighted Average
	116,909		78.68% Pervious Area
	31,681		21.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
8.7	320	0.0150	0.61		**Shallow Concentrated Flow, shallow - woods** Woodland Kv= 5.0 fps
37.0	370	Total			

Summary for Subcatchment E3: Exist. To Street

Runoff = 0.10 cfs @ 12.07 hrs, Volume= 0.007 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Event Rainfall=4.60"

Area (sf)	CN	Description
473	98	Paved parking, HSG C
798	74	>75% Grass cover, Good, HSG C
1,271	83	Weighted Average
798		62.79% Pervious Area
473		37.21% Impervious Area

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

Summary for Subcatchment E4: Exist. to Wetlands North

Runoff = 1.24 cfs @ 12.59 hrs, Volume= 0.186 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Event Rainfall=4.60"

	Area (sf)	CN	Description
*	907	98	Water Surface Wetlands, HSG C
	5,644	98	Paved parking, HSG C
	12,783	74	>75% Grass cover, Good, HSG C
*	520	98	walls othe rimp.
	21,313	70	Woods, Good, HSG C
	1,286	98	Roofs, HSG C
	42,453	77	Weighted Average
	34,096		80.31% Pervious Area
	8,357		19.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
14.3	430	0.0100	0.50		**Shallow Concentrated Flow, shallow - woods** Woodland Kv= 5.0 fps
42.6	480	Total			

Summary for Reach 1E: Exist. to Stream (DCP1)

Inflow Area = 5.582 ac, 28.05% Impervious, Inflow Depth = 2.46" for 10 Year Event event
Inflow = 7.72 cfs @ 12.56 hrs, Volume= 1.145 af
Outflow = 7.72 cfs @ 12.56 hrs, Volume= 1.145 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 1P: Prop. to Stream (DCP1)

Inflow Area = 5.778 ac, 40.84% Impervious, Inflow Depth = 2.19" for 10 Year Event event
Inflow = 6.38 cfs @ 12.51 hrs, Volume= 1.053 af
Outflow = 6.38 cfs @ 12.51 hrs, Volume= 1.053 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 2E: Exist East Wetland (DCP2)

Inflow Area = 3.411 ac, 21.32% Impervious, Inflow Depth = 2.21" for 10 Year Event event
Inflow = 4.50 cfs @ 12.54 hrs, Volume= 0.628 af
Outflow = 4.50 cfs @ 12.54 hrs, Volume= 0.628 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 2P: Prop. to East Wetland (DCP2)

Inflow Area = 2.908 ac, 31.02% Impervious, Inflow Depth = 2.43" for 10 Year Event event
Inflow = 4.12 cfs @ 12.50 hrs, Volume= 0.590 af
Outflow = 4.12 cfs @ 12.50 hrs, Volume= 0.590 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 3E: Exist To Street (DCP3)

Inflow Area = 0.029 ac, 37.21% Impervious, Inflow Depth = 2.81" for 10 Year Event event
Inflow = 0.10 cfs @ 12.07 hrs, Volume= 0.007 af
Outflow = 0.10 cfs @ 12.07 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 3P: Prop. To Street (DCP3)

Inflow Area = 0.014 ac, 83.11% Impervious, Inflow Depth = 3.91" for 10 Year Event event
Inflow = 0.06 cfs @ 12.07 hrs, Volume= 0.004 af
Outflow = 0.06 cfs @ 12.07 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 4E: Exist North Wetland (DCP4)

Inflow Area = 0.975 ac, 19.69% Impervious, Inflow Depth = 2.29" for 10 Year Event event
Inflow = 1.24 cfs @ 12.59 hrs, Volume= 0.186 af
Outflow = 1.24 cfs @ 12.59 hrs, Volume= 0.186 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 4P: Prop. to North Wetland (DCP4)

Inflow Area = 0.734 ac, 16.14% Impervious, Inflow Depth = 2.21" for 10 Year Event event
Inflow = 1.02 cfs @ 12.47 hrs, Volume= 0.135 af
Outflow = 1.02 cfs @ 12.47 hrs, Volume= 0.135 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Pond 1R: Pond 2 Outlet to Pond 4- 12" RCP

Inflow Area = 1.360 ac, 35.17% Impervious, Inflow Depth = 0.27" for 10 Year Event event
Inflow = 0.18 cfs @ 12.91 hrs, Volume= 0.031 af
Outflow = 0.18 cfs @ 12.91 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min
Primary = 0.18 cfs @ 12.91 hrs, Volume= 0.031 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 87.23' @ 12.98 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	87.00'	**12.0" Round Culvert** L= 210.0' Ke= 0.500 Inlet / Outlet Invert= 87.00' / 85.00' S= 0.0095 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.18 cfs @ 12.91 hrs HW=87.23' TW=86.33' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.18 cfs @ 1.90 fps)

Summary for Pond MH1: MH

Inflow Area = 0.395 ac, 61.75% Impervious, Inflow Depth = 3.39" for 10 Year Event event
Inflow = 1.59 cfs @ 12.07 hrs, Volume= 0.111 af
Outflow = 1.59 cfs @ 12.07 hrs, Volume= 0.111 af, Atten= 0%, Lag= 0.0 min
Primary = 1.59 cfs @ 12.07 hrs, Volume= 0.111 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 88.09' @ 12.32 hrs
Flood Elev= 89.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	87.00'	**15.0" Round Culvert** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 87.00' / 86.50' S= 0.0091 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf

Primary OutFlow Max=1.43 cfs @ 12.07 hrs HW=87.94' TW=87.79' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.43 cfs @ 2.01 fps)

Summary for Pond MH2: CB 3&4

Inflow Area = 0.904 ac, 39.42% Impervious, Inflow Depth = 2.81" for 10 Year Event event
Inflow = 3.09 cfs @ 12.07 hrs, Volume= 0.212 af
Outflow = 3.09 cfs @ 12.07 hrs, Volume= 0.212 af, Atten= 0%, Lag= 0.0 min
Primary = 3.09 cfs @ 12.07 hrs, Volume= 0.212 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 86.91' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	**15.0" Round Culvert** L= 57.0' Ke= 0.500 Inlet / Outlet Invert= 86.00' / 85.00' S= 0.0175 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf

Primary OutFlow Max=3.08 cfs @ 12.07 hrs HW=86.90' TW=85.69' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 3.08 cfs @ 3.24 fps)

Summary for Pond MH3: MH

Inflow Area = 1.325 ac, 33.42% Impervious, Inflow Depth = 2.72" for 10 Year Event event
Inflow = 4.38 cfs @ 12.07 hrs, Volume= 0.301 af
Outflow = 4.38 cfs @ 12.07 hrs, Volume= 0.301 af, Atten= 0%, Lag= 0.0 min
Primary = 4.38 cfs @ 12.07 hrs, Volume= 0.301 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 88.67' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	87.50'	**15.0" Round Culvert** L= 150.0' Ke= 0.500 Inlet / Outlet Invert= 87.50' / 86.00' S= 0.0100 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf

Primary OutFlow Max=4.37 cfs @ 12.07 hrs HW=88.66' TW=86.68' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 4.37 cfs @ 3.67 fps)

Summary for Pond P1: POND 1

Inflow Area = 0.395 ac, 61.75% Impervious, Inflow Depth = 3.39" for 10 Year Event event
Inflow = 1.59 cfs @ 12.07 hrs, Volume= 0.111 af
Outflow = 0.55 cfs @ 12.34 hrs, Volume= 0.090 af, Atten= 65%, Lag= 15.8 min
Discarded = 0.01 cfs @ 12.34 hrs, Volume= 0.020 af
Primary = 0.54 cfs @ 12.34 hrs, Volume= 0.070 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 88.07' @ 12.34 hrs Surf.Area= 1,504 sf Storage= 2,056 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 149.3 min (945.8 - 796.4)

Volume	Invert	Avail.Storage	Storage Description
#1	86.50'	5,410 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
86.50	1,050	200.0	0	0	1,050
87.00	1,255	210.0	575	575	1,392
88.00	1,486	221.0	1,369	1,944	1,826
89.00	1,730	233.0	1,606	3,551	2,316
90.00	1,991	245.0	1,859	5,410	2,831

Device	Routing	Invert	Outlet Devices
#1	Primary	87.50'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	86.50'	**0.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.34 hrs HW=88.07' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.54 cfs @ 12.34 hrs HW=88.07' TW=86.87' (Dynamic Tailwater)
1=Orifice/Grate (Orifice Controls 0.54 cfs @ 2.74 fps)

Summary for Pond P2: POND 2

Inflow Area = 1.360 ac, 35.17% Impervious, Inflow Depth = 3.08" for 10 Year Event event
Inflow = 5.18 cfs @ 12.08 hrs, Volume= 0.350 af
Outflow = 0.50 cfs @ 12.91 hrs, Volume= 0.350 af, Atten= 90%, Lag= 50.2 min
Discarded = 0.32 cfs @ 12.94 hrs, Volume= 0.319 af
Primary = 0.18 cfs @ 12.91 hrs, Volume= 0.031 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 87.33' @ 12.94 hrs Surf.Area= 5,769 sf Storage= 6,578 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 175.3 min (989.3 - 814.0)

Volume	Invert	Avail.Storage	Storage Description
#1	86.00'	18,021 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
86.00	4,123	395.0	0	0	4,123
87.00	5,353	416.0	4,725	4,725	5,538
88.00	6,647	437.0	5,988	10,713	7,026
89.00	7,990	460.0	7,308	18,021	8,727

Device	Routing	Invert	Outlet Devices
#1	Primary	87.00'	**5.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	86.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.32 cfs @ 12.94 hrs HW=87.33' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.32 cfs)

Primary OutFlow Max=0.18 cfs @ 12.91 hrs HW=87.33' TW=87.23' (Dynamic Tailwater)
1=Orifice/Grate (Orifice Controls 0.18 cfs @ 1.51 fps)

Summary for Pond P3: POND 3

Inflow Area = 2.264 ac, 36.86% Impervious, Inflow Depth = 1.29" for 10 Year Event event
Inflow = 3.09 cfs @ 12.07 hrs, Volume= 0.243 af
Outflow = 0.26 cfs @ 14.30 hrs, Volume= 0.176 af, Atten= 91%, Lag= 133.8 min
Discarded = 0.04 cfs @ 14.30 hrs, Volume= 0.073 af
Primary = 0.22 cfs @ 14.30 hrs, Volume= 0.103 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 86.45' @ 14.30 hrs Surf.Area= 4,758 sf Storage= 5,985 cf

Plug-Flow detention time= 371.8 min calculated for 0.176 af (72% of inflow)
Center-of-Mass det. time= 288.9 min (1,105.3 - 816.4)

Volume	Invert	Avail.Storage	Storage Description
#1	85.00'	17,729 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
85.00	3,516	295.0	0	0	3,516
86.00	4,345	332.0	3,923	3,923	5,389
87.00	5,282	365.0	4,806	8,729	7,252
88.00	6,220	385.0	5,745	14,474	8,503
88.50	6,805	400.0	3,255	17,729	9,460

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	85.00'	**0.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.04 cfs @ 14.30 hrs HW=86.45' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.22 cfs @ 14.30 hrs HW=86.45' TW=85.23' (Dynamic Tailwater)
1=Orifice/Grate (Orifice Controls 0.22 cfs @ 2.58 fps)

Summary for Pond R1: Pond1 Outlet - 12" RCP

Inflow Area = 0.395 ac, 61.75% Impervious, Inflow Depth = 2.12" for 10 Year Event event
Inflow = 0.54 cfs @ 12.34 hrs, Volume= 0.070 af
Outflow = 0.54 cfs @ 12.34 hrs, Volume= 0.070 af, Atten= 0%, Lag= 0.0 min
Primary = 0.54 cfs @ 12.34 hrs, Volume= 0.070 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 86.87' @ 12.34 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	86.50'	**12.0" Round Culvert** L= 25.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 86.50' / 86.20' S= 0.0120 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.54 cfs @ 12.34 hrs HW=86.87' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.54 cfs @ 2.06 fps)

Summary for Pond R4: Pond 3 Outlet - 12" RCP

Inflow Area = 2.264 ac, 36.86% Impervious, Inflow Depth = 0.54" for 10 Year Event event
Inflow = 0.22 cfs @ 14.30 hrs, Volume= 0.103 af
Outflow = 0.22 cfs @ 14.30 hrs, Volume= 0.103 af, Atten= 0%, Lag= 0.0 min
Primary = 0.22 cfs @ 14.30 hrs, Volume= 0.103 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 85.23' @ 14.30 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	85.00'	**12.0" Round Culvert** L= 25.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 85.00' / 84.50' S= 0.0200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.22 cfs @ 14.30 hrs HW=85.23' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.22 cfs @ 1.64 fps)

Summary for Link 3L: 11 Houses

Inflow Area = 0.036 ac,100.00% Impervious, Inflow Depth = 3.30" for 10 Year Event event
Inflow = 0.16 cfs @ 12.09 hrs, Volume= 0.010 af
Primary = 1.77 cfs @ 12.09 hrs, Volume= 0.108 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 11.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

10 Year Event Outflow Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce

Summary for Link 4L: 5 Houses

Inflow Area = 0.036 ac,100.00% Impervious, Inflow Depth = 3.30" for 10 Year Event event
Inflow = 0.16 cfs @ 12.09 hrs, Volume= 0.010 af
Primary = 0.81 cfs @ 12.09 hrs, Volume= 0.049 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 5.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

10 Year Event Outflow Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce

Summary for Link 5L: 3 Houses

Inflow Area = 0.036 ac,100.00% Impervious, Inflow Depth = 3.30" for 10 Year Event event
Inflow = 0.16 cfs @ 12.09 hrs, Volume= 0.010 af
Primary = 0.48 cfs @ 12.09 hrs, Volume= 0.029 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 3.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

10 Year Event Outflow Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce

Time span=0.00-35.00 hrs, dt=0.01 hrs, 3501 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 3S: Prop to Pond 3 from Runoff Area=39,376 sf 39.42% Impervious Runoff Depth=3.63"
Tc=5.0 min CN=83 Runoff=3.96 cfs 0.273 af

Subcatchment 4S: Prop. to East Wetland Runoff Area=107,948 sf 25.13% Impervious Runoff Depth=3.14"
Flow Length=370' Tc=37.0 min CN=78 Runoff=4.67 cfs 0.649 af

Subcatchment 5S: Prop. to Pond 1 Runoff Area=17,190 sf 61.75% Impervious Runoff Depth=4.25"
Tc=5.0 min CN=89 Runoff=1.97 cfs 0.140 af

Subcatchment 7S: Prop. to Pond 2 from Runoff Area=57,713 sf 33.42% Impervious Runoff Depth=3.53"
Tc=5.0 min CN=82 Runoff=5.65 cfs 0.390 af

Subcatchment 8S: Prop. to Street Runoff Area=592 sf 83.11% Impervious Runoff Depth=4.80"
Tc=5.0 min CN=94 Runoff=0.07 cfs 0.005 af

Subcatchment 9S: Prop. to North Wetland Runoff Area=31,967 sf 16.14% Impervious Runoff Depth=2.95"
Flow Length=480' Slope=0.0100 '/' Tc=33.1 min CN=76 Runoff=1.37 cfs 0.181 af

Subcatchment 10S: Prop. to Steam Runoff Area=151,509 sf 42.83% Impervious Runoff Depth=3.73"
Flow Length=1,030' Slope=0.0100 '/' Tc=38.3 min CN=84 Runoff=7.60 cfs 1.081 af

Subcatchment E1: Exist. to Stream Runoff Area=243,161 sf 28.05% Impervious Runoff Depth=3.24"
Flow Length=460' Slope=0.0100 '/' Tc=42.0 min CN=79 Runoff=10.18 cfs 1.506 af

Subcatchment E2: Exist. To East Runoff Area=148,590 sf 21.32% Impervious Runoff Depth=2.95"
Flow Length=370' Tc=37.0 min CN=76 Runoff=6.04 cfs 0.839 af

Subcatchment E3: Exist. To Street Runoff Area=1,271 sf 37.21% Impervious Runoff Depth=3.63"
Tc=5.0 min CN=83 Runoff=0.13 cfs 0.009 af

Subcatchment E4: Exist. to Wetlands North Runoff Area=42,453 sf 19.69% Impervious Runoff Depth=3.05"
Flow Length=480' Slope=0.0100 '/' Tc=42.6 min CN=77 Runoff=1.66 cfs 0.247 af

Reach 1E: Exist. to Stream (DCP1) Inflow=10.18 cfs 1.506 af
Outflow=10.18 cfs 1.506 af

Reach 1P: Prop. to Stream (DCP1) Inflow=8.29 cfs 1.432 af
Outflow=8.29 cfs 1.432 af

Reach 2E: Exist East Wetland (DCP2) Inflow=6.04 cfs 0.839 af
Outflow=6.04 cfs 0.839 af

Reach 2P: Prop. to East Wetland (DCP2) Inflow=5.46 cfs 0.784 af
Outflow=5.46 cfs 0.784 af

Reach 3E: Exist To Street (DCP3) Inflow=0.13 cfs 0.009 af
Outflow=0.13 cfs 0.009 af

Reach 3P: Prop. To Street (DCP3) Inflow=0.07 cfs 0.005 af
Outflow=0.07 cfs 0.005 af

Reach 4E: Exist North Wetland (DCP4) Inflow=1.66 cfs 0.247 af
Outflow=1.66 cfs 0.247 af

Reach 4P: Prop. to North Wetland (DCP4) Inflow=1.37 cfs 0.181 af
Outflow=1.37 cfs 0.181 af

Pond 1R: Pond 2 Outlet to Pond 4- 12" RCP Peak Elev=87.37' Inflow=0.36 cfs 0.085 af
12.0" Round Culvert n=0.011 L=210.0' S=0.0095 '/' Outflow=0.36 cfs 0.085 af

Pond MH1: MH Peak Elev=88.35' Inflow=1.97 cfs 0.140 af
15.0" Round Culvert n=0.011 L=55.0' S=0.0091 '/' Outflow=1.97 cfs 0.140 af

Pond MH2: CB 3&4 Peak Elev=87.07' Inflow=3.96 cfs 0.273 af
15.0" Round Culvert n=0.011 L=57.0' S=0.0175 '/' Outflow=3.96 cfs 0.273 af

Pond MH3: MH Peak Elev=89.04' Inflow=5.65 cfs 0.390 af
15.0" Round Culvert n=0.011 L=150.0' S=0.0100 '/' Outflow=5.65 cfs 0.390 af

Pond P1: POND 1 Peak Elev=88.34' Storage=2,458 cf Inflow=1.97 cfs 0.140 af
Discarded=0.01 cfs 0.020 af Primary=0.72 cfs 0.097 af Outflow=0.73 cfs 0.118 af

Pond P2: POND 2 Peak Elev=87.66' Storage=8,536 cf Inflow=6.61 cfs 0.453 af
Discarded=0.35 cfs 0.368 af Primary=0.36 cfs 0.085 af Outflow=0.70 cfs 0.453 af

Pond P3: POND 3 Peak Elev=86.92' Storage=8,310 cf Inflow=3.96 cfs 0.359 af
Discarded=0.04 cfs 0.078 af Primary=0.36 cfs 0.211 af Outflow=0.41 cfs 0.290 af

Pond R1: Pond1 Outlet - 12" RCP Peak Elev=86.93' Inflow=0.72 cfs 0.097 af
12.0" Round Culvert n=0.011 L=25.0' S=0.0120 '/' Outflow=0.72 cfs 0.097 af

Pond R4: Pond 3 Outlet - 12" RCP Peak Elev=85.30' Inflow=0.36 cfs 0.211 af
12.0" Round Culvert n=0.011 L=25.0' S=0.0200 '/' Outflow=0.36 cfs 0.211 af

ar Event Outflow **Link** Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce x 11.00 Inflow=0.19 cfs 0.013 af
Area= 0.036 ac 100.00% Imperv. Primary=2.14 cfs 0.140 af

ear Event Outflow **Link** Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce x 5.00 Inflow=0.19 cfs 0.013 af
Area= 0.036 ac 100.00% Imperv. Primary=0.97 cfs 0.063 af

ear Event Outflow **Link** Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce x 3.00 Inflow=0.19 cfs 0.013 af
Area= 0.036 ac 100.00% Imperv. Primary=0.58 cfs 0.038 af

Total Runoff Area = 19.324 ac Runoff Volume = 5.320 af Average Runoff Depth = 3.30"
70.08% Pervious = 13.543 ac 29.92% Impervious = 5.781 ac

Summary for Subcatchment 3S: Prop to Pond 3 from RDWY

Runoff = 3.96 cfs @ 12.07 hrs, Volume= 0.273 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Event Rainfall=5.50"

	Area (sf)	CN	Description
*	1,761	98	Paved parking, HSG C-Sidewalk
	13,760	98	Paved parking, HSG C
	14,044	74	>75% Grass cover, Good, HSG C
	9,811	74	>75% Grass cover, Good, HSG C
	39,376	83	Weighted Average
	23,855		60.58% Pervious Area
	15,521		39.42% Impervious Area

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

Summary for Subcatchment 4S: Prop. to East Wetland

Runoff = 4.67 cfs @ 12.53 hrs, Volume= 0.649 af, Depth= 3.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Event Rainfall=5.50"

	Area (sf)	CN	Description
*	25,672	98	Water Surface Wetlands, HSG C
	31,888	74	>75% Grass cover, Good, HSG C
	48,103	70	Woods, Good, HSG C
*	0	98	Houses
*	825	74	Patio
*	1,155	98	driveway
*	305	98	ret wall
	107,948	78	Weighted Average
	80,816		74.87% Pervious Area
	27,132		25.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.20"
8.7	320	0.0150	0.61		**Shallow Concentrated Flow, shallow** Woodland Kv= 5.0 fps
37.0	370	Total			

Summary for Subcatchment 5S: Prop. to Pond 1

Runoff = 1.97 cfs @ 12.07 hrs, Volume= 0.140 af, Depth= 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Event Rainfall=5.50"

Area (sf)	CN	Description
10,615	98	Paved parking, HSG C
6,575	74	>75% Grass cover, Good, HSG C
17,190	89	Weighted Average
6,575		38.25% Pervious Area
10,615		61.75% Impervious Area

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

Summary for Subcatchment 7S: Prop. to Pond 2 from RDWY

Runoff = 5.65 cfs @ 12.07 hrs, Volume= 0.390 af, Depth= 3.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Event Rainfall=5.50"

	Area (sf)	CN	Description
*	1,438	98	Paved parking, HSG C - Sidewalk
*	17,852	98	Paved parking, HSG C - rroad-drives
	19,807	74	>75% Grass cover, Good, HSG C
	435	74	>75% Grass cover, Good, HSG C
*	660	74	Patio
	17,521	74	>75% Grass cover, Good, HSG C
	57,713	82	Weighted Average
	38,423		66.58% Pervious Area
	19,290		33.42% Impervious Area

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

Summary for Subcatchment 8S: Prop. to Street

Runoff = 0.07 cfs @ 12.07 hrs, Volume= 0.005 af, Depth= 4.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Event Rainfall=5.50"

Area (sf)	CN	Description
492	98	Paved parking, HSG C
100	74	>75% Grass cover, Good, HSG C
592	94	Weighted Average
100		16.89% Pervious Area
492		83.11% Impervious Area

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

Summary for Subcatchment 9S: Prop. to North Wetland

Runoff = 1.37 cfs @ 12.47 hrs, Volume= 0.181 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Event Rainfall=5.50"

	Area (sf)	CN	Description
*	906	98	Water Surface Wetlands, HSG C
	2,664	98	Paved parking, HSG C
	15,147	74	>75% Grass cover, Good, HSG C
	1,286	98	Roofs, HSG C - infiltrated
*	302	98	walls othe rimp.
	11,662	70	Woods, Good, HSG C
	31,967	76	Weighted Average
	26,809		83.86% Pervious Area
	5,158		16.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
4.8	430	0.0100	1.50		**Shallow Concentrated Flow, shallow** Grassed Waterway Kv= 15.0 fps
33.1	480	Total			

Summary for Subcatchment 10S: Prop. to Steam

Runoff = 7.60 cfs @ 12.51 hrs, Volume= 1.081 af, Depth= 3.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Event Rainfall=5.50"

	Area (sf)	CN	Description
*	48,878	98	Water Surface Wetlands, HSG C
*	3,151	98	Prop Paved parking, HSG C
	69,157	74	>75% Grass cover, Good, HSG C
*	4,702	98	walls othe rimp.
	1,888	87	Dirt roads, HSG C
	13,921	70	Woods, Good, HSG C
*	2,457	98	Exisit,. Roof
*	5,705	98	Exisit. Pavement
*	1,650	74	Prop. Patios
	151,509	84	Weighted Average
	86,616		57.17% Pervious Area
	64,893		42.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.20"
1.7	50	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	30	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.7	110	0.0100	0.50		**Shallow Concentrated Flow, shallow** Woodland Kv= 5.0 fps
3.9	790	0.0100	3.35	20.11	**Channel Flow, Stream** Area= 6.0 sf Perim= 7.0' r= 0.86' n= 0.040 Earth, cobble bottom, clean sides
38.3	1,030	Total			

Summary for Subcatchment E1: Exist. to Stream

Runoff = 10.18 cfs @ 12.56 hrs, Volume= 1.506 af, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Event Rainfall=5.50"

	Area (sf)	CN	Description
*	48,977	98	Water Surface Wetlands, HSG C
	11,952	98	Paved parking, HSG C
	34,335	74	>75% Grass cover, Good, HSG C
	2,457	98	Roofs, HSG C
*	4,820	98	walls othe rimp.
	8,801	87	Dirt roads, HSG C
	131,819	70	Woods, Good, HSG C
	243,161	79	Weighted Average
	174,955		71.95% Pervious Area
	68,206		28.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
13.7	410	0.0100	0.50		**Shallow Concentrated Flow, shallow - woods** Woodland Kv= 5.0 fps
42.0	460	Total			

Summary for Subcatchment E2: Exist. To East Weltands

Runoff = 6.04 cfs @ 12.53 hrs, Volume= 0.839 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Event Rainfall=5.50"

	Area (sf)	CN	Description
*	25,672	98	Water Surface Wetlands, HSG C
	5,792	98	Paved parking, HSG C
	9,907	74	>75% Grass cover, Good, HSG C
*	217	98	walls othe rimp.
	107,002	70	Woods, Good, HSG C
	148,590	76	Weighted Average
	116,909		78.68% Pervious Area
	31,681		21.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
8.7	320	0.0150	0.61		**Shallow Concentrated Flow, shallow - woods** Woodland Kv= 5.0 fps
37.0	370	Total			

Summary for Subcatchment E3: Exist. To Street

Runoff = 0.13 cfs @ 12.07 hrs, Volume= 0.009 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Event Rainfall=5.50"

Area (sf)	CN	Description
473	98	Paved parking, HSG C
798	74	>75% Grass cover, Good, HSG C
1,271	83	Weighted Average
798		62.79% Pervious Area
473		37.21% Impervious Area

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

Summary for Subcatchment E4: Exist. to Wetlands North

Runoff = 1.66 cfs @ 12.59 hrs, Volume= 0.247 af, Depth= 3.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Event Rainfall=5.50"

	Area (sf)	CN	Description
*	907	98	Water Surface Wetlands, HSG C
	5,644	98	Paved parking, HSG C
	12,783	74	>75% Grass cover, Good, HSG C
*	520	98	walls othe rimp.
	21,313	70	Woods, Good, HSG C
	1,286	98	Roofs, HSG C
	42,453	77	Weighted Average
	34,096		80.31% Pervious Area
	8,357		19.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
14.3	430	0.0100	0.50		**Shallow Concentrated Flow, shallow - woods** Woodland Kv= 5.0 fps
42.6	480	Total			

Summary for Reach 1E: Exist. to Stream (DCP1)

Inflow Area = 5.582 ac, 28.05% Impervious, Inflow Depth = 3.24" for 25 Year Event event
Inflow = 10.18 cfs @ 12.56 hrs, Volume= 1.506 af
Outflow = 10.18 cfs @ 12.56 hrs, Volume= 1.506 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 1P: Prop. to Stream (DCP1)

Inflow Area = 5.778 ac, 40.84% Impervious, Inflow Depth = 2.97" for 25 Year Event event
Inflow = 8.29 cfs @ 12.48 hrs, Volume= 1.432 af
Outflow = 8.29 cfs @ 12.48 hrs, Volume= 1.432 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 2E: Exist East Wetland (DCP2)

Inflow Area = 3.411 ac, 21.32% Impervious, Inflow Depth = 2.95" for 25 Year Event event
Inflow = 6.04 cfs @ 12.53 hrs, Volume= 0.839 af
Outflow = 6.04 cfs @ 12.53 hrs, Volume= 0.839 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 2P: Prop. to East Wetland (DCP2)

Inflow Area = 2.908 ac, 31.02% Impervious, Inflow Depth = 3.24" for 25 Year Event event
Inflow = 5.46 cfs @ 12.50 hrs, Volume= 0.784 af
Outflow = 5.46 cfs @ 12.50 hrs, Volume= 0.784 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 3E: Exist To Street (DCP3)

Inflow Area = 0.029 ac, 37.21% Impervious, Inflow Depth = 3.63" for 25 Year Event event
Inflow = 0.13 cfs @ 12.07 hrs, Volume= 0.009 af
Outflow = 0.13 cfs @ 12.07 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 3P: Prop. To Street (DCP3)

Inflow Area = 0.014 ac, 83.11% Impervious, Inflow Depth = 4.80" for 25 Year Event event
Inflow = 0.07 cfs @ 12.07 hrs, Volume= 0.005 af
Outflow = 0.07 cfs @ 12.07 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 4E: Exist North Wetland (DCP4)

Inflow Area = 0.975 ac, 19.69% Impervious, Inflow Depth = 3.05" for 25 Year Event event
Inflow = 1.66 cfs @ 12.59 hrs, Volume= 0.247 af
Outflow = 1.66 cfs @ 12.59 hrs, Volume= 0.247 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 4P: Prop. to North Wetland (DCP4)

Inflow Area = 0.734 ac, 16.14% Impervious, Inflow Depth = 2.95" for 25 Year Event event
Inflow = 1.37 cfs @ 12.47 hrs, Volume= 0.181 af
Outflow = 1.37 cfs @ 12.47 hrs, Volume= 0.181 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Pond 1R: Pond 2 Outlet to Pond 4- 12" RCP

Inflow Area = 1.360 ac, 35.17% Impervious, Inflow Depth = 0.75" for 25 Year Event event
Inflow = 0.36 cfs @ 12.70 hrs, Volume= 0.085 af
Outflow = 0.36 cfs @ 12.70 hrs, Volume= 0.085 af, Atten= 0%, Lag= 0.0 min
Primary = 0.36 cfs @ 12.70 hrs, Volume= 0.085 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 87.37' @ 13.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	87.00'	**12.0" Round Culvert** L= 210.0' Ke= 0.500 Inlet / Outlet Invert= 87.00' / 85.00' S= 0.0095 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.36 cfs @ 12.70 hrs HW=87.36' TW=86.66' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.36 cfs @ 2.09 fps)

Summary for Pond MH1: MH

Inflow Area = 0.395 ac, 61.75% Impervious, Inflow Depth = 4.25" for 25 Year Event event
Inflow = 1.97 cfs @ 12.07 hrs, Volume= 0.140 af
Outflow = 1.97 cfs @ 12.07 hrs, Volume= 0.140 af, Atten= 0%, Lag= 0.0 min
Primary = 1.97 cfs @ 12.07 hrs, Volume= 0.140 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 88.35' @ 12.29 hrs
Flood Elev= 89.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	87.00'	**15.0" Round Culvert** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 87.00' / 86.50' S= 0.0091 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf

Primary OutFlow Max=1.73 cfs @ 12.07 hrs HW=88.18' TW=88.06' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.73 cfs @ 1.87 fps)

Summary for Pond MH2: CB 3&4

Inflow Area = 0.904 ac, 39.42% Impervious, Inflow Depth = 3.63" for 25 Year Event event
Inflow = 3.96 cfs @ 12.07 hrs, Volume= 0.273 af
Outflow = 3.96 cfs @ 12.07 hrs, Volume= 0.273 af, Atten= 0%, Lag= 0.0 min
Primary = 3.96 cfs @ 12.07 hrs, Volume= 0.273 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 87.07' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	**15.0" Round Culvert** L= 57.0' Ke= 0.500 Inlet / Outlet Invert= 86.00' / 85.00' S= 0.0175 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf

Primary OutFlow Max=3.95 cfs @ 12.07 hrs HW=87.07' TW=85.94' (Dynamic Tailwater)
1=Culvert (Inlet Controls 3.95 cfs @ 3.53 fps)

Summary for Pond MH3: MH

Inflow Area = 1.325 ac, 33.42% Impervious, Inflow Depth = 3.53" for 25 Year Event event
Inflow = 5.65 cfs @ 12.07 hrs, Volume= 0.390 af
Outflow = 5.65 cfs @ 12.07 hrs, Volume= 0.390 af, Atten= 0%, Lag= 0.0 min
Primary = 5.65 cfs @ 12.07 hrs, Volume= 0.390 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 89.04' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	87.50'	**15.0" Round Culvert** L= 150.0' Ke= 0.500 Inlet / Outlet Invert= 87.50' / 86.00' S= 0.0100 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf

Primary OutFlow Max=5.64 cfs @ 12.07 hrs HW=89.04' TW=86.93' (Dynamic Tailwater)
1=Culvert (Inlet Controls 5.64 cfs @ 4.60 fps)

Summary for Pond P1: POND 1

Inflow Area = 0.395 ac, 61.75% Impervious, Inflow Depth = 4.25" for 25 Year Event event
Inflow = 1.97 cfs @ 12.07 hrs, Volume= 0.140 af
Outflow = 0.73 cfs @ 12.30 hrs, Volume= 0.118 af, Atten= 63%, Lag= 13.8 min
Discarded = 0.01 cfs @ 12.30 hrs, Volume= 0.020 af
Primary = 0.72 cfs @ 12.30 hrs, Volume= 0.097 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 88.34' @ 12.30 hrs Surf.Area= 1,566 sf Storage= 2,458 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 125.1 min (915.3 - 790.2)

Volume	Invert	Avail.Storage	Storage Description
#1	86.50'	5,410 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
86.50	1,050	200.0	0	0	1,050
87.00	1,255	210.0	575	575	1,392
88.00	1,486	221.0	1,369	1,944	1,826
89.00	1,730	233.0	1,606	3,551	2,316
90.00	1,991	245.0	1,859	5,410	2,831

Device	Routing	Invert	Outlet Devices
#1	Primary	87.50'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	86.50'	**0.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.30 hrs HW=88.34' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.72 cfs @ 12.30 hrs HW=88.34' TW=86.93' (Dynamic Tailwater)
1=Orifice/Grate (Orifice Controls 0.72 cfs @ 3.69 fps)

Summary for Pond P2: POND 2

Inflow Area = 1.360 ac, 35.17% Impervious, Inflow Depth = 4.00" for 25 Year Event event
Inflow = 6.61 cfs @ 12.08 hrs, Volume= 0.453 af
Outflow = 0.70 cfs @ 12.72 hrs, Volume= 0.453 af, Atten= 89%, Lag= 38.5 min
Discarded = 0.35 cfs @ 12.82 hrs, Volume= 0.368 af
Primary = 0.36 cfs @ 12.70 hrs, Volume= 0.085 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 87.66' @ 12.82 hrs Surf.Area= 6,192 sf Storage= 8,536 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 178.2 min (985.3 - 807.1)

Volume	Invert	Avail.Storage	Storage Description
#1	86.00'	18,021 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
86.00	4,123	395.0	0	0	4,123
87.00	5,353	416.0	4,725	4,725	5,538
88.00	6,647	437.0	5,988	10,713	7,026
89.00	7,990	460.0	7,308	18,021	8,727

Device	Routing	Invert	Outlet Devices
#1	Primary	87.00'	**5.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	86.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.35 cfs @ 12.82 hrs HW=87.66' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.35 cfs)

Primary OutFlow Max=0.36 cfs @ 12.70 hrs HW=87.66' TW=87.36' (Dynamic Tailwater)
1=Orifice/Grate (Orifice Controls 0.36 cfs @ 2.63 fps)

Summary for Pond P3: POND 3

Inflow Area = 2.264 ac, 36.86% Impervious, Inflow Depth = 1.90" for 25 Year Event event
Inflow = 3.96 cfs @ 12.07 hrs, Volume= 0.359 af
Outflow = 0.41 cfs @ 14.68 hrs, Volume= 0.290 af, Atten= 90%, Lag= 156.6 min
Discarded = 0.04 cfs @ 14.68 hrs, Volume= 0.078 af
Primary = 0.36 cfs @ 14.68 hrs, Volume= 0.211 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 86.92' @ 14.68 hrs Surf.Area= 5,204 sf Storage= 8,310 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 248.1 min (1,063.2 - 815.0)

Volume	Invert	Avail.Storage	Storage Description
#1	85.00'	17,729 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
85.00	3,516	295.0	0	0	3,516
86.00	4,345	332.0	3,923	3,923	5,389
87.00	5,282	365.0	4,806	8,729	7,252
88.00	6,220	385.0	5,745	14,474	8,503
88.50	6,805	400.0	3,255	17,729	9,460

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	85.00'	**0.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.04 cfs @ 14.68 hrs HW=86.92' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.36 cfs @ 14.68 hrs HW=86.92' TW=85.30' (Dynamic Tailwater)
1=Orifice/Grate (Orifice Controls 0.36 cfs @ 4.18 fps)

Summary for Pond R1: Pond1 Outlet - 12" RCP

Inflow Area = 0.395 ac, 61.75% Impervious, Inflow Depth = 2.96" for 25 Year Event event
Inflow = 0.72 cfs @ 12.30 hrs, Volume= 0.097 af
Outflow = 0.72 cfs @ 12.30 hrs, Volume= 0.097 af, Atten= 0%, Lag= 0.0 min
Primary = 0.72 cfs @ 12.30 hrs, Volume= 0.097 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 86.93' @ 12.30 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	86.50'	**12.0" Round Culvert** L= 25.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 86.50' / 86.20' S= 0.0120 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.72 cfs @ 12.30 hrs HW=86.93' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.72 cfs @ 2.24 fps)

Summary for Pond R4: Pond 3 Outlet - 12" RCP

Inflow Area = 2.264 ac, 36.86% Impervious, Inflow Depth = 1.12" for 25 Year Event event
Inflow = 0.36 cfs @ 14.68 hrs, Volume= 0.211 af
Outflow = 0.36 cfs @ 14.68 hrs, Volume= 0.211 af, Atten= 0%, Lag= 0.0 min
Primary = 0.36 cfs @ 14.68 hrs, Volume= 0.211 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 85.30' @ 14.68 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	85.00'	**12.0" Round Culvert** L= 25.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 85.00' / 84.50' S= 0.0200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.36 cfs @ 14.68 hrs HW=85.30' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.36 cfs @ 1.86 fps)

Summary for Link 3L: 11 Houses

Inflow Area = 0.036 ac,100.00% Impervious, Inflow Depth = 4.28" for 25 Year Event event
Inflow = 0.19 cfs @ 12.09 hrs, Volume= 0.013 af
Primary = 2.14 cfs @ 12.09 hrs, Volume= 0.140 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 11.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

25 Year Event Outflow Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce

Summary for Link 4L: 5 Houses

Inflow Area = 0.036 ac,100.00% Impervious, Inflow Depth = 4.28" for 25 Year Event event
Inflow = 0.19 cfs @ 12.09 hrs, Volume= 0.013 af
Primary = 0.97 cfs @ 12.09 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 5.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

25 Year Event Outflow Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce

Summary for Link 5L: 3 Houses

Inflow Area = 0.036 ac,100.00% Impervious, Inflow Depth = 4.28" for 25 Year Event event
Inflow = 0.19 cfs @ 12.09 hrs, Volume= 0.013 af
Primary = 0.58 cfs @ 12.09 hrs, Volume= 0.038 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 3.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

25 Year Event Outflow Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce

Time span=0.00-35.00 hrs, dt=0.01 hrs, 3501 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 3S: Prop to Pond 3 from Runoff Area=39,376 sf 39.42% Impervious Runoff Depth=5.03"
Tc=5.0 min CN=83 Runoff=5.42 cfs 0.379 af

Subcatchment 4S: Prop. to East Wetland Runoff Area=107,948 sf 25.13% Impervious Runoff Depth=4.47"
Flow Length=370' Tc=37.0 min CN=78 Runoff=6.63 cfs 0.924 af

Subcatchment 5S: Prop. to Pond 1 Runoff Area=17,190 sf 61.75% Impervious Runoff Depth=5.71"
Tc=5.0 min CN=89 Runoff=2.60 cfs 0.188 af

Subcatchment 7S: Prop. to Pond 2 from Runoff Area=57,713 sf 33.42% Impervious Runoff Depth=4.92"
Tc=5.0 min CN=82 Runoff=7.79 cfs 0.543 af

Subcatchment 8S: Prop. to Street Runoff Area=592 sf 83.11% Impervious Runoff Depth=6.29"
Tc=5.0 min CN=94 Runoff=0.09 cfs 0.007 af

Subcatchment 9S: Prop. to North Wetland Runoff Area=31,967 sf 16.14% Impervious Runoff Depth=4.26"
Flow Length=480' Slope=0.0100 '/' Tc=33.1 min CN=76 Runoff=1.98 cfs 0.260 af

Subcatchment 10S: Prop. to Steam Runoff Area=151,509 sf 42.83% Impervious Runoff Depth=5.14"
Flow Length=1,030' Slope=0.0100 '/' Tc=38.3 min CN=84 Runoff=10.36 cfs 1.490 af

Subcatchment E1: Exist. to Stream Runoff Area=243,161 sf 28.05% Impervious Runoff Depth=4.58"
Flow Length=460' Slope=0.0100 '/' Tc=42.0 min CN=79 Runoff=14.37 cfs 2.133 af

Subcatchment E2: Exist. To East Runoff Area=148,590 sf 21.32% Impervious Runoff Depth=4.26"
Flow Length=370' Tc=37.0 min CN=76 Runoff=8.70 cfs 1.210 af

Subcatchment E3: Exist. To Street Runoff Area=1,271 sf 37.21% Impervious Runoff Depth=5.03"
Tc=5.0 min CN=83 Runoff=0.17 cfs 0.012 af

Subcatchment E4: Exist. to Wetlands North Runoff Area=42,453 sf 19.69% Impervious Runoff Depth=4.37"
Flow Length=480' Slope=0.0100 '/' Tc=42.6 min CN=77 Runoff=2.37 cfs 0.355 af

Reach 1E: Exist. to Stream (DCP1) Inflow=14.37 cfs 2.133 af
Outflow=14.37 cfs 2.133 af

Reach 1P: Prop. to Stream (DCP1) Inflow=11.33 cfs 2.063 af
Outflow=11.33 cfs 2.063 af

Reach 2E: Exist East Wetland (DCP2) Inflow=8.70 cfs 1.210 af
Outflow=8.70 cfs 1.210 af

Reach 2P: Prop. to East Wetland (DCP2) Inflow=7.68 cfs 1.119 af
Outflow=7.68 cfs 1.119 af

Reach 3E: Exist To Street (DCP3) Inflow=0.17 cfs 0.012 af
Outflow=0.17 cfs 0.012 af

Reach 3P: Prop. To Street (DCP3) Inflow=0.09 cfs 0.007 af
Outflow=0.09 cfs 0.007 af

Reach 4E: Exist North Wetland (DCP4) Inflow=2.37 cfs 0.355 af
Outflow=2.37 cfs 0.355 af

Reach 4P: Prop. to North Wetland (DCP4) Inflow=1.98 cfs 0.260 af
Outflow=1.98 cfs 0.260 af

Pond 1R: Pond 2 Outlet to Pond 4- 12" RCP Peak Elev=87.68' Inflow=0.54 cfs 0.171 af
12.0" Round Culvert n=0.011 L=210.0' S=0.0095 '/' Outflow=0.54 cfs 0.171 af

Pond MH1: MH Peak Elev=88.76' Inflow=2.60 cfs 0.188 af
15.0" Round Culvert n=0.011 L=55.0' S=0.0091 '/' Outflow=2.60 cfs 0.188 af

Pond MH2: CB 3&4 Peak Elev=87.62' Inflow=5.42 cfs 0.379 af
15.0" Round Culvert n=0.011 L=57.0' S=0.0175 '/' Outflow=5.42 cfs 0.379 af

Pond MH3: MH Peak Elev=89.86' Inflow=7.79 cfs 0.543 af
15.0" Round Culvert n=0.011 L=150.0' S=0.0100 '/' Outflow=7.79 cfs 0.543 af

Pond P1: POND 1 Peak Elev=88.74' Storage=3,105 cf Inflow=2.60 cfs 0.188 af
Discarded=0.01 cfs 0.021 af Primary=0.94 cfs 0.144 af Outflow=0.95 cfs 0.165 af

Pond P2: POND 2 Peak Elev=88.23' Storage=12,289 cf Inflow=8.97 cfs 0.627 af
Discarded=0.39 cfs 0.456 af Primary=0.54 cfs 0.171 af Outflow=0.93 cfs 0.627 af

Pond P3: POND 3 Peak Elev=87.61' Storage=12,146 cf Inflow=5.65 cfs 0.549 af
Discarded=0.05 cfs 0.087 af Primary=0.51 cfs 0.389 af Outflow=0.56 cfs 0.476 af

Pond R1: Pond1 Outlet - 12" RCP Peak Elev=87.00' Inflow=0.94 cfs 0.144 af
12.0" Round Culvert n=0.011 L=25.0' S=0.0120 '/' Outflow=0.94 cfs 0.144 af

Pond R4: Pond 3 Outlet - 12" RCP Peak Elev=85.35' Inflow=0.51 cfs 0.389 af
12.0" Round Culvert n=0.011 L=25.0' S=0.0200 '/' Outflow=0.51 cfs 0.389 af

ar Event Outflow **Link** Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce x 11.00 Inflow=0.24 cfs 0.017 af
Area= 0.036 ac 100.00% Imperv. Primary=2.66 cfs 0.185 af

ear Event Outflow **Link** Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce x 5.00 Inflow=0.24 cfs 0.017 af
Area= 0.036 ac 100.00% Imperv. Primary=1.21 cfs 0.084 af

ear Event Outflow **Link** Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce x 3.00 Inflow=0.24 cfs 0.017 af
Area= 0.036 ac 100.00% Imperv. Primary=0.72 cfs 0.050 af

Total Runoff Area = 19.324 ac Runoff Volume = 7.500 af Average Runoff Depth = 4.66"
70.08% Pervious = 13.543 ac 29.92% Impervious = 5.781 ac

Summary for Subcatchment 3S: Prop to Pond 3 from RDWY

Runoff = 5.42 cfs @ 12.07 hrs, Volume= 0.379 af, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Event Rainfall=7.00"

	Area (sf)	CN	Description
*	1,761	98	Paved parking, HSG C-Sidewalk
	13,760	98	Paved parking, HSG C
	14,044	74	>75% Grass cover, Good, HSG C
	9,811	74	>75% Grass cover, Good, HSG C
	39,376	83	Weighted Average
	23,855		60.58% Pervious Area
	15,521		39.42% Impervious Area

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

Summary for Subcatchment 4S: Prop. to East Wetland

Runoff = 6.63 cfs @ 12.50 hrs, Volume= 0.924 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Event Rainfall=7.00"

	Area (sf)	CN	Description
*	25,672	98	Water Surface Wetlands, HSG C
	31,888	74	>75% Grass cover, Good, HSG C
	48,103	70	Woods, Good, HSG C
*	0	98	Houses
*	825	74	Patio
*	1,155	98	driveway
*	305	98	ret wall
	107,948	78	Weighted Average
	80,816		74.87% Pervious Area
	27,132		25.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.20"
8.7	320	0.0150	0.61		**Shallow Concentrated Flow, shallow** Woodland Kv= 5.0 fps
37.0	370	Total			

Summary for Subcatchment 5S: Prop. to Pond 1

Runoff = 2.60 cfs @ 12.07 hrs, Volume= 0.188 af, Depth= 5.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Event Rainfall=7.00"

Area (sf)	CN	Description
10,615	98	Paved parking, HSG C
6,575	74	>75% Grass cover, Good, HSG C
17,190	89	Weighted Average
6,575		38.25% Pervious Area
10,615		61.75% Impervious Area

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

Summary for Subcatchment 7S: Prop. to Pond 2 from RDWY

Runoff = 7.79 cfs @ 12.07 hrs, Volume= 0.543 af, Depth= 4.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Event Rainfall=7.00"

	Area (sf)	CN	Description
*	1,438	98	Paved parking, HSG C - Sidewalk
*	17,852	98	Paved parking, HSG C - rroad-drives
	19,807	74	>75% Grass cover, Good, HSG C
	435	74	>75% Grass cover, Good, HSG C
*	660	74	Patio
	17,521	74	>75% Grass cover, Good, HSG C
	57,713	82	Weighted Average
	38,423		66.58% Pervious Area
	19,290		33.42% Impervious Area

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

Summary for Subcatchment 8S: Prop. to Street

Runoff = 0.09 cfs @ 12.07 hrs, Volume= 0.007 af, Depth= 6.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Event Rainfall=7.00"

Area (sf)	CN	Description
492	98	Paved parking, HSG C
100	74	>75% Grass cover, Good, HSG C
592	94	Weighted Average
100		16.89% Pervious Area
492		83.11% Impervious Area

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

Summary for Subcatchment 9S: Prop. to North Wetland

Runoff = 1.98 cfs @ 12.47 hrs, Volume= 0.260 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Event Rainfall=7.00"

	Area (sf)	CN	Description
*	906	98	Water Surface Wetlands, HSG C
	2,664	98	Paved parking, HSG C
	15,147	74	>75% Grass cover, Good, HSG C
	1,286	98	Roofs, HSG C - infiltrated
*	302	98	walls othe rimp.
	11,662	70	Woods, Good, HSG C
	31,967	76	Weighted Average
	26,809		83.86% Pervious Area
	5,158		16.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
4.8	430	0.0100	1.50		**Shallow Concentrated Flow, shallow** Grassed Waterway Kv= 15.0 fps
33.1	480	Total			

Summary for Subcatchment 10S: Prop. to Steam

Runoff = 10.36 cfs @ 12.51 hrs, Volume= 1.490 af, Depth= 5.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Event Rainfall=7.00"

	Area (sf)	CN	Description
*	48,878	98	Water Surface Wetlands, HSG C
*	3,151	98	Prop Paved parking, HSG C
	69,157	74	>75% Grass cover, Good, HSG C
*	4,702	98	walls othe rimp.
	1,888	87	Dirt roads, HSG C
	13,921	70	Woods, Good, HSG C
*	2,457	98	Exisit,. Roof
*	5,705	98	Exisit. Pavement
*	1,650	74	Prop. Patios
	151,509	84	Weighted Average
	86,616		57.17% Pervious Area
	64,893		42.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.20"
1.7	50	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	30	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.7	110	0.0100	0.50		**Shallow Concentrated Flow, shallow** Woodland Kv= 5.0 fps
3.9	790	0.0100	3.35	20.11	**Channel Flow, Stream** Area= 6.0 sf Perim= 7.0' r= 0.86' n= 0.040 Earth, cobble bottom, clean sides
38.3	1,030	Total			

Summary for Subcatchment E1: Exist. to Stream

Runoff = 14.37 cfs @ 12.56 hrs, Volume= 2.133 af, Depth= 4.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Event Rainfall=7.00"

	Area (sf)	CN	Description
*	48,977	98	Water Surface Wetlands, HSG C
	11,952	98	Paved parking, HSG C
	34,335	74	>75% Grass cover, Good, HSG C
	2,457	98	Roofs, HSG C
*	4,820	98	walls othe rimp.
	8,801	87	Dirt roads, HSG C
	131,819	70	Woods, Good, HSG C
	243,161	79	Weighted Average
	174,955		71.95% Pervious Area
	68,206		28.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
13.7	410	0.0100	0.50		**Shallow Concentrated Flow, shallow - woods** Woodland Kv= 5.0 fps
42.0	460	Total			

Summary for Subcatchment E2: Exist. To East Weltands

Runoff = 8.70 cfs @ 12.50 hrs, Volume= 1.210 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Event Rainfall=7.00"

	Area (sf)	CN	Description
*	25,672	98	Water Surface Wetlands, HSG C
	5,792	98	Paved parking, HSG C
	9,907	74	>75% Grass cover, Good, HSG C
*	217	98	walls othe rimp.
	107,002	70	Woods, Good, HSG C
	148,590	76	Weighted Average
	116,909		78.68% Pervious Area
	31,681		21.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
8.7	320	0.0150	0.61		**Shallow Concentrated Flow, shallow - woods** Woodland Kv= 5.0 fps
37.0	370	Total			

Summary for Subcatchment E3: Exist. To Street

Runoff = 0.17 cfs @ 12.07 hrs, Volume= 0.012 af, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Event Rainfall=7.00"

Area (sf)	CN	Description
473	98	Paved parking, HSG C
798	74	>75% Grass cover, Good, HSG C
1,271	83	Weighted Average
798		62.79% Pervious Area
473		37.21% Impervious Area

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

Summary for Subcatchment E4: Exist. to Wetlands North

Runoff = 2.37 cfs @ 12.59 hrs, Volume= 0.355 af, Depth= 4.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Event Rainfall=7.00"

	Area (sf)	CN	Description
*	907	98	Water Surface Wetlands, HSG C
	5,644	98	Paved parking, HSG C
	12,783	74	>75% Grass cover, Good, HSG C
*	520	98	walls othe rimp.
	21,313	70	Woods, Good, HSG C
	1,286	98	Roofs, HSG C
	42,453	77	Weighted Average
	34,096		80.31% Pervious Area
	8,357		19.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
14.3	430	0.0100	0.50		**Shallow Concentrated Flow, shallow - woods** Woodland Kv= 5.0 fps
42.6	480	Total			

Summary for Reach 1E: Exist. to Stream (DCP1)

Inflow Area = 5.582 ac, 28.05% Impervious, Inflow Depth = 4.58" for 100 Year Event event
Inflow = 14.37 cfs @ 12.56 hrs, Volume= 2.133 af
Outflow = 14.37 cfs @ 12.56 hrs, Volume= 2.133 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 1P: Prop. to Stream (DCP1)

Inflow Area = 5.778 ac, 40.84% Impervious, Inflow Depth = 4.29" for 100 Year Event event
Inflow = 11.33 cfs @ 12.47 hrs, Volume= 2.063 af
Outflow = 11.33 cfs @ 12.47 hrs, Volume= 2.063 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 2E: Exist East Wetland (DCP2)

Inflow Area = 3.411 ac, 21.32% Impervious, Inflow Depth = 4.26" for 100 Year Event event
Inflow = 8.70 cfs @ 12.50 hrs, Volume= 1.210 af
Outflow = 8.70 cfs @ 12.50 hrs, Volume= 1.210 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 2P: Prop. to East Wetland (DCP2)

Inflow Area = 2.908 ac, 31.02% Impervious, Inflow Depth = 4.62" for 100 Year Event event
Inflow = 7.68 cfs @ 12.49 hrs, Volume= 1.119 af
Outflow = 7.68 cfs @ 12.49 hrs, Volume= 1.119 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 3E: Exist To Street (DCP3)

Inflow Area = 0.029 ac, 37.21% Impervious, Inflow Depth = 5.03" for 100 Year Event event
Inflow = 0.17 cfs @ 12.07 hrs, Volume= 0.012 af
Outflow = 0.17 cfs @ 12.07 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 3P: Prop. To Street (DCP3)

Inflow Area = 0.014 ac, 83.11% Impervious, Inflow Depth = 6.29" for 100 Year Event event
Inflow = 0.09 cfs @ 12.07 hrs, Volume= 0.007 af
Outflow = 0.09 cfs @ 12.07 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 4E: Exist North Wetland (DCP4)

Inflow Area = 0.975 ac, 19.69% Impervious, Inflow Depth = 4.37" for 100 Year Event event
Inflow = 2.37 cfs @ 12.59 hrs, Volume= 0.355 af
Outflow = 2.37 cfs @ 12.59 hrs, Volume= 0.355 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Reach 4P: Prop. to North Wetland (DCP4)

Inflow Area = 0.734 ac, 16.14% Impervious, Inflow Depth = 4.26" for 100 Year Event event
Inflow = 1.98 cfs @ 12.47 hrs, Volume= 0.260 af
Outflow = 1.98 cfs @ 12.47 hrs, Volume= 0.260 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Summary for Pond 1R: Pond 2 Outlet to Pond 4- 12" RCP

Inflow Area = 1.360 ac, 35.17% Impervious, Inflow Depth = 1.51" for 100 Year Event event
Inflow = 0.54 cfs @ 12.57 hrs, Volume= 0.171 af
Outflow = 0.54 cfs @ 12.57 hrs, Volume= 0.171 af, Atten= 0%, Lag= 0.0 min
Primary = 0.54 cfs @ 12.57 hrs, Volume= 0.171 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 87.68' @ 14.58 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	87.00'	**12.0" Round Culvert** L= 210.0' Ke= 0.500 Inlet / Outlet Invert= 87.00' / 85.00' S= 0.0095 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.53 cfs @ 12.57 hrs HW=87.54' TW=87.19' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.53 cfs @ 1.78 fps)

Summary for Pond MH1: MH

Inflow Area = 0.395 ac, 61.75% Impervious, Inflow Depth = 5.71" for 100 Year Event event
Inflow = 2.60 cfs @ 12.07 hrs, Volume= 0.188 af
Outflow = 2.60 cfs @ 12.07 hrs, Volume= 0.188 af, Atten= 0%, Lag= 0.0 min
Primary = 2.60 cfs @ 12.07 hrs, Volume= 0.188 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 88.76' @ 12.29 hrs
Flood Elev= 89.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	87.00'	**15.0" Round Culvert** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 87.00' / 86.50' S= 0.0091 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf

Primary OutFlow Max=2.30 cfs @ 12.07 hrs HW=88.54' TW=88.39' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.30 cfs @ 1.87 fps)

Summary for Pond MH2: CB 3&4

Inflow Area = 0.904 ac, 39.42% Impervious, Inflow Depth = 5.03" for 100 Year Event event
Inflow = 5.42 cfs @ 12.07 hrs, Volume= 0.379 af
Outflow = 5.42 cfs @ 12.07 hrs, Volume= 0.379 af, Atten= 0%, Lag= 0.0 min
Primary = 5.42 cfs @ 12.07 hrs, Volume= 0.379 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 87.62' @ 14.98 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	**15.0" Round Culvert** L= 57.0' Ke= 0.500 Inlet / Outlet Invert= 86.00' / 85.00' S= 0.0175 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf

Primary OutFlow Max=5.41 cfs @ 12.07 hrs HW=87.46' TW=86.36' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 5.41 cfs @ 4.41 fps)

Summary for Pond MH3: MH

Inflow Area = 1.325 ac, 33.42% Impervious, Inflow Depth = 4.92" for 100 Year Event event
Inflow = 7.79 cfs @ 12.07 hrs, Volume= 0.543 af
Outflow = 7.79 cfs @ 12.07 hrs, Volume= 0.543 af, Atten= 0%, Lag= 0.0 min
Primary = 7.79 cfs @ 12.07 hrs, Volume= 0.543 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 89.86' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	87.50'	**15.0" Round Culvert** L= 150.0' Ke= 0.500 Inlet / Outlet Invert= 87.50' / 86.00' S= 0.0100 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf

Primary OutFlow Max=7.76 cfs @ 12.07 hrs HW=89.86' TW=87.37' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 7.76 cfs @ 6.33 fps)

Summary for Pond P1: POND 1

Inflow Area = 0.395 ac, 61.75% Impervious, Inflow Depth = 5.71" for 100 Year Event event
Inflow = 2.60 cfs @ 12.07 hrs, Volume= 0.188 af
Outflow = 0.95 cfs @ 12.31 hrs, Volume= 0.165 af, Atten= 63%, Lag= 14.1 min
Discarded = 0.01 cfs @ 12.31 hrs, Volume= 0.021 af
Primary = 0.94 cfs @ 12.31 hrs, Volume= 0.144 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 88.74' @ 12.31 hrs Surf.Area= 1,664 sf Storage= 3,105 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 104.9 min (887.1 - 782.3)

Volume	Invert	Avail.Storage	Storage Description
#1	86.50'	5,410 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
86.50	1,050	200.0	0	0	1,050
87.00	1,255	210.0	575	575	1,392
88.00	1,486	221.0	1,369	1,944	1,826
89.00	1,730	233.0	1,606	3,551	2,316
90.00	1,991	245.0	1,859	5,410	2,831

Device	Routing	Invert	Outlet Devices
#1	Primary	87.50'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	86.50'	**0.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.31 hrs HW=88.74' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.94 cfs @ 12.31 hrs HW=88.74' TW=87.00' (Dynamic Tailwater)
↑**1=Orifice/Grate** (Orifice Controls 0.94 cfs @ 4.78 fps)

Summary for Pond P2: POND 2

Inflow Area = 1.360 ac, 35.17% Impervious, Inflow Depth = 5.53" for 100 Year Event event
Inflow = 8.97 cfs @ 12.07 hrs, Volume= 0.627 af
Outflow = 0.93 cfs @ 12.59 hrs, Volume= 0.627 af, Atten= 90%, Lag= 31.2 min
Discarded = 0.39 cfs @ 12.83 hrs, Volume= 0.456 af
Primary = 0.54 cfs @ 12.57 hrs, Volume= 0.171 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 88.23' @ 12.83 hrs Surf.Area= 6,947 sf Storage= 12,289 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 202.5 min (1,000.9 - 798.5)

Volume	Invert	Avail.Storage	Storage Description
#1	86.00'	18,021 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
86.00	4,123	395.0	0	0	4,123
87.00	5,353	416.0	4,725	4,725	5,538
88.00	6,647	437.0	5,988	10,713	7,026
89.00	7,990	460.0	7,308	18,021	8,727

Device	Routing	Invert	Outlet Devices
#1	Primary	87.00'	**5.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	86.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.39 cfs @ 12.83 hrs HW=88.23' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.39 cfs)

Primary OutFlow Max=0.54 cfs @ 12.57 hrs HW=88.21' TW=87.54' (Dynamic Tailwater)
↑**1=Orifice/Grate** (Orifice Controls 0.54 cfs @ 3.95 fps)

Summary for Pond P3: POND 3

Inflow Area = 2.264 ac, 36.86% Impervious, Inflow Depth = 2.91" for 100 Year Event event
Inflow = 5.65 cfs @ 12.08 hrs, Volume= 0.549 af
Outflow = 0.56 cfs @ 14.98 hrs, Volume= 0.476 af, Atten= 90%, Lag= 174.4 min
Discarded = 0.05 cfs @ 14.98 hrs, Volume= 0.087 af
Primary = 0.51 cfs @ 14.98 hrs, Volume= 0.389 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 87.61' @ 14.98 hrs Surf.Area= 5,849 sf Storage= 12,146 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 255.9 min (1,079.2 - 823.2)

Volume	Invert	Avail.Storage	Storage Description
#1	85.00'	17,729 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
85.00	3,516	295.0	0	0	3,516
86.00	4,345	332.0	3,923	3,923	5,389
87.00	5,282	365.0	4,806	8,729	7,252
88.00	6,220	385.0	5,745	14,474	8,503
88.50	6,805	400.0	3,255	17,729	9,460

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	85.00'	**0.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.05 cfs @ 14.98 hrs HW=87.61' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.51 cfs @ 14.98 hrs HW=87.61' TW=85.35' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Orifice Controls 0.51 cfs @ 5.79 fps)

Summary for Pond R1: Pond1 Outlet - 12" RCP

Inflow Area = 0.395 ac, 61.75% Impervious, Inflow Depth = 4.39" for 100 Year Event event
Inflow = 0.94 cfs @ 12.31 hrs, Volume= 0.144 af
Outflow = 0.94 cfs @ 12.31 hrs, Volume= 0.144 af, Atten= 0%, Lag= 0.0 min
Primary = 0.94 cfs @ 12.31 hrs, Volume= 0.144 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 87.00' @ 12.31 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	86.50'	**12.0" Round Culvert** L= 25.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 86.50' / 86.20' S= 0.0120 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.94 cfs @ 12.31 hrs HW=87.00' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 0.94 cfs @ 3.50 fps)

Summary for Pond R4: Pond 3 Outlet - 12" RCP

Inflow Area = 2.264 ac, 36.86% Impervious, Inflow Depth = 2.06" for 100 Year Event event
Inflow = 0.51 cfs @ 14.98 hrs, Volume= 0.389 af
Outflow = 0.51 cfs @ 14.98 hrs, Volume= 0.389 af, Atten= 0%, Lag= 0.0 min
Primary = 0.51 cfs @ 14.98 hrs, Volume= 0.389 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 85.35' @ 14.98 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	85.00'	**12.0" Round Culvert** L= 25.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 85.00' / 84.50' S= 0.0200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.51 cfs @ 14.98 hrs HW=85.35' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.51 cfs @ 2.03 fps)

Summary for Link 3L: 11 Houses

Inflow Area = 0.036 ac,100.00% Impervious, Inflow Depth = 5.66" for 100 Year Event event
Inflow = 0.24 cfs @ 12.09 hrs, Volume= 0.017 af
Primary = 2.66 cfs @ 12.09 hrs, Volume= 0.185 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 11.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

100 Year Event Outflow Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce

Summary for Link 4L: 5 Houses

Inflow Area = 0.036 ac,100.00% Impervious, Inflow Depth = 5.66" for 100 Year Event event
Inflow = 0.24 cfs @ 12.09 hrs, Volume= 0.017 af
Primary = 1.21 cfs @ 12.09 hrs, Volume= 0.084 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 5.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

100 Year Event Outflow Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce

Summary for Link 5L: 3 Houses

Inflow Area = 0.036 ac,100.00% Impervious, Inflow Depth = 5.66" for 100 Year Event event
Inflow = 0.24 cfs @ 12.09 hrs, Volume= 0.017 af
Primary = 0.72 cfs @ 12.09 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 3.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

100 Year Event Outflow Imported from Concord ST one house with infiltration 9.21~Reach 2R.hce