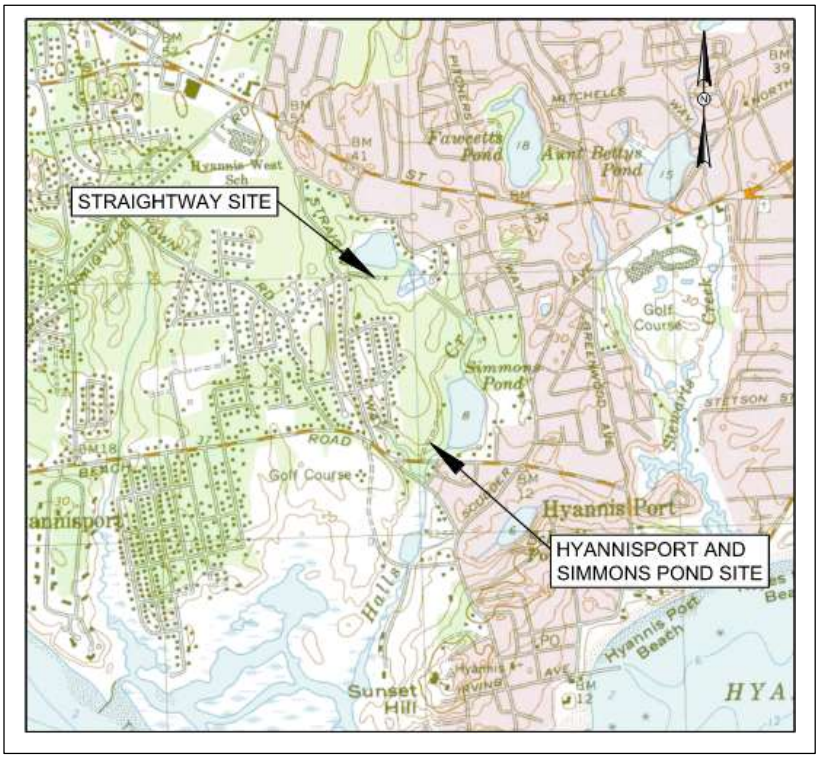
Barnstable Straightway Treatment Facility Design
Stormwater Design Report
Barnstable, MA
KLLEINFELDER PROJECT NO. 20233667.002A

November 22, 2024
VERSION 1



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A Report Prepared for:

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Barnstable Straightway Water Treatment Facility Design
Stormwater Design Report
Barnstable, MA

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1 INTRODUCTION

This Stormwater Management Report has been prepared to show compliance with the Massachusetts Stormwater Management Standards to support the Project's Notice of Intent Application.

The Town of Barnstable is proposing the installation of a 10,900 square foot PFAS treatment facility to support the existing Straightway well. The existing Granular Activated Carbon (GAC) tanks will be encased in a winterized structure prior to the construction of the new per- and polyfluoroalkyl substances (PFAS) treatment facility. The proposed development will also include the installation of associated utilities including a tight tank sewer system, a generator, condensers, a paved driveway, closed drainage, and infiltration basins.

Additionally, the project will include the installation of two pump stations to replace the Hyannisport and Simmons Pond pump stations. The existing pump stations and a portion of the existing access drive will be demolished. The remaining access drive will be resurfaced with an extension to the new Simmons Pond pump house and a security fence will be installed along its length. A tight tank sewer system is proposed near the new Hyannisport pump station.

2 EXISTING DRAINAGE CONDITIONS

Straightway Site

Under existing conditions, the proposed 3.65-acre site houses a well and water treatment infrastructure, a gravel access drive, a paved driveway, parking area, and a stone lined overflow lagoon for the GAC contactors. Wooded area borders the site to the south, there are wetlands to the north and east, and wooded area leads to residential homes to the west. The site is connected to the Hyannisport and Simmons Pond sites via an unpaved access drive extending to the southeast from the location of the proposed treatment facility.

The entirety of the site drains directly to the surrounding wetlands and Ben's Pond. The site is part of the Cape Cod major watershed. Approximately half of the site drains to the wetlands to the north and the other half drains to the wetland to the east. The two separate areas are connected by a small stream approximately 200' to the northeast of the existing well.

Boring logs for the project site are attached to this report in Appendix **F**. In conjunction with the onsite borings, a monitoring well was installed to observe the seasonal changes in groundwater levels. The installation log of this well and an approximate location map are also included in Appendix **F**. Groundwater for the Straightway site varies between elevations 15 to 17 throughout the geotechnical investigations. The seasonal high groundwater table was estimated at 18 feet elevation through the Cape Cod Commission's Technical Bulletin, "Estimation of High Groundwater Levels for Construction and Land Use Planning." This calculation is included in Appendix **H**.

Hyannisport and Simmons Pond Site

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Under existing conditions, the 1.1-acre site consists of the existing Hyannisport and Simmons Pond pump houses and the Hyannisport Well facility. The existing pump houses and well facility are accessible via a paved access drive. Wooded area surrounds the site on all sides, with wetlands and Simmons Pond along the eastern border. The nearest residential properties are approximately 100' to the west and adjacent to the site driveway on Smith Street. The site is connected to the Straightway site via an unpaved access drive extending to the northwest from the location of the proposed Simmons Pond pump station.

The entirety of the site drains west to east then into the surrounding wetlands and Simmons Pond. The site is part of the Cape Cod major watershed.

Boring logs for the project site is attached to this report in Appendix **G**. The installation log of this well and an approximate location map are also included in Appendix **G**. Groundwater for the Hyannisport and Simmons Pond site was observed at approximately 10 feet elevation throughout the geotechnical investigations. A groundwater table adjustment calculation through the Cape Cod Commission's method is included in Appendix **H**.

3 PROPOSED DRAINAGE CONDITIONS

Straightway Site

Stormwater flows will emulate existing drainage conditions to the maximum extent possible. No significant deviation from existing drainage patterns is expected via site grading. However, the rooftop drainage will divert a portion of the water originally intended to flow north to Ben's Pond to the east and into the connected wetland. Kleinfelder estimates that the proposed Straightway development will create 46,110 square feet of new impervious area, comprised of the proposed treatment building, paved driveway, and the expanded winterization facility for the GAC contactors. The working area of the site will be graded to emulate existing drainage patterns in slopes ranging from 1% to approximately 5%. Proposed grades will be tied into existing grade at a maximum of 3:1 H:V slopes. The bottom elevations of the infiltration basins were limited due to the elevation of the groundwater table, approximately 17' as observed by Kleinfelder. To ensure appropriate separation to the groundwater table, the infiltration basin was restricted to a minimum elevation of 20'. Gabion baskets will be installed within the basins to delineate the sediment forebays to provide pretreatment, as shown on the plans.

- Infiltration basin P-1 is located in the northwestern corner of the site and will capture stormwater via surface runoff and a closed drainage system. The basin will provide approximately 14,783 cubic feet of storage, including pretreatment. An overflow weir is proposed to direct stormwater north toward the Ben's Pond wetland complex during high volume storm events. However, to prevent inundation of the existing driveway to the maximum extent possible and to manage stormwater volumes on site, the basin has been sized to infiltrate all received stormwater up to the 2070 24-hour 100-year storm event.

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- Infiltration basin P-2 is located in the southeast corner of the site and will receive the majority of its runoff from closed drainage. The basin will provide approximately 7,000 cubic feet of storage, including pretreatment. An overflow weir will direct stormwater east to the adjacent wetland complex during high volume stormwater events.
- Subsurface infiltration system ST-1, is located beneath the northeastern portion of the proposed driveway. This system was sized for the water quality volume of its watershed area, providing approximately 442 cubic feet of storage, to ensure the maximum amount of proposed impervious area receives water quality treatment. Runoff will be directed to this system via closed drainage. An overflow pipe will outlet excess stormwater at the toe of slope to the east of the proposed driveway.

A closed stormwater drainage system will be used to convey stormwater into the proposed infiltration basins. Deep sump catch basins will be used to provide pretreatment before conveying stormwater into the sediment forebays and basins. The drainage system along the proposed drive will capture the majority of runoff coming from the proposed building roof, the paved access drive, and concrete pads. Stormwater from the rear of the building will be directed to the proposed basin by site grading. The project site has been located and designed so that the impact within the 100-foot wetland buffer and 100-year flood zone are minimized to the maximum extent possible.

Hyannisport and Simmons Pond Site

Under proposed conditions, Kleinfelder estimates that the proposed pump stations and driveway reconstruction will add 4,496 square feet of impervious area. The demolition of the existing pump stations and a portion of the driveway will result in the removal 4,175 square feet of impervious area. The project will result in a net increase of 321 square feet of impervious area. Additionally, 4,577 square feet of existing paved driveway will be repaved during construction. The site will be graded to preserve the existing drainage pattern to the maximum extent possible, with slopes ranging from 1% to approximately 8%. Proposed grades will be tied into existing grade at a maximum of 3:1 H:V slopes. The bottom elevations of the infiltration basins were limited due to the elevation of the groundwater table, approximately 10’ as observed by Kleinfelder. To ensure appropriate separation to the groundwater table, the infiltration basin was restricted to a minimum elevation of 12’

- Infiltration basin P-3 is located west of the proposed Hyannisport well and will capture the majority of runoff associated with the proposed improvements in this location. To prevent inundation of the site driveway and mitigate increased stormwater volumes, the basin was sized to accommodate runoff from the 2070 24-hour 100-year storm event, providing approximately 1,087 cubic feet of storage. A pea stone diaphragm upgradient of the basin will provide pretreatment for the system.
- Infiltration basin P-4 is located southeast of the proposed Simmon’s Pond well building. It will manage stormwater associated with the proposed driveway, turnaround, and building in this area. The basin provides approximately 777 cubic feet of storage and has an overflow weir that

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will direct stormwater overland toward Simmon's Pond during higher volume storm events. A pea stone diaphragm upgradient of the basin will provide pretreatment for the system.

4 HYDROLOGIC ANALYSIS

A HydroCAD hydrologic analysis was performed under both existing and proposed conditions. Each model was analyzed for the 1, 2, 5, 10, 25, and 100-year storm events. Rainfall data was acquired from the Precipitation Frequency Data Server maintained by NOAA.

The wetlands to the north of the Straightway site and to the east of the Hyannisport site are interconnected, where water drains from Ben's Pond south to Simmon's Pond prior to passing through a culvert along Smith Street that ultimately drains to Hyannis Point and the Atlantic Ocean. The sites were analyzed separately to ensure the individual impact of each development is mitigated to the maximum extent practicable. The total watershed for the site was measured to be approximately 4.7 acres.

The soil data used for this analysis was acquired via onsite soil borings, performed in April of 2024 by Geologic Earth Explorations and observed by Kleinfelder personnel. Soils on site are predominately poorly graded sands and gravels with trace silt. For determining infiltration capacities, the site soils are part of Hydrologic Soil Group A (HSG A).

The watershed area has been standardized between the two analyses to allow direct comparison of the impact of the proposed development. Both models include two design points that are used to analyze and compare stormwater flow rates and volumes.

- Design Point 1, or "DP-1" represents the wetland complex adjacent to Ben's Pond
- Design Point 2 or "DP-2" represents water flowing to the west of the Straightway site.
- Design Point 2 or "DP-3" represents the wetland complex adjacent to Simmon's Pond

For analysis of existing conditions, the sites were divided into four main sub-watershed areas.

- EX-1 is approximately 87,931 square feet in area. It encompasses the northern portion of the Straightway site that drains toward the Ben's Pond wetlands. The area consists of existing paved access drives, buildings, gravel driveway, grassed area, and woods in good condition.
- EX-2 is approximately 40,687 square feet in area. It covers the portion of the Straightway site that drains east to the wetlands. It includes a portion of the existing water storage tank, gravel aprons, grassed area, and woods in good condition.
- EX-3 is approximately 30,560 square feet in area. It represents the western portion of the Straightway site that drains toward the properties to the west. Ground cover consists of impervious roof area, gravel driveway, grassed area, and woods in good condition.

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- EX-4 is approximately 48,457 square feet in area. It represents the Hyannisport and Simmon's Pond Well site in its entirety. Water drains from west to east toward the wetlands surrounding Simmon's Pond. Ground cover includes existing well buildings, gravel parking areas, paved access drives, grassed areas, and woods in good condition.

Under proposed conditions, the sites were separated into nine sub-watershed areas based on proposed drainage features and grading.

- PR-1 is approximately 68,407 square feet in area. It represents the portion of the Straightway site that flows north directly into Ben's Pond. Ground cover consists of grassed area, paved driveways, existing buildings, and gravel aprons.
- PR-2 is approximately 22,246 square feet in area. It encompasses a portion of the Straightway Site along the western proposed driveway. Ground cover includes paved driveways, building roofs, and grassed area. Stormwater from this area is captured by the proposed stormwater system and routed to an infiltration basin on the northwest of the Straightway site.
- PR-3 is approximately 8,006 square feet in area. This sub-catchment area includes the northeastern area of the paved driveways on the Straightway site. The ground cover consists of paved driveways and nearby grassed areas.
- PR-4 is approximately 29,375 square feet in area. This encompasses the southeastern corner of the site that drains to the proposed infiltration basin, P-2. Ground cover in this area includes building roof, paved driveway, water storage tank, retaining wall, and grassed area. An overflow weir will direct excess stormwater toward DP-1 during high volume storm events.
- PR-5 is approximately 24,959 square feet in area. This encompasses a southwestern portion of the driveway and building roof that flows to a double grate, deep sump catch basin before being routed to infiltration basin P-2. Ground cover includes building roof, paved driveway, and grassed area.
- PR-6 is approximately 6,182 square feet in area. This represents the area on the west side of the Straightway site that is not captured by the stormwater system and flows directly to the western properties. The ground cover is composed entirely of grassed area.
- PR-7 is approximately 34,585 square feet in area. This sub-catchment represents the area of the Hyannisport and Simmons Pond wells site that is not captured by the proposed stormwater system. Ground cover includes paved driveway and grassed area.
- PR-8 is approximately 8,603 square feet in area and encompasses the watershed of the proposed basin near the new Hyannisport well building. Water will flow to a low point along the new parking area and then overland toward a pea stone diaphragm before reaching infiltration basin P-3.
- PR-9 is approximately 4,903 square feet in area. This represents the watershed of the proposed basin near the new Simmon's Pond well building. Water will flow southeast along the proposed driveway toward a pea stone diaphragm before discharging to infiltration basin P-4. During higher

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volume storm events, an overflow weir has been included that will direct stormwater toward the adjacent wetland complex, designated as DP-3.

5 MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION (MASSDEP) – STORMWATER MANAGEMENT STANDARDS

As demonstrated below, the proposed Project complies with the MassDEP Stormwater Management Standards (the Standards) to the maximum extent practicable. Under the Stormwater Management Standards, the Project is considered a new development project because it involves the construction of a new drinking water treatment facility. The Project has been designed to meet the Stormwater Management Standards to the maximum extent practicable and to improve upon existing conditions.

5.1 STANDARD 1: NO NEW UNTREATED DISCHARGES

No new stormwater conveyance (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

Straightway: Standard Met
Hyannisport / Simmons Pond: Standard Met

The Project has been designed to comply with Standard 1. Under existing conditions, there are no outfalls within the project area and a small infiltration system consisting of 3 drywells on the Straightway site; runoff currently flows overland directly from the site to the wetlands to the west and north before reaching Ben's Pond. Under proposed conditions, a portion of the stormwater originally destined to flow from the site to the wetlands will be intercepted by the proposed infiltration systems to mitigate increases in flow associated with newly proposed impervious area.

- Deep sump catch basins are proposed to provide pretreatment prior to discharging to sediment forebays.
- Stone gabion basket weirs are proposed to create a sediment forebay within the proposed infiltration basins to provide the additional pretreatment.
- The infiltration basins will provide primary water quality treatment for this development.
- All proposed outlets will include erosion protection aprons to prevent erosion.

On the Hyannisport Simmon's Pond site, stormwater currently flows from west to east toward Simmons Pond. Under proposed conditions stormwater will continue to follow the existing drainage pattern. Infiltration basins will provide stormwater treatment for all new improvements and erosion protection as necessary. Pretreatment on this site will be provided via pea stone diaphragms.

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5.2 STANDARD 2: PEAK RATE ATTENUATION

Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

Straightway: Standard Met
Hyannisport / Simmons Pond: Standard Met
The Project has been designed to comply with Standard 2. The infiltration basins on the Straightway and Hyannisport sites will mitigate the peak runoff rates under proposed conditions to be equal to or less than pre-development conditions. Areas that are not paved will be loamed and seeded at the end of construction.

A HydroCAD analysis was performed on both existing and proposed conditions, attached under Appendix **C**. A summary of this analysis in relation to standard 2 is below:

TABLE 1: PEAK FLOWS AT DESIGN POINT 1 (BEN'S POND)

Design Storm	Existing Peak Flow (cfs)	Proposed Peak Flow (cfs)
1-Year	2.00	1.66
2-Year	2.37	1.97
5-Year	2.98	2.47
10-Year	3.49	3.01
25-Year	4.21	4.02
100-Year	5.93	5.49
100-Year 2070	9.44	8.38

TABLE 2: TOTAL VOLUMES AT DESIGN POINT 1

Design Storm	Existing Total Storm Volume (ac-ft)	Proposed Total Storm Volume (ac-ft)
1-Year	0.161	0.135
2-Year	0.193	0.163
5-Year	0.253	0.216
10-Year	0.310	0.265
25-Year	0.399	0.340
100-Year	0.563	0.484
100-Year 2070	0.862	0.780

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TABLE 3: PEAK FLOWS AT DESIGN POINT 2 (WEST OF STRAIGHTWAY SITE)

Design Storm	Existing Peak Flow (cfs)	Proposed Peak Flow (cfs)
1-Year	0.65	0.00
2-Year	0.78	0.00
5-Year	0.98	0.00
10-Year	1.16	0.00
25-Year	1.39	0.02
100-Year	1.87	0.08
100-Year 2070	2.78	0.26

TABLE 4: TOTAL VOLUMES AT DESIGN POINT 2

Design Storm	Existing Total Storm Volume (ac-ft)	Proposed Total Storm Volume (ac-ft)
1-Year	0.051	0.000
2-Year	0.061	0.000
5-Year	0.080	0.001
10-Year	0.097	0.002
25-Year	0.123	0.005
100-Year	0.168	0.011
100-Year 2070	0.246	0.023

TABLE 5: PEAK FLOWS AT DESIGN POINT 3 (SIMMONS POND WETLANDS)

Design Storm	Existing Peak Flow (cfs)	Proposed Peak Flow (cfs)
1-Year	0.75	0.42
2-Year	0.89	0.49
5-Year	1.12	0.62
10-Year	1.31	0.73
25-Year	1.58	0.88
100-Year	2.24	1.43
100-Year 2070	3.58	3.17

TABLE 6: TOTAL VOLUMES AT DESIGN POINT 3

Design Storm	Existing Total Storm Volume (ac-ft)	Proposed Total Storm Volume (ac-ft)
1-Year	0.060	0.034

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2-Year	0.073	0.041
5-Year	0.095	0.055
10-Year	0.117	0.070
25-Year	0.151	0.095
100-Year	0.213	0.146
100-Year 2070	0.325	0.240

The post-development peak rates and volumes are equal to or less than the peak rates under existing conditions for all the analyzed storm events.

5.3 STANDARD 3: STORMWATER RECHARGE

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, stormwater management practices and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil types. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

Straightway: Standard Met
Hyannisport / Simmons Pond: Standard Met
The Project has been designed to comply with Standard 3. The proposed infiltration basins have 29,468 cubic feet of storage and can infiltrate the required water quality volume as well as the 100-year storm event for most of the project site. The required recharge volume calculation is included below.

TABLE 7: IMPERVIOUS AREA SUMMARY FOR STRAIGHTWAY STANDARD 3

Existing Impervious Area (sq. ft)	Proposed Impervious Area (sq. ft)	Change (sq. ft)
28,201	74,311	+46,110

TABLE 8: IMPERVIOUS AREA SUMMARY FOR HYANNISPORT/SIMMONS POND STANDARD 3

Existing Impervious Area (sq. ft)	Proposed Impervious Area (sq. ft)	Change (sq. ft)
10,408	10,729	+321

Both project sites are surrounded by Hydrologic Soil Group A soils. Per the Massachusetts Stormwater Handbook, a recharge rate of 0.6 inches (0.05 feet) shall be used for all impervious area in areas with Hydrologic Soil Group A, the highest recharge rate outlined in the definition of Standard 3. When this rate is applied to the proposed additional impervious area at the Straightway site (1.06 acres or 46,110 square feet), the required recharge volume is calculated to 2,305 cubic feet. When applied to the post

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construction additional impervious area on the Hyannisport Site (321 square feet), the required recharge volume is 16.05 cubic feet. The proposed stormwater management system for each site can store and infiltrate more than their respective required volumes. See Appendix **E** for stormwater storage calculations.

TABLE 9: REQUIRED RECHARGE VOLUMES

Design Point	Required Recharge	Provided Infiltration
1 (Ben's Pond)	2,305.85 cf	2,391.42 cf
2 (West of Straightway)	0 cf	0 cf
3 (Simmons Pond Wetlands)	16.05 cf	193.5 cf

5.4 STANDARD 4: WATER QUALITY

Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:

a) Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained.

b) Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and

c) *Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.*

Straightway: Standard Met
Hyannisport / Simmons Pond: Standard Met
The Project has been designed to comply with Standard 4. The project ultimately discharges to the Atlantic Ocean as part of the Cape Cod Watershed

Table 9 shows the stormwater treatment provided for the proposed developments. Water Quality Volumes were calculated for the first 1.0" of runoff per the Massachusetts Stormwater Handbook new development standards. The provided water quality volume represents the volume of the first inch of runoff from the impervious area captured by the proposed treatment system.

TABLE 9: REQUIRED WATER QUALITY VOLUME (WQV) AT STRAIGHTWAY SITE

Watershed 1 (to Ben's Pond)	Area	Required WQV	Provided WQV
Existing Total Impervious Area	38,609 sf	0 cf*	3,986 cf
Proposed New Impervious Area (in addition to existing)	46,110 sf	3,842 cf	

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*To Max. Extent Practicable

Watershed 2 (West of Straightway)	Area	Required WQV	Provided WQV
Existing Total Impervious Area	0 sf	0 cf*	0 cf
Proposed New Impervious Area (in addition to existing)	0 sf	0 cf	

*To Max. Extent Practicable

TABLE 10: REQUIRED WATER QUALITY VOLUME (WQV) AT HYANNISPORT SITE

Watershed 3 (to Simmons Pond Wetlands)	Area	Required WQV	Provided WQV
Existing Total Impervious Area	10,408 sf	0 cf*	322 cf
Proposed Net New Impervious Area (in addition to existing)	321 sf	26.75 cf	

*To Max. Extent Practicable

A Long-Term Pollution Prevention Plan (LTPPP) and Operation & Maintenance Plan is included in Appendix **D**.

5.5 STANDARD 5: LAND USES WITH HIGHER POTENTIAL POLLUTANT LOADS (LUHPPLS)

For Land Uses with Higher Potential Pollutant Loads (LUHPPLs), source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all LUHPPLs cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from LUHPPLs shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

Straightway: Standard Met
Hyannisport / Simmons Pond: Standard Met

There are no Land Uses with Higher Potential Pollutant Loads within the project area.

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5.6 STANDARD 6: CRITICAL AREAS

Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "stormwater discharge" as defined in 314 CMR 3.04(2)(a)1 or (b), to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

Straightway: Standard Met
Hyannisport / Simmons Pond: Standard Met

The project is within a Zone I Wellhead Protection Area. However, the proposed infiltration basins, P-1 and P-3 are sized to accommodate the 100-year 24-hour storm event without discharging to the surrounding area. An emergency overflow weir is provided as a precautionary measure but is not anticipated to see flow up to and including the 100-year storm event.

The other basins, P-2 and P-4 are sized to accommodate the maximum amount of stormwater runoff as practicable. These two basins are estimated to have capacity to accommodate up to the 25-year storm. During higher volume storm events, these basins will overflow via their proposed emergency overflow weirs. The additional stormwater treatment measures are sized to infiltrate stormwater to the maximum extent practicable. Additionally, the project proposed is essential to the operation of a public water supply. Thus, Standard 6 is met.

5.7 STANDARD 7: REDEVELOPMENTS AND OTHER PROJECTS SUBJECT TO THE STANDARDS ONLY TO THE MAXIMUM EXTENT PRACTICABLE

A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

Straightway: Standard Not Assumed
Hyannisport / Simmons Pond: Standard Not Assumed

Although portions of the project may be considered redevelopment areas, all new impervious surfaces proposed as a result of construction activities are managed as new development. For the purposes of

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documentation of compliance with Massachusetts minimum stormwater standards, the Project has been considered a new development and subject to all Standards 1 through 10.

5.8 STANDARD 8: CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROLS

A plan to control construction-related impacts, including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

Straightway: Standard Met
Hyannisport / Simmons Pond: Standard Met

A sediment and erosion control plan has been appended to this memo. The plan conforms with the requirements of the Massachusetts Erosion Control The site plans call for the installation of sediment control barriers around the perimeter of the site to prevent off-site sediment transport. A construction exit will be provided to reduce transport of sediment off-site via construction traffic. All stockpiles will be surrounded with straw wattle during the earthwork phase of construction. A SWPPP has been prepared.

During construction, the contractor will be required to address any erosion issues that appear as a result of land disturbance. This may include the installation of additional sediment barrier, temporary erosion control matting, or temporary seeding. Erosion control measures will be repaired as necessary during construction. The contractor will be required to install and maintain all erosion control measures in accordance with the Massachusetts Stormwater Handbook.

Stormwater controls must be maintained in good operating condition until all disturbed soils are permanently stabilized. To ensure this, the following areas will be inspected by the Contractor every week and after every rainfall event of 0.5 inches or greater:

The following standard maintenance practices will apply to the erosion and sedimentation controls for the project:

- All erosion and sediment control measures will be properly maintained. If repairs or other maintenance is necessary, it will be initiated by the Contractor within 24 hours of report;
- Straw Wattle will be inspected for depth of sediment, tears, to see if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground;
- Built up sediment will be removed from straw wattles when it has reached one-half the height of the fence and at end of the job;
- Erosion control measures will be maintained for disturbed areas of the site that have not been stabilized;

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- Erosion control measures will be installed and maintained for the construction staging area, stockpiles, and material storage areas until those areas have been stabilized after construction; and,
- Temporary and permanent seeding and planting will be inspected for bare spots, washouts, and healthy growth.

If the inspections reveal the need for additional control devices to prevent erosion and sedimentation, the Contractor will promptly install additional protection devices as required. Control devices in need of repair will be repaired promptly after identification. A stockpile of 100 linear feet of straw wattles will be maintained on the site and under cover for emergency repairs and routine maintenance.

The Owner (or their representative) will be responsible for preparing an inspection and maintenance report following each inspection and filing completed reports after maintenance action has taken place by the Contractor. The Contractor's superintendent will be responsible for maintenance and repair activities and completing and signing the maintenance action portion of inspection and maintenance reports.

5.9 STANDARD 9: OPERATION AND MAINTENANCE PLAN

A Long-Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.

Straightway: Standard Met
Hyannisport / Simmons Pond: Standard Met
An Operation & Maintenance Plan is referenced as Appendix **D** and is provided under separate cover. This O&M Plan conforms to the requirements of MassDEP and the Town of Barnstable Stormwater Management Rules and Regulations.

5.10 STANDARD 10: PROHIBITION OF ILLICIT DISCHARGES

All illicit discharges to the stormwater management system are prohibited.

Straightway: Standard Met
Hyannisport / Simmons Pond: Standard Met

Illicit Discharge Statement The project's stormwater management system, as shown on the plans submitted with this report, have been designed in full compliance with Standard 10. The project area does not have any known illicit connections.

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6 BARNSTABLE DPW STORMWATER STANDARDS

6.1 NO NEW STORMWATER DISCHARGES

No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or Waters of the Commonwealth.

Straightway: Standard Met
Hyannisport / Simmons Pond: Standard Met

See Massachusetts Stormwater Handbook Standard 1 response above.

6.2 LOW IMPACT DEVELOPMENT (LID)

Low Impact Development (LID) site planning and design strategies must be implemented unless infeasible in order to reduce the discharge of stormwater and development sites;

Straightway: Standard Met
Hyannisport / Simmons Pond: Standard Met

Low Impact Development site planning and design strategies are used to the maximum extent practicable. Tree and shrub clearing has been reduced to the maximum extent practicable. Infiltration practices are placed around the Straightway and Hyannisport/Simmons Pond sites to provide stormwater treatment and reduce discharge.

6.3 MASSACHUSETTS STORMWATER HANDBOOK

Stormwater management system design shall be consistent with, or more stringent than, the requirements of the 2008, or most current version, of the Massachusetts Stormwater Handbook;

Straightway: Standard Met
Hyannisport / Simmons Pond: Standard Met

The requirements set forth in the most current version of the Massachusetts Stormwater Handbook, dated 2008, were used during the stormwater design process.

6.4 NEW DEVELOPMENT POLLUTANT REMOVAL

Stormwater management systems on new development shall be optimized for nitrogen removal and designed to meet an average annual pollutant removal equivalent to 90% of the average annual load of Total Suspended Solids (TSS) related to the total post-construction impervious area on the site AND 60%

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of the average annual load of Total Phosphorous (TP) related to the total post-construction impervious surface area on the site.

a) Average annual pollutant removal requirements in Section 903-7 B.(4) are achieved through one of the following methods:

a. Installing BMPs / Structural Control Measures (SCMs) that meet the pollutant removal percentages based on calculations developed consistent with EPA Region 1's BMP Accounting and Tracking Tool (2-16) or other BMP / SCM performance evaluation tool provided by EPA Region 1, where available. If EPA Region 1 tools do not address the planned or installed BMP / SCM performance, then any federally or State-approved BMP / SCM design guidance or performance standards (e.g., State stormwater handbooks and design guidance manuals) may be used to calculate BMP performance; or

b. Retaining the volume of runoff equivalent to, or greater than, 1.0 inch multiplied by the total post-construction impervious surface area on the new development site; or

c. Meeting a combination of retention and treatment that achieves the above standards; or

d. Utilizing offsite mitigation that meets the above standards within the same USGS Hydrologic Unit Code (HUC)01 as the new development site.

Straightway: Standard Met
Hyannisport / Simmons Pond: Standard Met

The proposed stormwater system is sized to retain and infiltrate at least 1.0-inches of stormwater runoff from new impervious area under post construction conditions.

6.5 REDEVELOPMENT POLLUTANT REMOVAL

Stormwater management systems on redevelopment shall be optimized for nitrogen removal and designed to meet an average annual pollutant removal equivalent to 80% of the average annual load of Total Suspended Solids (TSS) related to the total post-construction impervious area on the site AND 50% of the average annual load of Total Phosphorous (TP) related to the total post-construction impervious surface area on the site.

b) Average annual pollutant removal requirements in Section 903-7 B.(4) are achieved through one of the following methods:

a. Installing BMPs / Structural Control Measures (SCMs) that meet the pollutant removal percentages based on calculations developed consistent with EPA Region 1's BMP Accounting and Tracking Tool (2-16) or other BMP / SCM performance evaluation tool provided by EPA Region 1, where available. If EPA Region 1 tools do not address the planned or installed BMP / SCM performance, then any federally or State-approved BMP / SCM design guidance or performance standards (e.g., State stormwater handbooks and design guidance manuals) may be used to calculate BMP performance; or

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b. *Retaining the volume of runoff equivalent to, or greater than, 0.8 inches multiplied by the total post-construction impervious surface area on the redevelopment site; or*

c. *Meeting a combination of retention and treatment that achieves the above standards; or*

d. *Utilizing offsite mitigation that meets the above standards within the same USGS Hydrologic Unit Code (HUC)01 as the redevelopment site.*

Straightway: Standard Not Assumed
Hyannisport / Simmons Pond: Standard Not Assumed

For the purposes of analysis, the sites have not been considered redevelopment sites. The project was designed to meet the new development standards referenced in Section 5.4 of this report.

6.6 REDEVELOPMENT ACTIVITIES

Redevelopment activities that are exclusively limited to maintenance and improvement of existing roadways (including widening less than a single land, adding shoulders, correcting substandard intersections, improving existing drainage systems, and repaving projects) shall improve existing conditions where feasible and are exempt from part Section 903-7 B.(5). Roadway widening or improvements that increase the amount of impervious area on the redevelopment site by greater than or equal to a single land width that shall meet the requirements of Section 903-8 7. (5).

Straightway: Standard Not Assumed
Hyannisport / Simmons Pond: Standard Not Assumed

The site is not considered a redevelopment site. The project was designed to meet the new development standards referenced in Section 5.4 of this report.

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Attachments:

Appendix A – Stormwater Checklist

Appendix B – Drainage Figures

Appendix C – HydroCAD Analysis
C.1 – Existing Conditions
C.2 – Proposed Conditions

Appendix D – Stormwater Operation and Maintenance Plan

Appendix E – Water Quality Calculation

Appendix F – Project Data: NOAA Rainfall and NRCS Web Soil Survey

Appendix G – Boring Logs

Appendix H – Groundwater Table Worksheet

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Appendix A
Stormwater Checklist Stormwater Checklist

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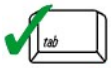
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Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.





A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



Greg Avenia

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☐ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☒ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☒ Other (describe): Underground infiltration system, infiltration basins

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☐ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☒ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☐ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☒ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☒ is within the Zone II or Interim Wellhead Protection Area
- ☒ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

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

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☒ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

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

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☒ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

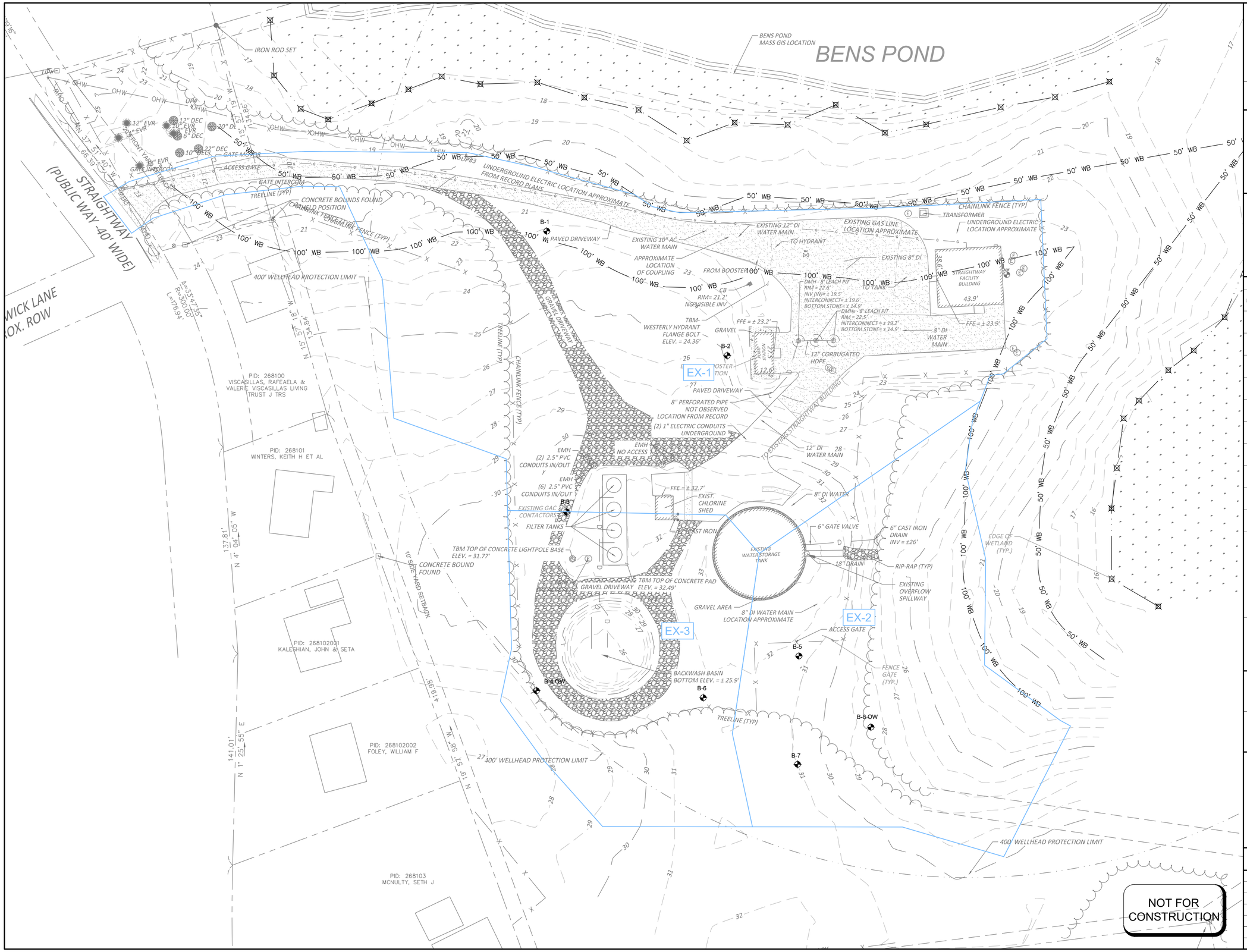
☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Appendix B
Drainage Figures

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REVISIONS

REV	DESCRIPTION	DSN / DWN	CHK / APP	DATE

SCALE VERIFICATION

THIS BAR IS 1 INCH IN LENGTH ON ORIGINAL DRAWING

0 1"

IF IT'S NOT 1 INCH ON THIS SHEET ADJUST YOUR SCALES ACCORDINGLY

0 30 60 90

SCALE: 1" = 30' SCALE IN FEET

ORIGINAL DRAWING SIZE IS 22 x 34

STRAIGHTWAY EXISTING DRAINAGE MAP

STRAIGHTWAY
WATER TREATMENT FACILITY

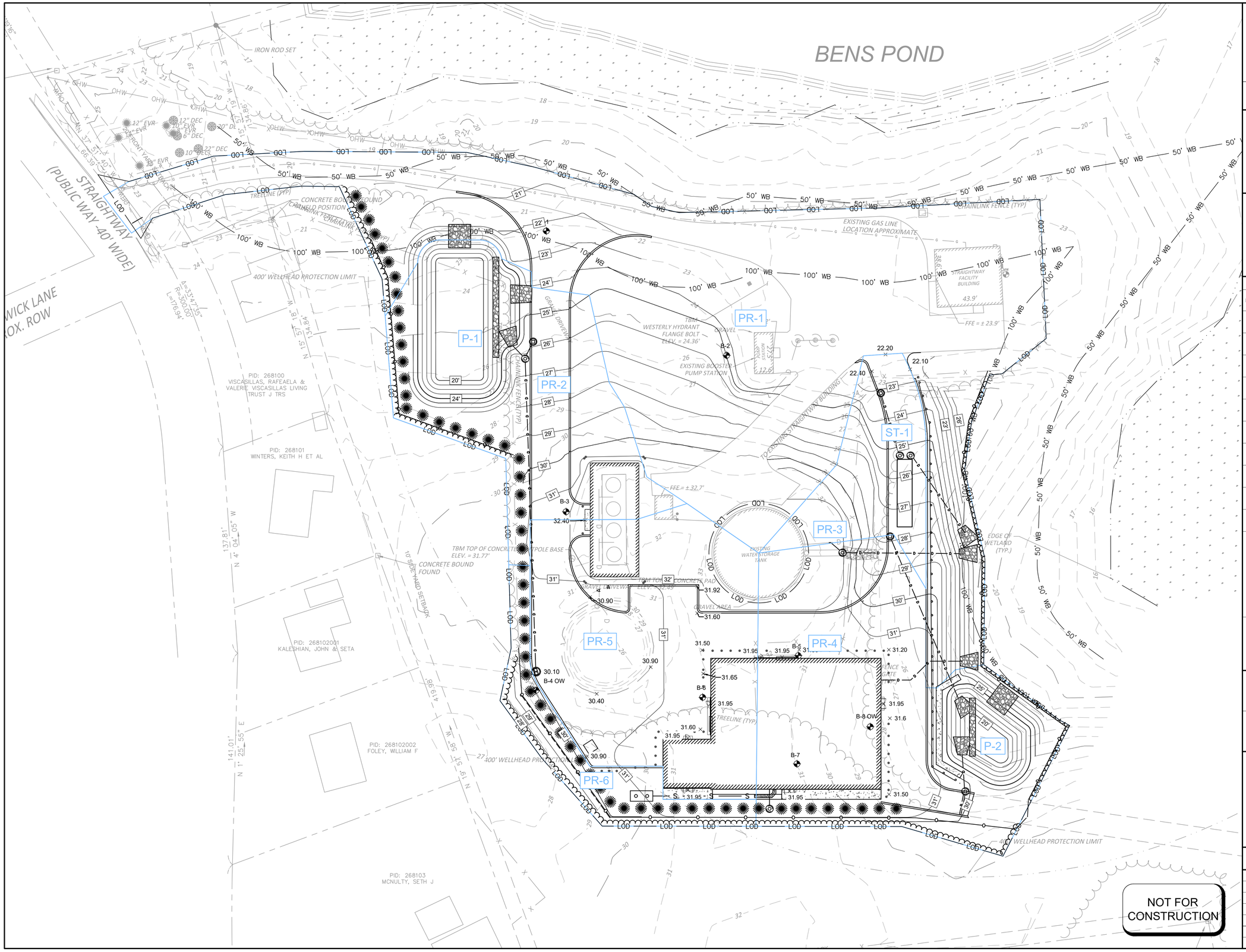
TOWN OF BARNSTABLE DPW
WATER SUPPLY DIVISION
47 OLD YARMOUTH ROAD
HYANNIS, MA 02601

NOT FOR CONSTRUCTION

PROJECT NO.	24003062.001A
ISSUE DATE	11/22/2024
CURRENT REVISION	-
DESIGNED BY	TB
DRAWN BY	MD/MPS
CHECKED BY	TB/GAA
APPROVED BY	GAA

D-101

SHEET 1 of 28


BENS POND
IRON ROD SET
STRAIGHTWAY (PUBLIC WAY -40' WIDE)
WICK LANE
OX. ROW
PID: 268100
VISCASILLAS, RAFEAELA & VALERIE VISCASILLAS LIVING TRUST J TRS
PID: 268101
WINTERS, KEITH H ET AL
PID: 268102001
KALESHIAN, JOHN & SETA
PID: 268102002
FOLEY, WILLIAM F
PID: 268103
MCNULTY, SETH J
CONCRETE BOUND FOUND
CHAINLINK FENCE (TYP)
TREELINE (TYP)
400' WELLHEAD PROTECTION LIMIT
10' SIDEYARD SETBACK
EXISTING GAS LINE LOCATION APPROXIMATE
STRAIGHTWAY FACILITY BUILDING
FFE = ± 23.9'
TBM WESTERLY HYDRANT FLANGE BOLT ELEV. = 24.36'
EXISTING BOOSTER PUMP STATION
GRAVEL DRIVEWAY
GRAVEL
P-1
PR-1
PR-2
PR-3
PR-4
PR-5
PR-6
ST-1
P-2
B-1
B-2
B-3
B-4 OW
B-5
B-6
B-7
B-8 OW
TBM TOP OF CONCRETE UTILITY POLE BASE ELEV. = 31.77'
TBM TOP OF CONCRETE PAD ELEV. = 32.49
EXISTING WATER STORAGE TANK
FFE = ± 32.7'
GRAVEL AREA
GRAVEL DRIVEWAY
EDGE OF WETLAND (TYP.)
FENCE GATE (TYP.)
TO EXISTING STRAIGHTWAY BUILDING
LOD
50' WB
100' WB
S
W
G
OHW
OHW
OHW

400' REPLACEMENT WELLHEAD PROTECTION LIMIT

400' EXISTING WELLHEAD PROTECTION LIMIT

10' SIDE YARD SETBACK

400' EXISTING WELLHEAD PROTECTION LIMIT

400' REPLACEMENT WELLHEAD PROTECTION LIMIT

SIMMONS POND
(LOCATION MASS GIS)

SMITH STREET
(PUBLIC WAY - 40' WIDE)

EX-4

TBM -
SOUTH-EASTERLY
HYDRANT FLANGE BOLT
ELEV. = 13.61'

TBM
SOUTH-EASTERLY
HYDRANT FLANGE BOLT
ELEV. = 17.77'

SP-03A-OW
SP-03

HP-02B
HP-02B-OW

100 YEAR FLOOD ZONE X
BOUNDARY

TREELINE (TYP.)

BITUMINOUS
PAVEMENT

FFE = ± 9.7'

20.0'

SIMMONS
POND
WELL
STATION

GRAVEL
PARKING
AREA

HYANNISPORT
WELL
STATION
39.3'

FFE = ± 14.7'

PLANTER AREA
W/STONE WALL
PERIMETER

EXISTING ACCESS
GATE

20' FRONT YARD SETBACK

CONCRETE
HEADWALL

FLOW

NOT FOR
CONSTRUCTION

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0 1"

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0 30 60 90

SCALE: 1" = 30' SCALE IN FEET

ORIGINAL DRAWING SIZE IS 22 x 34

HYANNISPORT - SIMMONS POND
EXISTING DRAINAGE MAP

STRAIGHTWAY
WATER TREATMENT FACILITY

TOWN OF BARNSTABLE DPW
WATER SUPPLY DIVISION
47 OLD YARMOUTH ROAD
HYANNIS, MA 02601

PROJECT NO.	24003062.001A
ISSUE DATE	11/22/2024
CURRENT REVISION	
DESIGNED BY	TB
DRAWN BY	MD/MPS
CHECKED BY	TB/GAA
APPROVED BY	GAA

D-201

SHEET 3 of 28

400' REPLACEMENT WELLHEAD PROTECTION LIMIT

400' EXISTING WELLHEAD PROTECTION LIMIT

400' EXISTING WELLHEAD PROTECTION LIMIT

400' REPLACEMENT WELLHEAD PROTECTION LIMIT

10' SIDE YARD SETBACK

10' SIDE YARD SETBACK

20' FRONT YARD SETBACK

SIMMONS POND PUMP STATION BUILDING FFE = 18.5'

PEA GRAVEL DIAPHRAGM

HYANNISPORT PUMP STATION BUILDING FFE = 18.5' APPROX. 702 SF

STORMWATER INFILTRATION BASIN C VOLUME = 1,087CF

PEA GRAVEL DIAPHRAGM

GRADE EXISTING TOPOGRAPHY TO DRAIN TO STORMWATER BASIN

STORMWATER INFILTRATION BASIN D VOLUME = 777 CF

EMERGENCY OVERFLOW WEIR WITH OUTLET EROSION PROTECTION ELEV = 14.0

PR-9

P-4

PR-8

P-3

PR-7

LOD

BITUMINOUS PAVEMENT

SIMMONS POND
(LOCATION MASS GIS)

SMITH STREET
(PUBLIC WAY - 40' WIDE)

CONCRETE HEADWALL

FLOW

NOT FOR CONSTRUCTION

PLOTTED:

KLEINFELDER
Bright People. Right Solutions.

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Boston, MA 02108
Phone: 617-497-7800
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REVISIONS

REV	DESCRIPTION	DSN / DWN	CHK / APP	DATE

SCALE VERIFICATION

THIS BAR IS 1 INCH IN LENGTH ON ORIGINAL DRAWING

0 1"

IF IT'S NOT 1 INCH ON THIS SHEET ADJUST YOUR SCALES ACCORDINGLY

0 30 60 90

SCALE: 1" = 30' SCALE IN FEET

ORIGINAL DRAWING SIZE IS 22 x 34

HYANNISPORT - SIMMONS POND
PROPOSED DRAINAGE MAP

STRAIGHTWAY
WATER TREATMENT FACILITY

TOWN OF BARNSTABLE DPW
WATER SUPPLY DIVISION
47 OLD YARMOUTH ROAD
HYANNIS, MA 02601

PROJECT NO.	24003062.001A
ISSUE DATE	11/22/2024
CURRENT REVISION	
DESIGNED BY	TB
DRAWN BY	MD/MPS
CHECKED BY	TB/GAA
APPROVED BY	GAA

D-202

Appendix C
HydroCAD Analysis

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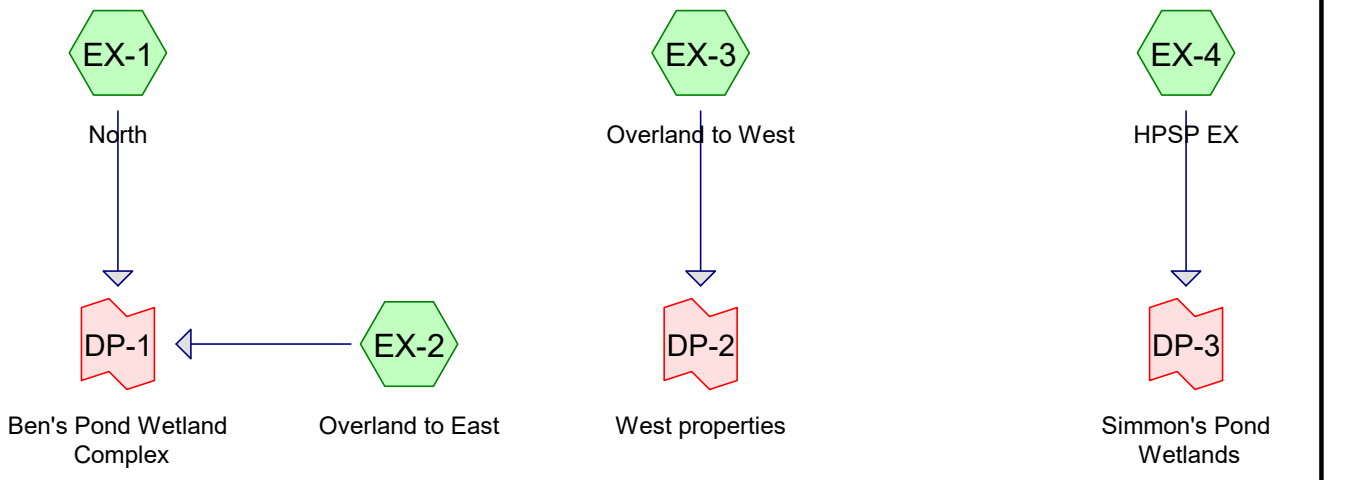
Appendix C.1
Existing Conditions

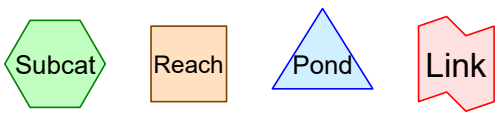
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Barnstable Straighway Existing Conditions

Barnstable Hyannisport and Simmons Pond Proposed Conditions





Routing Diagram for Barnstable Straightway Existing Drainage
Prepared by Kleinfelder, Printed 11/13/2024
HydroCAD® 10.20-2f s/n 00759 © 2022 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	Type III 24-hr		Default	24.00	1	2.87	2
2	2-Year	Type III 24-hr		Default	24.00	1	3.39	2
3	5-Year	Type III 24-hr		Default	24.00	1	4.24	2
4	10-Year	Type III 24-hr		Default	24.00	1	4.95	2
5	25-Year	Type III 24-hr		Default	24.00	1	5.92	2
6	100-Year	Type III 24-hr		Default	24.00	1	7.41	2
7	100-Year 2070	Type III 24-hr		Default	24.00	1	9.70	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.087	39	>75% Grass cover, Good, HSG A (EX-1, EX-2, EX-3, EX-4)
0.380	96	Gravel surface, HSG A (EX-1, EX-2, EX-3, EX-4)
0.579	98	Impervious, HSG A (EX-1)
0.239	98	Unconnected pavement, HSG A (EX-4)
0.069	98	Unconnected roofs, HSG A (EX-2, EX-3)
1.405	30	Woods, Good, HSG A (EX-1, EX-2, EX-3, EX-4)
4.758	**52**	**TOTAL AREA**

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: North Runoff Area=87,931 sf 28.67% Impervious Runoff Depth=0.92"
Tc=6.0 min CN=WQ Runoff=1.92 cfs 0.154 af

Subcatchment EX-2: Overland to East Runoff Area=40,687 sf 2.78% Impervious Runoff Depth=0.08"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.08 cfs 0.006 af

Subcatchment EX-3: Overland to West Runoff Area=30,560 sf 6.08% Impervious Runoff Depth=0.87"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.65 cfs 0.051 af

Subcatchment EX-4: HPSP EX Runoff Area=48,091 sf 21.64% Impervious Runoff Depth=0.66"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.75 cfs 0.060 af

Link DP-1: Ben's Pond Wetland Complex Inflow=2.00 cfs 0.161 af
Primary=2.00 cfs 0.161 af

Link DP-2: West properties Inflow=0.65 cfs 0.051 af
Primary=0.65 cfs 0.051 af

Link DP-3: Simmon's Pond Wetlands Inflow=0.75 cfs 0.060 af
Primary=0.75 cfs 0.060 af

Total Runoff Area = 4.758 ac Runoff Volume = 0.272 af Average Runoff Depth = 0.69"
81.37% Pervious = 3.872 ac 18.63% Impervious = 0.886 ac

Summary for Subcatchment EX-1: North

Runoff = 1.92 cfs @ 12.09 hrs, Volume= 0.154 af, Depth= 0.92"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.87"

	Area (sf)	CN	Description
*	25,213	98	Impervious, HSG A
	5,774	96	Gravel surface, HSG A
	13,096	30	Woods, Good, HSG A
	43,848	39	>75% Grass cover, Good, HSG A
	87,931		Weighted Average
	62,718	42	71.33% Pervious Area
	25,213	98	28.67% Impervious Area

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

Summary for Subcatchment EX-2: Overland to East

Runoff = 0.08 cfs @ 12.09 hrs, Volume= 0.006 af, Depth= 0.08"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.87"

Area (sf)	CN	Adj	Description
25,832	30	30	Woods, Good, HSG A
1,131	98	98	Unconnected roofs, HSG A
166	96	96	Gravel surface, HSG A
13,558	39	39	>75% Grass cover, Good, HSG A
40,687			Weighted Average
39,556	33	33	97.22% Pervious Area
1,131	98	98	2.78% Impervious Area
1,131			100.00% Unconnected

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

Summary for Subcatchment EX-3: Overland to West

Runoff = 0.65 cfs @ 12.09 hrs, Volume= 0.051 af, Depth= 0.87"
Routed to Link DP-2 : West properties

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.87"

Area (sf)	CN	Adj	Description
9,063	30	30	Woods, Good, HSG A
1,857	98	98	Unconnected roofs, HSG A
8,930	96	96	Gravel surface, HSG A
10,710	39	39	>75% Grass cover, Good, HSG A
30,560			Weighted Average
28,703	54	54	93.92% Pervious Area
1,857	98	98	6.08% Impervious Area
1,857			100.00% Unconnected

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

Summary for Subcatchment EX-4: HPSP EX

Runoff = 0.75 cfs @ 12.09 hrs, Volume= 0.060 af, Depth= 0.66"
Routed to Link DP-3 : Simmon's Pond Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.87"

Area (sf)	CN	Adj	Description
10,408	98	98	Unconnected pavement, HSG A
1,691	96	96	Gravel surface, HSG A
13,201	30	30	Woods, Good, HSG A
22,791	39	39	>75% Grass cover, Good, HSG A
48,091			Weighted Average
37,683	38	38	78.36% Pervious Area
10,408	98	98	21.64% Impervious Area
10,408			100.00% Unconnected

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

Summary for Link DP-1: Ben's Pond Wetland Complex

Inflow Area = 2.953 ac, 20.48% Impervious, Inflow Depth = 0.65" for 1-Year event
Inflow = 2.00 cfs @ 12.09 hrs, Volume= 0.161 af
Primary = 2.00 cfs @ 12.09 hrs, Volume= 0.161 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: West properties

Inflow Area = 0.702 ac, 6.08% Impervious, Inflow Depth = 0.87" for 1-Year event
Inflow = 0.65 cfs @ 12.09 hrs, Volume= 0.051 af
Primary = 0.65 cfs @ 12.09 hrs, Volume= 0.051 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Simmon's Pond Wetlands

Inflow Area = 1.104 ac, 21.64% Impervious, Inflow Depth = 0.66" for 1-Year event
Inflow = 0.75 cfs @ 12.09 hrs, Volume= 0.060 af
Primary = 0.75 cfs @ 12.09 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: North Runoff Area=87,931 sf 28.67% Impervious Runoff Depth=1.10"
Tc=6.0 min CN=WQ Runoff=2.28 cfs 0.185 af

Subcatchment EX-2: Overland to East Runoff Area=40,687 sf 2.78% Impervious Runoff Depth=0.10"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.10 cfs 0.008 af

Subcatchment EX-3: Overland to West Runoff Area=30,560 sf 6.08% Impervious Runoff Depth=1.05"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.78 cfs 0.061 af

Subcatchment EX-4: HPSP EX Runoff Area=48,091 sf 21.64% Impervious Runoff Depth=0.79"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.89 cfs 0.073 af

Link DP-1: Ben's Pond Wetland Complex Inflow=2.37 cfs 0.193 af
Primary=2.37 cfs 0.193 af

Link DP-2: West properties Inflow=0.78 cfs 0.061 af
Primary=0.78 cfs 0.061 af

Link DP-3: Simmon's Pond Wetlands Inflow=0.89 cfs 0.073 af
Primary=0.89 cfs 0.073 af

Total Runoff Area = 4.758 ac Runoff Volume = 0.327 af Average Runoff Depth = 0.82"
81.37% Pervious = 3.872 ac 18.63% Impervious = 0.886 ac

Summary for Subcatchment EX-1: North

Runoff = 2.28 cfs @ 12.09 hrs, Volume= 0.185 af, Depth= 1.10"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.39"

	Area (sf)	CN	Description
*	25,213	98	Impervious, HSG A
	5,774	96	Gravel surface, HSG A
	13,096	30	Woods, Good, HSG A
	43,848	39	>75% Grass cover, Good, HSG A
	87,931		Weighted Average
	62,718	42	71.33% Pervious Area
	25,213	98	28.67% Impervious Area

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

Summary for Subcatchment EX-2: Overland to East

Runoff = 0.10 cfs @ 12.09 hrs, Volume= 0.008 af, Depth= 0.10"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.39"

Area (sf)	CN	Adj	Description
25,832	30	30	Woods, Good, HSG A
1,131	98	98	Unconnected roofs, HSG A
166	96	96	Gravel surface, HSG A
13,558	39	39	>75% Grass cover, Good, HSG A
40,687			Weighted Average
39,556	33	33	97.22% Pervious Area
1,131	98	98	2.78% Impervious Area
1,131			100.00% Unconnected

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

Summary for Subcatchment EX-3: Overland to West

Runoff = 0.78 cfs @ 12.09 hrs, Volume= 0.061 af, Depth= 1.05"
Routed to Link DP-2 : West properties

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.39"

Area (sf)	CN	Adj	Description
9,063	30	30	Woods, Good, HSG A
1,857	98	98	Unconnected roofs, HSG A
8,930	96	96	Gravel surface, HSG A
10,710	39	39	>75% Grass cover, Good, HSG A
30,560			Weighted Average
28,703	54	54	93.92% Pervious Area
1,857	98	98	6.08% Impervious Area
1,857			100.00% Unconnected

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

Summary for Subcatchment EX-4: HPSP EX

Runoff = 0.89 cfs @ 12.09 hrs, Volume= 0.073 af, Depth= 0.79"
Routed to Link DP-3 : Simmon's Pond Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.39"

Area (sf)	CN	Adj	Description
10,408	98	98	Unconnected pavement, HSG A
1,691	96	96	Gravel surface, HSG A
13,201	30	30	Woods, Good, HSG A
22,791	39	39	>75% Grass cover, Good, HSG A
48,091			Weighted Average
37,683	38	38	78.36% Pervious Area
10,408	98	98	21.64% Impervious Area
10,408			100.00% Unconnected

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

Summary for Link DP-1: Ben's Pond Wetland Complex

Inflow Area = 2.953 ac, 20.48% Impervious, Inflow Depth = 0.78" for 2-Year event
Inflow = 2.37 cfs @ 12.09 hrs, Volume= 0.193 af
Primary = 2.37 cfs @ 12.09 hrs, Volume= 0.193 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: West properties

Inflow Area = 0.702 ac, 6.08% Impervious, Inflow Depth = 1.05" for 2-Year event
Inflow = 0.78 cfs @ 12.09 hrs, Volume= 0.061 af
Primary = 0.78 cfs @ 12.09 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Simmon's Pond Wetlands

Inflow Area = 1.104 ac, 21.64% Impervious, Inflow Depth = 0.79" for 2-Year event
Inflow = 0.89 cfs @ 12.09 hrs, Volume= 0.073 af
Primary = 0.89 cfs @ 12.09 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: North Runoff Area=87,931 sf 28.67% Impervious Runoff Depth=1.43"
Tc=6.0 min CN=WQ Runoff=2.86 cfs 0.241 af

Subcatchment EX-2: Overland to East Runoff Area=40,687 sf 2.78% Impervious Runoff Depth=0.15"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.12 cfs 0.012 af

Subcatchment EX-3: Overland to West Runoff Area=30,560 sf 6.08% Impervious Runoff Depth=1.37"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.98 cfs 0.080 af

Subcatchment EX-4: HPSP EX Runoff Area=48,091 sf 21.64% Impervious Runoff Depth=1.03"
Tc=6.0 min UI Adjusted CN=WQ Runoff=1.12 cfs 0.095 af

Link DP-1: Ben's Pond Wetland Complex Inflow=2.98 cfs 0.253 af
Primary=2.98 cfs 0.253 af

Link DP-2: West properties Inflow=0.98 cfs 0.080 af
Primary=0.98 cfs 0.080 af

Link DP-3: Simmon's Pond Wetlands Inflow=1.12 cfs 0.095 af
Primary=1.12 cfs 0.095 af

Total Runoff Area = 4.758 ac Runoff Volume = 0.428 af Average Runoff Depth = 1.08"
81.37% Pervious = 3.872 ac 18.63% Impervious = 0.886 ac

Summary for Subcatchment EX-1: North

Runoff = 2.86 cfs @ 12.09 hrs, Volume= 0.241 af, Depth= 1.43"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.24"

	Area (sf)	CN	Description
*	25,213	98	Impervious, HSG A
	5,774	96	Gravel surface, HSG A
	13,096	30	Woods, Good, HSG A
	43,848	39	>75% Grass cover, Good, HSG A
	87,931		Weighted Average
	62,718	42	71.33% Pervious Area
	25,213	98	28.67% Impervious Area

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

Summary for Subcatchment EX-2: Overland to East

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 0.012 af, Depth= 0.15"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.24"

Area (sf)	CN	Adj	Description
25,832	30	30	Woods, Good, HSG A
1,131	98	98	Unconnected roofs, HSG A
166	96	96	Gravel surface, HSG A
13,558	39	39	>75% Grass cover, Good, HSG A
40,687			Weighted Average
39,556	33	33	97.22% Pervious Area
1,131	98	98	2.78% Impervious Area
1,131			100.00% Unconnected

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

Summary for Subcatchment EX-3: Overland to West

Runoff = 0.98 cfs @ 12.09 hrs, Volume= 0.080 af, Depth= 1.37"
Routed to Link DP-2 : West properties

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.24"

Area (sf)	CN	Adj	Description
9,063	30	30	Woods, Good, HSG A
1,857	98	98	Unconnected roofs, HSG A
8,930	96	96	Gravel surface, HSG A
10,710	39	39	>75% Grass cover, Good, HSG A
30,560			Weighted Average
28,703	54	54	93.92% Pervious Area
1,857	98	98	6.08% Impervious Area
1,857			100.00% Unconnected

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

Summary for Subcatchment EX-4: HPSP EX

Runoff = 1.12 cfs @ 12.09 hrs, Volume= 0.095 af, Depth= 1.03"
Routed to Link DP-3 : Simmon's Pond Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.24"

Area (sf)	CN	Adj	Description
10,408	98	98	Unconnected pavement, HSG A
1,691	96	96	Gravel surface, HSG A
13,201	30	30	Woods, Good, HSG A
22,791	39	39	>75% Grass cover, Good, HSG A
48,091			Weighted Average
37,683	38	38	78.36% Pervious Area
10,408	98	98	21.64% Impervious Area
10,408			100.00% Unconnected

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

Summary for Link DP-1: Ben's Pond Wetland Complex

Inflow Area = 2.953 ac, 20.48% Impervious, Inflow Depth = 1.03" for 5-Year event
Inflow = 2.98 cfs @ 12.09 hrs, Volume= 0.253 af
Primary = 2.98 cfs @ 12.09 hrs, Volume= 0.253 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: West properties

Inflow Area = 0.702 ac, 6.08% Impervious, Inflow Depth = 1.37" for 5-Year event
Inflow = 0.98 cfs @ 12.09 hrs, Volume= 0.080 af
Primary = 0.98 cfs @ 12.09 hrs, Volume= 0.080 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Simmon's Pond Wetlands

Inflow Area = 1.104 ac, 21.64% Impervious, Inflow Depth = 1.03" for 5-Year event
Inflow = 1.12 cfs @ 12.09 hrs, Volume= 0.095 af
Primary = 1.12 cfs @ 12.09 hrs, Volume= 0.095 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: North Runoff Area=87,931 sf 28.67% Impervious Runoff Depth=1.74"
Tc=6.0 min CN=WQ Runoff=3.35 cfs 0.293 af

Subcatchment EX-2: Overland to East Runoff Area=40,687 sf 2.78% Impervious Runoff Depth=0.21"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.14 cfs 0.017 af

Subcatchment EX-3: Overland to West Runoff Area=30,560 sf 6.08% Impervious Runoff Depth=1.66"
Tc=6.0 min UI Adjusted CN=WQ Runoff=1.16 cfs 0.097 af

Subcatchment EX-4: HPSP EX Runoff Area=48,091 sf 21.64% Impervious Runoff Depth=1.27"
Tc=6.0 min UI Adjusted CN=WQ Runoff=1.31 cfs 0.117 af

Link DP-1: Ben's Pond Wetland Complex Inflow=3.49 cfs 0.310 af
Primary=3.49 cfs 0.310 af

Link DP-2: West properties Inflow=1.16 cfs 0.097 af
Primary=1.16 cfs 0.097 af

Link DP-3: Simmon's Pond Wetlands Inflow=1.31 cfs 0.117 af
Primary=1.31 cfs 0.117 af

Total Runoff Area = 4.758 ac Runoff Volume = 0.524 af Average Runoff Depth = 1.32"
81.37% Pervious = 3.872 ac 18.63% Impervious = 0.886 ac

Summary for Subcatchment EX-1: North

Runoff = 3.35 cfs @ 12.09 hrs, Volume= 0.293 af, Depth= 1.74"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.95"

	Area (sf)	CN	Description
*	25,213	98	Impervious, HSG A
	5,774	96	Gravel surface, HSG A
	13,096	30	Woods, Good, HSG A
	43,848	39	>75% Grass cover, Good, HSG A
	87,931		Weighted Average
	62,718	42	71.33% Pervious Area
	25,213	98	28.67% Impervious Area

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

Summary for Subcatchment EX-2: Overland to East

Runoff = 0.14 cfs @ 12.09 hrs, Volume= 0.017 af, Depth= 0.21"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.95"

Area (sf)	CN	Adj	Description
25,832	30	30	Woods, Good, HSG A
1,131	98	98	Unconnected roofs, HSG A
166	96	96	Gravel surface, HSG A
13,558	39	39	>75% Grass cover, Good, HSG A
40,687			Weighted Average
39,556	33	33	97.22% Pervious Area
1,131	98	98	2.78% Impervious Area
1,131			100.00% Unconnected

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

Summary for Subcatchment EX-3: Overland to West

Runoff = 1.16 cfs @ 12.09 hrs, Volume= 0.097 af, Depth= 1.66"
Routed to Link DP-2 : West properties

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.95"

Area (sf)	CN	Adj	Description
9,063	30	30	Woods, Good, HSG A
1,857	98	98	Unconnected roofs, HSG A
8,930	96	96	Gravel surface, HSG A
10,710	39	39	>75% Grass cover, Good, HSG A
30,560			Weighted Average
28,703	54	54	93.92% Pervious Area
1,857	98	98	6.08% Impervious Area
1,857			100.00% Unconnected

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

Summary for Subcatchment EX-4: HPSP EX

Runoff = 1.31 cfs @ 12.09 hrs, Volume= 0.117 af, Depth= 1.27"
Routed to Link DP-3 : Simmon's Pond Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.95"

Area (sf)	CN	Adj	Description
10,408	98	98	Unconnected pavement, HSG A
1,691	96	96	Gravel surface, HSG A
13,201	30	30	Woods, Good, HSG A
22,791	39	39	>75% Grass cover, Good, HSG A
48,091			Weighted Average
37,683	38	38	78.36% Pervious Area
10,408	98	98	21.64% Impervious Area
10,408			100.00% Unconnected

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

Summary for Link DP-1: Ben's Pond Wetland Complex

Inflow Area = 2.953 ac, 20.48% Impervious, Inflow Depth = 1.26" for 10-Year event
Inflow = 3.49 cfs @ 12.09 hrs, Volume= 0.310 af
Primary = 3.49 cfs @ 12.09 hrs, Volume= 0.310 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: West properties

Inflow Area = 0.702 ac, 6.08% Impervious, Inflow Depth = 1.66" for 10-Year event
Inflow = 1.16 cfs @ 12.09 hrs, Volume= 0.097 af
Primary = 1.16 cfs @ 12.09 hrs, Volume= 0.097 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Simmon's Pond Wetlands

Inflow Area = 1.104 ac, 21.64% Impervious, Inflow Depth = 1.27" for 10-Year event
Inflow = 1.31 cfs @ 12.09 hrs, Volume= 0.117 af
Primary = 1.31 cfs @ 12.09 hrs, Volume= 0.117 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: North Runoff Area=87,931 sf 28.67% Impervious Runoff Depth=2.21"
Tc=6.0 min CN=WQ Runoff=4.04 cfs 0.371 af

Subcatchment EX-2: Overland to East Runoff Area=40,687 sf 2.78% Impervious Runoff Depth=0.36"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.18 cfs 0.028 af

Subcatchment EX-3: Overland to West Runoff Area=30,560 sf 6.08% Impervious Runoff Depth=2.10"
Tc=6.0 min UI Adjusted CN=WQ Runoff=1.39 cfs 0.123 af

Subcatchment EX-4: HPSP EX Runoff Area=48,091 sf 21.64% Impervious Runoff Depth=1.64"
Tc=6.0 min UI Adjusted CN=WQ Runoff=1.58 cfs 0.151 af

Link DP-1: Ben's Pond Wetland Complex Inflow=4.21 cfs 0.399 af
Primary=4.21 cfs 0.399 af

Link DP-2: West properties Inflow=1.39 cfs 0.123 af
Primary=1.39 cfs 0.123 af

Link DP-3: Simmon's Pond Wetlands Inflow=1.58 cfs 0.151 af
Primary=1.58 cfs 0.151 af

Total Runoff Area = 4.758 ac Runoff Volume = 0.673 af Average Runoff Depth = 1.70"
81.37% Pervious = 3.872 ac 18.63% Impervious = 0.886 ac

Summary for Subcatchment EX-1: North

Runoff = 4.04 cfs @ 12.09 hrs, Volume= 0.371 af, Depth= 2.21"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.92"

	Area (sf)	CN	Description
*	25,213	98	Impervious, HSG A
	5,774	96	Gravel surface, HSG A
	13,096	30	Woods, Good, HSG A
	43,848	39	>75% Grass cover, Good, HSG A
	87,931		Weighted Average
	62,718	42	71.33% Pervious Area
	25,213	98	28.67% Impervious Area

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

Summary for Subcatchment EX-2: Overland to East

Runoff = 0.18 cfs @ 12.10 hrs, Volume= 0.028 af, Depth= 0.36"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.92"

Area (sf)	CN	Adj	Description
25,832	30	30	Woods, Good, HSG A
1,131	98	98	Unconnected roofs, HSG A
166	96	96	Gravel surface, HSG A
13,558	39	39	>75% Grass cover, Good, HSG A
40,687			Weighted Average
39,556	33	33	97.22% Pervious Area
1,131	98	98	2.78% Impervious Area
1,131			100.00% Unconnected

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

Summary for Subcatchment EX-3: Overland to West

Runoff = 1.39 cfs @ 12.09 hrs, Volume= 0.123 af, Depth= 2.10"
Routed to Link DP-2 : West properties

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.92"

Area (sf)	CN	Adj	Description
9,063	30	30	Woods, Good, HSG A
1,857	98	98	Unconnected roofs, HSG A
8,930	96	96	Gravel surface, HSG A
10,710	39	39	>75% Grass cover, Good, HSG A
30,560			Weighted Average
28,703	54	54	93.92% Pervious Area
1,857	98	98	6.08% Impervious Area
1,857			100.00% Unconnected

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

Summary for Subcatchment EX-4: HPSP EX

Runoff = 1.58 cfs @ 12.09 hrs, Volume= 0.151 af, Depth= 1.64"
Routed to Link DP-3 : Simmon's Pond Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.92"

Area (sf)	CN	Adj	Description
10,408	98	98	Unconnected pavement, HSG A
1,691	96	96	Gravel surface, HSG A
13,201	30	30	Woods, Good, HSG A
22,791	39	39	>75% Grass cover, Good, HSG A
48,091			Weighted Average
37,683	38	38	78.36% Pervious Area
10,408	98	98	21.64% Impervious Area
10,408			100.00% Unconnected

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

Summary for Link DP-1: Ben's Pond Wetland Complex

Inflow Area = 2.953 ac, 20.48% Impervious, Inflow Depth = 1.62" for 25-Year event
Inflow = 4.21 cfs @ 12.09 hrs, Volume= 0.399 af
Primary = 4.21 cfs @ 12.09 hrs, Volume= 0.399 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: West properties

Inflow Area = 0.702 ac, 6.08% Impervious, Inflow Depth = 2.10" for 25-Year event
Inflow = 1.39 cfs @ 12.09 hrs, Volume= 0.123 af
Primary = 1.39 cfs @ 12.09 hrs, Volume= 0.123 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Simmon's Pond Wetlands

Inflow Area = 1.104 ac, 21.64% Impervious, Inflow Depth = 1.64" for 25-Year event
Inflow = 1.58 cfs @ 12.09 hrs, Volume= 0.151 af
Primary = 1.58 cfs @ 12.09 hrs, Volume= 0.151 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: North Runoff Area=87,931 sf 28.67% Impervious Runoff Depth=3.01"
Tc=6.0 min CN=WQ Runoff=5.56 cfs 0.507 af

Subcatchment EX-2: Overland to East Runoff Area=40,687 sf 2.78% Impervious Runoff Depth=0.72"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.38 cfs 0.056 af

Subcatchment EX-3: Overland to West Runoff Area=30,560 sf 6.08% Impervious Runoff Depth=2.87"
Tc=6.0 min UI Adjusted CN=WQ Runoff=1.87 cfs 0.168 af

Subcatchment EX-4: HPSP EX Runoff Area=48,091 sf 21.64% Impervious Runoff Depth=2.31"
Tc=6.0 min UI Adjusted CN=WQ Runoff=2.24 cfs 0.213 af

Link DP-1: Ben's Pond Wetland Complex Inflow=5.93 cfs 0.563 af
Primary=5.93 cfs 0.563 af

Link DP-2: West properties Inflow=1.87 cfs 0.168 af
Primary=1.87 cfs 0.168 af

Link DP-3: Simmon's Pond Wetlands Inflow=2.24 cfs 0.213 af
Primary=2.24 cfs 0.213 af

Total Runoff Area = 4.758 ac Runoff Volume = 0.943 af Average Runoff Depth = 2.38"
81.37% Pervious = 3.872 ac 18.63% Impervious = 0.886 ac

Summary for Subcatchment EX-1: North

Runoff = 5.56 cfs @ 12.09 hrs, Volume= 0.507 af, Depth= 3.01"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.41"

	Area (sf)	CN	Description
*	25,213	98	Impervious, HSG A
	5,774	96	Gravel surface, HSG A
	13,096	30	Woods, Good, HSG A
	43,848	39	>75% Grass cover, Good, HSG A
	87,931		Weighted Average
	62,718	42	71.33% Pervious Area
	25,213	98	28.67% Impervious Area

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

Summary for Subcatchment EX-2: Overland to East

Runoff = 0.38 cfs @ 12.11 hrs, Volume= 0.056 af, Depth= 0.72"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.41"

Area (sf)	CN	Adj	Description
25,832	30	30	Woods, Good, HSG A
1,131	98	98	Unconnected roofs, HSG A
166	96	96	Gravel surface, HSG A
13,558	39	39	>75% Grass cover, Good, HSG A
40,687			Weighted Average
39,556	33	33	97.22% Pervious Area
1,131	98	98	2.78% Impervious Area
1,131			100.00% Unconnected

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

Summary for Subcatchment EX-3: Overland to West

Runoff = 1.87 cfs @ 12.09 hrs, Volume= 0.168 af, Depth= 2.87"
Routed to Link DP-2 : West properties

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.41"

Area (sf)	CN	Adj	Description
9,063	30	30	Woods, Good, HSG A
1,857	98	98	Unconnected roofs, HSG A
8,930	96	96	Gravel surface, HSG A
10,710	39	39	>75% Grass cover, Good, HSG A
30,560			Weighted Average
28,703	54	54	93.92% Pervious Area
1,857	98	98	6.08% Impervious Area
1,857			100.00% Unconnected

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

Summary for Subcatchment EX-4: HPSP EX

Runoff = 2.24 cfs @ 12.09 hrs, Volume= 0.213 af, Depth= 2.31"
Routed to Link DP-3 : Simmon's Pond Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.41"

Area (sf)	CN	Adj	Description
10,408	98	98	Unconnected pavement, HSG A
1,691	96	96	Gravel surface, HSG A
13,201	30	30	Woods, Good, HSG A
22,791	39	39	>75% Grass cover, Good, HSG A
48,091			Weighted Average
37,683	38	38	78.36% Pervious Area
10,408	98	98	21.64% Impervious Area
10,408			100.00% Unconnected

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

Summary for Link DP-1: Ben's Pond Wetland Complex

Inflow Area = 2.953 ac, 20.48% Impervious, Inflow Depth = 2.29" for 100-Year event
Inflow = 5.93 cfs @ 12.09 hrs, Volume= 0.563 af
Primary = 5.93 cfs @ 12.09 hrs, Volume= 0.563 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: West properties

Inflow Area = 0.702 ac, 6.08% Impervious, Inflow Depth = 2.87" for 100-Year event
Inflow = 1.87 cfs @ 12.09 hrs, Volume= 0.168 af
Primary = 1.87 cfs @ 12.09 hrs, Volume= 0.168 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Simmon's Pond Wetlands

Inflow Area = 1.104 ac, 21.64% Impervious, Inflow Depth = 2.31" for 100-Year event
Inflow = 2.24 cfs @ 12.09 hrs, Volume= 0.213 af
Primary = 2.24 cfs @ 12.09 hrs, Volume= 0.213 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: North Runoff Area=87,931 sf 28.67% Impervious Runoff Depth=4.42"
Tc=6.0 min CN=WQ Runoff=8.46 cfs 0.744 af

Subcatchment EX-2: Overland to East Runoff Area=40,687 sf 2.78% Impervious Runoff Depth=1.52"
Tc=6.0 min UI Adjusted CN=WQ Runoff=1.01 cfs 0.118 af

Subcatchment EX-3: Overland to West Runoff Area=30,560 sf 6.08% Impervious Runoff Depth=4.21"
Tc=6.0 min UI Adjusted CN=WQ Runoff=2.78 cfs 0.246 af

Subcatchment EX-4: HPSP EX Runoff Area=48,091 sf 21.64% Impervious Runoff Depth=3.54"
Tc=6.0 min UI Adjusted CN=WQ Runoff=3.58 cfs 0.325 af

Link DP-1: Ben's Pond Wetland Complex Inflow=9.44 cfs 0.862 af
Primary=9.44 cfs 0.862 af

Link DP-2: West properties Inflow=2.78 cfs 0.246 af
Primary=2.78 cfs 0.246 af

Link DP-3: Simmon's Pond Wetlands Inflow=3.58 cfs 0.325 af
Primary=3.58 cfs 0.325 af

Total Runoff Area = 4.758 ac Runoff Volume = 1.433 af Average Runoff Depth = 3.61"
81.37% Pervious = 3.872 ac 18.63% Impervious = 0.886 ac

Summary for Subcatchment EX-1: North

Runoff = 8.46 cfs @ 12.09 hrs, Volume= 0.744 af, Depth= 4.42"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year 2070 Rainfall=9.70"

	Area (sf)	CN	Description
*	25,213	98	Impervious, HSG A
	5,774	96	Gravel surface, HSG A
	13,096	30	Woods, Good, HSG A
	43,848	39	>75% Grass cover, Good, HSG A
	87,931		Weighted Average
	62,718	42	71.33% Pervious Area
	25,213	98	28.67% Impervious Area

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

Summary for Subcatchment EX-2: Overland to East

Runoff = 1.01 cfs @ 12.12 hrs, Volume= 0.118 af, Depth= 1.52"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year 2070 Rainfall=9.70"

Area (sf)	CN	Adj	Description
25,832	30	30	Woods, Good, HSG A
1,131	98	98	Unconnected roofs, HSG A
166	96	96	Gravel surface, HSG A
13,558	39	39	>75% Grass cover, Good, HSG A
40,687			Weighted Average
39,556	33	33	97.22% Pervious Area
1,131	98	98	2.78% Impervious Area
1,131			100.00% Unconnected

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

Summary for Subcatchment EX-3: Overland to West

Runoff = 2.78 cfs @ 12.09 hrs, Volume= 0.246 af, Depth= 4.21"
Routed to Link DP-2 : West properties

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year 2070 Rainfall=9.70"

Area (sf)	CN	Adj	Description
9,063	30	30	Woods, Good, HSG A
1,857	98	98	Unconnected roofs, HSG A
8,930	96	96	Gravel surface, HSG A
10,710	39	39	>75% Grass cover, Good, HSG A
30,560			Weighted Average
28,703	54	54	93.92% Pervious Area
1,857	98	98	6.08% Impervious Area
1,857			100.00% Unconnected

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

Summary for Subcatchment EX-4: HPSP EX

Runoff = 3.58 cfs @ 12.10 hrs, Volume= 0.325 af, Depth= 3.54"
Routed to Link DP-3 : Simmon's Pond Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year 2070 Rainfall=9.70"

Area (sf)	CN	Adj	Description
10,408	98	98	Unconnected pavement, HSG A
1,691	96	96	Gravel surface, HSG A
13,201	30	30	Woods, Good, HSG A
22,791	39	39	>75% Grass cover, Good, HSG A
48,091			Weighted Average
37,683	38	38	78.36% Pervious Area
10,408	98	98	21.64% Impervious Area
10,408			100.00% Unconnected

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

Summary for Link DP-1: Ben's Pond Wetland Complex

Inflow Area = 2.953 ac, 20.48% Impervious, Inflow Depth = 3.50" for 100-Year 2070 event
Inflow = 9.44 cfs @ 12.10 hrs, Volume= 0.862 af
Primary = 9.44 cfs @ 12.10 hrs, Volume= 0.862 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: West properties

Inflow Area = 0.702 ac, 6.08% Impervious, Inflow Depth = 4.21" for 100-Year 2070 event
Inflow = 2.78 cfs @ 12.09 hrs, Volume= 0.246 af
Primary = 2.78 cfs @ 12.09 hrs, Volume= 0.246 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Simmon's Pond Wetlands

Inflow Area = 1.104 ac, 21.64% Impervious, Inflow Depth = 3.54" for 100-Year 2070 event
Inflow = 3.58 cfs @ 12.10 hrs, Volume= 0.325 af
Primary = 3.58 cfs @ 12.10 hrs, Volume= 0.325 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

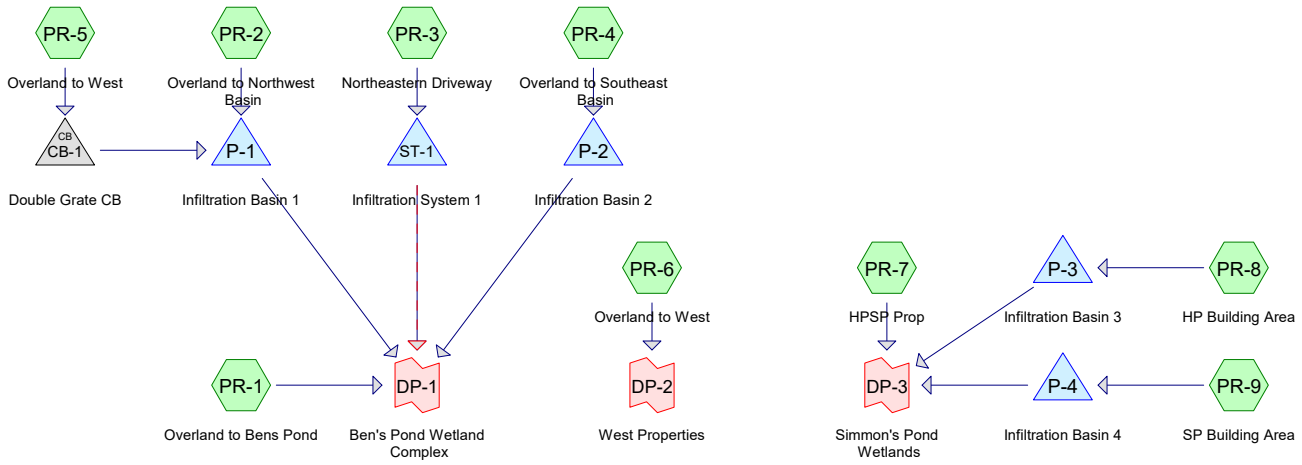
Appendix C.2
Proposed Conditions

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Barnstable Straighway Proposed Conditions

Barnstable Hyannisport and Simmons Pond Proposed Conditions



Subcat Reach Pond Link

Routing Diagram for Barnstable Straightway Proposed Drainage
Prepared by Kleinfelder, Printed 11/20/2024
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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	Type III 24-hr		Default	24.00	1	2.87	2
2	2-Year	Type III 24-hr		Default	24.00	1	3.39	2
3	5-Year	Type III 24-hr		Default	24.00	1	4.24	2
4	10-Year	Type III 24-hr		Default	24.00	1	4.95	2
5	25-Year	Type III 24-hr		Default	24.00	1	5.92	2
6	100-Year	Type III 24-hr		Default	24.00	1	7.41	2
7	100-Year 2070	Type III 24-hr		Default	24.00	1	9.70	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.282	39	>75% Grass cover, Good, HSG A (PR-1, PR-2, PR-3, PR-7, PR-8, PR-9)
0.026	96	Gravel surface, HSG A (PR-1, PR-2, PR-4)
0.498	39	Pasture/grassland/range, Good, HSG A (PR-4, PR-5, PR-6)
0.968	98	Paved parking, HSG A (PR-3, PR-4, PR-5)
0.984	98	Unconnected pavement, HSG A (PR-1, PR-2, PR-7, PR-8, PR-9)
4.758	**64**	**TOTAL AREA**

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR-1: Overland to Bens Runoff Area=68,407 sf 38.71% Impervious Runoff Depth=1.03"
Tc=6.0 min CN=WQ Runoff=1.66 cfs 0.135 af

Subcatchment PR-2: Overland to Runoff Area=22,246 sf 25.45% Impervious Runoff Depth=0.72"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.38 cfs 0.030 af

Subcatchment PR-3: Northeastern Driveway Runoff Area=8,006 sf 48.61% Impervious Runoff Depth=1.28"
Tc=6.0 min CN=WQ Runoff=0.24 cfs 0.020 af

Subcatchment PR-4: Overland to Runoff Area=29,375 sf 57.91% Impervious Runoff Depth=1.57"
Tc=6.0 min CN=WQ Runoff=1.09 cfs 0.088 af

Subcatchment PR-5: Overland to West Runoff Area=24,959 sf 85.20% Impervious Runoff Depth=2.25"
Tc=6.0 min CN=WQ Runoff=1.32 cfs 0.107 af

Subcatchment PR-6: Overland to West Runoff Area=6,182 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment PR-7: HPSP Prop Runoff Area=34,585 sf 19.33% Impervious Runoff Depth=0.51"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.42 cfs 0.034 af

Subcatchment PR-8: HP Building Area Runoff Area=8,603 sf 20.50% Impervious Runoff Depth=0.54"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.11 cfs 0.009 af

Subcatchment PR-9: SP Building Area Runoff Area=4,903 sf 46.50% Impervious Runoff Depth=1.23"
Tc=6.0 min CN=WQ Runoff=0.14 cfs 0.012 af

Pond CB-1: Double Grate CB Peak Elev=27.02' Inflow=1.32 cfs 0.107 af
18.0" Round Culvert n=0.013 L=162.0' S=0.0253 '/' Outflow=1.32 cfs 0.107 af

Pond P-1: Infiltration Basin 1 Peak Elev=20.70' Storage=2,054 cf Inflow=1.70 cfs 0.138 af
Discarded=0.18 cfs 0.138 af Primary=0.00 cfs 0.000 af Outflow=0.18 cfs 0.138 af

Pond P-2: Infiltration Basin 2 Peak Elev=21.88' Storage=1,806 cf Inflow=1.09 cfs 0.088 af
Discarded=0.08 cfs 0.089 af Primary=0.00 cfs 0.000 af Outflow=0.08 cfs 0.089 af

Pond P-3: Infiltration Basin 3 Peak Elev=12.34' Storage=105 cf Inflow=0.11 cfs 0.009 af
Discarded=0.02 cfs 0.009 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.009 af

Pond P-4: Infiltration Basin 4 Peak Elev=12.81' Storage=183 cf Inflow=0.14 cfs 0.012 af
Discarded=0.02 cfs 0.012 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.012 af

Pond ST-1: Infiltration System 1 Peak Elev=21.90' Storage=329 cf Inflow=0.24 cfs 0.020 af
Discarded=0.02 cfs 0.020 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.020 af

Link DP-1: Ben's Pond Wetland Complex Inflow=1.66 cfs 0.135 af
Primary=1.66 cfs 0.135 af

Link DP-2: West Properties Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link DP-3: Simmon's Pond Wetlands Inflow=0.42 cfs 0.034 af
Primary=0.42 cfs 0.034 af

Total Runoff Area = 4.758 ac Runoff Volume = 0.435 af Average Runoff Depth = 1.10"
58.97% Pervious = 2.806 ac 41.03% Impervious = 1.952 ac

Summary for Subcatchment PR-1: Overland to Bens Pond

Runoff = 1.66 cfs @ 12.09 hrs, Volume= 0.135 af, Depth= 1.03"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.87"

Area (sf)	CN	Description
41,747	39	>75% Grass cover, Good, HSG A
26,482	98	Unconnected pavement, HSG A
178	96	Gravel surface, HSG A
68,407		Weighted Average
41,925	39	61.29% Pervious Area
26,482	98	38.71% Impervious Area
26,482		100.00% Unconnected

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

Summary for Subcatchment PR-2: Overland to Northwest Basin

Runoff = 0.38 cfs @ 12.09 hrs, Volume= 0.030 af, Depth= 0.72"
Routed to Pond P-1 : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.87"

Area (sf)	CN	Adj	Description
5,662	98	98	Unconnected pavement, HSG A
16,182	39	39	>75% Grass cover, Good, HSG A
402	96	96	Gravel surface, HSG A
22,246			Weighted Average
16,584	40	40	74.55% Pervious Area
5,662	98	98	25.45% Impervious Area
5,662			100.00% Unconnected

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

Summary for Subcatchment PR-3: Northeastern Driveway

Runoff = 0.24 cfs @ 12.09 hrs, Volume= 0.020 af, Depth= 1.28"
Routed to Pond ST-1 : Infiltration System 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.87"

Area (sf)	CN	Description
3,892	98	Paved parking, HSG A
4,114	39	>75% Grass cover, Good, HSG A
8,006		Weighted Average
4,114	39	51.39% Pervious Area
3,892	98	48.61% Impervious Area

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

Summary for Subcatchment PR-4: Overland to Southeast Basin

Runoff = 1.09 cfs @ 12.09 hrs, Volume= 0.088 af, Depth= 1.57"
Routed to Pond P-2 : Infiltration Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.87"

Area (sf)	CN	Description
17,010	98	Paved parking, HSG A
11,808	39	Pasture/grassland/range, Good, HSG A
557	96	Gravel surface, HSG A
29,375		Weighted Average
12,365	42	42.09% Pervious Area
17,010	98	57.91% Impervious Area

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

Summary for Subcatchment PR-5: Overland to West

Runoff = 1.32 cfs @ 12.09 hrs, Volume= 0.107 af, Depth= 2.25"
Routed to Pond CB-1 : Double Grate CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.87"

Area (sf)	CN	Description
21,265	98	Paved parking, HSG A
3,694	39	Pasture/grassland/range, Good, HSG A
24,959		Weighted Average
3,694	39	14.80% Pervious Area
21,265	98	85.20% Impervious Area

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

Summary for Subcatchment PR-6: Overland to West

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link DP-2 : West Properties

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.87"

Area (sf)	CN	Description
6,182	39	Pasture/grassland/range, Good, HSG A
6,182	39	100.00% Pervious Area

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

Summary for Subcatchment PR-7: HPSP Prop

Runoff = 0.42 cfs @ 12.09 hrs, Volume= 0.034 af, Depth= 0.51"
Routed to Link DP-3 : Simmon's Pond Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.87"

Area (sf)	CN	Adj	Description
6,685	98	98	Unconnected pavement, HSG A
27,900	39	39	>75% Grass cover, Good, HSG A
34,585			Weighted Average
27,900	39	39	80.67% Pervious Area
6,685	98	98	19.33% Impervious Area
6,685			100.00% Unconnected

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

Summary for Subcatchment PR-8: HP Building Area

Runoff = 0.11 cfs @ 12.09 hrs, Volume= 0.009 af, Depth= 0.54"
Routed to Pond P-3 : Infiltration Basin 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.87"

Area (sf)	CN	Adj	Description
1,764	98	98	Unconnected pavement, HSG A
6,839	39	39	>75% Grass cover, Good, HSG A
8,603			Weighted Average
6,839	39	39	79.50% Pervious Area
1,764	98	98	20.50% Impervious Area
1,764			100.00% Unconnected

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

Summary for Subcatchment PR-9: SP Building Area

Runoff = 0.14 cfs @ 12.09 hrs, Volume= 0.012 af, Depth= 1.23"
Routed to Pond P-4 : Infiltration Basin 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.87"

Area (sf)	CN	Description
2,280	98	Unconnected pavement, HSG A
2,623	39	>75% Grass cover, Good, HSG A
4,903		Weighted Average
2,623	39	53.50% Pervious Area
2,280	98	46.50% Impervious Area
2,280		100.00% Unconnected

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

Summary for Pond CB-1: Double Grate CB

Inflow Area = 0.573 ac, 85.20% Impervious, Inflow Depth = 2.25" for 1-Year event
Inflow = 1.32 cfs @ 12.09 hrs, Volume= 0.107 af
Outflow = 1.32 cfs @ 12.09 hrs, Volume= 0.107 af, Atten= 0%, Lag= 0.0 min
Primary = 1.32 cfs @ 12.09 hrs, Volume= 0.107 af
Routed to Pond P-1 : Infiltration Basin 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 27.02' @ 12.09 hrs
Flood Elev= 30.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	26.50'	**18.0" Round Culvert** L= 162.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 26.50' / 22.40' S= 0.0253 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.29 cfs @ 12.09 hrs HW=27.01' TW=20.37' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.29 cfs @ 2.43 fps)

Summary for Pond P-1: Infiltration Basin 1

Inflow Area = 1.084 ac, 57.04% Impervious, Inflow Depth = 1.53" for 1-Year event
Inflow = 1.70 cfs @ 12.09 hrs, Volume= 0.138 af
Outflow = 0.18 cfs @ 12.79 hrs, Volume= 0.138 af, Atten= 89%, Lag= 42.4 min
Discarded = 0.18 cfs @ 12.79 hrs, Volume= 0.138 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 20.70' @ 12.79 hrs Surf.Area= 3,247 sf Storage= 2,054 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 81.2 min (840.2 - 759.0)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	17,828 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.00	2,590	0	0
24.00	6,324	17,828	17,828

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	23.50'	**12.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.18 cfs @ 12.79 hrs HW=20.70' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' TW=0.00' (Dynamic Tailwater)
└**2=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Pond P-2: Infiltration Basin 2

Inflow Area = 0.674 ac, 57.91% Impervious, Inflow Depth = 1.57" for 1-Year event
Inflow = 1.09 cfs @ 12.09 hrs, Volume= 0.088 af
Outflow = 0.08 cfs @ 13.35 hrs, Volume= 0.089 af, Atten= 93%, Lag= 75.6 min
Discarded = 0.08 cfs @ 13.35 hrs, Volume= 0.089 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 21.88' @ 13.35 hrs Surf.Area= 1,388 sf Storage= 1,806 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 235.7 min (995.0 - 759.3)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	8,348 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.00	530	0	0
25.00	2,809	8,348	8,348

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	24.00'	**4.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.08 cfs @ 13.35 hrs HW=21.88' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P-3: Infiltration Basin 3

Inflow Area = 0.197 ac, 20.50% Impervious, Inflow Depth = 0.54" for 1-Year event
Inflow = 0.11 cfs @ 12.09 hrs, Volume= 0.009 af
Outflow = 0.02 cfs @ 12.54 hrs, Volume= 0.009 af, Atten= 82%, Lag= 27.1 min
Discarded = 0.02 cfs @ 12.54 hrs, Volume= 0.009 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Simmon's Pond Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 12.34' @ 12.54 hrs Surf.Area= 355 sf Storage= 105 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 32.0 min (790.8 - 758.7)

Volume	Invert	Avail.Storage	Storage Description
#1	12.00'	1,087 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
12.00	257	0	0
14.00	830	1,087	1,087

Device	Routing	Invert	Outlet Devices
#1	Discarded	12.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	13.99'	**7.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.02 cfs @ 12.54 hrs HW=12.34' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=12.00' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Controls 0.00 cfs)

Summary for Pond P-4: Infiltration Basin 4

Inflow Area = 0.113 ac, 46.50% Impervious, Inflow Depth = 1.23" for 1-Year event
Inflow = 0.14 cfs @ 12.09 hrs, Volume= 0.012 af
Outflow = 0.02 cfs @ 12.62 hrs, Volume= 0.012 af, Atten= 87%, Lag= 32.1 min
Discarded = 0.02 cfs @ 12.62 hrs, Volume= 0.012 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Simmon's Pond Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 12.81' @ 12.62 hrs Surf.Area= 337 sf Storage= 183 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 82.6 min (841.3 - 758.7)

Volume	Invert	Avail.Storage	Storage Description
#1	12.00'	777 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
12.00	112	0	0
14.00	665	777	777

Device	Routing	Invert	Outlet Devices
#1	Discarded	12.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	13.50'	**7.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.02 cfs @ 12.62 hrs HW=12.81' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=12.00' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Controls 0.00 cfs)

Summary for Pond ST-1: Infiltration System 1

Inflow Area = 0.184 ac, 48.61% Impervious, Inflow Depth = 1.28" for 1-Year event
Inflow = 0.24 cfs @ 12.09 hrs, Volume= 0.020 af
Outflow = 0.02 cfs @ 11.50 hrs, Volume= 0.020 af, Atten= 93%, Lag= 0.0 min
Discarded = 0.02 cfs @ 11.50 hrs, Volume= 0.020 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : Ben's Pond Wetland Complex
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 21.90' @ 13.26 hrs Surf.Area= 317 sf Storage= 329 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 139.8 min (898.5 - 758.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	20.00'	237 cf	**8.17'W x 38.80'L x 2.33'H Field A** 739 cf Overall - 147 cf Embedded = 592 cf x 40.0% Voids
#2A	20.50'	147 cf	**ADS_StormTech SC-310 +Cap** x 10 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 10 Chambers in 2 Rows
#3	22.00'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**
		422 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	22.00'	**12.0" Round Culvert** L= 60.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 22.00' / 21.50' S= 0.0083 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Secondary	24.90'	**2.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.02 cfs @ 11.50 hrs HW=20.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' TW=0.00' (Dynamic Tailwater)
↑—**3=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Link DP-1: Ben's Pond Wetland Complex

Inflow Area = 3.512 ac, 48.57% Impervious, Inflow Depth = 0.46" for 1-Year event
Inflow = 1.66 cfs @ 12.09 hrs, Volume= 0.135 af
Primary = 1.66 cfs @ 12.09 hrs, Volume= 0.135 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: West Properties

Inflow Area = 0.142 ac, 0.00% Impervious, Inflow Depth = 0.00" for 1-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Simmon's Pond Wetlands

Inflow Area = 1.104 ac, 22.31% Impervious, Inflow Depth = 0.37" for 1-Year event
Inflow = 0.42 cfs @ 12.09 hrs, Volume= 0.034 af
Primary = 0.42 cfs @ 12.09 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR-1: Overland to Bens Runoff Area=68,407 sf 38.71% Impervious Runoff Depth=1.23"
Tc=6.0 min CN=WQ Runoff=1.97 cfs 0.161 af

Subcatchment PR-2: Overland to Runoff Area=22,246 sf 25.45% Impervious Runoff Depth=0.86"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.45 cfs 0.037 af

Subcatchment PR-3: Northeastern Driveway Runoff Area=8,006 sf 48.61% Impervious Runoff Depth=1.54"
Tc=6.0 min CN=WQ Runoff=0.29 cfs 0.024 af

Subcatchment PR-4: Overland to Runoff Area=29,375 sf 57.91% Impervious Runoff Depth=1.89"
Tc=6.0 min CN=WQ Runoff=1.30 cfs 0.106 af

Subcatchment PR-5: Overland to West Runoff Area=24,959 sf 85.20% Impervious Runoff Depth=2.69"
Tc=6.0 min CN=WQ Runoff=1.57 cfs 0.128 af

Subcatchment PR-6: Overland to West Runoff Area=6,182 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment PR-7: HPSP Prop Runoff Area=34,585 sf 19.33% Impervious Runoff Depth=0.61"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.49 cfs 0.041 af

Subcatchment PR-8: HP Building Area Runoff Area=8,603 sf 20.50% Impervious Runoff Depth=0.65"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.13 cfs 0.011 af

Subcatchment PR-9: SP Building Area Runoff Area=4,903 sf 46.50% Impervious Runoff Depth=1.47"
Tc=6.0 min CN=WQ Runoff=0.17 cfs 0.014 af

Pond CB-1: Double Grate CB Peak Elev=27.07' Inflow=1.57 cfs 0.128 af
18.0" Round Culvert n=0.013 L=162.0' S=0.0253 '/' Outflow=1.57 cfs 0.128 af

Pond P-1: Infiltration Basin 1 Peak Elev=20.87' Storage=2,601 cf Inflow=2.02 cfs 0.165 af
Discarded=0.19 cfs 0.165 af Primary=0.00 cfs 0.000 af Outflow=0.19 cfs 0.165 af

Pond P-2: Infiltration Basin 2 Peak Elev=22.19' Storage=2,249 cf Inflow=1.30 cfs 0.106 af
Discarded=0.09 cfs 0.106 af Primary=0.00 cfs 0.000 af Outflow=0.09 cfs 0.106 af

Pond P-3: Infiltration Basin 3 Peak Elev=12.42' Storage=134 cf Inflow=0.13 cfs 0.011 af
Discarded=0.02 cfs 0.011 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.011 af

Pond P-4: Infiltration Basin 4 Peak Elev=12.94' Storage=228 cf Inflow=0.17 cfs 0.014 af
Discarded=0.02 cfs 0.014 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.014 af

Pond ST-1: Infiltration System 1 Peak Elev=22.13' Storage=360 cf Inflow=0.29 cfs 0.024 af
Discarded=0.02 cfs 0.022 af Primary=0.06 cfs 0.002 af Secondary=0.00 cfs 0.000 af Outflow=0.08 cfs 0.024 af

Link DP-1: Ben's Pond Wetland Complex Inflow=1.97 cfs 0.163 af
Primary=1.97 cfs 0.163 af

Link DP-2: West Properties Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link DP-3: Simmon's Pond Wetlands Inflow=0.49 cfs 0.041 af
Primary=0.49 cfs 0.041 af

Total Runoff Area = 4.758 ac Runoff Volume = 0.521 af Average Runoff Depth = 1.31"
58.97% Pervious = 2.806 ac 41.03% Impervious = 1.952 ac

Summary for Subcatchment PR-1: Overland to Bens Pond

Runoff = 1.97 cfs @ 12.09 hrs, Volume= 0.161 af, Depth= 1.23"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.39"

Area (sf)	CN	Description
41,747	39	>75% Grass cover, Good, HSG A
26,482	98	Unconnected pavement, HSG A
178	96	Gravel surface, HSG A
68,407		Weighted Average
41,925	39	61.29% Pervious Area
26,482	98	38.71% Impervious Area
26,482		100.00% Unconnected

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

Summary for Subcatchment PR-2: Overland to Northwest Basin

Runoff = 0.45 cfs @ 12.09 hrs, Volume= 0.037 af, Depth= 0.86"
Routed to Pond P-1 : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.39"

Area (sf)	CN	Adj	Description
5,662	98	98	Unconnected pavement, HSG A
16,182	39	39	>75% Grass cover, Good, HSG A
402	96	96	Gravel surface, HSG A
22,246			Weighted Average
16,584	40	40	74.55% Pervious Area
5,662	98	98	25.45% Impervious Area
5,662			100.00% Unconnected

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

Summary for Subcatchment PR-3: Northeastern Driveway

Runoff = 0.29 cfs @ 12.09 hrs, Volume= 0.024 af, Depth= 1.54"
Routed to Pond ST-1 : Infiltration System 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.39"

Area (sf)	CN	Description
3,892	98	Paved parking, HSG A
4,114	39	>75% Grass cover, Good, HSG A
8,006		Weighted Average
4,114	39	51.39% Pervious Area
3,892	98	48.61% Impervious Area

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

Summary for Subcatchment PR-4: Overland to Southeast Basin

Runoff = 1.30 cfs @ 12.09 hrs, Volume= 0.106 af, Depth= 1.89"
Routed to Pond P-2 : Infiltration Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.39"

Area (sf)	CN	Description
17,010	98	Paved parking, HSG A
11,808	39	Pasture/grassland/range, Good, HSG A
557	96	Gravel surface, HSG A
29,375		Weighted Average
12,365	42	42.09% Pervious Area
17,010	98	57.91% Impervious Area

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

Summary for Subcatchment PR-5: Overland to West

Runoff = 1.57 cfs @ 12.09 hrs, Volume= 0.128 af, Depth= 2.69"
Routed to Pond CB-1 : Double Grate CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.39"

Area (sf)	CN	Description
21,265	98	Paved parking, HSG A
3,694	39	Pasture/grassland/range, Good, HSG A
24,959		Weighted Average
3,694	39	14.80% Pervious Area
21,265	98	85.20% Impervious Area

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

Summary for Subcatchment PR-6: Overland to West

Runoff = 0.00 cfs @ 23.55 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link DP-2 : West Properties

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.39"

Area (sf)	CN	Description
6,182	39	Pasture/grassland/range, Good, HSG A
6,182	39	100.00% Pervious Area

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

Summary for Subcatchment PR-7: HPSP Prop

Runoff = 0.49 cfs @ 12.09 hrs, Volume= 0.041 af, Depth= 0.61"
Routed to Link DP-3 : Simmon's Pond Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.39"

Area (sf)	CN	Adj	Description
6,685	98	98	Unconnected pavement, HSG A
27,900	39	39	>75% Grass cover, Good, HSG A
34,585			Weighted Average
27,900	39	39	80.67% Pervious Area
6,685	98	98	19.33% Impervious Area
6,685			100.00% Unconnected

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

Summary for Subcatchment PR-8: HP Building Area

Runoff = 0.13 cfs @ 12.09 hrs, Volume= 0.011 af, Depth= 0.65"
Routed to Pond P-3 : Infiltration Basin 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.39"

Area (sf)	CN	Adj	Description
1,764	98	98	Unconnected pavement, HSG A
6,839	39	39	>75% Grass cover, Good, HSG A
8,603			Weighted Average
6,839	39	39	79.50% Pervious Area
1,764	98	98	20.50% Impervious Area
1,764			100.00% Unconnected

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

Summary for Subcatchment PR-9: SP Building Area

Runoff = 0.17 cfs @ 12.09 hrs, Volume= 0.014 af, Depth= 1.47"
Routed to Pond P-4 : Infiltration Basin 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.39"

Area (sf)	CN	Description
2,280	98	Unconnected pavement, HSG A
2,623	39	>75% Grass cover, Good, HSG A
4,903		Weighted Average
2,623	39	53.50% Pervious Area
2,280	98	46.50% Impervious Area
2,280		100.00% Unconnected

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

Summary for Pond CB-1: Double Grate CB

Inflow Area = 0.573 ac, 85.20% Impervious, Inflow Depth = 2.69" for 2-Year event
Inflow = 1.57 cfs @ 12.09 hrs, Volume= 0.128 af
Outflow = 1.57 cfs @ 12.09 hrs, Volume= 0.128 af, Atten= 0%, Lag= 0.0 min
Primary = 1.57 cfs @ 12.09 hrs, Volume= 0.128 af
Routed to Pond P-1 : Infiltration Basin 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 27.07' @ 12.09 hrs
Flood Elev= 30.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	26.50'	**18.0" Round Culvert** L= 162.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 26.50' / 22.40' S= 0.0253 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.53 cfs @ 12.09 hrs HW=27.06' TW=20.47' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.53 cfs @ 2.55 fps)

Summary for Pond P-1: Infiltration Basin 1

Inflow Area = 1.084 ac, 57.04% Impervious, Inflow Depth = 1.83" for 2-Year event
Inflow = 2.02 cfs @ 12.09 hrs, Volume= 0.165 af
Outflow = 0.19 cfs @ 12.92 hrs, Volume= 0.165 af, Atten= 91%, Lag= 49.9 min
Discarded = 0.19 cfs @ 12.92 hrs, Volume= 0.165 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 20.87' @ 12.92 hrs Surf.Area= 3,401 sf Storage= 2,601 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 103.4 min (859.4 - 756.0)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	17,828 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.00	2,590	0	0
24.00	6,324	17,828	17,828

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	23.50'	**12.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.19 cfs @ 12.92 hrs HW=20.87' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Controls 0.00 cfs)

Summary for Pond P-2: Infiltration Basin 2

Inflow Area = 0.674 ac, 57.91% Impervious, Inflow Depth = 1.89" for 2-Year event
Inflow = 1.30 cfs @ 12.09 hrs, Volume= 0.106 af
Outflow = 0.09 cfs @ 13.55 hrs, Volume= 0.106 af, Atten= 93%, Lag= 87.5 min
Discarded = 0.09 cfs @ 13.55 hrs, Volume= 0.106 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 22.19' @ 13.55 hrs Surf.Area= 1,527 sf Storage= 2,249 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 273.2 min (1,029.4 - 756.2)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	8,348 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.00	530	0	0
25.00	2,809	8,348	8,348

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	24.00'	**4.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.09 cfs @ 13.55 hrs HW=22.19' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P-3: Infiltration Basin 3

Inflow Area = 0.197 ac, 20.50% Impervious, Inflow Depth = 0.65" for 2-Year event
Inflow = 0.13 cfs @ 12.09 hrs, Volume= 0.011 af
Outflow = 0.02 cfs @ 12.56 hrs, Volume= 0.011 af, Atten= 84%, Lag= 28.5 min
Discarded = 0.02 cfs @ 12.56 hrs, Volume= 0.011 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Simmon's Pond Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 12.42' @ 12.56 hrs Surf.Area= 378 sf Storage= 134 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 40.6 min (798.6 - 758.1)

Volume	Invert	Avail.Storage	Storage Description
#1	12.00'	1,087 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
12.00	257	0	0
14.00	830	1,087	1,087

Device	Routing	Invert	Outlet Devices
#1	Discarded	12.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	13.99'	**7.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.02 cfs @ 12.56 hrs HW=12.42' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=12.00' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Controls 0.00 cfs)

Summary for Pond P-4: Infiltration Basin 4

Inflow Area = 0.113 ac, 46.50% Impervious, Inflow Depth = 1.47" for 2-Year event
Inflow = 0.17 cfs @ 12.09 hrs, Volume= 0.014 af
Outflow = 0.02 cfs @ 12.66 hrs, Volume= 0.014 af, Atten= 88%, Lag= 34.3 min
Discarded = 0.02 cfs @ 12.66 hrs, Volume= 0.014 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Simmon's Pond Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 12.94' @ 12.66 hrs Surf.Area= 372 sf Storage= 228 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 97.3 min (853.4 - 756.1)

Volume	Invert	Avail.Storage	Storage Description
#1	12.00'	777 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
12.00	112	0	0
14.00	665	777	777

Device	Routing	Invert	Outlet Devices
#1	Discarded	12.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	13.50'	**7.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.02 cfs @ 12.66 hrs HW=12.94' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=12.00' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Controls 0.00 cfs)

Summary for Pond ST-1: Infiltration System 1

Inflow Area = 0.184 ac, 48.61% Impervious, Inflow Depth = 1.54" for 2-Year event
Inflow = 0.29 cfs @ 12.09 hrs, Volume= 0.024 af
Outflow = 0.08 cfs @ 12.45 hrs, Volume= 0.024 af, Atten= 73%, Lag= 22.0 min
Discarded = 0.02 cfs @ 12.35 hrs, Volume= 0.022 af
Primary = 0.06 cfs @ 12.45 hrs, Volume= 0.002 af
Routed to Link DP-1 : Ben's Pond Wetland Complex
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 22.13' @ 12.45 hrs Surf.Area= 329 sf Storage= 360 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 139.1 min (895.1 - 756.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	20.00'	237 cf	**8.17'W x 38.80'L x 2.33'H Field A** 739 cf Overall - 147 cf Embedded = 592 cf x 40.0% Voids
#2A	20.50'	147 cf	**ADS_StormTech SC-310 +Cap** x 10 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 10 Chambers in 2 Rows
#3	22.00'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**
		422 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	22.00'	**12.0" Round Culvert** L= 60.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 22.00' / 21.50' S= 0.0083 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Secondary	24.90'	**2.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.02 cfs @ 12.35 hrs HW=22.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.06 cfs @ 12.45 hrs HW=22.13' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert** (Barrel Controls 0.06 cfs @ 1.55 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' TW=0.00' (Dynamic Tailwater)
↑—**3=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Link DP-1: Ben's Pond Wetland Complex

Inflow Area = 3.512 ac, 48.57% Impervious, Inflow Depth = 0.56" for 2-Year event
Inflow = 1.97 cfs @ 12.09 hrs, Volume= 0.163 af
Primary = 1.97 cfs @ 12.09 hrs, Volume= 0.163 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: West Properties

Inflow Area = 0.142 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 23.55 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 23.55 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Simmon's Pond Wetlands

Inflow Area = 1.104 ac, 22.31% Impervious, Inflow Depth = 0.44" for 2-Year event
Inflow = 0.49 cfs @ 12.09 hrs, Volume= 0.041 af
Primary = 0.49 cfs @ 12.09 hrs, Volume= 0.041 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR-1: Overland to Bens Runoff Area=68,407 sf 38.71% Impervious Runoff Depth=1.61"
Tc=6.0 min CN=WQ Runoff=2.47 cfs 0.210 af

Subcatchment PR-2: Overland to Runoff Area=22,246 sf 25.45% Impervious Runoff Depth=1.14"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.56 cfs 0.049 af

Subcatchment PR-3: Northeastern Driveway Runoff Area=8,006 sf 48.61% Impervious Runoff Depth=1.98"
Tc=6.0 min CN=WQ Runoff=0.36 cfs 0.030 af

Subcatchment PR-4: Overland to Runoff Area=29,375 sf 57.91% Impervious Runoff Depth=2.42"
Tc=6.0 min CN=WQ Runoff=1.63 cfs 0.136 af

Subcatchment PR-5: Overland to West Runoff Area=24,959 sf 85.20% Impervious Runoff Depth=3.42"
Tc=6.0 min CN=WQ Runoff=1.97 cfs 0.163 af

Subcatchment PR-6: Overland to West Runoff Area=6,182 sf 0.00% Impervious Runoff Depth=0.07"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.001 af

Subcatchment PR-7: HPSP Prop Runoff Area=34,585 sf 19.33% Impervious Runoff Depth=0.83"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.62 cfs 0.055 af

Subcatchment PR-8: HP Building Area Runoff Area=8,603 sf 20.50% Impervious Runoff Depth=0.88"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.16 cfs 0.014 af

Subcatchment PR-9: SP Building Area Runoff Area=4,903 sf 46.50% Impervious Runoff Depth=1.90"
Tc=6.0 min CN=WQ Runoff=0.21 cfs 0.018 af

Pond CB-1: Double Grate CB Peak Elev=27.14' Inflow=1.97 cfs 0.163 af
18.0" Round Culvert n=0.013 L=162.0' S=0.0253 '/' Outflow=1.97 cfs 0.163 af

Pond P-1: Infiltration Basin 1 Peak Elev=21.14' Storage=3,565 cf Inflow=2.53 cfs 0.212 af
Discarded=0.20 cfs 0.212 af Primary=0.00 cfs 0.000 af Outflow=0.20 cfs 0.212 af

Pond P-2: Infiltration Basin 2 Peak Elev=22.65' Storage=3,005 cf Inflow=1.63 cfs 0.136 af
Discarded=0.10 cfs 0.136 af Primary=0.00 cfs 0.000 af Outflow=0.10 cfs 0.136 af

Pond P-3: Infiltration Basin 3 Peak Elev=12.55' Storage=184 cf Inflow=0.16 cfs 0.014 af
Discarded=0.02 cfs 0.014 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.014 af

Pond P-4: Infiltration Basin 4 Peak Elev=13.13' Storage=305 cf Inflow=0.21 cfs 0.018 af
Discarded=0.02 cfs 0.018 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.018 af

Pond ST-1: Infiltration System 1 Peak Elev=22.25' Storage=376 cf Inflow=0.36 cfs 0.030 af
Discarded=0.02 cfs 0.025 af Primary=0.21 cfs 0.006 af Secondary=0.00 cfs 0.000 af Outflow=0.23 cfs 0.030 af

Link DP-1: Ben's Pond Wetland Complex Inflow=2.47 cfs 0.216 af
Primary=2.47 cfs 0.216 af

Link DP-2: West Properties Inflow=0.00 cfs 0.001 af
Primary=0.00 cfs 0.001 af

Link DP-3: Simmon's Pond Wetlands Inflow=0.62 cfs 0.055 af
Primary=0.62 cfs 0.055 af

Total Runoff Area = 4.758 ac Runoff Volume = 0.677 af Average Runoff Depth = 1.71"
58.97% Pervious = 2.806 ac 41.03% Impervious = 1.952 ac

Summary for Subcatchment PR-1: Overland to Bens Pond

Runoff = 2.47 cfs @ 12.09 hrs, Volume= 0.210 af, Depth= 1.61"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.24"

Area (sf)	CN	Description
41,747	39	>75% Grass cover, Good, HSG A
26,482	98	Unconnected pavement, HSG A
178	96	Gravel surface, HSG A
68,407		Weighted Average
41,925	39	61.29% Pervious Area
26,482	98	38.71% Impervious Area
26,482		100.00% Unconnected

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

Summary for Subcatchment PR-2: Overland to Northwest Basin

Runoff = 0.56 cfs @ 12.09 hrs, Volume= 0.049 af, Depth= 1.14"
Routed to Pond P-1 : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.24"

Area (sf)	CN	Adj	Description
5,662	98	98	Unconnected pavement, HSG A
16,182	39	39	>75% Grass cover, Good, HSG A
402	96	96	Gravel surface, HSG A
22,246			Weighted Average
16,584	40	40	74.55% Pervious Area
5,662	98	98	25.45% Impervious Area
5,662			100.00% Unconnected

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

Summary for Subcatchment PR-3: Northeastern Driveway

Runoff = 0.36 cfs @ 12.09 hrs, Volume= 0.030 af, Depth= 1.98"
Routed to Pond ST-1 : Infiltration System 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.24"

Area (sf)	CN	Description
3,892	98	Paved parking, HSG A
4,114	39	>75% Grass cover, Good, HSG A
8,006		Weighted Average
4,114	39	51.39% Pervious Area
3,892	98	48.61% Impervious Area

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

Summary for Subcatchment PR-4: Overland to Southeast Basin

Runoff = 1.63 cfs @ 12.09 hrs, Volume= 0.136 af, Depth= 2.42"
Routed to Pond P-2 : Infiltration Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.24"

Area (sf)	CN	Description
17,010	98	Paved parking, HSG A
11,808	39	Pasture/grassland/range, Good, HSG A
557	96	Gravel surface, HSG A
29,375		Weighted Average
12,365	42	42.09% Pervious Area
17,010	98	57.91% Impervious Area

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

Summary for Subcatchment PR-5: Overland to West

Runoff = 1.97 cfs @ 12.09 hrs, Volume= 0.163 af, Depth= 3.42"
Routed to Pond CB-1 : Double Grate CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.24"

Area (sf)	CN	Description
21,265	98	Paved parking, HSG A
3,694	39	Pasture/grassland/range, Good, HSG A
24,959		Weighted Average
3,694	39	14.80% Pervious Area
21,265	98	85.20% Impervious Area

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

Summary for Subcatchment PR-6: Overland to West

Runoff = 0.00 cfs @ 15.09 hrs, Volume= 0.001 af, Depth= 0.07"
Routed to Link DP-2 : West Properties

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.24"

Area (sf)	CN	Description
6,182	39	Pasture/grassland/range, Good, HSG A
6,182	39	100.00% Pervious Area

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

Summary for Subcatchment PR-7: HPSP Prop

Runoff = 0.62 cfs @ 12.09 hrs, Volume= 0.055 af, Depth= 0.83"
Routed to Link DP-3 : Simmon's Pond Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.24"

Area (sf)	CN	Adj	Description
6,685	98	98	Unconnected pavement, HSG A
27,900	39	39	>75% Grass cover, Good, HSG A
34,585			Weighted Average
27,900	39	39	80.67% Pervious Area
6,685	98	98	19.33% Impervious Area
6,685			100.00% Unconnected

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

Summary for Subcatchment PR-8: HP Building Area

Runoff = 0.16 cfs @ 12.09 hrs, Volume= 0.014 af, Depth= 0.88"
Routed to Pond P-3 : Infiltration Basin 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.24"

Area (sf)	CN	Adj	Description
1,764	98	98	Unconnected pavement, HSG A
6,839	39	39	>75% Grass cover, Good, HSG A
8,603			Weighted Average
6,839	39	39	79.50% Pervious Area
1,764	98	98	20.50% Impervious Area
1,764			100.00% Unconnected

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

Summary for Subcatchment PR-9: SP Building Area

Runoff = 0.21 cfs @ 12.09 hrs, Volume= 0.018 af, Depth= 1.90"
Routed to Pond P-4 : Infiltration Basin 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.24"

Area (sf)	CN	Description
2,280	98	Unconnected pavement, HSG A
2,623	39	>75% Grass cover, Good, HSG A
4,903		Weighted Average
2,623	39	53.50% Pervious Area
2,280	98	46.50% Impervious Area
2,280		100.00% Unconnected

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

Summary for Pond CB-1: Double Grate CB

Inflow Area = 0.573 ac, 85.20% Impervious, Inflow Depth = 3.42" for 5-Year event
Inflow = 1.97 cfs @ 12.09 hrs, Volume= 0.163 af
Outflow = 1.97 cfs @ 12.09 hrs, Volume= 0.163 af, Atten= 0%, Lag= 0.0 min
Primary = 1.97 cfs @ 12.09 hrs, Volume= 0.163 af
Routed to Pond P-1 : Infiltration Basin 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 27.14' @ 12.09 hrs
Flood Elev= 30.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	26.50'	**18.0" Round Culvert** L= 162.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 26.50' / 22.40' S= 0.0253 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.92 cfs @ 12.09 hrs HW=27.13' TW=20.64' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.92 cfs @ 2.71 fps)

Summary for Pond P-1: Infiltration Basin 1

Inflow Area = 1.084 ac, 57.04% Impervious, Inflow Depth = 2.35" for 5-Year event
Inflow = 2.53 cfs @ 12.09 hrs, Volume= 0.212 af
Outflow = 0.20 cfs @ 13.07 hrs, Volume= 0.212 af, Atten= 92%, Lag= 58.9 min
Discarded = 0.20 cfs @ 13.07 hrs, Volume= 0.212 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 21.14' @ 13.07 hrs Surf.Area= 3,656 sf Storage= 3,565 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 142.5 min (898.1 - 755.5)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	17,828 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.00	2,590	0	0
24.00	6,324	17,828	17,828

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	23.50'	**12.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.20 cfs @ 13.07 hrs HW=21.14' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.20 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Controls 0.00 cfs)

Summary for Pond P-2: Infiltration Basin 2

Inflow Area = 0.674 ac, 57.91% Impervious, Inflow Depth = 2.42" for 5-Year event
Inflow = 1.63 cfs @ 12.09 hrs, Volume= 0.136 af
Outflow = 0.10 cfs @ 13.83 hrs, Volume= 0.136 af, Atten= 94%, Lag= 104.7 min
Discarded = 0.10 cfs @ 13.83 hrs, Volume= 0.136 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 22.65' @ 13.83 hrs Surf.Area= 1,738 sf Storage= 3,005 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 330.8 min (1,086.2 - 755.4)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	8,348 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.00	530	0	0
25.00	2,809	8,348	8,348

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	24.00'	**4.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.10 cfs @ 13.83 hrs HW=22.65' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P-3: Infiltration Basin 3

Inflow Area = 0.197 ac, 20.50% Impervious, Inflow Depth = 0.88" for 5-Year event
Inflow = 0.16 cfs @ 12.09 hrs, Volume= 0.014 af
Outflow = 0.02 cfs @ 12.60 hrs, Volume= 0.014 af, Atten= 86%, Lag= 30.8 min
Discarded = 0.02 cfs @ 12.60 hrs, Volume= 0.014 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Simmon's Pond Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 12.55' @ 12.60 hrs Surf.Area= 414 sf Storage= 184 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 53.9 min (827.1 - 773.2)

Volume	Invert	Avail.Storage	Storage Description
#1	12.00'	1,087 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
12.00	257	0	0
14.00	830	1,087	1,087

Device	Routing	Invert	Outlet Devices
#1	Discarded	12.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	13.99'	**7.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.02 cfs @ 12.60 hrs HW=12.55' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=12.00' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Controls 0.00 cfs)

Summary for Pond P-4: Infiltration Basin 4

Inflow Area = 0.113 ac, 46.50% Impervious, Inflow Depth = 1.90" for 5-Year event
Inflow = 0.21 cfs @ 12.09 hrs, Volume= 0.018 af
Outflow = 0.02 cfs @ 12.73 hrs, Volume= 0.018 af, Atten= 89%, Lag= 38.8 min
Discarded = 0.02 cfs @ 12.73 hrs, Volume= 0.018 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Simmon's Pond Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 13.13' @ 12.73 hrs Surf.Area= 426 sf Storage= 305 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 120.3 min (878.2 - 757.8)

Volume	Invert	Avail.Storage	Storage Description
#1	12.00'	777 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
12.00	112	0	0
14.00	665	777	777

Device	Routing	Invert	Outlet Devices
#1	Discarded	12.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	13.50'	**7.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.02 cfs @ 12.73 hrs HW=13.13' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=12.00' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Controls 0.00 cfs)

Summary for Pond ST-1: Infiltration System 1

Inflow Area = 0.184 ac, 48.61% Impervious, Inflow Depth = 1.98" for 5-Year event
Inflow = 0.36 cfs @ 12.09 hrs, Volume= 0.030 af
Outflow = 0.23 cfs @ 12.22 hrs, Volume= 0.030 af, Atten= 36%, Lag= 7.8 min
Discarded = 0.02 cfs @ 12.15 hrs, Volume= 0.025 af
Primary = 0.21 cfs @ 12.22 hrs, Volume= 0.006 af
Routed to Link DP-1 : Ben's Pond Wetland Complex
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 22.25' @ 12.22 hrs Surf.Area= 329 sf Storage= 376 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 128.6 min (885.9 - 757.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	20.00'	237 cf	**8.17'W x 38.80'L x 2.33'H Field A** 739 cf Overall - 147 cf Embedded = 592 cf x 40.0% Voids
#2A	20.50'	147 cf	**ADS_StormTech SC-310 +Cap** x 10 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 10 Chambers in 2 Rows
#3	22.00'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**
		422 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	22.00'	**12.0" Round Culvert** L= 60.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 22.00' / 21.50' S= 0.0083 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Secondary	24.90'	**2.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.02 cfs @ 12.15 hrs HW=22.09' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.19 cfs @ 12.22 hrs HW=22.23' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert** (Barrel Controls 0.19 cfs @ 2.15 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' TW=0.00' (Dynamic Tailwater)
↑—**3=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Link DP-1: Ben's Pond Wetland Complex

Inflow Area = 3.512 ac, 48.57% Impervious, Inflow Depth = 0.74" for 5-Year event
Inflow = 2.47 cfs @ 12.09 hrs, Volume= 0.216 af
Primary = 2.47 cfs @ 12.09 hrs, Volume= 0.216 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: West Properties

Inflow Area = 0.142 ac, 0.00% Impervious, Inflow Depth = 0.07" for 5-Year event
Inflow = 0.00 cfs @ 15.09 hrs, Volume= 0.001 af
Primary = 0.00 cfs @ 15.09 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Simmon's Pond Wetlands

Inflow Area = 1.104 ac, 22.31% Impervious, Inflow Depth = 0.60" for 5-Year event
Inflow = 0.62 cfs @ 12.09 hrs, Volume= 0.055 af
Primary = 0.62 cfs @ 12.09 hrs, Volume= 0.055 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR-1: Overland to Bens Runoff Area=68,407 sf 38.71% Impervious Runoff Depth=1.95"
Tc=6.0 min CN=WQ Runoff=2.89 cfs 0.255 af

Subcatchment PR-2: Overland to Runoff Area=22,246 sf 25.45% Impervious Runoff Depth=1.42"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.66 cfs 0.060 af

Subcatchment PR-3: Northeastern Driveway Runoff Area=8,006 sf 48.61% Impervious Runoff Depth=2.39"
Tc=6.0 min CN=WQ Runoff=0.42 cfs 0.037 af

Subcatchment PR-4: Overland to Runoff Area=29,375 sf 57.91% Impervious Runoff Depth=2.89"
Tc=6.0 min CN=WQ Runoff=1.91 cfs 0.162 af

Subcatchment PR-5: Overland to West Runoff Area=24,959 sf 85.20% Impervious Runoff Depth=4.04"
Tc=6.0 min CN=WQ Runoff=2.31 cfs 0.193 af

Subcatchment PR-6: Overland to West Runoff Area=6,182 sf 0.00% Impervious Runoff Depth=0.19"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.002 af

Subcatchment PR-7: HPSP Prop Runoff Area=34,585 sf 19.33% Impervious Runoff Depth=1.06"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.73 cfs 0.070 af

Subcatchment PR-8: HP Building Area Runoff Area=8,603 sf 20.50% Impervious Runoff Depth=1.12"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.19 cfs 0.018 af

Subcatchment PR-9: SP Building Area Runoff Area=4,903 sf 46.50% Impervious Runoff Depth=2.29"
Tc=6.0 min CN=WQ Runoff=0.25 cfs 0.022 af

Pond CB-1: Double Grate CB Peak Elev=27.20' Inflow=2.31 cfs 0.193 af
18.0" Round Culvert n=0.013 L=162.0' S=0.0253 '/' Outflow=2.31 cfs 0.193 af

Pond P-1: Infiltration Basin 1 Peak Elev=21.38' Storage=4,465 cf Inflow=2.97 cfs 0.253 af
Discarded=0.22 cfs 0.254 af Primary=0.00 cfs 0.000 af Outflow=0.22 cfs 0.254 af

Pond P-2: Infiltration Basin 2 Peak Elev=23.03' Storage=3,692 cf Inflow=1.91 cfs 0.162 af
Discarded=0.11 cfs 0.162 af Primary=0.00 cfs 0.000 af Outflow=0.11 cfs 0.162 af

Pond P-3: Infiltration Basin 3 Peak Elev=12.66' Storage=233 cf Inflow=0.19 cfs 0.018 af
Discarded=0.02 cfs 0.018 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.018 af

Pond P-4: Infiltration Basin 4 Peak Elev=13.29' Storage=374 cf Inflow=0.25 cfs 0.022 af
Discarded=0.03 cfs 0.022 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.022 af

Pond ST-1: Infiltration System 1 Peak Elev=22.33' Storage=387 cf Inflow=0.42 cfs 0.037 af
Discarded=0.02 cfs 0.027 af Primary=0.38 cfs 0.010 af Secondary=0.00 cfs 0.000 af Outflow=0.40 cfs 0.037 af

Link DP-1: Ben's Pond Wetland Complex Inflow=3.01 cfs 0.265 af
Primary=3.01 cfs 0.265 af

Link DP-2: West Properties Inflow=0.00 cfs 0.002 af
Primary=0.00 cfs 0.002 af

Link DP-3: Simmon's Pond Wetlands Inflow=0.73 cfs 0.070 af
Primary=0.73 cfs 0.070 af

Total Runoff Area = 4.758 ac Runoff Volume = 0.821 af Average Runoff Depth = 2.07"
58.97% Pervious = 2.806 ac 41.03% Impervious = 1.952 ac

Summary for Subcatchment PR-1: Overland to Bens Pond

Runoff = 2.89 cfs @ 12.09 hrs, Volume= 0.255 af, Depth= 1.95"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.95"

Area (sf)	CN	Description
41,747	39	>75% Grass cover, Good, HSG A
26,482	98	Unconnected pavement, HSG A
178	96	Gravel surface, HSG A
68,407		Weighted Average
41,925	39	61.29% Pervious Area
26,482	98	38.71% Impervious Area
26,482		100.00% Unconnected

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

Summary for Subcatchment PR-2: Overland to Northwest Basin

Runoff = 0.66 cfs @ 12.09 hrs, Volume= 0.060 af, Depth= 1.42"
Routed to Pond P-1 : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.95"

Area (sf)	CN	Adj	Description
5,662	98	98	Unconnected pavement, HSG A
16,182	39	39	>75% Grass cover, Good, HSG A
402	96	96	Gravel surface, HSG A
22,246			Weighted Average
16,584	40	40	74.55% Pervious Area
5,662	98	98	25.45% Impervious Area
5,662			100.00% Unconnected

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

Summary for Subcatchment PR-3: Northeastern Driveway

Runoff = 0.42 cfs @ 12.09 hrs, Volume= 0.037 af, Depth= 2.39"
Routed to Pond ST-1 : Infiltration System 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.95"

Area (sf)	CN	Description
3,892	98	Paved parking, HSG A
4,114	39	>75% Grass cover, Good, HSG A
8,006		Weighted Average
4,114	39	51.39% Pervious Area
3,892	98	48.61% Impervious Area

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

Summary for Subcatchment PR-4: Overland to Southeast Basin

Runoff = 1.91 cfs @ 12.09 hrs, Volume= 0.162 af, Depth= 2.89"
Routed to Pond P-2 : Infiltration Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.95"

Area (sf)	CN	Description
17,010	98	Paved parking, HSG A
11,808	39	Pasture/grassland/range, Good, HSG A
557	96	Gravel surface, HSG A
29,375		Weighted Average
12,365	42	42.09% Pervious Area
17,010	98	57.91% Impervious Area

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

Summary for Subcatchment PR-5: Overland to West

Runoff = 2.31 cfs @ 12.09 hrs, Volume= 0.193 af, Depth= 4.04"
Routed to Pond CB-1 : Double Grate CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.95"

Area (sf)	CN	Description
21,265	98	Paved parking, HSG A
3,694	39	Pasture/grassland/range, Good, HSG A
24,959		Weighted Average
3,694	39	14.80% Pervious Area
21,265	98	85.20% Impervious Area

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

Summary for Subcatchment PR-6: Overland to West

Runoff = 0.00 cfs @ 12.49 hrs, Volume= 0.002 af, Depth= 0.19"
Routed to Link DP-2 : West Properties

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.95"

Area (sf)	CN	Description
6,182	39	Pasture/grassland/range, Good, HSG A
6,182	39	100.00% Pervious Area

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

Summary for Subcatchment PR-7: HPSP Prop

Runoff = 0.73 cfs @ 12.09 hrs, Volume= 0.070 af, Depth= 1.06"
Routed to Link DP-3 : Simmon's Pond Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.95"

Area (sf)	CN	Adj	Description
6,685	98	98	Unconnected pavement, HSG A
27,900	39	39	>75% Grass cover, Good, HSG A
34,585			Weighted Average
27,900	39	39	80.67% Pervious Area
6,685	98	98	19.33% Impervious Area
6,685			100.00% Unconnected

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

Summary for Subcatchment PR-8: HP Building Area

Runoff = 0.19 cfs @ 12.09 hrs, Volume= 0.018 af, Depth= 1.12"
Routed to Pond P-3 : Infiltration Basin 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.95"

Area (sf)	CN	Adj	Description
1,764	98	98	Unconnected pavement, HSG A
6,839	39	39	>75% Grass cover, Good, HSG A
8,603			Weighted Average
6,839	39	39	79.50% Pervious Area
1,764	98	98	20.50% Impervious Area
1,764			100.00% Unconnected

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

Summary for Subcatchment PR-9: SP Building Area

Runoff = 0.25 cfs @ 12.09 hrs, Volume= 0.022 af, Depth= 2.29"
Routed to Pond P-4 : Infiltration Basin 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.95"

Area (sf)	CN	Description
2,280	98	Unconnected pavement, HSG A
2,623	39	>75% Grass cover, Good, HSG A
4,903		Weighted Average
2,623	39	53.50% Pervious Area
2,280	98	46.50% Impervious Area
2,280		100.00% Unconnected

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

Summary for Pond CB-1: Double Grate CB

Inflow Area = 0.573 ac, 85.20% Impervious, Inflow Depth = 4.04" for 10-Year event
Inflow = 2.31 cfs @ 12.09 hrs, Volume= 0.193 af
Outflow = 2.31 cfs @ 12.09 hrs, Volume= 0.193 af, Atten= 0%, Lag= 0.0 min
Primary = 2.31 cfs @ 12.09 hrs, Volume= 0.193 af
Routed to Pond P-1 : Infiltration Basin 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 27.20' @ 12.09 hrs
Flood Elev= 30.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	26.50'	**18.0" Round Culvert** L= 162.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 26.50' / 22.40' S= 0.0253 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=2.25 cfs @ 12.09 hrs HW=27.19' TW=20.79' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.25 cfs @ 2.83 fps)

Summary for Pond P-1: Infiltration Basin 1

Inflow Area = 1.084 ac, 57.04% Impervious, Inflow Depth = 2.81" for 10-Year event
Inflow = 2.97 cfs @ 12.09 hrs, Volume= 0.253 af
Outflow = 0.22 cfs @ 13.41 hrs, Volume= 0.254 af, Atten= 93%, Lag= 79.6 min
Discarded = 0.22 cfs @ 13.41 hrs, Volume= 0.254 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 21.38' @ 13.41 hrs Surf.Area= 3,879 sf Storage= 4,465 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 179.2 min (935.2 - 756.0)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	17,828 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.00	2,590	0	0
24.00	6,324	17,828	17,828

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	23.50'	**12.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.22 cfs @ 13.41 hrs HW=21.38' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Controls 0.00 cfs)

Summary for Pond P-2: Infiltration Basin 2

Inflow Area = 0.674 ac, 57.91% Impervious, Inflow Depth = 2.89" for 10-Year event
Inflow = 1.91 cfs @ 12.09 hrs, Volume= 0.162 af
Outflow = 0.11 cfs @ 14.07 hrs, Volume= 0.162 af, Atten= 94%, Lag= 119.3 min
Discarded = 0.11 cfs @ 14.07 hrs, Volume= 0.162 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 23.03' @ 14.07 hrs Surf.Area= 1,909 sf Storage= 3,692 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 377.4 min (1,133.0 - 755.6)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	8,348 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.00	530	0	0
25.00	2,809	8,348	8,348

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	24.00'	**4.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.11 cfs @ 14.07 hrs HW=23.03' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P-3: Infiltration Basin 3

Inflow Area = 0.197 ac, 20.50% Impervious, Inflow Depth = 1.12" for 10-Year event
Inflow = 0.19 cfs @ 12.09 hrs, Volume= 0.018 af
Outflow = 0.02 cfs @ 12.78 hrs, Volume= 0.018 af, Atten= 87%, Lag= 41.6 min
Discarded = 0.02 cfs @ 12.78 hrs, Volume= 0.018 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Simmon's Pond Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 12.66' @ 12.78 hrs Surf.Area= 446 sf Storage= 233 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 71.8 min (855.9 - 784.1)

Volume	Invert	Avail.Storage	Storage Description
#1	12.00'	1,087 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
12.00	257	0	0
14.00	830	1,087	1,087

Device	Routing	Invert	Outlet Devices
#1	Discarded	12.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	13.99'	**7.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.02 cfs @ 12.78 hrs HW=12.66' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=12.00' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Controls 0.00 cfs)

Summary for Pond P-4: Infiltration Basin 4

Inflow Area = 0.113 ac, 46.50% Impervious, Inflow Depth = 2.29" for 10-Year event
Inflow = 0.25 cfs @ 12.09 hrs, Volume= 0.022 af
Outflow = 0.03 cfs @ 12.87 hrs, Volume= 0.022 af, Atten= 89%, Lag= 46.8 min
Discarded = 0.03 cfs @ 12.87 hrs, Volume= 0.022 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Simmon's Pond Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 13.29' @ 12.87 hrs Surf.Area= 468 sf Storage= 374 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 140.5 min (900.4 - 760.0)

Volume	Invert	Avail.Storage	Storage Description
#1	12.00'	777 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
12.00	112	0	0
14.00	665	777	777

Device	Routing	Invert	Outlet Devices
#1	Discarded	12.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	13.50'	**7.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.03 cfs @ 12.87 hrs HW=13.29' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=12.00' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Controls 0.00 cfs)

Summary for Pond ST-1: Infiltration System 1

Inflow Area = 0.184 ac, 48.61% Impervious, Inflow Depth = 2.39" for 10-Year event
Inflow = 0.42 cfs @ 12.09 hrs, Volume= 0.037 af
Outflow = 0.40 cfs @ 12.16 hrs, Volume= 0.037 af, Atten= 6%, Lag= 4.3 min
Discarded = 0.02 cfs @ 12.10 hrs, Volume= 0.027 af
Primary = 0.38 cfs @ 12.16 hrs, Volume= 0.010 af
Routed to Link DP-1 : Ben's Pond Wetland Complex
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 22.33' @ 12.16 hrs Surf.Area= 329 sf Storage= 387 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 121.2 min (880.2 - 759.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	20.00'	237 cf	**8.17'W x 38.80'L x 2.33'H Field A** 739 cf Overall - 147 cf Embedded = 592 cf x 40.0% Voids
#2A	20.50'	147 cf	**ADS_StormTech SC-310 +Cap** x 10 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 10 Chambers in 2 Rows
#3	22.00'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**
		422 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	22.00'	**12.0" Round Culvert** L= 60.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 22.00' / 21.50' S= 0.0083 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Secondary	24.90'	**2.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.02 cfs @ 12.10 hrs HW=22.19' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.35 cfs @ 12.16 hrs HW=22.31' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert** (Inlet Controls 0.35 cfs @ 1.68 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' TW=0.00' (Dynamic Tailwater)
↑—**3=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Link DP-1: Ben's Pond Wetland Complex

Inflow Area = 3.512 ac, 48.57% Impervious, Inflow Depth = 0.91" for 10-Year event
Inflow = 3.01 cfs @ 12.10 hrs, Volume= 0.265 af
Primary = 3.01 cfs @ 12.10 hrs, Volume= 0.265 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: West Properties

Inflow Area = 0.142 ac, 0.00% Impervious, Inflow Depth = 0.19" for 10-Year event
Inflow = 0.00 cfs @ 12.49 hrs, Volume= 0.002 af
Primary = 0.00 cfs @ 12.49 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Simmon's Pond Wetlands

Inflow Area = 1.104 ac, 22.31% Impervious, Inflow Depth = 0.77" for 10-Year event
Inflow = 0.73 cfs @ 12.09 hrs, Volume= 0.070 af
Primary = 0.73 cfs @ 12.09 hrs, Volume= 0.070 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR-1: Overland to Bens Runoff Area=68,407 sf 38.71% Impervious Runoff Depth=2.47"
Tc=6.0 min CN=WQ Runoff=3.48 cfs 0.323 af

Subcatchment PR-2: Overland to Runoff Area=22,246 sf 25.45% Impervious Runoff Depth=1.85"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.79 cfs 0.079 af

Subcatchment PR-3: Northeastern Driveway Runoff Area=8,006 sf 48.61% Impervious Runoff Depth=2.98"
Tc=6.0 min CN=WQ Runoff=0.51 cfs 0.046 af

Subcatchment PR-4: Overland to Runoff Area=29,375 sf 57.91% Impervious Runoff Depth=3.56"
Tc=6.0 min CN=WQ Runoff=2.29 cfs 0.200 af

Subcatchment PR-5: Overland to West Runoff Area=24,959 sf 85.20% Impervious Runoff Depth=4.90"
Tc=6.0 min CN=WQ Runoff=2.77 cfs 0.234 af

Subcatchment PR-6: Overland to West Runoff Area=6,182 sf 0.00% Impervious Runoff Depth=0.42"
Tc=6.0 min CN=39 Runoff=0.02 cfs 0.005 af

Subcatchment PR-7: HPSP Prop Runoff Area=34,585 sf 19.33% Impervious Runoff Depth=1.44"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.88 cfs 0.095 af

Subcatchment PR-8: HP Building Area Runoff Area=8,603 sf 20.50% Impervious Runoff Depth=1.50"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.23 cfs 0.025 af

Subcatchment PR-9: SP Building Area Runoff Area=4,903 sf 46.50% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=WQ Runoff=0.30 cfs 0.027 af

Pond CB-1: Double Grate CB Peak Elev=27.28' Inflow=2.77 cfs 0.234 af
18.0" Round Culvert n=0.013 L=162.0' S=0.0253 '/' Outflow=2.77 cfs 0.234 af

Pond P-1: Infiltration Basin 1 Peak Elev=21.73' Storage=5,884 cf Inflow=3.56 cfs 0.313 af
Discarded=0.23 cfs 0.313 af Primary=0.00 cfs 0.000 af Outflow=0.23 cfs 0.313 af

Pond P-2: Infiltration Basin 2 Peak Elev=23.53' Storage=4,719 cf Inflow=2.29 cfs 0.200 af
Discarded=0.12 cfs 0.200 af Primary=0.00 cfs 0.000 af Outflow=0.12 cfs 0.200 af

Pond P-3: Infiltration Basin 3 Peak Elev=12.88' Storage=337 cf Inflow=0.23 cfs 0.025 af
Discarded=0.03 cfs 0.025 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.025 af

Pond P-4: Infiltration Basin 4 Peak Elev=13.50' Storage=481 cf Inflow=0.30 cfs 0.027 af
Discarded=0.03 cfs 0.027 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.027 af

Pond ST-1: Infiltration System 1 Peak Elev=22.40' Storage=389 cf Inflow=0.51 cfs 0.046 af
Discarded=0.02 cfs 0.030 af Primary=0.55 cfs 0.016 af Secondary=0.00 cfs 0.000 af Outflow=0.57 cfs 0.046 af

Link DP-1: Ben's Pond Wetland Complex Inflow=4.02 cfs 0.340 af
Primary=4.02 cfs 0.340 af

Link DP-2: West Properties Inflow=0.02 cfs 0.005 af
Primary=0.02 cfs 0.005 af

Link DP-3: Simmon's Pond Wetlands Inflow=0.88 cfs 0.095 af
Primary=0.88 cfs 0.095 af

Total Runoff Area = 4.758 ac Runoff Volume = 1.034 af Average Runoff Depth = 2.61"
58.97% Pervious = 2.806 ac 41.03% Impervious = 1.952 ac

Summary for Subcatchment PR-1: Overland to Bens Pond

Runoff = 3.48 cfs @ 12.09 hrs, Volume= 0.323 af, Depth= 2.47"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.92"

Area (sf)	CN	Description
41,747	39	>75% Grass cover, Good, HSG A
26,482	98	Unconnected pavement, HSG A
178	96	Gravel surface, HSG A
68,407		Weighted Average
41,925	39	61.29% Pervious Area
26,482	98	38.71% Impervious Area
26,482		100.00% Unconnected

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

Summary for Subcatchment PR-2: Overland to Northwest Basin

Runoff = 0.79 cfs @ 12.09 hrs, Volume= 0.079 af, Depth= 1.85"
Routed to Pond P-1 : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.92"

Area (sf)	CN	Adj	Description
5,662	98	98	Unconnected pavement, HSG A
16,182	39	39	>75% Grass cover, Good, HSG A
402	96	96	Gravel surface, HSG A
22,246			Weighted Average
16,584	40	40	74.55% Pervious Area
5,662	98	98	25.45% Impervious Area
5,662			100.00% Unconnected

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

Summary for Subcatchment PR-3: Northeastern Driveway

Runoff = 0.51 cfs @ 12.09 hrs, Volume= 0.046 af, Depth= 2.98"
Routed to Pond ST-1 : Infiltration System 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.92"

Area (sf)	CN	Description
3,892	98	Paved parking, HSG A
4,114	39	>75% Grass cover, Good, HSG A
8,006		Weighted Average
4,114	39	51.39% Pervious Area
3,892	98	48.61% Impervious Area

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

Summary for Subcatchment PR-4: Overland to Southeast Basin

Runoff = 2.29 cfs @ 12.09 hrs, Volume= 0.200 af, Depth= 3.56"
Routed to Pond P-2 : Infiltration Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.92"

Area (sf)	CN	Description
17,010	98	Paved parking, HSG A
11,808	39	Pasture/grassland/range, Good, HSG A
557	96	Gravel surface, HSG A
29,375		Weighted Average
12,365	42	42.09% Pervious Area
17,010	98	57.91% Impervious Area

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

Summary for Subcatchment PR-5: Overland to West

Runoff = 2.77 cfs @ 12.09 hrs, Volume= 0.234 af, Depth= 4.90"
Routed to Pond CB-1 : Double Grate CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.92"

Area (sf)	CN	Description
21,265	98	Paved parking, HSG A
3,694	39	Pasture/grassland/range, Good, HSG A
24,959		Weighted Average
3,694	39	14.80% Pervious Area
21,265	98	85.20% Impervious Area

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

Summary for Subcatchment PR-6: Overland to West

Runoff = 0.02 cfs @ 12.35 hrs, Volume= 0.005 af, Depth= 0.42"
Routed to Link DP-2 : West Properties

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.92"

Area (sf)	CN	Description
6,182	39	Pasture/grassland/range, Good, HSG A
6,182	39	100.00% Pervious Area

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

Summary for Subcatchment PR-7: HPSP Prop

Runoff = 0.88 cfs @ 12.09 hrs, Volume= 0.095 af, Depth= 1.44"
Routed to Link DP-3 : Simmon's Pond Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.92"

Area (sf)	CN	Adj	Description
6,685	98	98	Unconnected pavement, HSG A
27,900	39	39	>75% Grass cover, Good, HSG A
34,585			Weighted Average
27,900	39	39	80.67% Pervious Area
6,685	98	98	19.33% Impervious Area
6,685			100.00% Unconnected

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

Summary for Subcatchment PR-8: HP Building Area

Runoff = 0.23 cfs @ 12.09 hrs, Volume= 0.025 af, Depth= 1.50"
Routed to Pond P-3 : Infiltration Basin 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.92"

Area (sf)	CN	Adj	Description
1,764	98	98	Unconnected pavement, HSG A
6,839	39	39	>75% Grass cover, Good, HSG A
8,603			Weighted Average
6,839	39	39	79.50% Pervious Area
1,764	98	98	20.50% Impervious Area
1,764			100.00% Unconnected

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

Summary for Subcatchment PR-9: SP Building Area

Runoff = 0.30 cfs @ 12.09 hrs, Volume= 0.027 af, Depth= 2.87"
Routed to Pond P-4 : Infiltration Basin 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.92"

Area (sf)	CN	Description
2,280	98	Unconnected pavement, HSG A
2,623	39	>75% Grass cover, Good, HSG A
4,903		Weighted Average
2,623	39	53.50% Pervious Area
2,280	98	46.50% Impervious Area
2,280		100.00% Unconnected

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

Summary for Pond CB-1: Double Grate CB

Inflow Area = 0.573 ac, 85.20% Impervious, Inflow Depth = 4.90" for 25-Year event
Inflow = 2.77 cfs @ 12.09 hrs, Volume= 0.234 af
Outflow = 2.77 cfs @ 12.09 hrs, Volume= 0.234 af, Atten= 0%, Lag= 0.0 min
Primary = 2.77 cfs @ 12.09 hrs, Volume= 0.234 af
Routed to Pond P-1 : Infiltration Basin 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 27.28' @ 12.09 hrs
Flood Elev= 30.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	26.50'	**18.0" Round Culvert** L= 162.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 26.50' / 22.40' S= 0.0253 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=2.69 cfs @ 12.09 hrs HW=27.26' TW=20.99' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.69 cfs @ 2.98 fps)

Summary for Pond P-1: Infiltration Basin 1

Inflow Area = 1.084 ac, 57.04% Impervious, Inflow Depth = 3.47" for 25-Year event
Inflow = 3.56 cfs @ 12.09 hrs, Volume= 0.313 af
Outflow = 0.23 cfs @ 13.82 hrs, Volume= 0.313 af, Atten= 93%, Lag= 103.7 min
Discarded = 0.23 cfs @ 13.82 hrs, Volume= 0.313 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 21.73' @ 13.82 hrs Surf.Area= 4,206 sf Storage= 5,884 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 230.8 min (987.4 - 756.7)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	17,828 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.00	2,590	0	0
24.00	6,324	17,828	17,828

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	23.50'	**12.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.23 cfs @ 13.82 hrs HW=21.73' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.23 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Controls 0.00 cfs)

Summary for Pond P-2: Infiltration Basin 2

Inflow Area = 0.674 ac, 57.91% Impervious, Inflow Depth = 3.56" for 25-Year event
Inflow = 2.29 cfs @ 12.09 hrs, Volume= 0.200 af
Outflow = 0.12 cfs @ 14.53 hrs, Volume= 0.200 af, Atten= 95%, Lag= 146.8 min
Discarded = 0.12 cfs @ 14.53 hrs, Volume= 0.200 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 23.53' @ 14.53 hrs Surf.Area= 2,141 sf Storage= 4,719 cf

Plug-Flow detention time= 437.7 min calculated for 0.200 af (100% of inflow)
Center-of-Mass det. time= 438.0 min (1,194.1 - 756.1)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	8,348 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.00	530	0	0
25.00	2,809	8,348	8,348

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	24.00'	**4.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.12 cfs @ 14.53 hrs HW=23.53' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P-3: Infiltration Basin 3

Inflow Area = 0.197 ac, 20.50% Impervious, Inflow Depth = 1.50" for 25-Year event
Inflow = 0.23 cfs @ 12.09 hrs, Volume= 0.025 af
Outflow = 0.03 cfs @ 13.09 hrs, Volume= 0.025 af, Atten= 88%, Lag= 60.0 min
Discarded = 0.03 cfs @ 13.09 hrs, Volume= 0.025 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Simmon's Pond Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 12.88' @ 13.09 hrs Surf.Area= 509 sf Storage= 337 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 105.0 min (899.0 - 794.0)

Volume	Invert	Avail.Storage	Storage Description
#1	12.00'	1,087 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
12.00	257	0	0
14.00	830	1,087	1,087

Device	Routing	Invert	Outlet Devices
#1	Discarded	12.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	13.99'	**7.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.03 cfs @ 13.09 hrs HW=12.88' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=12.00' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Controls 0.00 cfs)

Summary for Pond P-4: Infiltration Basin 4

Inflow Area = 0.113 ac, 46.50% Impervious, Inflow Depth = 2.87" for 25-Year event
Inflow = 0.30 cfs @ 12.09 hrs, Volume= 0.027 af
Outflow = 0.03 cfs @ 12.87 hrs, Volume= 0.027 af, Atten= 89%, Lag= 47.0 min
Discarded = 0.03 cfs @ 12.87 hrs, Volume= 0.027 af
Primary = 0.00 cfs @ 12.87 hrs, Volume= 0.000 af
Routed to Link DP-3 : Simmon's Pond Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 13.50' @ 12.87 hrs Surf.Area= 528 sf Storage= 481 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 167.8 min (930.2 - 762.5)

Volume	Invert	Avail.Storage	Storage Description
#1	12.00'	777 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
12.00	112	0	0
14.00	665	777	777

Device	Routing	Invert	Outlet Devices
#1	Discarded	12.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	13.50'	**7.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.03 cfs @ 12.87 hrs HW=13.50' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 12.87 hrs HW=13.50' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Weir Controls 0.00 cfs @ 0.19 fps)

Summary for Pond ST-1: Infiltration System 1

Inflow Area = 0.184 ac, 48.61% Impervious, Inflow Depth = 2.98" for 25-Year event
Inflow = 0.51 cfs @ 12.09 hrs, Volume= 0.046 af
Outflow = 0.57 cfs @ 12.10 hrs, Volume= 0.046 af, Atten= 0%, Lag= 0.9 min
Discarded = 0.02 cfs @ 12.00 hrs, Volume= 0.030 af
Primary = 0.55 cfs @ 12.10 hrs, Volume= 0.016 af
Routed to Link DP-1 : Ben's Pond Wetland Complex
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 22.40' @ 12.10 hrs Surf.Area= 329 sf Storage= 389 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 112.7 min (873.9 - 761.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	20.00'	237 cf	**8.17'W x 38.80'L x 2.33'H Field A** 739 cf Overall - 147 cf Embedded = 592 cf x 40.0% Voids
#2A	20.50'	147 cf	**ADS_StormTech SC-310 +Cap** x 10 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 10 Chambers in 2 Rows
#3	22.00'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**
		422 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	22.00'	**12.0" Round Culvert** L= 60.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 22.00' / 21.50' S= 0.0083 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Secondary	24.90'	**2.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.02 cfs @ 12.00 hrs HW=22.01' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.54 cfs @ 12.10 hrs HW=22.39' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert** (Inlet Controls 0.54 cfs @ 1.89 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' TW=0.00' (Dynamic Tailwater)
↑—**3=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Link DP-1: Ben's Pond Wetland Complex

Inflow Area = 3.512 ac, 48.57% Impervious, Inflow Depth = 1.16" for 25-Year event
Inflow = 4.02 cfs @ 12.09 hrs, Volume= 0.340 af
Primary = 4.02 cfs @ 12.09 hrs, Volume= 0.340 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: West Properties

Inflow Area = 0.142 ac, 0.00% Impervious, Inflow Depth = 0.42" for 25-Year event
Inflow = 0.02 cfs @ 12.35 hrs, Volume= 0.005 af
Primary = 0.02 cfs @ 12.35 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Simmon's Pond Wetlands

Inflow Area = 1.104 ac, 22.31% Impervious, Inflow Depth = 1.04" for 25-Year event
Inflow = 0.88 cfs @ 12.09 hrs, Volume= 0.095 af
Primary = 0.88 cfs @ 12.09 hrs, Volume= 0.095 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR-1: Overland to Bens Runoff Area=68,407 sf 38.71% Impervious Runoff Depth=3.36"
Tc=6.0 min CN=WQ Runoff=4.84 cfs 0.439 af

Subcatchment PR-2: Overland to Runoff Area=22,246 sf 25.45% Impervious Runoff Depth=2.62"
Tc=6.0 min UI Adjusted CN=WQ Runoff=1.18 cfs 0.111 af

Subcatchment PR-3: Northeastern Driveway Runoff Area=8,006 sf 48.61% Impervious Runoff Depth=3.96"
Tc=6.0 min CN=WQ Runoff=0.68 cfs 0.061 af

Subcatchment PR-4: Overland to Runoff Area=29,375 sf 57.91% Impervious Runoff Depth=4.65"
Tc=6.0 min CN=WQ Runoff=3.00 cfs 0.262 af

Subcatchment PR-5: Overland to West Runoff Area=24,959 sf 85.20% Impervious Runoff Depth=6.25"
Tc=6.0 min CN=WQ Runoff=3.51 cfs 0.298 af

Subcatchment PR-6: Overland to West Runoff Area=6,182 sf 0.00% Impervious Runoff Depth=0.92"
Tc=6.0 min CN=39 Runoff=0.08 cfs 0.011 af

Subcatchment PR-7: HPSP Prop Runoff Area=34,585 sf 19.33% Impervious Runoff Depth=2.13"
Tc=6.0 min UI Adjusted CN=WQ Runoff=1.43 cfs 0.141 af

Subcatchment PR-8: HP Building Area Runoff Area=8,603 sf 20.50% Impervious Runoff Depth=2.20"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.37 cfs 0.036 af

Subcatchment PR-9: SP Building Area Runoff Area=4,903 sf 46.50% Impervious Runoff Depth=3.83"
Tc=6.0 min CN=WQ Runoff=0.40 cfs 0.036 af

Pond CB-1: Double Grate CB Peak Elev=27.39' Inflow=3.51 cfs 0.298 af
18.0" Round Culvert n=0.013 L=162.0' S=0.0253 '/' Outflow=3.51 cfs 0.298 af

Pond P-1: Infiltration Basin 1 Peak Elev=22.29' Storage=8,391 cf Inflow=4.69 cfs 0.410 af
Discarded=0.26 cfs 0.410 af Primary=0.00 cfs 0.000 af Outflow=0.26 cfs 0.410 af

Pond P-2: Infiltration Basin 2 Peak Elev=24.07' Storage=5,923 cf Inflow=3.00 cfs 0.262 af
Discarded=0.13 cfs 0.245 af Primary=0.16 cfs 0.017 af Outflow=0.29 cfs 0.262 af

Pond P-3: Infiltration Basin 3 Peak Elev=13.29' Storage=573 cf Inflow=0.37 cfs 0.036 af
Discarded=0.04 cfs 0.036 af Primary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.036 af

Pond P-4: Infiltration Basin 4 Peak Elev=13.54' Storage=502 cf Inflow=0.40 cfs 0.036 af
Discarded=0.03 cfs 0.031 af Primary=0.20 cfs 0.005 af Outflow=0.23 cfs 0.036 af

Pond ST-1: Infiltration System 1 Peak Elev=22.44' Storage=390 cf Inflow=0.68 cfs 0.061 af
Discarded=0.02 cfs 0.033 af Primary=0.66 cfs 0.028 af Secondary=0.00 cfs 0.000 af Outflow=0.67 cfs 0.061 af

Link DP-1: Ben's Pond Wetland Complex Inflow=5.49 cfs 0.484 af
Primary=5.49 cfs 0.484 af

Link DP-2: West Properties Inflow=0.08 cfs 0.011 af
Primary=0.08 cfs 0.011 af

Link DP-3: Simmon's Pond Wetlands Inflow=1.43 cfs 0.146 af
Primary=1.43 cfs 0.146 af

Total Runoff Area = 4.758 ac Runoff Volume = 1.395 af Average Runoff Depth = 3.52"
58.97% Pervious = 2.806 ac 41.03% Impervious = 1.952 ac

Summary for Subcatchment PR-1: Overland to Bens Pond

Runoff = 4.84 cfs @ 12.09 hrs, Volume= 0.439 af, Depth= 3.36"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.41"

Area (sf)	CN	Description
41,747	39	>75% Grass cover, Good, HSG A
26,482	98	Unconnected pavement, HSG A
178	96	Gravel surface, HSG A
68,407		Weighted Average
41,925	39	61.29% Pervious Area
26,482	98	38.71% Impervious Area
26,482		100.00% Unconnected

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

Summary for Subcatchment PR-2: Overland to Northwest Basin

Runoff = 1.18 cfs @ 12.10 hrs, Volume= 0.111 af, Depth= 2.62"
Routed to Pond P-1 : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.41"

Area (sf)	CN	Adj	Description
5,662	98	98	Unconnected pavement, HSG A
16,182	39	39	>75% Grass cover, Good, HSG A
402	96	96	Gravel surface, HSG A
22,246			Weighted Average
16,584	40	40	74.55% Pervious Area
5,662	98	98	25.45% Impervious Area
5,662			100.00% Unconnected

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

Summary for Subcatchment PR-3: Northeastern Driveway

Runoff = 0.68 cfs @ 12.09 hrs, Volume= 0.061 af, Depth= 3.96"
Routed to Pond ST-1 : Infiltration System 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.41"

Area (sf)	CN	Description
3,892	98	Paved parking, HSG A
4,114	39	>75% Grass cover, Good, HSG A
8,006		Weighted Average
4,114	39	51.39% Pervious Area
3,892	98	48.61% Impervious Area

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

Summary for Subcatchment PR-4: Overland to Southeast Basin

Runoff = 3.00 cfs @ 12.09 hrs, Volume= 0.262 af, Depth= 4.65"
Routed to Pond P-2 : Infiltration Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.41"

Area (sf)	CN	Description
17,010	98	Paved parking, HSG A
11,808	39	Pasture/grassland/range, Good, HSG A
557	96	Gravel surface, HSG A
29,375		Weighted Average
12,365	42	42.09% Pervious Area
17,010	98	57.91% Impervious Area

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

Summary for Subcatchment PR-5: Overland to West

Runoff = 3.51 cfs @ 12.09 hrs, Volume= 0.298 af, Depth= 6.25"
Routed to Pond CB-1 : Double Grate CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.41"

Area (sf)	CN	Description
21,265	98	Paved parking, HSG A
3,694	39	Pasture/grassland/range, Good, HSG A
24,959		Weighted Average
3,694	39	14.80% Pervious Area
21,265	98	85.20% Impervious Area

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

Summary for Subcatchment PR-6: Overland to West

Runoff = 0.08 cfs @ 12.14 hrs, Volume= 0.011 af, Depth= 0.92"
Routed to Link DP-2 : West Properties

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.41"

Area (sf)	CN	Description
6,182	39	Pasture/grassland/range, Good, HSG A
6,182	39	100.00% Pervious Area

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

Summary for Subcatchment PR-7: HPSP Prop

Runoff = 1.43 cfs @ 12.10 hrs, Volume= 0.141 af, Depth= 2.13"
Routed to Link DP-3 : Simmon's Pond Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.41"

Area (sf)	CN	Adj	Description
6,685	98	98	Unconnected pavement, HSG A
27,900	39	39	>75% Grass cover, Good, HSG A
34,585			Weighted Average
27,900	39	39	80.67% Pervious Area
6,685	98	98	19.33% Impervious Area
6,685			100.00% Unconnected

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

Summary for Subcatchment PR-8: HP Building Area

Runoff = 0.37 cfs @ 12.10 hrs, Volume= 0.036 af, Depth= 2.20"
Routed to Pond P-3 : Infiltration Basin 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.41"

Area (sf)	CN	Adj	Description
1,764	98	98	Unconnected pavement, HSG A
6,839	39	39	>75% Grass cover, Good, HSG A
8,603			Weighted Average
6,839	39	39	79.50% Pervious Area
1,764	98	98	20.50% Impervious Area
1,764			100.00% Unconnected

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

Summary for Subcatchment PR-9: SP Building Area

Runoff = 0.40 cfs @ 12.09 hrs, Volume= 0.036 af, Depth= 3.83"
Routed to Pond P-4 : Infiltration Basin 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.41"

Area (sf)	CN	Description
2,280	98	Unconnected pavement, HSG A
2,623	39	>75% Grass cover, Good, HSG A
4,903		Weighted Average
2,623	39	53.50% Pervious Area
2,280	98	46.50% Impervious Area
2,280		100.00% Unconnected

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

Summary for Pond CB-1: Double Grate CB

Inflow Area = 0.573 ac, 85.20% Impervious, Inflow Depth = 6.25" for 100-Year event
Inflow = 3.51 cfs @ 12.09 hrs, Volume= 0.298 af
Outflow = 3.51 cfs @ 12.09 hrs, Volume= 0.298 af, Atten= 0%, Lag= 0.0 min
Primary = 3.51 cfs @ 12.09 hrs, Volume= 0.298 af
Routed to Pond P-1 : Infiltration Basin 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 27.39' @ 12.09 hrs
Flood Elev= 30.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	26.50'	**18.0" Round Culvert** L= 162.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 26.50' / 22.40' S= 0.0253 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=3.42 cfs @ 12.09 hrs HW=27.38' TW=21.32' (Dynamic Tailwater)
1=Culvert (Inlet Controls 3.42 cfs @ 3.19 fps)

Summary for Pond P-1: Infiltration Basin 1

Inflow Area = 1.084 ac, 57.04% Impervious, Inflow Depth = 4.54" for 100-Year event
Inflow = 4.69 cfs @ 12.09 hrs, Volume= 0.410 af
Outflow = 0.26 cfs @ 14.31 hrs, Volume= 0.410 af, Atten= 94%, Lag= 133.5 min
Discarded = 0.26 cfs @ 14.31 hrs, Volume= 0.410 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 22.29' @ 14.31 hrs Surf.Area= 4,730 sf Storage= 8,391 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 309.3 min (1,067.0 - 757.7)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	17,828 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.00	2,590	0	0
24.00	6,324	17,828	17,828

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	23.50'	**12.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.26 cfs @ 14.31 hrs HW=22.29' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Controls 0.00 cfs)

Summary for Pond P-2: Infiltration Basin 2

Inflow Area = 0.674 ac, 57.91% Impervious, Inflow Depth = 4.65" for 100-Year event
Inflow = 3.00 cfs @ 12.09 hrs, Volume= 0.262 af
Outflow = 0.29 cfs @ 12.97 hrs, Volume= 0.262 af, Atten= 90%, Lag= 53.1 min
Discarded = 0.13 cfs @ 12.97 hrs, Volume= 0.245 af
Primary = 0.16 cfs @ 12.97 hrs, Volume= 0.017 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 24.07' @ 12.97 hrs Surf.Area= 2,383 sf Storage= 5,923 cf

Plug-Flow detention time= 468.1 min calculated for 0.261 af (100% of inflow)
Center-of-Mass det. time= 468.5 min (1,225.3 - 756.8)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	8,348 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.00	530	0	0
25.00	2,809	8,348	8,348

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	24.00'	**4.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.13 cfs @ 12.97 hrs HW=24.07' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=0.16 cfs @ 12.97 hrs HW=24.07' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.16 cfs @ 0.61 fps)

Summary for Pond P-3: Infiltration Basin 3

Inflow Area = 0.197 ac, 20.50% Impervious, Inflow Depth = 2.20" for 100-Year event
Inflow = 0.37 cfs @ 12.10 hrs, Volume= 0.036 af
Outflow = 0.04 cfs @ 13.81 hrs, Volume= 0.036 af, Atten= 91%, Lag= 102.8 min
Discarded = 0.04 cfs @ 13.81 hrs, Volume= 0.036 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Simmon's Pond Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 13.29' @ 13.81 hrs Surf.Area= 628 sf Storage= 573 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 166.2 min (968.2 - 802.0)

Volume	Invert	Avail.Storage	Storage Description
#1	12.00'	1,087 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
12.00	257	0	0
14.00	830	1,087	1,087

Device	Routing	Invert	Outlet Devices
#1	Discarded	12.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	13.99'	**7.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.04 cfs @ 13.81 hrs HW=13.29' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=12.00' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Controls 0.00 cfs)

Summary for Pond P-4: Infiltration Basin 4

Inflow Area = 0.113 ac, 46.50% Impervious, Inflow Depth = 3.83" for 100-Year event
Inflow = 0.40 cfs @ 12.09 hrs, Volume= 0.036 af
Outflow = 0.23 cfs @ 12.26 hrs, Volume= 0.036 af, Atten= 43%, Lag= 10.2 min
Discarded = 0.03 cfs @ 12.26 hrs, Volume= 0.031 af
Primary = 0.20 cfs @ 12.26 hrs, Volume= 0.005 af
Routed to Link DP-3 : Simmon's Pond Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 13.54' @ 12.26 hrs Surf.Area= 539 sf Storage= 502 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 152.5 min (917.8 - 765.4)

Volume	Invert	Avail.Storage	Storage Description
#1	12.00'	777 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
12.00	112	0	0
14.00	665	777	777

Device	Routing	Invert	Outlet Devices
#1	Discarded	12.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	13.50'	**7.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.03 cfs @ 12.26 hrs HW=13.54' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.19 cfs @ 12.26 hrs HW=13.54' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Weir Controls 0.19 cfs @ 0.66 fps)

Summary for Pond ST-1: Infiltration System 1

Inflow Area = 0.184 ac, 48.61% Impervious, Inflow Depth = 3.96" for 100-Year event
Inflow = 0.68 cfs @ 12.09 hrs, Volume= 0.061 af
Outflow = 0.67 cfs @ 12.09 hrs, Volume= 0.061 af, Atten= 1%, Lag= 0.0 min
Discarded = 0.02 cfs @ 11.90 hrs, Volume= 0.033 af
Primary = 0.66 cfs @ 12.09 hrs, Volume= 0.028 af
Routed to Link DP-1 : Ben's Pond Wetland Complex
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 22.44' @ 12.09 hrs Surf.Area= 329 sf Storage= 390 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 101.7 min (865.4 - 763.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	20.00'	237 cf	**8.17'W x 38.80'L x 2.33'H Field A** 739 cf Overall - 147 cf Embedded = 592 cf x 40.0% Voids
#2A	20.50'	147 cf	**ADS_StormTech SC-310 +Cap** x 10 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 10 Chambers in 2 Rows
#3	22.00'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**
		422 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	22.00'	**12.0" Round Culvert** L= 60.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 22.00' / 21.50' S= 0.0083 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Secondary	24.90'	**2.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.02 cfs @ 11.90 hrs HW=22.20' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.64 cfs @ 12.09 hrs HW=22.43' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert** (Inlet Controls 0.64 cfs @ 1.98 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' TW=0.00' (Dynamic Tailwater)
↑—**3=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Link DP-1: Ben's Pond Wetland Complex

Inflow Area = 3.512 ac, 48.57% Impervious, Inflow Depth = 1.65" for 100-Year event
Inflow = 5.49 cfs @ 12.09 hrs, Volume= 0.484 af
Primary = 5.49 cfs @ 12.09 hrs, Volume= 0.484 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: West Properties

Inflow Area = 0.142 ac, 0.00% Impervious, Inflow Depth = 0.92" for 100-Year event
Inflow = 0.08 cfs @ 12.14 hrs, Volume= 0.011 af
Primary = 0.08 cfs @ 12.14 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Simmon's Pond Wetlands

Inflow Area = 1.104 ac, 22.31% Impervious, Inflow Depth = 1.59" for 100-Year event
Inflow = 1.43 cfs @ 12.10 hrs, Volume= 0.146 af
Primary = 1.43 cfs @ 12.10 hrs, Volume= 0.146 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR-1: Overland to Bens Runoff Area=68,407 sf 38.71% Impervious Runoff Depth=4.87"
Tc=6.0 min CN=WQ Runoff=7.39 cfs 0.638 af

Subcatchment PR-2: Overland to Runoff Area=22,246 sf 25.45% Impervious Runoff Depth=3.99"
Tc=6.0 min UI Adjusted CN=WQ Runoff=1.96 cfs 0.170 af

Subcatchment PR-3: Northeastern Driveway Runoff Area=8,006 sf 48.61% Impervious Runoff Depth=5.60"
Tc=6.0 min CN=WQ Runoff=1.00 cfs 0.086 af

Subcatchment PR-4: Overland to Runoff Area=29,375 sf 57.91% Impervious Runoff Depth=6.43"
Tc=6.0 min CN=WQ Runoff=4.23 cfs 0.362 af

Subcatchment PR-5: Overland to West Runoff Area=24,959 sf 85.20% Impervious Runoff Depth=8.35"
Tc=6.0 min CN=WQ Runoff=4.69 cfs 0.399 af

Subcatchment PR-6: Overland to West Runoff Area=6,182 sf 0.00% Impervious Runoff Depth=1.94"
Tc=6.0 min CN=39 Runoff=0.26 cfs 0.023 af

Subcatchment PR-7: HPSP Prop Runoff Area=34,585 sf 19.33% Impervious Runoff Depth=3.40"
Tc=6.0 min UI Adjusted CN=WQ Runoff=2.57 cfs 0.225 af

Subcatchment PR-8: HP Building Area Runoff Area=8,603 sf 20.50% Impervious Runoff Depth=3.49"
Tc=6.0 min UI Adjusted CN=WQ Runoff=0.66 cfs 0.057 af

Subcatchment PR-9: SP Building Area Runoff Area=4,903 sf 46.50% Impervious Runoff Depth=5.44"
Tc=6.0 min CN=WQ Runoff=0.59 cfs 0.051 af

Pond CB-1: Double Grate CB Peak Elev=27.56' Inflow=4.69 cfs 0.399 af
18.0" Round Culvert n=0.013 L=162.0' S=0.0253 '/' Outflow=4.69 cfs 0.399 af

Pond P-1: Infiltration Basin 1 Peak Elev=23.16' Storage=12,839 cf Inflow=6.64 cfs 0.568 af
Discarded=0.31 cfs 0.568 af Primary=0.00 cfs 0.000 af Outflow=0.31 cfs 0.568 af

Pond P-2: Infiltration Basin 2 Peak Elev=24.30' Storage=6,504 cf Inflow=4.23 cfs 0.362 af
Discarded=0.14 cfs 0.268 af Primary=1.64 cfs 0.094 af Outflow=1.78 cfs 0.362 af

Pond P-3: Infiltration Basin 3 Peak Elev=13.99' Storage=1,080 cf Inflow=0.66 cfs 0.057 af
Discarded=0.05 cfs 0.057 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.057 af

Pond P-4: Infiltration Basin 4 Peak Elev=13.59' Storage=529 cf Inflow=0.59 cfs 0.051 af
Discarded=0.03 cfs 0.036 af Primary=0.62 cfs 0.015 af Outflow=0.65 cfs 0.051 af

Pond ST-1: Infiltration System 1 Peak Elev=22.55' Storage=391 cf Inflow=1.00 cfs 0.086 af
Discarded=0.02 cfs 0.037 af Primary=0.99 cfs 0.049 af Secondary=0.00 cfs 0.000 af Outflow=1.01 cfs 0.086 af

Link DP-1: Ben's Pond Wetland Complex Inflow=8.38 cfs 0.780 af
Primary=8.38 cfs 0.780 af

Link DP-2: West Properties Inflow=0.26 cfs 0.023 af
Primary=0.26 cfs 0.023 af

Link DP-3: Simmon's Pond Wetlands Inflow=3.17 cfs 0.240 af
Primary=3.17 cfs 0.240 af

Total Runoff Area = 4.758 ac Runoff Volume = 2.009 af Average Runoff Depth = 5.07"
58.97% Pervious = 2.806 ac 41.03% Impervious = 1.952 ac

Summary for Subcatchment PR-1: Overland to Bens Pond

Runoff = 7.39 cfs @ 12.09 hrs, Volume= 0.638 af, Depth= 4.87"
Routed to Link DP-1 : Ben's Pond Wetland Complex

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year 2070 Rainfall=9.70"

Area (sf)	CN	Description
41,747	39	>75% Grass cover, Good, HSG A
26,482	98	Unconnected pavement, HSG A
178	96	Gravel surface, HSG A
68,407		Weighted Average
41,925	39	61.29% Pervious Area
26,482	98	38.71% Impervious Area
26,482		100.00% Unconnected

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

Summary for Subcatchment PR-2: Overland to Northwest Basin

Runoff = 1.96 cfs @ 12.10 hrs, Volume= 0.170 af, Depth= 3.99"
Routed to Pond P-1 : Infiltration Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year 2070 Rainfall=9.70"

Area (sf)	CN	Adj	Description
5,662	98	98	Unconnected pavement, HSG A
16,182	39	39	>75% Grass cover, Good, HSG A
402	96	96	Gravel surface, HSG A
22,246			Weighted Average
16,584	40	40	74.55% Pervious Area
5,662	98	98	25.45% Impervious Area
5,662			100.00% Unconnected

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

Summary for Subcatchment PR-3: Northeastern Driveway

Runoff = 1.00 cfs @ 12.09 hrs, Volume= 0.086 af, Depth= 5.60"
Routed to Pond ST-1 : Infiltration System 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year 2070 Rainfall=9.70"

Area (sf)	CN	Description
3,892	98	Paved parking, HSG A
4,114	39	>75% Grass cover, Good, HSG A
8,006		Weighted Average
4,114	39	51.39% Pervious Area
3,892	98	48.61% Impervious Area

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

Summary for Subcatchment PR-4: Overland to Southeast Basin

Runoff = 4.23 cfs @ 12.09 hrs, Volume= 0.362 af, Depth= 6.43"
Routed to Pond P-2 : Infiltration Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year 2070 Rainfall=9.70"

Area (sf)	CN	Description
17,010	98	Paved parking, HSG A
11,808	39	Pasture/grassland/range, Good, HSG A
557	96	Gravel surface, HSG A
29,375		Weighted Average
12,365	42	42.09% Pervious Area
17,010	98	57.91% Impervious Area

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

Summary for Subcatchment PR-5: Overland to West

Runoff = 4.69 cfs @ 12.09 hrs, Volume= 0.399 af, Depth= 8.35"
Routed to Pond CB-1 : Double Grate CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year 2070 Rainfall=9.70"

Area (sf)	CN	Description
21,265	98	Paved parking, HSG A
3,694	39	Pasture/grassland/range, Good, HSG A
24,959		Weighted Average
3,694	39	14.80% Pervious Area
21,265	98	85.20% Impervious Area

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

Summary for Subcatchment PR-6: Overland to West

Runoff = 0.26 cfs @ 12.11 hrs, Volume= 0.023 af, Depth= 1.94"
Routed to Link DP-2 : West Properties

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year 2070 Rainfall=9.70"

Area (sf)	CN	Description
6,182	39	Pasture/grassland/range, Good, HSG A
6,182	39	100.00% Pervious Area

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

Summary for Subcatchment PR-7: HPSP Prop

Runoff = 2.57 cfs @ 12.10 hrs, Volume= 0.225 af, Depth= 3.40"
Routed to Link DP-3 : Simmon's Pond Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year 2070 Rainfall=9.70"

Area (sf)	CN	Adj	Description
6,685	98	98	Unconnected pavement, HSG A
27,900	39	39	>75% Grass cover, Good, HSG A
34,585			Weighted Average
27,900	39	39	80.67% Pervious Area
6,685	98	98	19.33% Impervious Area
6,685			100.00% Unconnected

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

Summary for Subcatchment PR-8: HP Building Area

Runoff = 0.66 cfs @ 12.10 hrs, Volume= 0.057 af, Depth= 3.49"
Routed to Pond P-3 : Infiltration Basin 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year 2070 Rainfall=9.70"

Area (sf)	CN	Adj	Description
1,764	98	98	Unconnected pavement, HSG A
6,839	39	39	>75% Grass cover, Good, HSG A
8,603			Weighted Average
6,839	39	39	79.50% Pervious Area
1,764	98	98	20.50% Impervious Area
1,764			100.00% Unconnected

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

Summary for Subcatchment PR-9: SP Building Area

Runoff = 0.59 cfs @ 12.09 hrs, Volume= 0.051 af, Depth= 5.44"
Routed to Pond P-4 : Infiltration Basin 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year 2070 Rainfall=9.70"

Area (sf)	CN	Description
2,280	98	Unconnected pavement, HSG A
2,623	39	>75% Grass cover, Good, HSG A
4,903		Weighted Average
2,623	39	53.50% Pervious Area
2,280	98	46.50% Impervious Area
2,280		100.00% Unconnected

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

Summary for Pond CB-1: Double Grate CB

Inflow Area = 0.573 ac, 85.20% Impervious, Inflow Depth = 8.35" for 100-Year 2070 event
Inflow = 4.69 cfs @ 12.09 hrs, Volume= 0.399 af
Outflow = 4.69 cfs @ 12.09 hrs, Volume= 0.399 af, Atten= 0%, Lag= 0.0 min
Primary = 4.69 cfs @ 12.09 hrs, Volume= 0.399 af
Routed to Pond P-1 : Infiltration Basin 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 27.56' @ 12.09 hrs
Flood Elev= 30.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	26.50'	**18.0" Round Culvert** L= 162.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 26.50' / 22.40' S= 0.0253 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=4.57 cfs @ 12.09 hrs HW=27.54' TW=21.84' (Dynamic Tailwater)
1=Culvert (Inlet Controls 4.57 cfs @ 3.48 fps)

Summary for Pond P-1: Infiltration Basin 1

Inflow Area = 1.084 ac, 57.04% Impervious, Inflow Depth = 6.29" for 100-Year 2070 event
Inflow = 6.64 cfs @ 12.09 hrs, Volume= 0.568 af
Outflow = 0.31 cfs @ 15.02 hrs, Volume= 0.568 af, Atten= 95%, Lag= 175.9 min
Discarded = 0.31 cfs @ 15.02 hrs, Volume= 0.568 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 23.16' @ 15.02 hrs Surf.Area= 5,539 sf Storage= 12,839 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 422.7 min (1,181.6 - 758.9)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	17,828 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.00	2,590	0	0
24.00	6,324	17,828	17,828

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	23.50'	**12.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.31 cfs @ 15.02 hrs HW=23.16' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.31 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Controls 0.00 cfs)

Summary for Pond P-2: Infiltration Basin 2

Inflow Area = 0.674 ac, 57.91% Impervious, Inflow Depth = 6.43" for 100-Year 2070 event
Inflow = 4.23 cfs @ 12.09 hrs, Volume= 0.362 af
Outflow = 1.78 cfs @ 12.32 hrs, Volume= 0.362 af, Atten= 58%, Lag= 13.5 min
Discarded = 0.14 cfs @ 12.32 hrs, Volume= 0.268 af
Primary = 1.64 cfs @ 12.32 hrs, Volume= 0.094 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 24.30' @ 12.32 hrs Surf.Area= 2,492 sf Storage= 6,504 cf

Plug-Flow detention time= 383.0 min calculated for 0.361 af (100% of inflow)
Center-of-Mass det. time= 383.5 min (1,141.2 - 757.7)

Volume	Invert	Avail.Storage	Storage Description
#1	20.00'	8,348 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.00	530	0	0
25.00	2,809	8,348	8,348

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	24.00'	**4.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.14 cfs @ 12.32 hrs HW=24.30' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=1.62 cfs @ 12.32 hrs HW=24.30' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Weir Controls 1.62 cfs @ 1.34 fps)

Summary for Pond P-3: Infiltration Basin 3

Inflow Area = 0.197 ac, 20.50% Impervious, Inflow Depth = 3.49" for 100-Year 2070 event
Inflow = 0.66 cfs @ 12.10 hrs, Volume= 0.057 af
Outflow = 0.05 cfs @ 14.37 hrs, Volume= 0.057 af, Atten= 93%, Lag= 136.1 min
Discarded = 0.05 cfs @ 14.37 hrs, Volume= 0.057 af
Primary = 0.00 cfs @ 14.37 hrs, Volume= 0.000 af
Routed to Link DP-3 : Simmon's Pond Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 13.99' @ 14.37 hrs Surf.Area= 828 sf Storage= 1,080 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 258.7 min (1,065.2 - 806.5)

Volume	Invert	Avail.Storage	Storage Description
#1	12.00'	1,087 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
12.00	257	0	0
14.00	830	1,087	1,087

Device	Routing	Invert	Outlet Devices
#1	Discarded	12.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	13.99'	**7.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.05 cfs @ 14.37 hrs HW=13.99' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 14.37 hrs HW=13.99' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Weir Controls 0.00 cfs @ 0.13 fps)

Summary for Pond P-4: Infiltration Basin 4

Inflow Area = 0.113 ac, 46.50% Impervious, Inflow Depth = 5.44" for 100-Year 2070 event
Inflow = 0.59 cfs @ 12.09 hrs, Volume= 0.051 af
Outflow = 0.65 cfs @ 12.12 hrs, Volume= 0.051 af, Atten= 0%, Lag= 1.6 min
Discarded = 0.03 cfs @ 12.12 hrs, Volume= 0.036 af
Primary = 0.62 cfs @ 12.12 hrs, Volume= 0.015 af
Routed to Link DP-3 : Simmon's Pond Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 13.59' @ 12.12 hrs Surf.Area= 552 sf Storage= 529 cf

Plug-Flow detention time= 132.2 min calculated for 0.051 af (100% of inflow)
Center-of-Mass det. time= 132.2 min (900.3 - 768.1)

Volume	Invert	Avail.Storage	Storage Description
#1	12.00'	777 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
12.00	112	0	0
14.00	665	777	777

Device	Routing	Invert	Outlet Devices
#1	Discarded	12.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	13.50'	**7.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.03 cfs @ 12.12 hrs HW=13.58' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.55 cfs @ 12.12 hrs HW=13.58' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Weir Controls 0.55 cfs @ 0.94 fps)

Summary for Pond ST-1: Infiltration System 1

Inflow Area = 0.184 ac, 48.61% Impervious, Inflow Depth = 5.60" for 100-Year 2070 event
Inflow = 1.00 cfs @ 12.09 hrs, Volume= 0.086 af
Outflow = 1.01 cfs @ 12.09 hrs, Volume= 0.086 af, Atten= 0%, Lag= 0.1 min
Discarded = 0.02 cfs @ 11.55 hrs, Volume= 0.037 af
Primary = 0.99 cfs @ 12.09 hrs, Volume= 0.049 af
Routed to Link DP-1 : Ben's Pond Wetland Complex
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : Ben's Pond Wetland Complex

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 22.55' @ 12.09 hrs Surf.Area= 329 sf Storage= 391 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 87.3 min (853.4 - 766.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	20.00'	237 cf	**8.17'W x 38.80'L x 2.33'H Field A** 739 cf Overall - 147 cf Embedded = 592 cf x 40.0% Voids
#2A	20.50'	147 cf	**ADS_StormTech SC-310 +Cap** x 10 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 10 Chambers in 2 Rows
#3	22.00'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**
		422 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	20.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	22.00'	**12.0" Round Culvert** L= 60.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 22.00' / 21.50' S= 0.0083 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Secondary	24.90'	**2.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Discarded OutFlow Max=0.02 cfs @ 11.55 hrs HW=22.02' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.97 cfs @ 12.09 hrs HW=22.55' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert** (Barrel Controls 0.97 cfs @ 3.22 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=20.00' TW=0.00' (Dynamic Tailwater)
↑—**3=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Link DP-1: Ben's Pond Wetland Complex

Inflow Area = 3.512 ac, 48.57% Impervious, Inflow Depth = 2.67" for 100-Year 2070 event
Inflow = 8.38 cfs @ 12.09 hrs, Volume= 0.780 af
Primary = 8.38 cfs @ 12.09 hrs, Volume= 0.780 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: West Properties

Inflow Area = 0.142 ac, 0.00% Impervious, Inflow Depth = 1.94" for 100-Year 2070 event
Inflow = 0.26 cfs @ 12.11 hrs, Volume= 0.023 af
Primary = 0.26 cfs @ 12.11 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Simmon's Pond Wetlands

Inflow Area = 1.104 ac, 22.31% Impervious, Inflow Depth = 2.61" for 100-Year 2070 event
Inflow = 3.17 cfs @ 12.11 hrs, Volume= 0.240 af
Primary = 3.17 cfs @ 12.11 hrs, Volume= 0.240 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Appendix D
Stormwater Operation and Maintenance Plan

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KLEINFELDER One Beacon Street, Suite 8100, Boston, MA 02108 p | 617.497.7800 f | 617.498.4630

STORMWATER OPERATION AND MAINTANENCE PLAN (O&M)

Owner/
Operator: Town of Barnstable
Department of Public Works
382 Falmouth Street
Hyannis, MA 02601

Prepared by: Kleinfelder
1 Beacon Street, Suite 8100
Boston, MA 02118

The following operation and maintenance practices will be performed on the proposed stormwater system by the Owner (Town of Millis).

Table OM-1 Summary of Stormwater System Operation & Maintenance Tasks Listed By Item

Item ***location on site***	**Frequency**	**What to do**
Infiltration Basin	1st & 2nd Year Post Construction Every 6 months, and after a major storm Inspection frequency can be reduced to annual following 2nd year post-construction monitoring.	Inspections should focus on: Checking the infiltration basin surface for standing water or accumulated sediments. Checking the sedimentation chamber or forebay for sediment accumulation, trash, and debris. Inspect to be certain the sedimentation forebay drains within 24 to 72 hrs. Checking inlets, outlets, and overflow spillway for blockage, structural integrity, and evidence of erosion. Removal of decaying vegetation, litter, and debris.
Paved surfaces	Every Six Months or as needed	Sweep and remove sediment from paved wearing surfaces at the site.

Table OM-1 – Continued

Riprap Apron at Pressure Relief Outlet and Overflow Weir	Every Six Months, and after major storms	Inspect apron for excessive sediment accumulation, eroding slopes, rilling or gullying, repair and clean as necessary.
	Once every 4 years	The apron should be cleaned of vegetation.
Rip rap aprons *At pipe outlets*	Annually, and after major storms	Inspect aprons after major storm events or at a minimum annually. Repair as necessary.
	Annually	Cleaning and remove debris from apron. Repair as necessary.
Water Conveyance Swales	Semi-annually, and after major storms	Inspect swales after major storm event. Clean debris, and repair as necessary
	Annually	Cleaning and remove debris from swales. Repair as necessary.
Infiltration Chambers	1st & 2nd Year Post Construction Every 6 months, and after a major storm Inspection frequency can be reduced to annual following 2nd year post-construction monitoring.	Inspections should focus on: Checking the infiltration chambers for standing water or accumulated sediments. Checking the inlet basin or forebay for sediment accumulation, trash, and debris. Inspect to be certain the sedimentation forebay drains within 24 to 72 hrs. Checking inlets, and outlets for blockage, structural integrity, and evidence of erosion. Removal of decaying vegetation, litter, and debris.
Catch Basins & Manholes	Every Six Months, and after major storms	Inspect basin for excessive sediment accumulation, trash, and vegetation build up. Remove leaves and trash build up from catch basin grates as necessary. Inspect connected pipes for blockages and structural integrity Remove accumulated sediment, trash, and vegetation from sump.
Pea Stone Diaphragm	Every Six Months, and after major storms	Inspect for sediment accumulation, trash, and vegetation build up.

Table OM-2 Annual Checklist of Stormwater System Operation & Maintenance Tasks Listed By Frequency.

Frequency	**Item** ***location on site***	**What to do**	**Date completed**	**Notes**
Every Six Months	Paved surfaces	Sweep and remove sediment from paved surfaces on a semi-annual basis.		
	Catch Basins, Manholes	Inspect basin for excessive sediment accumulation, trash, and vegetation build up. Remove leaves and trash build up from catch basin grates as necessary. Inspect connected pipes for blockages and structural integrity Remove accumulated sediment, trash, and vegetation from sump.		

	Infiltration Chambers	Inspections should focus on: Check the infiltration chamber surface for standing water and accumulated sediments. Check the inlet basin or forebay for sediment accumulation, trash, and debris. Inspect to be certain the infiltration system drains within 24 to 72 hrs. Check inlets, outlets, and overflow spillway for blockage, structural integrity, and evidence of erosion. Remove decaying vegetation, litter, and debris.		
	Riprap Aprons at Pressure Relief Outlet, Drain Outlet, and Overflow Weir	Inspect riprap aprons and Overflow Weir for excessive sediment accumulation, eroding slopes, rilling or gullying, repair and clean as necessary		

	Pea Stone Diaphragm	Inspect and remove all accumulated sediment and debris.		

♦♦♦ These inspections should also be performed after all major storms (more than 3.5 inches of rain in a 24-hour period).

Table OM-2 - Continued

Frequency	Item location on site	What to do	Date completed	Notes
Every six months	Infiltration Basin	♦♦♦ <u>1st & 2nd Year Post Construction</u> Every 6 months, and after a major storm Inspection frequency can be reduced to annual following 1st and 2nd year post-construction monitoring. Remove any accumulated sediment deposits. Use light equipment to remove top layer without compacting underlying area. Mow the area around the detention basin. Remove all clippings after mowing.		Inspections should focus on: Checking the detention basin surface for standing water and accumulated sediments. Checking the sedimentation chamber or forebay for sediment accumulation, trash, and debris. Inspect to be certain the sedimentation forebay drains within 24 to 72 hrs. Checking inlets, outlets, and overflow spillway for blockage, structural integrity, and evidence of erosion. Removal of decaying vegetation, litter, and debris.

♦♦♦ These inspections should also be performed after all major storms (more than 3.5 inches of rain in a 24-hour period).

STORMWATER MANAGEMENT
LONG TERM POLLUTION PREVENTION PLAN (LTPPP)

Owner/
Operators: Town of Barnstable Department of Public Works
382 Falmouth Street
Hyannis, MA 02601

Prepared by: Kleinfelder
1 Beacon Street, Suite 8100
Boston, MA 02118

A. MATERIALS MANAGEMENT PRACTICES

The following are the material management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff. The Owner and Operator will be responsible for ensuring that these procedures are followed:

1. Good Housekeeping

The following good housekeeping practices will be followed onsite:

a) An effort will be made to store only enough products required to do the job.
b) All materials stored onsite will be stored in a neat, orderly manner and, if possible, under a roof or in a containment area. At a minimum, all containers will be stored with their lids on when not in use. Drip pans shall be provided under all dispensers.
c) Products will be kept in their original containers with the original manufacturer's label in legible condition.
d) Substances will not be mixed with one another unless recommended by the manufacturer.
e) Whenever possible, all of a product will be used up before disposing of the container.
f) Manufacturer’s recommendations for proper use and disposal will be followed.
g) The Operator will be responsible for daily inspections for windblown litter and to ensure proper use and disposal of materials. Collection of all windblown litter will be deposited in an appropriate solid waste container.
h) The Operator will be responsible for periodic street sweeping on an as need basis for all paved wearing surfaces on site. At a minimum sweeping shall be performed on a quarterly basis.

2. Hazardous Substances

These practices will be used to reduce the risks associated with Hazardous Substances. Material Safety Data Sheets (MSDS's) for each product with hazardous properties that is used at the Site will be obtained and used for the proper management of potential wastes that may result from these products. An MSDS will be posted in the immediate area where such product is stored and/or used and another copy of each MSDS will be maintained in the operations office at the Site. Each employee who must handle a Hazardous Substance will be instructed on the use of MSDS sheets for the product he/she is using, particularly regarding spill control techniques.

a) Products will be kept in original containers with the original labels in legible condition.
b) Original labels and MSDS's will be procured and used for each product.
c) If surplus product must be disposed manufacturer's and local/state/federal required methods for proper disposal must be followed.

3. Hazardous Waste

It is imperative that all Hazardous Waste be properly identified and handled in accordance with all applicable Hazardous Waste Standards, including the storage, transport and disposal of the Hazardous Wastes. There are significant penalties for the improper handling of Hazardous Wastes. It is important that the Owner/Operator seeks appropriate assistance in making the determination of whether a substance or material is a Hazardous Waste. For example, Hazardous Waste may include certain Hazardous Substances, as well as pesticides, paints, paint solvents, cleaning solvents, pesticides, contaminated soils, and other materials, substances or chemicals that have been discarded (or are to be discarded) as being out-of-date, contaminated, or otherwise unusable, and can include the containers for those substances; other materials and substances can also be or become Hazardous Wastes, however. The Owner/Operator is also responsible for ensuring that all site personnel are instructed as to these Hazardous Waste requirements and also that the requirements are being followed.

4. Product Specific Practices

The following product specific practices will be followed on the site:

Petroleum Products

All onsite vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers which are clearly labeled. Drip pans shall be provided for all dispensers. Any asphalt substances used onsite will be applied according to the manufacturer's recommendations.

Fertilizers

Fertilizers will be applied only in the minimum amounts recommended by the manufacturer. Fertilizer will not be stored on-site on a long-term basis. All temporary storage of fertilizer will be in a covered container. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.

Paints, Paint Solvents, and Cleaning Solvents.

All containers will be tightly sealed and stored when not in use. Excess paint and solvents will not be discharged to the storm sewer system but will be properly disposed of according to manufacturer's instructions or federal, state, and local regulations.

5. Solid Wastes

All waste materials will be collected and stored in a covered or enclosed containers and/or securely contained metal dumpsters or compactors. The containers will comply with all local and state solid waste management regulations.

B. SPILL PREVENTION

The Owner will train all personnel in the proper handling and cleanup of spilled Hazardous Substances or Oil. No spilled Hazardous Substances or Oil will be allowed to come in contact with stormwater discharges. If such contact occurs, the storm water discharge will be contained on site until appropriate measures in compliance with state and federal regulations are taken to dispose of such contaminated stormwater. It shall be the responsibility of the Owner to be properly trained, and to train all personnel in spill prevention and clean up procedures.

In order to prevent or minimize the potential for a spill of Hazardous Substances or Oil to come into contact with stormwater, the following steps will be implemented:

a) All Hazardous Substances or Oil (such as pesticides, petroleum products, fertilizers, detergents, construction chemicals, acids, paints, paint solvents, and cleaning solvents, etc.) will be stored in a secure location, with their lids on, preferably under cover, when not in use.
b) The minimum practical quantity of all such materials will be kept at the site.
c) A spill control and containment kit (containing, for example, absorbent materials, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) will be provided at the storage site.
d) Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be trained regarding these procedures and the location of the information and cleanup supplies.
e) It is the Operators responsibility to ensure that all Hazardous Waste discovered or generated at the site is disposed of properly by a licensed hazardous material disposal company. The Operator is responsible for not exceeding Hazardous Waste storage requirements mandated by the EPA or state and local authority.

C. SNOW MANAGEMENT

Snow management will be performed by the Barnstable Department of Public Works. Snow will be placed and mounded on site, as necessary. Melting snow will be allowed to percolate through the vegetated surface. In the spring, when all the snow has melted, all accumulated sediment, and debris remaining shall be cleaned and removed from the site.

Appendix E
Water Quality Calculations

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Stage-Area-Storage for Pond P-1: Infiltration Basin 1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
20.00	2,590	0
20.05	2,637	131
20.10	2,683	264
20.15	2,730	399
20.20	2,777	537
20.25	2,823	677
20.30	2,870	819
20.35	2,917	964
20.40	2,963	1,111
20.45	3,010	1,260
20.50	3,057	1,412
20.55	3,103	1,566
20.60	3,150	1,722
20.65	3,197	1,881
20.70	3,243	2,042
20.75	3,290	2,205
20.80	3,337	2,371
20.85	3,383	2,539
20.90	3,430	2,709
20.95	3,477	2,882
21.00	3,524	3,057
21.05	3,570	3,234
21.10	3,617	3,414
21.15	3,664	3,596
21.20	3,710	3,780
21.25	3,757	3,967
21.30	3,804	4,156
21.35	3,850	4,347
21.40	3,897	4,541
21.45	3,944	4,737
21.50	3,990	4,935
21.55	4,037	5,136
21.60	4,084	5,339
21.65	4,130	5,544
21.70	4,177	5,752
21.75	4,224	5,962
21.80	4,270	6,174
21.85	4,317	6,389
21.90	4,364	6,606
21.95	4,410	6,825
22.00	4,457	7,047
22.05	4,504	7,271
22.10	4,550	7,497
22.15	4,597	7,726
22.20	4,644	7,957
22.25	4,690	8,190
22.30	4,737	8,426
22.35	4,784	8,664
22.40	4,830	8,904
22.45	4,877	9,147
22.50	4,924	9,392
22.55	4,970	9,640
22.60	5,017	9,889
22.65	5,064	10,141
22.70	5,110	10,396
22.75	5,157	10,652
22.80	5,204	10,911
22.85	5,250	11,173
22.90	5,297	11,436
22.95	5,344	11,702
23.00	5,391	11,971
23.05	5,437	12,241
23.10	5,484	12,514
23.15	5,531	12,790
23.20	5,577	13,068
23.25	5,624	13,348
23.30	5,671	13,630
23.35	5,717	13,915
23.40	5,764	14,202
23.45	5,811	14,491
23.50	5,857	14,783
23.55	5,904	15,077
23.60	5,951	15,373
23.65	5,997	15,672
23.70	6,044	15,973
23.75	6,091	16,276
23.80	6,137	16,582
23.85	6,184	16,890
23.90	6,231	17,200
23.95	6,277	17,513
24.00	**6,324**	**17,828**

26,927 square feet of impervious area are tributary to this basin.

WQv = 26,927 * (1/12)ft = 2,243.9 cu ft.

Recharge = 26927*(1/12)ft*0.6=1,346.35 cu ft

Storage elevations for each value are highlighted in the table above.

Stage-Area-Storage for Pond P-2: Infiltration Basin 2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
20.00	530	0
20.05	553	27
20.10	576	55
20.15	598	85
20.20	621	115
20.25	644	147
20.30	667	180
20.35	690	213
20.40	712	248
20.45	735	285
20.50	758	322
20.55	781	360
20.60	803	400
20.65	826	441
20.70	849	483
20.75	872	526
20.80	895	570
20.85	917	615
20.90	940	662
20.95	963	709
21.00	986	758
21.05	1,009	808
21.10	1,031	859
21.15	1,054	911
21.20	1,077	964
21.25	1,100	1,019
21.30	1,123	1,074
21.35	1,145	1,131
21.40	1,168	1,189
21.45	1,191	1,248
21.50	1,214	1,308
21.55	1,236	1,369
21.60	1,259	1,431
21.65	1,282	1,495
21.70	1,305	1,560
21.75	1,328	1,625
21.80	1,350	1,692
21.85	1,373	1,760
21.90	1,396	1,830
21.95	1,419	1,900
22.00	1,442	1,972
22.05	1,464	2,044
22.10	1,487	2,118
22.15	1,510	2,193
22.20	1,533	2,269
22.25	1,556	2,346
22.30	1,578	2,425
22.35	1,601	2,504
22.40	1,624	2,585
22.45	1,647	2,666
22.50	1,670	2,749
22.55	1,692	2,833
22.60	1,715	2,919
22.65	1,738	3,005
22.70	1,761	3,092
22.75	1,783	3,181
22.80	1,806	3,271
22.85	1,829	3,362
22.90	1,852	3,454
22.95	1,875	3,547
23.00	1,897	3,641
23.05	1,920	3,737
23.10	1,943	3,833
23.15	1,966	3,931
23.20	1,989	4,030
23.25	2,011	4,130
23.30	2,034	4,231
23.35	2,057	4,333
23.40	2,080	4,437
23.45	2,103	4,541
23.50	2,125	4,647
23.55	2,148	4,754
23.60	2,171	4,862
23.65	2,194	4,971
23.70	2,216	5,081
23.75	2,239	5,192
23.80	2,262	5,305
23.85	2,285	5,419
23.90	2,308	5,533
23.95	2,330	5,649
24.00	2,353	5,766
24.05	2,376	5,885
24.10	2,399	6,004
24.15	2,422	6,125
24.20	2,444	6,246
24.25	2,467	6,369
24.30	2,490	6,493
24.35	2,513	6,618
24.40	2,536	6,744
24.45	2,558	6,871
24.50	2,581	7,000
24.55	2,604	7,130
24.60	2,627	7,260
24.65	2,649	7,392
24.70	2,672	7,525
24.75	2,695	7,659
24.80	2,718	7,795
24.85	2,741	7,931
24.90	2,763	8,069
24.95	2,786	8,208
25.00	**2,809**	**8,348**

17,010 square feet of impervious area are tributary to this basin.

WQv
= 17,010 * (1/12)ft
= 1,417.5 cu ft.

Recharge
=17,010*(1/12)ft*0.6
=850.5 cu ft

Storage elevations for each value are highlighted in the table above.

Stage-Area-Storage for Pond P-3: Infiltration Basin 3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
12.00	257	0
12.02	263	5
12.04	268	11
12.06	274	16
12.08	280	21
12.10	286	27
12.12	291	33
12.14	297	39
12.16	303	45
12.18	309	51
12.20	314	57
12.22	320	63
12.24	326	70
12.26	331	77
12.28	337	83
12.30	343	90
12.32	349	97
12.34	354	104
12.36	360	111
12.38	366	118
12.40	372	126
12.42	377	133
12.44	383	141
12.46	389	149
12.48	395	156
12.50	400	164
12.52	406	172
12.54	412	181
12.56	417	189
12.58	423	197
12.60	429	206
12.62	435	214
12.64	440	223
12.66	446	232
12.68	452	241
12.70	458	250
12.72	463	259
12.74	469	269
12.76	475	278
12.78	480	288
12.80	486	297
12.82	492	307
12.84	498	317
12.86	503	327
12.88	509	337
12.90	515	347
12.92	521	358
12.94	526	368
12.96	532	379
12.98	538	389
13.00	544	400
13.02	549	411
13.04	555	422
13.06	561	433
13.08	566	445
13.10	572	456
13.12	578	468
13.14	584	479
13.16	589	491
13.18	595	503
13.20	601	515
13.22	607	527
13.24	612	539
13.26	618	551
13.28	624	564
13.30	629	576
13.32	635	589
13.34	641	602
13.36	647	614
13.38	652	627
13.40	658	641
13.42	664	654
13.44	670	667
13.46	675	681
13.48	681	694
13.50	687	708
13.52	692	722
13.54	698	736
13.56	704	750
13.58	710	764
13.60	715	778
13.62	721	792
13.64	727	807
13.66	733	821
13.68	738	836
13.70	744	851
13.72	750	866
13.74	756	881
13.76	761	896
13.78	767	911
13.80	773	927
13.82	778	942
13.84	784	958
13.86	790	974
13.88	796	989
13.90	801	1,005
13.92	807	1,022
13.94	813	1,038
13.96	819	1,054
13.98	824	1,070
14.00	**830**	**1,087**

1,764 square feet of impervious area are tributary to this basin.

WQv
= 1,764 * (1/12)ft
= 147 cu ft.

Recharge
=1,764*(1/12)ft*0.6
=88.2 cu ft

Storage elevations for each value are highlighted in the table above.

Stage-Area-Storage for Pond P-4: Infiltration Basin 4

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
12.00	112	0
12.02	118	2
12.04	123	5
12.06	129	7
12.08	134	10
12.10	140	13
12.12	145	15
12.14	151	18
12.16	156	21
12.18	162	25
12.20	167	28
12.22	173	31
12.24	178	35
12.26	184	38
12.28	189	42
12.30	195	46
12.32	200	50
12.34	206	54
12.36	212	58
12.38	217	63
12.40	223	67
12.42	228	71
12.44	234	76
12.46	239	81
12.48	245	86
12.50	250	91
12.52	256	96
12.54	261	101
12.56	267	106
12.58	272	111
12.60	278	117
12.62	283	123
12.64	289	128
12.66	294	134
12.68	300	140
12.70	306	146
12.72	311	152
12.74	317	159
12.76	322	165
12.78	328	171
12.80	333	178
12.82	339	185
12.84	344	192
12.86	350	199
12.88	355	206
12.90	361	213
12.92	366	220
12.94	372	227
12.96	377	235
12.98	383	243
13.00	389	250
13.02	394	258
13.04	400	266
13.06	405	274
13.08	411	282
13.10	416	290
13.12	422	299
13.14	427	307
13.16	433	316
13.18	438	325
13.20	444	333
13.22	449	342
13.24	455	351
13.26	460	361
13.28	466	370
13.30	471	379
13.32	477	389
13.34	483	398
13.36	488	408
13.38	494	418
13.40	499	428
13.42	505	438
13.44	510	448
13.46	516	458
13.48	521	469
13.50	527	479
13.52	532	490
13.54	538	500
13.56	543	511
13.58	549	522
13.60	554	533
13.62	560	544
13.64	565	556
13.66	571	567
13.68	577	578
13.70	582	590
13.72	588	602
13.74	593	613
13.76	599	625
13.78	604	637
13.80	610	650
13.82	615	662
13.84	621	674
13.86	626	687
13.88	632	699
13.90	637	712
13.92	643	725
13.94	648	738
13.96	654	751
13.98	659	764
14.00	**665**	**777**

2,280 square feet of impervious area are tributary to this basin.

WQv
= 2,280 * (1/12)ft
= 190 cu ft.

Recharge
=2,280*(1/12)ft*0.6
=114 cu ft

Storage elevations for each value are highlighted in the table above.

Stage-Area-Storage for Pond ST-1: Infiltration System 1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
20.00	317	0
20.05	317	6
20.10	317	13
20.15	317	19
20.20	317	25
20.25	317	32
20.30	317	38
20.35	317	44
20.40	317	51
20.45	317	57
20.50	317	63
20.55	317	75
20.60	317	86
20.65	317	98
20.70	317	109
20.75	317	120
20.80	317	131
20.85	317	142
20.90	317	153
20.95	317	164
21.00	317	175
21.05	317	185
21.10	317	196
21.15	317	206
21.20	317	216
21.25	317	226
21.30	317	236
21.35	317	245
21.40	317	255
21.45	317	264
21.50	317	272
21.55	317	281
21.60	317	289
21.65	317	296
21.70	317	303
21.75	317	310
21.80	317	317
21.85	317	323
21.90	317	329
21.95	317	336
22.00	**329**	342
22.05	329	349
22.10	329	356
22.15	329	363
22.20	329	370
22.25	329	377
22.30	329	384
22.35	329	389
22.40	329	389
22.45	329	390
22.50	329	390
22.55	329	391
22.60	329	392
22.65	329	392
22.70	329	393
22.75	329	394
22.80	329	394
22.85	329	395
22.90	329	396
22.95	329	396
23.00	329	397
23.05	329	397
23.10	329	398
23.15	329	399
23.20	329	399
23.25	329	400
23.30	329	401
23.35	329	401
23.40	329	402
23.45	329	402
23.50	329	403
23.55	329	404
23.60	329	404
23.65	329	405
23.70	329	406
23.75	329	406
23.80	329	407
23.85	329	407
23.90	329	408
23.95	329	409
24.00	329	409
24.05	329	410
24.10	329	411
24.15	329	411
24.20	329	412
24.25	329	412
24.30	329	413
24.35	329	414
24.40	329	414
24.45	329	415
24.50	329	416
24.55	329	416
24.60	329	417
24.65	329	417
24.70	329	418
24.75	329	419
24.80	329	419
24.85	329	420
24.90	329	421
24.95	329	421
25.00	329	**422**

3,892 square feet of impervious area are tributary to this basin.

WQv
= 3,982 * (1/12)ft
= 324.3 cu ft.

Recharge
=3,892*(1/12)ft*0.6
=194.6 cu ft

Storage elevations for each value are highlighted in the table above.

Appendix F
Project Data: NOAA Rainfall and NRCS Web Soil Survey

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NOAA Atlas 14, Volume 10, Version 3
Location name: Barnstable Town, Massachusetts, USA*
Latitude: 41.6437°, Longitude: -70.3075°
Elevation: 29 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.267** (0.219-0.324)	**0.337** (0.276-0.410)	**0.452** (0.370-0.551)	**0.549** (0.445-0.673)	**0.681** (0.530-0.879)	**0.779** (0.593-1.03)	**0.884** (0.650-1.22)	**1.01** (0.690-1.41)	**1.20** (0.782-1.74)	**1.36** (0.863-2.01)
10-min	**0.378** (0.310-0.459)	**0.478** (0.392-0.581)	**0.642** (0.524-0.783)	**0.777** (0.630-0.954)	**0.964** (0.751-1.24)	**1.10** (0.839-1.46)	**1.25** (0.921-1.73)	**1.43** (0.976-2.00)	**1.70** (1.11-2.46)	**1.93** (1.22-2.85)
15-min	**0.444** (0.365-0.539)	**0.562** (0.461-0.683)	**0.755** (0.616-0.921)	**0.914** (0.741-1.12)	**1.13** (0.884-1.46)	**1.30** (0.987-1.72)	**1.47** (1.08-2.03)	**1.68** (1.15-2.35)	**2.00** (1.30-2.90)	**2.27** (1.44-3.35)
30-min	**0.660** (0.542-0.801)	**0.830** (0.680-1.01)	**1.11** (0.904-1.35)	**1.34** (1.08-1.64)	**1.66** (1.29-2.14)	**1.89** (1.44-2.50)	**2.15** (1.58-2.96)	**2.45** (1.67-3.42)	**2.92** (1.90-4.22)	**3.31** (2.10-4.89)
60-min	**0.875** (0.718-1.06)	**1.10** (0.900-1.33)	**1.46** (1.19-1.78)	**1.76** (1.43-2.16)	**2.18** (1.70-2.81)	**2.49** (1.89-3.29)	**2.82** (2.08-3.89)	**3.22** (2.20-4.50)	**3.83** (2.49-5.54)	**4.35** (2.75-6.42)
2-hr	**1.23** (1.02-1.48)	**1.53** (1.26-1.84)	**2.01** (1.65-2.44)	**2.41** (1.97-2.94)	**2.97** (2.33-3.80)	**3.38** (2.59-4.43)	**3.82** (2.84-5.23)	**4.36** (3.00-6.02)	**5.18** (3.41-7.41)	**5.89** (3.77-8.57)
3-hr	**1.47** (1.22-1.77)	**1.81** (1.50-2.18)	**2.37** (1.96-2.86)	**2.83** (2.32-3.44)	**3.47** (2.74-4.42)	**3.94** (3.04-5.14)	**4.46** (3.33-6.05)	**5.07** (3.52-6.96)	**6.01** (3.98-8.52)	**6.81** (4.39-9.84)
6-hr	**1.93** (1.61-2.30)	**2.34** (1.95-2.80)	**3.02** (2.51-3.61)	**3.58** (2.95-4.31)	**4.35** (3.46-5.48)	**4.92** (3.82-6.34)	**5.54** (4.16-7.41)	**6.26** (4.39-8.49)	**7.35** (4.92-10.3)	**8.26** (5.38-11.8)
12-hr	**2.42** (2.03-2.86)	**2.89** (2.43-3.43)	**3.66** (3.06-4.36)	**4.30** (3.58-5.15)	**5.19** (4.15-6.46)	**5.85** (4.57-7.43)	**6.55** (4.94-8.60)	**7.34** (5.20-9.82)	**8.48** (5.74-11.7)	**9.42** (6.21-13.2)
24-hr	**2.87** (2.43-3.38)	**3.39** (2.87-4.00)	**4.24** (3.57-5.01)	**4.95** (4.14-5.87)	**5.92** (4.76-7.28)	**6.65** (5.22-8.34)	**7.41** (5.61-9.58)	**8.24** (5.90-10.9)	**9.39** (6.44-12.8)	**10.3** (6.88-14.3)
2-day	**3.27** (2.79-3.82)	**3.83** (3.26-4.48)	**4.73** (4.01-5.55)	**5.48** (4.62-6.46)	**6.51** (5.28-7.93)	**7.30** (5.78-9.04)	**8.10** (6.18-10.3)	**8.96** (6.49-11.7)	**10.1** (7.02-13.6)	**11.1** (7.46-15.1)
3-day	**3.55** (3.04-4.13)	**4.11** (3.51-4.79)	**5.03** (4.28-5.87)	**5.79** (4.90-6.79)	**6.84** (5.57-8.29)	**7.64** (6.07-9.41)	**8.46** (6.49-10.7)	**9.32** (6.80-12.1)	**10.5** (7.34-14.0)	**11.5** (7.78-15.5)
4-day	**3.79** (3.25-4.39)	**4.35** (3.73-5.05)	**5.28** (4.50-6.14)	**6.04** (5.12-7.06)	**7.10** (5.80-8.57)	**7.90** (6.31-9.69)	**8.72** (6.72-11.0)	**9.60** (7.03-12.4)	**10.8** (7.60-14.4)	**11.8** (8.05-15.9)
7-day	**4.42** (3.81-5.10)	**4.99** (4.30-5.76)	**5.93** (5.09-6.86)	**6.71** (5.72-7.80)	**7.78** (6.40-9.32)	**8.60** (6.91-10.5)	**9.43** (7.32-11.8)	**10.3** (7.62-13.2)	**11.5** (8.16-15.1)	**12.5** (8.60-16.7)
10-day	**5.02** (4.34-5.77)	**5.61** (4.85-6.45)	**6.58** (5.67-7.59)	**7.38** (6.32-8.55)	**8.49** (7.02-10.1)	**9.34** (7.54-11.3)	**10.2** (7.94-12.6)	**11.1** (8.24-14.1)	**12.3** (8.78-16.0)	**13.3** (9.20-17.6)
20-day	**6.83** (5.96-7.80)	**7.52** (6.55-8.59)	**8.65** (7.51-9.90)	**9.59** (8.27-11.0)	**10.9** (9.05-12.8)	**11.9** (9.65-14.2)	**12.9** (10.1-15.7)	**13.8** (10.4-17.3)	**15.0** (10.9-19.3)	**15.9** (11.2-20.8)
30-day	**8.40** (7.36-9.55)	**9.18** (8.03-10.4)	**10.5** (9.11-11.9)	**11.5** (9.98-13.2)	**13.0** (10.8-15.2)	**14.1** (11.5-16.7)	**15.2** (11.9-18.3)	**16.2** (12.3-20.2)	**17.5** (12.7-22.3)	**18.4** (13.0-23.7)
45-day	**10.4** (9.17-11.8)	**11.3** (9.94-12.8)	**12.8** (11.2-14.5)	**14.0** (12.2-15.9)	**15.6** (13.1-18.2)	**17.0** (13.9-19.9)	**18.2** (14.3-21.7)	**19.3** (14.7-23.8)	**20.6** (15.1-26.0)	**21.5** (15.3-27.5)
60-day	**12.2** (10.7-13.7)	**13.2** (11.6-14.9)	**14.8** (13.0-16.7)	**16.1** (14.0-18.3)	**17.9** (15.1-20.7)	**19.4** (15.9-22.7)	**20.7** (16.4-24.6)	**21.9** (16.8-26.9)	**23.3** (17.1-29.2)	**24.2** (17.3-30.8)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

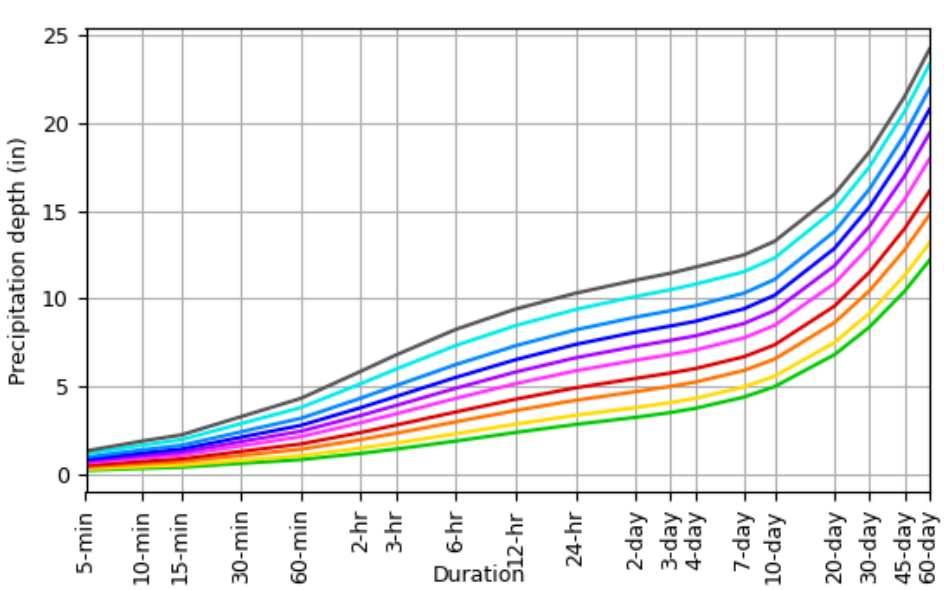
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

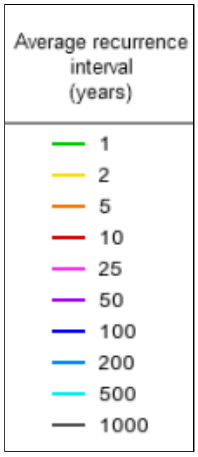
Please refer to NOAA Atlas 14 document for more information.

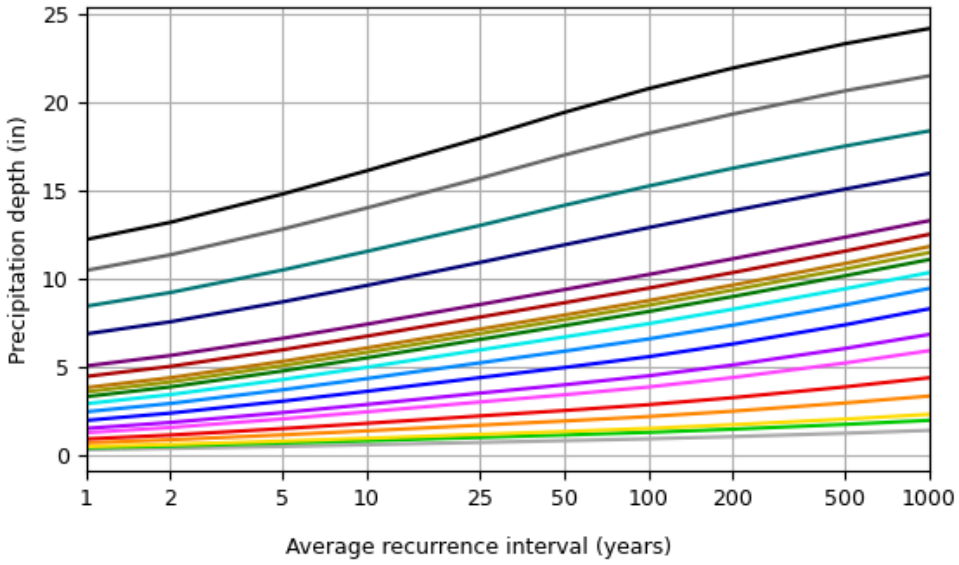
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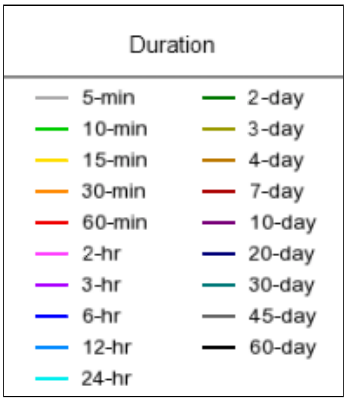
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 41.6437°, Longitude: -70.3075°









NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Wed Nov 13 20:46:36 2024

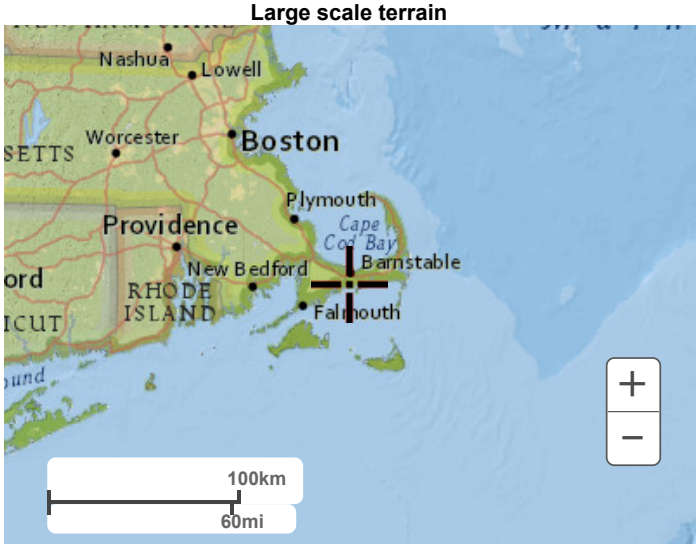
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Maps & aerials

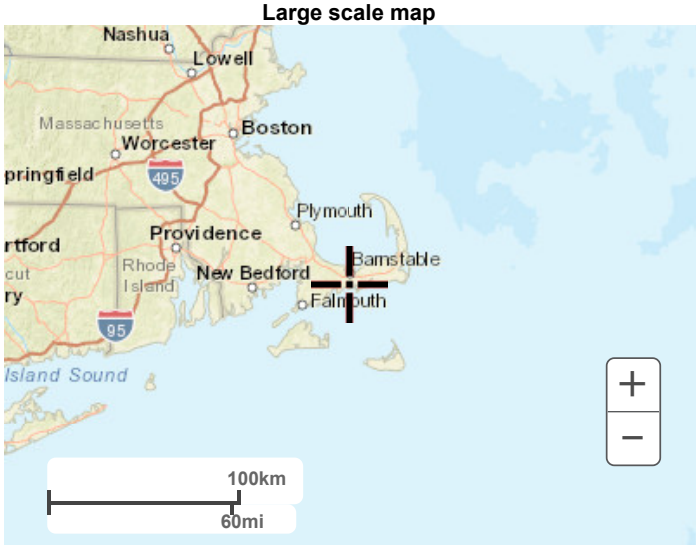
Small scale terrain



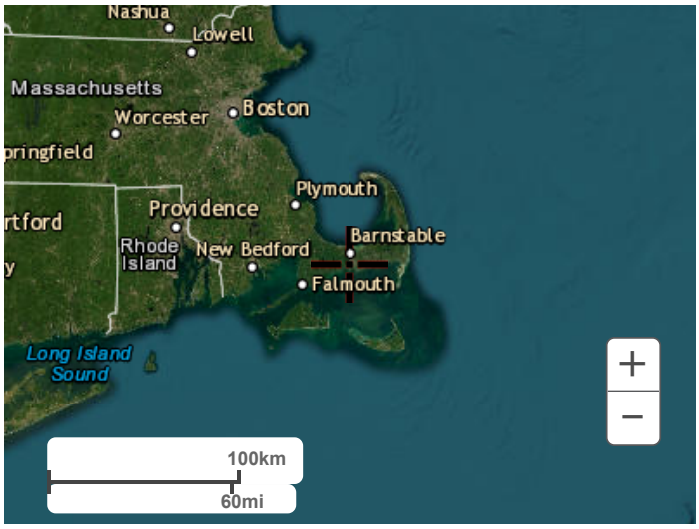
Large scale terrain



Large scale map



Large scale aerial

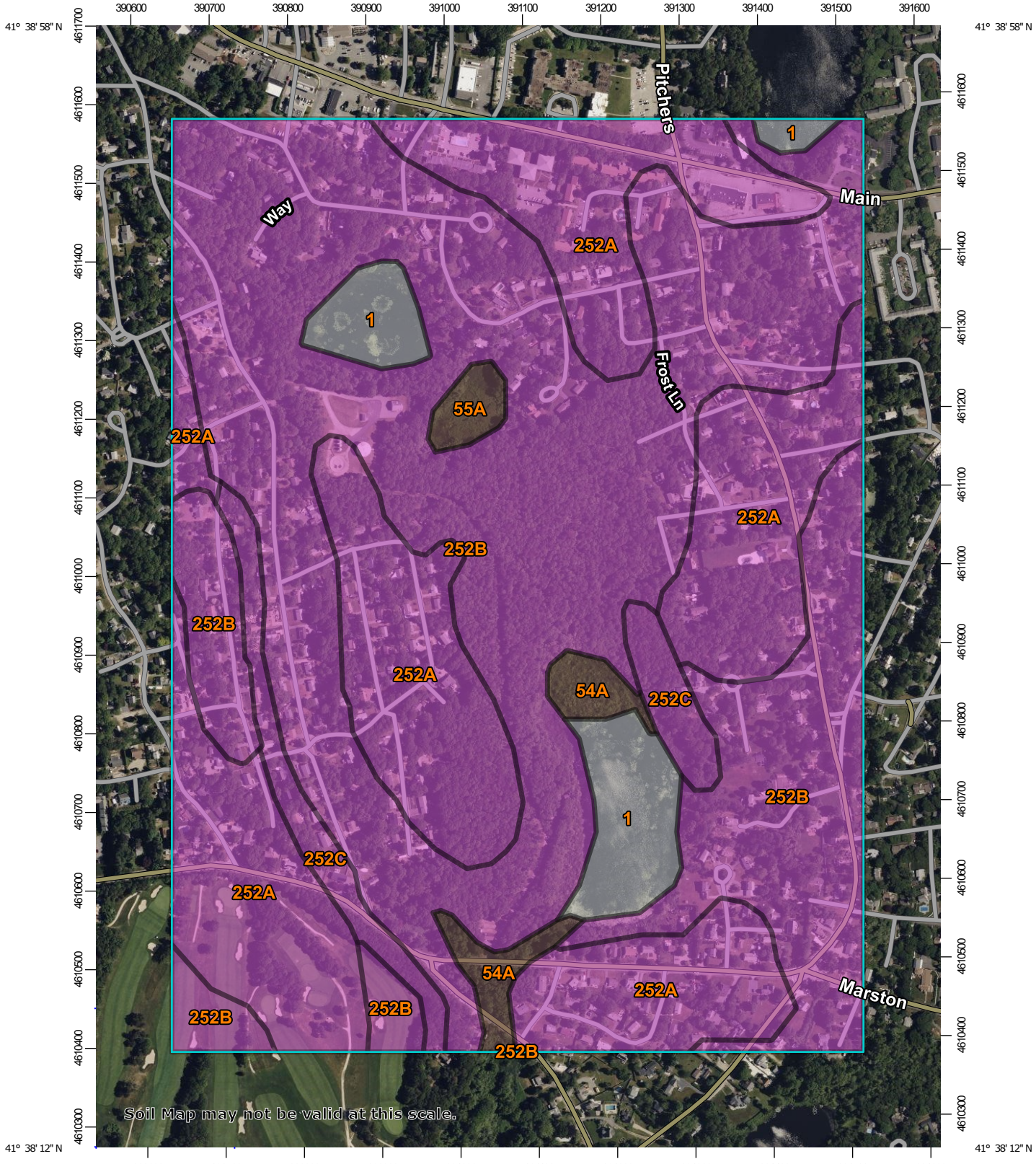


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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Hydrologic Soil Group—Barnstable County, Massachusetts
(Straightway Water Treatment Facility HSG MAP)



Map Scale: 1:6,950 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 300 600 1200 1800

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Barnstable County, Massachusetts
Survey Area Data: Version 23, Sep 17, 2024

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

Date(s) aerial images were photographed: Jun 10, 2022—Jun 30, 2022

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		11.6	4.5%
54A	Freetown and Swansea mucks, coastal lowland, 0 to 1 percent slopes	B/D	4.6	1.8%
55A	Freetown coarse sand, 0 to 3 percent slopes, sanded surface	B/D	1.9	0.7%
252A	Carver coarse sand, 0 to 3 percent slopes	A	85.1	32.7%
252B	Carver coarse sand, 3 to 8 percent slopes	A	147.4	56.7%
252C	Carver coarse sand, 8 to 15 percent slopes	A	9.5	3.6%
Totals for Area of Interest			**260.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix G
Boring Logs

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DRILLING METHOD/SAMPLER TYPE GRAPHICS



STANDARD PENETRATION SPLIT SPOON SAMPLER (2 in. (50.8 mm.) outer diameter and 1-3/8 in. (34.9 mm.) inner diameter)

VacTruck

GROUND WATER GRAPHICS

- WATER LEVEL (level where first observed)
- WATER LEVEL (level after stabilizing period)
- WATER LEVEL (additional levels after exploration)
- OBSERVED SEEPAGE

NOTES

- The report and graphics key are an integral part of these logs. All data and interpretations in this log are subject to the explanations and limitations stated in the report.
- Solid lines separating strata on the logs represent approximate boundaries only, dashed lines are inferred or extrapolated boundaries. Actual transitions may be gradual or differ from those represented.
- No warranty is provided as to the continuity of soil or rock conditions between individual sample locations.
- Logs represent general soil or rock conditions observed at the point of exploration on the date indicated.
- In general, Unified Soil Classification System (ASTM D2488/D2487) designations presented on the logs were based on visual classification in the field and were modified where appropriate based on gradation and index property testing.
- Fine grained soils that plot within the hatched area on the Plasticity Chart, and coarse grained soils with between 5% and 12% passing the No. 200 sieve require dual USCS symbols, ie., CL-ML, GW-GM, GP-GM, GW-GC, GP-GC, GC-GM, SW-SM, SP-SM, SW-SC, SP-SC, SC-SM.
- If sampler is not able to be driven at least 6 inches then 50/X indicates number of blows required to drive the identified sampler X inches with a 140 pound hammer falling 30 inches.

ABBREVIATIONS

C_u - Coefficients of Uniformity
C_c - Coefficients of Curvature
WOH - Weight of Hammer
WOR - Weight of Rod

REFERENCES

1. American Society for Materials and Testing (ASTM), 2011, ASTM D2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System).

UNIFIED SOIL CLASSIFICATION SYSTEM[1]

COARSE GRAINED SOILS (More than 50% retained on No. 200 Sieve)	**GRAVELS** (More than 50% of coarse fraction retained on No. 4 Sieve)	CLEAN GRAVEL WITH <5% FINES		**GW**	WELL-GRADED GRAVEL, WELL-GRADED GRAVEL WITH SAND
				**GP**	POORLY GRADED GRAVEL, POORLY GRADED GRAVEL WITH SAND
		GRAVELS WITH 5% TO 12% FINES		**GW-GM**	WELL-GRADED GRAVEL WITH SILT, WELL-GRADED GRAVEL WITH SILT AND SAND
				**GW-GC**	WELL-GRADED GRAVEL WITH CLAY (OR SILTY CLAY), WELL-GRADED GRAVEL WITH CLAY AND SAND (OR SILT CLAY AND SAND)
				**GP-GM**	POORLY GRADED GRAVEL WITH SILT, POORLY GRADED GRAVEL WITH SILT AND SAND
				**GP-GC**	POORLY GRADED GRAVEL WITH CLAY (OR SILTY CLAY), POORLY GRADED GRAVEL WITH CLAY AND (OR SILTY CLAY AND SAND)
		GRAVELS WITH > 12% FINES		**GM**	SILTY GRAVEL, SILTY GRAVEL WITH SAND
				**GC**	CLAYEY GRAVEL, CLAYEY GRAVEL WITH SAND
				**GC-GM**	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL WITH SAND
	SANDS (50% or more of coarse fraction passes the No. 4 Sieve)	CLEAN SANDS WITH <5% FINES		**SW**	WELL-GRADED SAND, WELL-GRADED SAND WITH GRAVEL
				**SP**	POORLY GRADED SAND, POORLY GRADED SAND WITH GRAVEL
		SANDS WITH 5% TO 12% FINES		**SW-SM**	WELL-GRADED SAND WITH SILT, WELL-GRADED SAND WITH SILT AND GRAVEL
				**SW-SC**	WELL-GRADED SAND WITH CLAY (OR SILTY CLAY), WELL-GRADED SAND WITH CLAY AND GRAVEL (OR SILTY CLAY AND GRAVEL)
				**SP-SM**	POORLY GRADED SAND WITH SILT, POORLY GRADED SAND WITH SILT AND GRAVEL
				**SP-SC**	POORLY GRADED SAND WITH CLAY, POORLY GRADED SAND WITH CLAY AND GRAVEL (OR SILTY CLAY AND GRAVEL)
		SANDS WITH > 12% FINES		**SM**	SILTY SAND, SILTY SAND WITH GRAVEL
				**SC**	CLAYEY SAND, CLAYEY SAND WITH GRAVEL
				**SC-SM**	SILTY, CLAYEY SAND, SILTY, CLAYEY SAND WITH GRAVEL
FINE GRAINED SOILS (50% or more passes the No. #200 sieve)	SILTS AND CLAYS (Liquid Limit less than 50)			**ML**	SILT, SILT WITH SAND, SILT WITH GRAVEL
				CL	LEAN CLAY, LEAN CLAY WITH SAND, LEAN CLAY WITH GRAVEL
				CL-ML	SILTY CLAY, SILTY CLAY WITH SAND, SILTY CLAY WITH GRAVEL
				OL	ORGANIC CLAY, ORGANIC CLAY WITH SAND, ORGANIC CLAY WITH GRAVEL, ORGANIC SILT, ORGANIC SILT WITH SAND, ORGANIC SILT WITH GRAVEL
	SILTS AND CLAYS (Liquid Limit 50 or greater)			**MH**	ELASTIC SILT. ELASTIC SILT WITH SAND, ELASTIC SILT WITH GRAVEL
				CH	FAT CLAY, FAT CLAY WITH SAND, FAT CLAY WITH GRAVEL
				OH	ORGANIC CLAY, ORGANIC CLAY WITH SAND, ORGANIC CLAY WITH GRAVEL, ORGANIC SILT, ORGANIC SILT WITH SAND, ORGANIC SILT WITH GRAVEL

NOTE: USE MATERIAL DESCRIPTION ON THE LOG TO DEFINE A GRAPHIC THAT MAY NOT BE PROVIDED ON THIS LEGEND.

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.: 24003062.001A
DRAWN BY: SP
CHECKED BY: BGS
DATE: 4/19/2024

GRAPHICS KEY

W Barnstable Straightway Water Treatment Facility
228 Straightway/132 Smith Street
Barnstable, MA

PLOTTED: 05/21/2024 03:49 PM BY: SPanda
PROJECT NUMBER: 24003062.001A OFFICE FILTER: BOSTON
gINT FILE: Klf_gint_master_2024 gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2024.GLB [_KLF_GEO_LEG1_GRAPHICS_KEY_W_USCS]

GRAIN SIZE[1]

DESCRIPTION		SIEVE SIZE	GRAIN SIZE
Boulders		>12 in.	>12 in. (304.8 mm.)
Cobbles		3 - 12 in.	3 - 12 in. (76.2 - 304.8 mm.)
Gravel	coarse	3/4 -3 in.	3/4 -3 in. (19 - 76.2 mm.)
	fine	#4 - 3/4 in.	0.19 - 0.75 in. (4.8 - 19 mm.)
Sand	coarse	#10 - #4	0.079 - 0.19 in. (2 - 4.9 mm.)
	medium	#40 - #10	0.017 - 0.079 in. (0.43 - 2 mm.)
	fine	#200 - #40	0.0029 - 0.017 in. (0.07 - 0.43 mm.)
Fines		Passing #200	<0.0029 in. (<0.07 mm.)

SECONDARY CONSTITUENT[1]

Term of Use	AMOUNT	
	Secondary Constituent is Fine Grained	Secondary Constituent is Coarse Grained
Trace	<5%	<15%
With	≥5 to <15%	≥15 to <30%
Modifier	≥15%	≥30%

PLASTICITY[1]

DESCRIPTION	CRITERIA
Non-Plastic	A 1/8 in. (3 mm) thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

MOISTURE CONTENT[1]

DESCRIPTION	FIELD TEST
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

CONSISTENCY - FINE-GRAINED SOIL[2, 3]

CONSISTENCY	SPT - N (# blows / ft)	Pocket Pen (tsf)	UNCONFINED COMPRESSIVE STRENGTH (Q_u)(psf)	VISUAL / MANUAL CRITERIA
Very Soft	<2	PP < 0.25	<500	Easily penetrated several inches by fist
Soft	2 - 4	0.25 ≤ PP <0.5	500 - 1,000	Easily penetrated several inches by thumb
Medium Stiff	4 - 8	0.5 ≤ PP <1	1,000 - 2,000	Can be penetrated several inches by thumb with moderate effort
Stiff	8 - 15	1 ≤ PP <2	2,000 - 4,000	Readily indented by thumb but penetrated only with great effort
Very Stiff	15 - 30	2 ≤ PP <4	4,000 - 8,000	Readily indented by thumbnail
Hard	>30	4 ≤ PP	>8,000	Indented by thumbnail with difficulty

APPARENT DENSITY - COARSE-GRAINED SOIL[2]

APPARENT DENSITY	SPT-N (# blows / ft)
Very Loose	<4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	>50

STRUCTURE[1]

DESCRIPTION	CRITERIA
Stratified	Alternating layers of varying material or color with layers at least 1/4-in. (6mm) thick, note thickness.
Laminated	Alternating layers of varying material or color with the layers less than 1/4-in. (6 mm) thick, note thickness.
Fissured	Breaks along definite planes of fracture with little resistance to fracturing.
Slickensided	Fracture planes appear polished or glossy, sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay; note thickness.
Homogeneous	Same color and appearance throughout

ANGULARITY[1]

DESCRIPTION	CRITERIA
Angular	Particles have sharp edges and relatively plane sides with unpolished surfaces.
Subangular	Particles are similar to angular description but have rounded edges.
Subrounded	Particles have nearly plane sides but have well-rounded corners and edges.
Rounded	Particles have smoothly curved sides and no edges.

REACTION WITH HYDROCHLORIC ACID[1]

DESCRIPTION	FIELD TEST
None	No visible reaction
Weak	Some reaction, with bubbles forming slowly
Strong	Violent reaction, with bubbles forming immediately

CEMENTATION[1]

DESCRIPTION	FIELD TEST
Weakly	Crumbles or breaks with handling or little finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumble or break with finger pressure

REFERENCES

1. American Society for Materials and Testing (ASTM), 2017, ASTM D2488: Standard Practice for Description and Identification of Soils (Visual Manual Procedures).
2. Terzaghi, K and Peck, R., 1948, Soil Mechanics in Engineering Practice, John Wiley & Sons, New York.
3. United States Department of the Interior Bureau of Reclamation (USBR), 1998, Earth Manual, Part I.

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PROJECT NO.: 24003062.001A
DRAWN BY: SP
CHECKED BY: BGS
DATE: 4/19/2024

SOIL DESCRIPTION KEY
(For additional tables, see ASTM D2488)

W Barnstable Straightway Water Treatment Facility
228 Straightway/132 Smith Street
Barnstable, MA

PLOTTED: 05/21/2024 03:49 PM BY: SPanda
OFFICE FILTER: BOSTON
PROJECT NUMBER: 24003062.001A
gINT FILE: Klf_gint_master_2024
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2024.GLB [KLF_GEO_LEG2_SOIL_DESC_KEY]

PLOTTED: 05/21/2024 03:45 PM BY: SPanda

BORING LOG B-1

Date Begin - End:	4/15/2024 - 4/15/2024	**Drilling Company:**	Geologic Earth Explorations		
Logged By:	S. Panda/T. Templeton	**Drill Crew:**	T. Gernier/M. Jimmy		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	VacTruck FX50/Acker Soil Scout	**Hammer Type - Drop:**	140 lb. Cathead - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Vacuum Excavation/Drive and Wash with Casing		
Weather:	Cloudy 50s-60s	**Exploration Diameter:**	24 in. O.D.		

Massachusetts State Plane Coordinate System
Ground Surface Elevation (ft.): 24.00
Surface Condition: Grass

Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in.	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
20	5		**G-1:** 3-in thick topsoil	G-1											PID= 1
			Dark brown, fine to medium SAND and SILT, trace gravel with root fragments [FILL]	G-2											PID= 0.5
			G-2: Light brown, fine to medium SAND and SILT, little gravel, with root fragments [FILL]	G-3											PID= 0.4
			G-3: Same as above [FILL]	G-4											PID= 0.4
			G-4: Light brown, fine to coarse SAND, little silt, trace gravel [FILL]	G-5											PID= 0.2
			G-5: Same as above	G-6											PID= 0.3
			G-6: Brown, fine to coarse SAND, little gravel, trace silt [FILL]	S-1		BC=7 5 5 7	3"								PID= 0
15	10		**S-1:** Brown, medium dense, fine to coarse SAND and GRAVEL, trace silt [FILL]	S-2		BC=10 7 7 7	11"	SP			95	2.2			PID= 0
			S-2: Brown, medium dense, fine to coarse SAND, trace gravel, trace silt	S-3		BC=12 10 9 13	24"								PID= 0
			S-3: Grey, medium dense, fine to coarse SAND and GRAVEL, trace silt with cobbles												

23.75 — 16.0 — 12.0

The boring was terminated at approximately 12 ft. below ground surface. The boring was backfilled with cuttings on April 15, 2024.

GROUNDWATER LEVEL INFORMATION:
▼ Groundwater was observed at approximately 6 ft. (Elev.= 18.00 ft.) below ground surface at the end of drilling.

GENERAL NOTES:
1. Ground surface elevation based on conceptual design drawing titled "Straightway Site Plan Alternative 2", prepared by Kleinfelder, dated March 6, 2024.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.)
3. A Photo Ionization Detector (PID in ppmv) was used for environmental field screening of soil samples.
4. Analytical samples were collected from the top 2 feet for environmental testing.
5. The top 6 feet was pre-cleared using vacuum excavation.

gINT FILE: Klf_gint_master_2024
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2024.GLB [_KLF_BORING/TEST PIT SOIL LOG]
PROJECT NUMBER: 24003062.001A
OFFICE FILTER: BOSTON

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PROJECT NO.: 24003062.001A
DRAWN BY: SP
CHECKED BY: BGS
DATE: 4/24/2024

BORING LOG B-1

W Barnstable Straightway Water Treatment Facility
228 Straightway/132 Smith Street
Barnstable, MA

Date Begin - End: 4/15/2024 - 4/15/2024 **Drilling Company:** Geologic Earth Explorations **BORING LOG B-2**

Logged By: S. Panda/T. Templeton **Drill Crew:** T. Gernier/M. Jimmy

Hor.-Vert. Datum: NAD83 - NAVD88 **Drilling Equipment:** VacTruck FX50/Acker Soil Scout **Hammer Type - Drop:** 140 lb. Cathead - 30 in.

Plunge: -90 degrees **Drilling Method:** Vacuum Excavation/Drive and Wash with Casing

Weather: Sunny 60s-70s **Exploration Diameter:** 24 in. O.D.

Massachusetts State Plane Coordinate System
Ground Surface Elevation (ft.): 26.00
Surface Condition: Gravel

Elevation (feet) / Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in.	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
25 / 1		**G-1:** 1-inch thick gravel 25.9	G-1											PID =0.1
		Brown, fine to coarse SAND, little gravel, trace silt with root fragments [FILL]	G-2											PID = 0.2
		G-2: Tan, fine to coarse SAND, little gravel, trace silt with root fragments [FILL]	G-3					3.9						PID = 0.2; Organic content = 0.1%
		G-3: Tan, fine to coarse SAND, little gravel, trace silt with root fragments [FILL]	G-4											PID = 0.1
5		**G-4:** Tan, fine to coarse SAND, some gravel, trace silt [FILL]	G-5											PID = 0.1
20		**G-5:** Tan, fine to coarse SAND, little gravel, trace silt [FILL]	G-6											PID = 0
		G-6: Tan, coarse SAND, trace gravel, trace silt [FILL] 18.0	S-1		BC=1 2 5 8	8"	SP			87	0.9			PID = 0.1
		S-1: Tan, loose, fine to coarse SAND, little gravel, trace silt [FILL]	S-2		BC=8 12 9 12	12"								PID = 0.1
10		**S-2:** Brown, medium dense, fine to coarse SAND and GRAVEL, little silt												
15		**S-3:** Multi colored, loose, GRAVEL, trace sand	S-3		BC=8 5 5 1	1"								PID = 0
15 / 10		**S-4:** Grey, medium dense, fine to coarse SAND, trace silt	S-4		BC=4 6 6 6	9"	SP			100	1.0			PID = 0.1
20 / 5		**S-5:** Grey-brown, medium dense, fine to coarse SAND, some gravel, trace silt with cobbles	S-5		BC=8 11 16 21	17"								PID = 0
25 / 0														Rig chatter
30 / -5		**S-6:** Tan, medium dense, GRAVEL, some fine to coarse sand, trace silt	S-6		BC=11 14 15 13	3"								PID = 0; red staining
35 / -10		**S-7:** Tan, medium dense, coarse SAND, little gravel	S-7		BC=4 7 8 14	24"								PID = 0.1
			S-8			3"								PID = 0; blowount/heave in sand

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PROJECT NO.: 24003062.001A

DRAWN BY: SP

CHECKED BY: BGS

DATE: 4/24/2024

BORING LOG B-2

W Barnstable Straightway Water Treatment Facility
228 Straightway/132 Smith Street
Barnstable, MA

PLOTTED: 05/21/2024 03:45 PM BY: SPanda
OFFICE FILTER: BOSTON
PROJECT NUMBER: 24003062.001A
gINT FILE: Klf_gint_master_2024
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2024.GLB [_KLF_BORING/TEST PIT SOIL LOG]

Date Begin - End: 4/15/2024 - 4/15/2024 **Drilling Company:** Geologic Earth Explorations **BORING LOG B-2**

Logged By: S. Panda/T. Templeton **Drill Crew:** T. Gernier/M. Jimmy

Hor.-Vert. Datum: NAD83 - NAVD88 **Drilling Equipment:** VacTruck FX50/Acker Soil Scout **Hammer Type - Drop:** 140 lb. Cathead - 30 in.

Plunge: -90 degrees **Drilling Method:** Vacuum Excavation/Drive and Wash with Casing

Weather: Sunny 60s-70s **Exploration Diameter:** 24 in. O.D.

FIELD EXPLORATION | LABORATORY RESULTS

Massachusetts State Plane Coordinate System
Ground Surface Elevation (ft.): 26.00
Surface Condition: Gravel

Elevation (feet) / Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in.	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
-15		**S-8:** Tan, medium dense, GRAVEL, little coarse sand, trace silt	S-8 (cont.)		BC=6 9 13 12	3" (cont.)								observed
45 -20		**S-9:** No recovery	S-9		BC=9 11 15 14	NR								PID = n/a;
		S-10: Grey-tan, medium dense, fine to coarse SAND and GRAVEL, trace silt	S-10		BC=14 12 14 12	3"								PID = 0.1 Switched to 3-in split spoon sampler to get better sample recovery
		-22.0												
50 -25		The boring was terminated at approximately 48 ft. below ground surface. The boring was backfilled with cuttings and sand on April 15, 2024.												
55 -30														
60 -35														
65 -40														
70 -45														
75 -50														

GROUNDWATER LEVEL INFORMATION:
⧖ Groundwater was observed at approximately 9 ft. (Elev.= 17.00 ft.) below ground surface during drilling.
⧗ Groundwater was observed at approximately 9.5 ft. (Elev.= 16.50 ft.) below ground surface at the end of drilling.

GENERAL NOTES:
1. Ground surface elevation based on conceptual design drawing titled "Straightway Site Plan Alternative 2", prepared by Kleinfelder, dated March 6, 2024.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.)
3. A Photo Ionization Detector (PID in ppmv) was used for environmental field screening of soil samples.
4. Analytical samples were collected from the top 2 feet for environmental testing.
5. The top 6 feet was pre-cleared using vacuum excavation.

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PROJECT NO.: 24003062.001A
DRAWN BY: SP
CHECKED BY: BGS
DATE: 4/24/2024

BORING LOG B-2

W Barnstable Straightway Water Treatment Facility
228 Straightway/132 Smith Street
Barnstable, MA

PLOTTED: 05/21/2024 03:45 PM BY: SPanda
PROJECT NUMBER: 24003062.001A OFFICE FILTER: BOSTON
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2024.GLB [_KLF_BORING/TEST PIT SOIL LOG]
gINT FILE: Klf_gint_master_2024

Date Begin - End: 4/15/2024 - 4/15/2024 **Drilling Company:** Geologic Earth Explorations **BORING LOG B-3**

Logged By: S. Panda/T. Templeton **Drill Crew:** T. Gernier/M. Jimmy

Hor.-Vert. Datum: NAD83 - NAVD88 **Drilling Equipment:** VacTruck FX50/Acker Soil Scout **Hammer Type - Drop:** 140 lb. Cathead - 30 in.

Plunge: -90 degrees **Drilling Method:** Vacuum Excavation/Drive and Wash with Casing

Weather: Sunny 60s-70s **Exploration Diameter:** 24 in. O.D.

Massachusetts State Plane Coordinate System
Ground Surface Elevation (ft.): 31.00
Surface Condition: Grass

Elevation (feet) / Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in.	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
30 / 0		**G-1:** 1-inch thick gravel (30.9)	G-1											PID= 0.1
		Tan, fine to coarse SAND, little gravel, trace silt with cobbles [FILL]	G-2							57	4.5			PID= 0.1
		G-2: Brown, fine to coarse SAND and GRAVEL, trace silt with cobbles [FILL]	G-3											PID= 0.1
		G-3: Brown, fine to coarse SAND and GRAVEL, trace silt [FILL]	G-4											PID= 0
5		**G-4:** Tan, coarse SAND, some gravel, trace silt with cobbles [FILL]	G-5											PID= 0
25		**G-5:** Tan, coarse SAND, little gravel, trace silt [FILL] (25.0)	S-1		BC=5 4 11 14	9"								PID= 0.1
		S-1: Tan brown, medium dense, fine to coarse SAND, little gravel, trace silt	S-2		BC=38 24 20 22	15"	SP-SM			70	5.6			PID= 0.1; metallic odor
10 / 20		**S-2:** Tan, dense, fine to coarse SAND, some gravel, little silt												Rig chatter
														Rig chatter
														Rig chatter
														Rig chatter
15 / 15		**S-3:** Multi-colored, medium dense, GRAVEL, little sand, trace silt	S-3		BC=11 13 12 11	12"								PID= 0.1, petroleum odor
20 / 10		**S-4:** Tan, dense, fine to coarse SAND and GRAVEL with cobbles (10.0)	S-4		BC=11 16 17 24	6"								PID= 0.1, red stain, petroleum odor
25 / 5														
30 / 0														
35 / -5														

The boring was terminated at approximately 21 ft. below ground surface. The boring was backfilled with cuttings on April 15, 2024.

GROUNDWATER LEVEL INFORMATION:
▼ Groundwater was observed at approximately 15 ft. (Elev.= 16.00 ft.) below ground surface at the end of drilling.

GENERAL NOTES:
1. Ground surface elevation based on conceptual design drawing titled "Straightway Site Plan Alternative 2", prepared by Kleinfelder, dated March 6, 2024.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.)
3. A Photo Ionization Detector (PID in ppmv) was used for environmental field screening of soil samples.
4. The top 6 feet was pre-cleared using vacuum excavation.

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PROJECT NO.: 24003062.001A
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CHECKED BY: BGS
DATE: 4/24/2024

BORING LOG B-3

W Barnstable Straightway Water Treatment Facility
228 Straightway/132 Smith Street
Barnstable, MA

PLOTTED: 05/21/2024 03:46 PM BY: SPanda
OFFICE FILTER: BOSTON
PROJECT NUMBER: 24003062.001A
gINT FILE: Klf_gint_master_2024
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Date Begin - End:	4/16/2024 - 4/16/2024	**Drilling Company:**	Geologic Earth Explorations	**BORING LOG B-4-OW**	
Logged By:	S. Panda	**Drill Crew:**	T. Gernier		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	Acker Soil Scout	**Hammer Type - Drop:**	140 lb. Cathead - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Drive and Wash with Casing		
Weather:	Sunny 50s-60s	**Exploration Diameter:**	4 in. O.D.		

FIELD EXPLORATION

Massachusetts State Plane Coordinate System
Ground Surface Elevation (ft.): 31.00
Surface Condition: Grass

Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in.	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	MONITORING WELL CONSTRUCTION*
30			**S-1:** 2-inch thick topsoil	S-1		BC=9 9 13 16	14"								Concrete
			30.83												Soil Cuttings
			Dark brown, medium dense, fine to medium SAND, some gravel, little silt with root fragments [FILL]												PID= 0.1
			S-2: Light brown, loose, fine to coarse SAND, some silt, little gravel [FILL]	S-2		BC=10 3 6 6	14"								Bentonite Chips
			S-3: Light brown, dense, fine to coarse SAND and GRAVEL, little clayey silt [FILL]	S-3		BC=11 12 25 28	4"								2" SCH 40 Solid PVC Riser
25	5		**S-4:** Light brown, very dense, fine to coarse SAND, some gravel, trace clayey silt with stone fragments [FILL]	S-4		BC=29 29 37 34	12"	SW-SM			87	7.7			PID= 0.1
			S-5: Grey brown, very dense, fine to coarse SAND and GRAVEL, little clayey silt with stone fragments [FILL]	S-5		BC=20 29 29 21	11"								Sand
20	10														PID= 0
			19.0												Sand
			S-6: Grey tan, dense, coarse SAND, some gravel	S-6		BC=24 18 18 18	8"								PID= 0.2
15	15		15.0												2" SCH 40 Slotted 0.010 PVC Screen
															PID= 0.2
															Sand
															PID= 0

The boring was terminated at approximately 16 ft. below ground surface. The boring was backfilled with sand, bentonite seal, cuttings and cement/roadbox installed at surface on April 16, 2024.

GROUNDWATER LEVEL INFORMATION:
- Groundwater was observed at approximately 3.5 ft. (Elev.= 27.50 ft.) below ground surface during drilling.
- Groundwater was observed at approximately 5 ft. (Elev.= 26.00 ft.) below ground surface at the end of drilling.
- Groundwater was observed at approximately 16 ft. (Elev.= 15 ft.) below ground surface after drilling completion.

GENERAL NOTES:
1. Ground surface elevation based on conceptual design drawing titled "Straightway Site Plan Alternative 2", prepared by Kleinfelder, dated March 6, 2024.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.)
3. A Photo Ionization Detector (PID in ppmv) was used for environmental field screening of soil samples.

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PROJECT NO.: 24003062.001A
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CHECKED BY: BGS
DATE: 4/24/2024

BORING LOG B-4-OW

W Barnstable Straightway Water Treatment Facility
228 Straightway/132 Smith Street
Barnstable, MA

PLOTTED: 05/15/2024 03:53 PM BY: SPanda
OFFICE FILTER: BOSTON
PROJECT NUMBER: 24003062.001A
gINT FILE: Klf_gint_master_2024
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2024.GLB [_KLF_BORING/TEST PIT SOIL LOG]

Date Begin - End: 4/15/2024 - 4/17/2024 **Drilling Company:** Geologic Earth Explorations **BORING LOG B-5**

Logged By: S. Panda/T. Templeton **Drill Crew:** T. Gernier/M. Jimmy

Hor.-Vert. Datum: NAD83 - NAVD88 **Drilling Equipment:** VacTruck FX50/Acker Soil Scout **Hammer Type - Drop:** 140 lb. Cathead - 30 in.

Plunge: -90 degrees **Drilling Method:** Vacuum Excavation/Drive and Wash with Casing

Weather: Sunny 50s-60s **Exploration Diameter:** 24 in. O.D.

Massachusetts State Plane Coordinate System
Ground Surface Elevation (ft.): 31.50
Surface Condition: Grass

Elevation (feet) / Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in.	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
31.50 / 0		**G-1:** 5-inch thick topsoil	G-1											PID= 0
31.00 / 0.5		Dark brown, fine to medium SAND, some silt, little gravel with root fragments [FILL]	G-2											PID= 0.1
		G-2: Same as above [FILL]	G-3											PID= 0.1
		G-3: Tan, fine to coarse SAND, trace silt, trace gravel [FILL]	G-4											PID= 0.1
		G-4: Same as above [FILL]	G-5											PID= 0
		G-5: Tan, coarse SAND, trace gravel, trace silt [FILL]												PID= 0
25 / 6.5		**S-1:** No recovery [FILL]	S-1		BC=16 15 25 12	NR								PID= N/A
23.5 / 8		**S-2:** Tan, very dense, fine to coarse SAND, trace gravel, little silt	S-2		BC=30 31 35 25	16"	SW-SM			93	6.9			PID= 0
15 / 16.5		**S-3:** Grey-tan, medium dense, fine to coarse SAND, little gravel, trace silt	S-3		BC=9 11 11 9	8"	SP			89	1.6			PID= 0
10 / 21.5		**S-4:** Grey tan, medium dense, fine to coarse SAND and GRAVEL, trace silt	S-4		BC=11 7 10 7	7"								PID= 0
														blowout/heave in sand observed, hence drilling mud introduced
5 / 26.5		**S-5:** Tan grey, medium dense, fine to coarse SAND, trace gravel, trace silt	S-5		BC=10 11 16 12	10"	SP			95	1.9			PID= 0
0 / 31.5		**S-6:** Same as above except medium dense	S-6		BC=7 9 10 13	10"								PID= 0
-5 / 36.5		**S-7:** Tan grey, medium dense, fine to coarse SAND, some gravel, trace silt	S-7		BC=12 13 13 16	11"								PID= 0
			S-8			8"								PID= 0

KLEINFELDER
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PROJECT NO.: 24003062.001A
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DATE: 4/24/2024

BORING LOG B-5

W Barnstable Straightway Water Treatment Facility
228 Straightway/132 Smith Street
Barnstable, MA

PLOTTED: 05/21/2024 03:46 PM BY: SPanda
OFFICE FILTER: BOSTON
PROJECT NUMBER: 24003062.001A
gINT FILE: Klf_gint_master_2024
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2024.GLB [_KLF_BORING/TEST PIT SOIL LOG]

Date Begin - End: 4/15/2024 - 4/17/2024 **Drilling Company:** Geologic Earth Explorations **BORING LOG B-5**

Logged By: S. Panda/T. Templeton **Drill Crew:** T. Gernier/M. Jimmy

Hor.-Vert. Datum: NAD83 - NAVD88 **Drilling Equipment:** VacTruck FX50/Acker Soil Scout **Hammer Type - Drop:** 140 lb. Cathead - 30 in.

Plunge: -90 degrees **Drilling Method:** Vacuum Excavation/Drive and Wash with Casing

Weather: Sunny 50s-60s **Exploration Diameter:** 24 in. O.D.

Elevation (feet) / Depth (feet)	Graphical Log	FIELD EXPLORATION: Massachusetts State Plane Coordinate System; Ground Surface Elevation (ft.): 31.50; Surface Condition: Grass Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in.	Recovery (NR=No Recovery)	LABORATORY RESULTS: USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
-10		**S-8:** Tan grey, medium dense, fine to coarse SAND and GRAVEL, trace silt	S-8 *(cont.)*		BC=10 12 13 7	8" *(cont.)*								
45		**S-9:** Tan grey, medium dense, fine to coarse SAND, little gravel, trace silt	S-9		BC=9 10 14 14	6"								PID = 0
-15		-14.5 The boring was terminated at approximately 46 ft. below ground surface. The boring was backfilled with cuttings on April 17, 2024.												
50														
-20														
55														
-25														
60														
-30														
65														
-35														
70														
-40														
75														
-45														

GROUNDWATER LEVEL INFORMATION:
▼ Groundwater was observed at approximately 14 ft. (Elev.= 17.50 ft.) below ground surface at the end of drilling.

GENERAL NOTES:
1. Ground surface elevation based on conceptual design drawing titled "Straightway Site Plan Alternative 2", prepared by Kleinfelder, dated March 6, 2024.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.)
3. A Photo Ionization Detector (PID in ppmv) was used for environmental field screening of soil samples.
4. Analytical samples were collected from the top 2 to 10 feet for environmental testing.
5. The top 6 feet was pre-cleared using vacuum excavation.

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.: 24003062.001A
DRAWN BY: SP
CHECKED BY: BGS
DATE: 4/24/2024

BORING LOG B-5

W Barnstable Straightway Water Treatment Facility
228 Straightway/132 Smith Street
Barnstable, MA

PLOTTED: 05/21/2024 03:46 PM BY: SPanda
OFFICE FILTER: BOSTON
PROJECT NUMBER: 24003062.001A
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gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2024.GLB [_KLF_BORING/TEST PIT SOIL LOG]

PLOTTED: 05/21/2024 03:46 PM BY: SPanda

BORING LOG B-6

Date Begin - End:	4/16/2024 - 4/17/2024	**Drilling Company:**	Geologic Earth Explorations		
Logged By:	S. Panda	**Drill Crew:**	T. Gernier		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	Acker Soil Scout	**Hammer Type - Drop:**	140 lb. Cathead - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Drive and Wash with Casing		
Weather:	Sunny 60s-70s	**Exploration Diameter:**	4 in. O.D.		

Massachusetts State Plane Coordinate System
Ground Surface Elevation (ft.): 31.00
Surface Condition: Grass

Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in.	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
30	0		**S-1:** 10-inch thick topsoil	S-1		BC=3 6 6 6	12"	SP-SM			78	12			PID= 0
			Brown, medium dense, fine to coarse SAND, some gravel, little silt [FILL]												
			S-2: Yellow, medium dense, coarse SAND, some gravel, trace silt with root fragments [FILL]	S-2		BC=10 12 14 17	15"		3.3						PID= 0; Organic content = 0.5%
25	5		**S-3:** Grey, medium dense, fine to coarse SAND and GRAVEL, trace silt [FILL]	S-3		BC=10 13 16 24	7"								PID= 0
			S-4: Grey-brown, dense, fine to coarse SAND and GRAVEL, little silt with cobbles [FILL]	S-4		BC=12 16 16 18	8"								PID= 0; red staining
20	10		**S-5:** Grey, dense, fine to coarse SAND, some gravel, trace silt	S-5		BC=10 15 16 20	9"								PID= 0
15	15		**S-6:** Grey, dense, fine to coarse SAND, some gravel, trace silt	S-6		BC=13 14 18 14	10"								PID= 0
20	10		**S-7:** Grey, medium dense, fine to coarse SAND, some gravel, trace silt	S-7		BC=12 10 13 10	4"								PID= 0
25	5		**S-8:** Grey, medium dense, GRAVEL, some fine to coarse sand, little silt	S-8		BC=6 6 9 12	4"								PID= 0.2; petroleum odor
30	0		**S-9:** Grey, medium dense, GRAVEL, some fine to coarse sand, little silt	S-9		BC=8 8 15 18	4"								PID= 0.1; petroleum odor
35	-5		**S-10:** Grey, medium dense, fine to coarse SAND, trace gravel, trace silt	S-10		BC=6 7 14 10	3"								PID= 0.1; petroleum odor
			S-11: No recovery	S-11			NR								PID = N/A; blowount/heave in

0.17
23.0
8.5
-1.5

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CHECKED BY: BGS
DATE: 4/24/2024

BORING LOG B-6

W Barnstable Straightway Water Treatment Facility
228 Straightway/132 Smith Street
Barnstable, MA

gINT FILE: Klf_gint_master_2024
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2024.GLB [_KLF_BORING/TEST PIT SOIL LOG]
PROJECT NUMBER: 24003062.001A
OFFICE FILTER: BOSTON

Date Begin - End: 4/16/2024 - 4/17/2024 **Drilling Company:** Geologic Earth Explorations **BORING LOG B-6**

Logged By: S. Panda **Drill Crew:** T. Gernier

Hor.-Vert. Datum: NAD83 - NAVD88 **Drilling Equipment:** Acker Soil Scout **Hammer Type - Drop:** 140 lb. Cathead - 30 in.

Plunge: -90 degrees **Drilling Method:** Drive and Wash with Casing

Weather: Sunny 60s-70s **Exploration Diameter:** 4 in. O.D.

Elevation (feet) / Depth (feet)	Graphical Log	Lithologic Description (Massachusetts State Plane Coordinate System; Ground Surface Elevation (ft.): 31.00; Surface Condition: Grass)	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in.	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
-10			S-11 (cont.)		BC=3 5 8 7	NR (cont.)								sand observed
45		**S-12:** Light brown, dense, fine to coarse SAND, trace silt	S-12		BC=9 10 21 20	9"	SP			100	1.9			PID = 0.1; split spoon sampler changed to 3-in sampler and left overnight to obtain a sample with recovery
-15		-15.0												

The boring was terminated at approximately 46 ft. below ground surface. The boring was backfilled with cuttings on April 17, 2024.

GROUNDWATER LEVEL INFORMATION:
▼ Groundwater was observed at approximately 14 ft. (Elev.= 17.00 ft.) below ground surface at the end of drilling.

GENERAL NOTES:
1. Ground surface elevation based on conceptual design drawing titled "Straightway Site Plan Alternative 2", prepared by Kleinfelder, dated March 6, 2024.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.)
3. A Photo Ionization Detector (PID in ppmv) was used for environmental field screening of soil samples.
4. It should be noted, a 5-feet long section of a 4-inch diameter steel casing was lost during retrieval.

-20 50
-25 55
-30 60
-35 65
-40 70
-45 75

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CHECKED BY: BGS
DATE: 4/24/2024

BORING LOG B-6

W Barnstable Straightway Water Treatment Facility
228 Straightway/132 Smith Street
Barnstable, MA

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PROJECT NUMBER: 24003062.001A OFFICE FILTER: BOSTON
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2024.GLB [_KLF_BORING/TEST PIT SOIL LOG]
gINT FILE: Klf_gint_master_2024

Date Begin - End:	4/18/2024 - 4/18/2024	**Drilling Company:**	Geologic Earth Explorations	**BORING LOG B-7**	
Logged By:	S. Panda	**Drill Crew:**	T. Gernier		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	Acker Soil Scout	**Hammer Type - Drop:**	140 lb. Cathead - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Drive and Wash with Casing		
Weather:	Cloudy 40s	**Exploration Diameter:**	4 in. O.D.		

FIELD EXPLORATION

Massachusetts State Plane Coordinate System
Ground Surface Elevation (ft.): 32.00
Surface Condition: Sparse Vegetation

Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in.	Recovery (NR=No Recovery)
30	0		**S-1:** 6-inch thick topsoil	S-1		BC=WOR 1 2 9	7"
			Brown, very loose, fine to medium SAND, some silt, little gravel with root fragments [SUBSOIL]				
			S-2: Tan, medium dense, fine to coarse SAND, trace gravel, trace silt with cobbles [SUBSOIL]	S-2		BC=4 5 7 8	9"
25	5		**S-3:** Tan, medium dense, fine to coarse SAND and GRAVEL, trace silt	S-3		BC=7 10 18 23	12"
			S-4: Tan, dense, fine to coarse SAND and GRAVEL with cobbles	S-4		BC=12 18 21 19	14"
20	10		**S-5:** Grey tan, medium dense, fine to coarse SAND and GRAVEL, litle clayey silt	S-5		BC=12 13 11 11	9"
15	15		**S-6:** Tan, medium dense, fine to coarse SAND and GRAVEL, trace silt	S-6		BC=13 10 12 10	9"
10	20		**S-7:** Tan, medium dense, fine to coarse SAND, trace silt	S-7		BC=9 9 13 9	7"
5	25		**S-8:** Same as above	S-8		BC=9 9 11 13	9"
0	30						
-5	35						

LABORATORY RESULTS

USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
							PID= 0
							PID= 0
SP			97	1.5			PID= 0
							PID= 0
							PID= 0
							PID= 0
							PID= 0
	11.0						PID= 0; Organic content = 0.5%
							PID = 0
SP			100	2.1			PID = 0

31.5
28.0
14.5
6.0

The boring was terminated at approximately 26 ft. below ground surface. The boring was backfilled with cuttings on April 18, 2024.

GROUNDWATER LEVEL INFORMATION:
▼ Groundwater was observed at approximately 14 ft. (Elev.= 18.00 ft.) below ground surface at the end of drilling.

GENERAL NOTES:
1. Ground surface elevation based on conceptual design drawing titled "Straightway Site Plan Alternative 2", prepared by Kleinfelder, dated March 6, 2024.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.)
3. A Photo Ionization Detector (PID in ppmv) was used for environmental field screening of soil samples.

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DATE: 4/24/2024

BORING LOG B-7

W Barnstable Straightway Water Treatment Facility
228 Straightway/132 Smith Street
Barnstable, MA

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OFFICE FILTER: BOSTON
PROJECT NUMBER: 24003062.001A
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2024.GLB [_KLF_BORING/TEST PIT SOIL LOG]
gINT FILE: Klf_gint_master_2024

BORING LOG B-8-OW

Date Begin - End:	4/15/2024 - 4/17/2024	**Drilling Company:**	Geologic Earth Explorations		
Logged By:	S. Panda/T. Templeton	**Drill Crew:**	T. Gernier/M. Jimmy		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	VacTruck FX50/Acker Soil Scout	**Hammer Type - Drop:**	140 lb. Cathead - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Vacuum Excavation/Drive and Wash with Casing		
Weather:	Sunny 40s-50s	**Exploration Diameter:**	24 in. O.D.		

Massachusetts State Plane Coordinate System
Ground Surface Elevation (ft.): 29.50
Surface Condition: Grass

Elevation (feet)	Depth (feet)	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in.	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)
25	5	**G-1:** 3-inch thick topsoil (29.25) Brown, fine to coarse SAND, trace silt, trace gravel with root fragments [FILL] **G-2:** Same as above [FILL] **G-3:** Same as above [FILL] **G-4:** Brown, fine to coarse SAND, trace silt, trace gravel [FILL] **G-5:** Tan, fine to coarse SAND, trace silt, trace gravel with cobbles [FILL] **S-1:** Tan, very loose to loose, fine to coarse SAND, little gravel, trace silt [FILL]	G-1										
			G-2										
			G-3										
			G-4										
			G-5										
			S-1		BC=1 1 3 13	8"	SP			86	3.2		
20	10	**S-2:** Brown, dense, fine to coarse SAND, some gravel, little silt (21.5)	S-2		BC=24 25 22 22	16"							
15	15	**S-3:** Tan grey, medium dense, fine to coarse SAND and GRAVEL, trace silt	S-3		BC=16 8 9 9	6"							
10	20	**S-4:** Tan grey, medium dense, fine to medium SAND and GRAVEL, trace silt with rock fragments	S-4		BC=8 8 10 10	7"							
5	25	**S-5:** Grey, medium dense, fine to coarse SAND and GRAVEL (3.5)	S-5		BC=8 7 14 14	4"							
0	30												
-5	35												
-10													

MONITORING WELL CONSTRUCTION*

Concrete
2" SCH 40 Solid PVC Riser
Soil Cuttings
Bentonite Chips
Sand
2" SCH 40 Slotted 0.010 PVC Screen
Sand
Sand

PID= 0 (all readings)

The boring was terminated at approximately 26 ft. below ground surface. The boring was backfilled with sand, bentonite seal, cuttings and cement/roadbox installed at surface on April 17, 2024.

GROUNDWATER LEVEL INFORMATION:
▼ Groundwater was observed at approximately 11 ft. (Elev.= 18.50 ft.) below ground surface at the end of drilling.
▼ Groundwater was observed at approximately 14.5 ft. (Elev.= 15 ft.) below ground surface after drilling completion.

GENERAL NOTES:
1. Ground surface elevation based on conceptual design drawing titled "Straightway Site Plan Alternative 2", prepared by Kleinfelder, dated March 6, 2024.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.)
3. A Photo Ionization Detector (PID in ppmv) was used for environmental field screening of soil samples.
4. The top 6 feet was pre-cleared using vacuum excavation. A PID (ppmv) was used for environmental field screening.

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DATE: 4/24/2024

BORING LOG B-8-OW

W Barnstable Straightway Water Treatment Facility
228 Straightway/132 Smith Street
Barnstable, MA

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OFFICE FILTER: BOSTON
PROJECT NUMBER: 24003062.001A
gINT FILE: Klf_gint_master_2024
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2024.GLB [_KLF_BORING/TEST PIT SOIL LOG]

Date Begin - End: 4/18/2024 - 4/18/2024 **Drilling Company:** Geologic Earth Explorations **BORING LOG B-9**

Logged By: S. Panda **Drill Crew:** T. Gernier

Hor.-Vert. Datum: NAD83 - NAVD88 **Drilling Equipment:** Acker Soil Scout **Hammer Type - Drop:** 140 lb. Cathead - 30 in.

Plunge: -90 degrees **Drilling Method:** Drive and Wash with Casing

Weather: Cloudy/rain 40s **Exploration Diameter:** 4 in. O.D.

Massachusetts State Plane Coordinate System
Ground Surface Elevation (ft.): 17.00
Surface Condition: Sparse Vegetation

Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in.	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
17	0		**S-1:** 4-in topsoil	S-1		BC=2	8"								PID= 0.1
			16.67			6									
			Brown-yellow, medium dense, fine to medium SAND, little silt, little gravel with root fragments [SUBSOIL]			13									
15						10									
			S-2: Tan, medium dense, fine to coarse SAND, trace gravel, trace silt [SUBSOIL]	S-2		BC=10	18"								PID= 0.1
			13.0			10									
			S-3: Tan, medium dense, fine to coarse SAND and GRAVEL, trace silt	S-3		7	7"								PID= 0.1
5						BC=9									
			S-4: Tan, medium dense, fine to coarse SAND, trace gravel, trace silt with cobbles	S-4		19	10"	SP			96	2.7			PID= 0.1
10						11									
						8									
						BC=18									
			S-5: Grey, medium dense, fine to coarse SAND, little silt, little gravel	S-5		10	7"								PID= 0.1
						15									
						12									
						BC=12									
10						11									
						14									
						13									
5															
			S-6: Grey-brown, medium dense, fine to coarse SAND, trace silt	S-6		BC=9	10"	SP			100	3.5			PID= 0.1; orange stains
15						12									
						16									
						21									
0															
			S-7: Same as above	S-7		BC=12	7"								PID= 0.1; orange stains
20						12									
						10									
						12									
-5															
			S-8: Same as above	S-8		BC=10	12"								PID= 0.1
25						13									
						12									
						24									
-10															
			S-9: Same as above except dense	S-9		BC=9	21"								PID= 0.1
30						18									
						17									
			-14.0			21									
-15			The boring was terminated at approximately 31 ft. below ground surface. The boring was backfilled with cuttings on April 18, 2024.												
35															
-20															

GROUNDWATER LEVEL INFORMATION:
▼ Groundwater was observed at approximately 8 ft. (Elev.= 9.00 ft.) below ground surface at the end of drilling.

GENERAL NOTES:
1. Ground surface elevation based on conceptual design drawing titled "Hyannisport and Simmons Pond Site Plan", prepared by Kleinfelder, March 6, 2024.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.)
3. A Photo Ionization Detector (PID in ppmv) was used for environmental field screening of soil samples.

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BORING LOG B-9

W Barnstable Straightway Water Treatment Facility
228 Straightway/132 Smith Street
Barnstable, MA

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OFFICE FILTER: BOSTON
PROJECT NUMBER: 24003062.001A
[L_KLF_BORING/TEST PIT SOIL LOG]
gINT FILE: Klf_gint_master_2024
gINT TEMPLATE: E:KLF_STANDARD_GINT_LIBRARY_2024.GLB

BORING LOG B-10

Date Begin - End:	4/18/2024 - 4/18/2024	**Drilling Company:**	Geologic Earth Explorations		
Logged By:	S. Panda	**Drill Crew:**	T. Gernier		
Hor.-Vert. Datum:	NAD83 - NAVD88	**Drilling Equipment:**	Acker Soil Scout	**Hammer Type - Drop:**	140 lb. Cathead - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Drive and Wash with Casing		
Weather:	Cloudy/rain 40s	**Exploration Diameter:**	4 in. O.D.		

FIELD EXPLORATION | LABORATORY RESULTS

Massachusetts State Plane Coordinate System
Ground Surface Elevation (ft.): 18.00
Surface Condition: Sparse Vegetation

Elevation (feet) / Depth (feet)	Graphical Log	Lithologic Description	Sample Number	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in.	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
18 / 0		**S-1:** 12-in thick topsoil	S-1		BC=1 4 3 6	7"								PID= 0
17.0 / 1.0		Brown yellow, loose, fine to medium SAND, some silt with root fragments [SUBSOIL]												
15 / 3		**S-2:** Tan, loose, fine to coarse SAND, little silt, little gravel [SUBSOIL]	S-2		BC=4 5 4 4	15"		4.0						PID= 0; Organic content = 0.4%
14.0 / 4.0		**S-3:** Tan, medium dense, fine to coarse SAND, little silt, little gravel	S-3		BC=4 7 8 10	14"								PID= 0
12 / 6		**S-4:** Tan, medium dense, fine to coarse SAND, little silt, little gravel	S-4		BC=10 8 9 11	12"								PID= 0
10 / 8 ▼		**S-5:** Tan, medium dense, fine to coarse SAND, trace silt	S-5		BC=8 6 6 5	11"	SP			100	3.0			PID= 0
5 / 13		**S-6:** Tan, medium dense, fine to coarse SAND and GRAVEL, trace silt	S-6		BC=3 5 7 12	10"								PID= 0.1
0 / 18		**S-7A:** Tan, fine to coarse SAND and GRAVEL, trace silt	S-7A		BC=9 9	6"								PID= 0.1
		S-7B: Yellow brown, fine to coarse SAND, little gravel, trace silt	S-7B		16 13	6"								
-5 / 23		**S-8:** Tan, medium dense, fine to coarse SAND, little gravel, trace silt	S-8		BC=11 11 18 16	11"								PID= 0.1
-10 / 28		**S-9:** Tan, medium dense, fine to coarse SAND, little gravel, trace silt	S-9		BC=9 11 13 14	16"								PID= 0.1
-13.0 / 31.0		The boring was terminated at approximately 31 ft. below ground surface. The boring was backfilled with cuttings on April 18, 2024.												

GROUNDWATER LEVEL INFORMATION:
▼ Groundwater was observed at approximately 8.5 ft. (Elev.= 9.50 ft.) below ground surface at the end of drilling.

GENERAL NOTES:
1. Ground surface elevation based on conceptual design drawing titled "Hyannisport and Simmons Pond Site Plan", prepared by Kleinfelder, March 6, 2024.
2. When strata breaks are not observed in the split spoon, strata breaks are inferred based on rig behavior (bouncing, chattering, penetration resistance, drilling water color, etc.)
3. A Photo Ionization Detector (PID in ppmv) was used for environmental field screening of soil samples.

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PROJECT NO.: 24003062.001A
DRAWN BY: SP
CHECKED BY: BGS
DATE: 4/24/2024

BORING LOG B-10

W Barnstable Straightway Water Treatment Facility
228 Straightway/132 Smith Street
Barnstable, MA

PLOTTED: 05/21/2024 03:47 PM BY: SPanda
OFFICE FILTER: BOSTON
PROJECT NUMBER: 24003062.001A
gINT FILE: Klf_gint_master_2024
gINT TEMPLATE: E:\KLF_STANDARD_GINT_LIBRARY_2024.GLB [_KLF_BORING/TEST PIT SOIL LOG]

Appendix H
Groundwater Table Worksheet

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HIGH GROUND-WATER LEVEL COMPUTATION

Date: 07/18/2024

Site Location: Barnstable Straightway Permit:

Owner: City of Barnstable Phone:

Contractor: Phone:

Notes:

STEP 1 Measure depth to water table to nearest 1/10 ft. (depth is in feet below land surface)

Date: 04/18/2024 (mm/dd/yy) — 7.0 feet below ls

STEP 2 Using Water-Level Range Zone and Index Well Map locate site and determine:

A) Appropriate index well: A1W-230

B) Water-level range zone: C

STEP 3 Using monthly "Current Water Resources Conditions" determine current depth to water level for index well.

04/18/2024 (mm/yy) — 27.1

STEP 4 Using Table of Potential Water Level Rise for index well (STEP 2A), current depth to water level for index well (STEP 3), and water-level zone (STEP 2B) determine water-level adjustment.

2.90

STEP 5 Estimate depth to high water by subtracting the water-level adjustment (STEP 4) from measured depth to water level at site (STEP 1).

4.10

NOTE* **Tables 1-9 "Potential Water-Level Rise" are attached as worksheets to this file.**

monthly index well data: www.capecodcommission.org/wells.html