The Morin-Cameron GROUP, INC.

TECHNICAL NARRATIVE & STORMWATER MANAGEMENT REPORT

THE WILLOWS AT BOXFORD

LOCATED OFF WILLOW ROAD

BOXFORD, MASSACHUSETTS

November 19, 2020

CIVIL ENGINEERS • LAND SURVEYORS • ENVIRONMENTAL CONSULTANTS • LAND USE PLANNERS

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LOCATED OFF WILLOW ROAD

BOXFORD, MASSACHUSETTS

November 19, 2020

APPLICANT:

TOLL BROS., INC.
116 FLANDERS ROAD
WESTBOROUGH, MA 01581

PREPARED BY:

THE MORIN-CAMERON GROUP, INC.
66 ELM STREET
DANVERS, MA 01923

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TECHNICAL NARRATIVE

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The Willows at Boxford

I. EXECUTIVE SUMMARY

Toll Brothers, Inc., the project proponent, proposes to develop a 66-unit age-restricted, active adult community on a 117.62-acre parcel located on Willow Road in Boxford, Massachusetts. The project consists of thirty-three (33) duplex style buildings, an accessory community building and outdoor amenity space. The new neighborhood will be supported by a private drive, stormwater management systems, electric and communications utilities, private water supply and an onsite wastewater disposal system. A large portion of the parcel will be preserved as permanent open space. The dwellings, associated improvements and open space on the property described herein will be known as The Willows at Boxford.

The Willows at Boxford was designed in accordance with the Town of Boxford Zoning Bylaw, the Massachusetts Stormwater Handbook and Boxford Stormwater Bylaw, the Wetlands Protection Act and its Regulations promulgated through 310 CMR 10.00, the Boxford Wetlands Protection Bylaw and the Boxford Health Regulations. The project will require a Special Permit and Site Plan Approval from the Boxford Zoning Board, an Order of Conditions from the Boxford Conservation Commission, an onsite wastewater disposal system approval from the Boxford Board of Health, a Conservation and Management permit from the Natural Heritage and Endangered Species Program, a community public water system permit from Mass Department of Environmental Protection (MassDEP) and an Environmental Notification Form under the Massachusetts Environmental Policy Act.

II. EXISTING SITE DESCRIPTION

The property consists of a single tract with a total land area of 117.62-acres. It is identified by the Boxford Assessor's Department on Tax Map 6 as Block 2, Lot 2.2. The property has 2,195± feet of frontage along Willow Road split between a small access frontage of 50-feet and the remaining frontage. The property is entirely within the Elderly Housing Zoning District. It has historically been used for agriculture and forestry. Refer to Figure 1 for an aerial depiction of the property.

Agricultural uses extend north from Willow Road over an approximate 25.62-acre portion of the tract (the "agricultural area"). Farming activities such as haying, corn, blueberry and Christmas tree horticulture are evidenced on the property today. There is a small farm stand structure near Willow Road which was used in the past for retail sales of the farmed products. The property has also been used for loam screening and distribution and recreational dirt biking. In support of the agricultural activities, manmade farm ponds were constructed. The remainder of the property, approximately 92 acres, has been left in a natural state and is interspersed by woods roads and pedestrian trails. The parcel also contains an extensive wetlands system which includes several vernal pools and is bordered to the north by the Parker River.

The Parker River is a regulatory floodway in this location, according the FEMA Federal Insurance Rate Map (FIRM) #25009C0233F with an effective date of July 3, 2012 (See Figure 2: FEMA Map). The 100-year Base Flood Elevation at the subject property is between elevation 88.0 and 89.0 (NAVD88), which generally follows the edge of the bordering vegetated wetlands that abut the river and serve as floodplain area. The remaining portion of the subject property is located within a FEMA flood hazard zone X (above the 100-year flood elevation).

An Order of Resource Area Delineation (ORAD) and ORAD Extension were issued for the subject property by the Boxford Conservation Commission, under DEP File No. 114-1235. Refer to the Notice of Intent prepared by LEC, dated November 19, 2020 for more information about the wetland resource areas (LEC report).

The contouring of the property varies from undulating hilly terrain to rolling farm fields. Slopes range from 2-3% to as steep as 25-33% in the hilly areas and approximately 10-15% throughout the farm fields. Wetlands, ponds and vernal pools can be found consistently at low points on the property. The lowest elevation on the property can be found near the northern property line along the Parker River at elevation 90. The highest elevation on the property can be found near the center of the property to the northwest of the well area at elevation 158. The agricultural area ranges from elevation 124 near Willow Road to 130 near the northern end of the field. Contours throughout the agricultural area have been manipulated over time through excavation activities as evidenced by soil tests conducted throughout this area. See Figure 3 for the United States Geological Survey map of the property.

Extensive soil testing was conducted by MCG and the project proponent throughout the agricultural area. In total, 111 test holes were excavated, the results of which are included in the site development plan set. In general, most of the agricultural area has been stripped down to within 2-4 feet of bedrock and filled with loam for agricultural purposes. Towards the rear of this area, native soil remains consisting of Glaciofluvial outwash deposits. Other pockets of native soil were identified throughout this area. The Natural Resource Conservation Service (NRCS) soil maps were also evaluated throughout the entire property. The Western and Southern portions of the locus parcel consist of well-drained Charlton Fine Sandy Loam (406D, 406C), excessively drained Hinckley loamy Sand (253B/C/D, 257E), and poorly drained Freetown muck (52A). The Northern portion of the locus parcel consists of poorly drained Swansea muck (51A) and excessively drained Hinckley Loamy Sand (253C/D, 257E). The Eastern portion of the locus parcel consists of well-drained Charlton Fine Sandy Loam (406D), excessively drained Hinckley loamy sand (253B/C/D, 257E), and poorly drained Freetown muck (52A). Refer to Figure 4 for the NRCS Soil boundaries.

III. PROPOSED PROJECT DESCRIPTION

A. Dwelling Units & Amenities

The Willows at Boxford will consist of thirty-three (33) new duplex buildings for a total of sixty-six (66) new age-restricted homes. The age restriction is consistent with the Elderly Housing Zoning District for persons 55 years or older and the dwellings and amenities are configured specifically for that age demographic. There will be multiple unit styles available for buyers to select each with a relatively consistent exterior appearance. Various options will be available for each unit style along with the flexibility of customizing interior finishes. The unit floor plans will all include a first-floor master bedroom. Livable floor area will vary between 1,627-2,900 square feet per home, including the second-floor guest bed/study area. Each home will have a dedicated driveway, a two-car garage facing the street, and a patio or deck in the rear. Landscaping around each unit is illustrated on the landscape plans included with this report. There will be a community clubhouse with a pool, and outdoor recreational area for use by residents of The Willows at Boxford. The project will also feature an extensive passive recreational pedestrian trail network throughout preserved woodland and open space for use by the residents of the neighborhood and public at large.

B. Private Drive, Sidewalks & Emergency Access

A twenty-four-foot-wide private drive will be constructed to provide access to the dwelling units and amenity spaces. Private Drive "A" is the primary access and is 2,490 feet long from Willow Road to a cul-de-sac designed in accordance with the Boxford Subdivision Regulations. Private Drive "B" is a short spur road off of Private Drive "A", which services three duplex buildings and connects to the emergency access Drive. The emergency access drive will be gated at Willow Road, and signage will be placed at the other end, prohibiting use by unauthorized vehicles. All vehicular surfaces will be paved with bituminous asphalt. The total length of new private drive is approximately 2,837 feet, and the emergency access drive is approximately 537 feet long. The length of Private Drive A between the emergency access drive and the end of the cul-de-sac is 1,342 feet.

Sidewalks will be constructed along one side of the private drive. The sidewalks will provide a pedestrian route through the neighborhood and connect to the amenities including the clubhouse, trails and open space. The slope of the sidewalk will match the slope of the adjacent private drive.

The private drives were primarily designed to have gentle slopes ranging between 1.2% to 4%. A short section between stations 21+23.5 to 22+68.5 will be constructed to a 5% slope. Vertical curves along the road were designed to accommodate a 25 MPH design speed. The private drives will have a crown along the centerline and a curb at the gutter line to convey roadway runoff to closed drainage infrastructure (i.e. catch basins), before being directed to stormwater best management practices for treatment prior to infiltration or discharge. All dwelling driveways were sloped back to the private drive so that stormwater runoff from all paved areas

will be directed to the closed drainage system. The private drive design standards follow the Boxford Subdivision Rules and Regulations.

Private Drive A will feature a significant upgrade to the existing access to the rear portion of the parcel as it passes through a wetland near flags W105 to W108. The existing farm road passing through the wetland in this area was constructed with a 12" culvert, solely intended to allow the conveyance of surface runoff under the farm road. With the construction of Private Drive A, a new 10' wide x 9' tall concrete box culvert will replace the existing 12" culvert as part of a full reconstruction of this wetland crossing. The new box culvert will maintain existing grades at each end to preserve the hydrologic gradient that exists today. This is important in maintaining the hydrology of the wetland system. Concurrently, the culvert will improve wildlife passage by complying with the openness ratio (height and width vs. area) and other requirements of the MassDEP River and Stream Crossing Guidance. While there will be a marginal increase to the footprint of the road as it crosses through the wetland (compared to the narrow farm road), this footprint has been minimized through the use of modular retaining walls. Wetland impacts will be mitigated through the construction of new wetland areas as outlined in the LEC report.

C. Earthwork and Land Disturbance

The Project Site is generally located within the previously altered agricultural area on the property. The land area of the Project Site is approximately 25.62 acres. As described above, this area has been historically manipulated through excavation of overburden soil and import of loam associated with the agricultural use. It is for the most part relatively flat with earth work being driven by the need to ensure proper stormwater management slopes are achieved for the road and areas around the dwellings. Earth work occurring between stations #+## to #+## will be necessary to soften the steep slope of the hill in that area. Overall, the project has been designed to balance cut and fill volumes to minimize the export and import of soil material from the property. Not only is this strategy cost effective, but it also benefits the public by minimizing temporary construction truck trips and the duration of construction.

D. Stormwater Management Overview

The stormwater management system was designed in full compliance with the Massachusetts Stormwater Handbook and Boxford Stormwater Bylaw. The treatment train consists of deep-sump hooded catch basins, sediment forebays, infiltration basins, infiltration trenches and a detention basin. A closed-drainage system will be installed in the roadway, which will convey runoff to best management practice systems to provide storage and infiltration. Further explanation of the stormwater management system and design methodology can be found later in this report.

E. Open Space and Preservation of Natural Features

The project was designed such that a significant percentage of the site will remain undisturbed. Of the 117.6-acre total parcel area, only 25.7 acres will be disturbed, and two acres will be set aside for a future development parcel along Willow Road. This results in a total of 89.9 acres of land that will be protected, which is 76% of the subject property. The proposed site design

incorporates the principals of clustered development practices in minimizing the separation between dwellings, minimizing pavement footprints and consolidation the limit of work. This approach maximizes land use efficiency by filling the need for senior housing while maximizing the preservation of open space. The design allows for the protection of all wetland resource areas and other unique natural features on the subject property, such as the farm ponds and multiple open meadow areas.

The Natural Heritage and Endangered Species Program has jurisdiction over the subject property, and the applicant, through LEC, has had extensive conversations with Massachusetts Division of Fisheries and Wildlife about the proposed project. In conjunction with these efforts, the project has been designed to avoid, minimize, and mitigate potential impacts to state-listed rare species habitat. A Habitat Management Area Plan was prepared by LEC, which is included in the Notice of Intent application. LEC will also be filing a Conservation and Management Permit Application with NHESP and an Environmental Notification Form with MEPA for the project.

F. Utilities

The project will include a community public water supply system, with the proposed well locations identified on the Site Plans. The well design, permitting, construction and long-term maintenance will follow MassDEP regulations. The project will also include an onsite wastewater disposal system which will be designed in accordance with 310 CMR 15.00: Title 5 and the Boxford Board of Health Regulations. Provisions for natural gas (if no natural gas, propane or oil fuel will be utilized), electric service, cable, fiber optic and other communications services will be coordinated with the individual utility providers. Two new fire cisterns will be installed within the development, which will be coordinated with the Boxford Fire Department.

G. Schedule

Construction of the proposed development is anticipated to start in spring of 2021 and will take approximately 2 years to complete.

IV. STORMWATER MANAGEMENT

The proposed stormwater management system for the project will consist of various Best Management Practice (BMP) techniques used in both mitigating and renovating stormwater runoff. The entire stormwater system was designed in accordance with the Massachusetts Stormwater Management Handbook, in addition to the requirements contained within the Boxford Stormwater Management Bylaw. The existing watershed characteristics, flow paths and drainage patterns were matched to the extent practicable in the proposed condition to ensure that there are no adverse impacts to adjacent properties or wetland resource areas.

A detailed analysis was conducted for each of the three vernal pools on the subject property, to ensure that there will not be a decrease in the amount of water they receive from their tributary watersheds. This "water budget" comparison was made based on the existing versus proposed conditions and includes an analysis of both surface runoff and groundwater recharge volumes.

The vernal pool subcatchments are identified in the next section, and the results of this analysis are summarized in Appendix H: Vernal Pool Water Budget Summary.

A. Existing Watershed Description

The existing watershed of the Project Site was divided into eight separate subcatchment areas, as shown on Figure 5: Existing Watershed Plan. The edge of the bordering vegetated wetland surrounding the Project Site was chosen as the limit of the study area, and the Design Points were selected according to the natural drainage divides of the study area. In order to perform the water budget analysis of the vernal pools, individual subcatchments were delineated and a Design Point was assigned to each vernal pool (2A, 3A and 5A). As these Design Points were only used to compare existing and proposed volumes discharging to the vernal pools, the peak flow rates are not reported at these locations. Instead, Design Points 2A, 3A and 5A were routed to Design Points 2, 3 and 5, respectively. The table below summarizes the characteristics and tributary Design Point of each subcatchment.

Based on the results of extensive on-site soil testing, Hydrologic Soil Group B (HSG-B) was selected as the most appropriate and realistic category for the purposes of the drainage analysis. The published SCS Soil Map lists the upland soils in the study area as HSG-A, based on the well-draining parent material derived from glacial outwash deposits. However, the landscape within the study area has been substantially altered by past earth disturbance and agricultural activities, so the soils will not function as native undisturbed soils would. Additionally, the use of HSG-A in the HydroCAD model gives unrealistically low runoff rates for these large watershed areas, based on the associated runoff curve numbers. Therefore, the selection of HSG-B as a composite Hydrologic Soil Group was determined to yield the most accurate representation of the surface runoff and infiltration values within the study area.

Summary of Existing Subcatchments

Existing Subcatchment	Total Area (SF)	% Impervious	Curve Number	Tributary Design Point
ES1	338,407	0	59	DP-1
ES2	201,899	0	58	DP-2
ES2A	84,051	0	60	DP2A (VP1) → DP2
ES3	160,395	0	59	DP-3
ES3A	115,072	0	57	DP3A (VP3) → DP3
ES4	420,097	0	61	DP-4
ES5	301,140	0	60	DP-5
ES5A	168,926	0	59	DP5A (VP2) → DP5
Totals	**1,789,987**	**0**	**59**	

B. Proposed Watershed Description

The proposed (post development) drainage analysis was performed by dividing the study area into sixteen (16) subcatchment areas (See Figure 6: Proposed Watershed Plan). In order to provide treatment and mitigation of stormwater runoff from the development, several BMPs were included in the design. They are listed below, along with their corresponding HydroCAD "pond" number.

- Pond 1P: Grassed Detention Basin
- Pond 2P: Grassed Infiltration Basin
- Pond 3P: Grassed Infiltration Basin
- Pond 4P: Grassed Infiltration Basin
- Pond 5P: Grassed Infiltration Basin
- Pond 6P: Crushed Stone Infiltration Trench

The table below summarizes the characteristics and tributary Design Point (and BMP) of each subcatchment.

Summary of Proposed Subcatchments

Proposed Subcatchment	Total Area (SF)	% Impervious	Curve Number	Tributary Design Point / Pond
PS1	343,774	1.74	58	DP1
PS2	119,197	5.18	59	DP2
PS2A	52,258	2.20	57	DP2A → DP2
PS3	97,067	3.56	58	DP3
PS3A	67,954	3.39	57	DP3A → DP3
PS4	171,976	9.20	61	DP4
PS5	73,892	3.12	58	PS5
PS5A	95,000	1.21	56	DP5A → DP5
PS6	168,938	15.67	63	DP5
PS7	95,556	32.02	73	5P → DP5A → DP5
PS8	39,073	71.28	87	3P → DP4
PS9	149,876	53.46	81	3P → DP4
PS10	78,810	59.90	83	1P → DP2
PS11	72,767	37.18	79	3P → DP4
PS12	45,344	3.81	62	1P → DP2
PS13	25,606	30.26	72	2P → DP2A → DP2
PS14	22,124	10.42	63	4P → DP3A → DP3
PS15	21,777	100	98	2P → DP2A → DP2
PS16	21,777	100	98	3P → DP4
PS17	27,221	100	98	6P → DP3A → DP3
Totals	**1,789,987**	**20.12**	**66**	

C. Hydrologic Analysis

The purpose of the stormwater analysis is to demonstrate that the proposed development will not adversely impact either the Project Site or surrounding land and resource areas. The industry standard for stormwater management design in Massachusetts is governed by the Massachusetts Stormwater Management Handbook ("Handbook") published by the Mass Department of Environmental Protection, January 2008. The Regulations require applicants to comply with the Handbook standards for development projects. The Handbook lists 10 standards covering both mitigation and renovation of stormwater runoff. A full discussion on the project compliance with the standards can be found at the end of this report. However, the following section will summarize the project's compliance with the mitigation standards 1 and 2 of the Handbook relating to reducing peak rates of runoff and creating no adverse down gradient impacts.

To demonstrate that there will be no downstream impacts because of developing the site, a stormwater analysis was performed using the U.S. Soil Conservation Service (S.C.S) method of analysis contained in Technical Release #20 (TR-20) published by the U.S. Conservation Service, along with the precipitation values listed in Boxford's Stormwater Management Bylaw. The software application HydroCAD was utilized to analyze the pre and post-development watershed conditions.

The following is a listing of the total pre-and post-development rates of stormwater runoff for the primary Design Points for the 2, 10, 25, 50 and 100-year rainfall events. The dedicated vernal pool Design Points (2A, 3A & 5A) were not individually analyzed because they are tributary to other Design Points (2, 3 & 5) as described previously.

Comparison of Existing and Proposed Rates of Runoff

Design Point	Storm Event (Years)	Existing Conditions (Peak CFS)	Proposed Conditions (Peak CFS)	Change in Peak (CFS)
DP-1	2	1.4	1.2	-0.2
	10	6.6	6.4	-0.2
	25	11.0	10.7	-0.3
	50	14.5	14.3	-0.2
	100	18.5	18.4	-0.1
DP-2	2	1.2	1.1	-0.1
	10	6.7	4.8	-1.9
	25	11.2	9.5	-1.7
	50	14.8	14.5	-0.3
	100	19.1	19.1	-0.0

DP-3	2	1.0	0.7	-0.3
	10	5.4	5.1	-0.3
	25	9.1	8.0	-1.1
	50	12.1	10.3	-1.8
	100	15.6	12.9	-2.7
DP-4	2	2.3	1.3	-1.0
	10	10.0	5.8	-4.2
	25	16.1	9.4	-6.7
	50	21.0	12.2	-8.8
	100	26.6	16.0	-10.6
DP-5	2	2.2	1.7	-0.5
	10	10.4	8.0	-2.4
	25	17.0	13.0	-4.0
	50	22.4	18.8	-3.6
	100	28.6	26.9	-1.7

As shown in the table above, the proposed development will maintain or reduce peak flow rates to all Design Points for the 2, 10, and 100-year design storms as required by the Massachusetts Stormwater Management Handbook. The 25-year and 50-year events were also analyzed as required by Boxford's Stormwater Management Bylaw.

The Boxford Stormwater Management Bylaw also requires that total runoff volume is not increased from the pre-development to post-development condition. The table below summarizes the total runoff volume generated by the study area watershed, which is reported at Design Point 1, the most downstream location of the Parker River.

Comparison of Existing and Proposed Volumes of Runoff

Design Point	Storm Event (Years)	Existing Conditions (CF)	Proposed Conditions (CF)	Change in Volume (CF)
DP-1	2	60,455	51,634	-8,821
	10	198,997	178,492	-20,505
	25	308,122	291,336	-16,786

50	396,067	383,075	-12,992
100	499,157	489,806	-9,351

D. Stormwater Management Standards

The proposed site development will comply with all Stormwater Management Standards. The following is an assessment of each Standard:

1. **STANDARD:** No stormwater conveyance system discharges untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

   SUMMARY OF MITIGATING MEASURES: The project meets this standard as there are no new untreated discharges from the project site. The existing drainage patterns will be maintained to the extent practicable and the stormwater discharge locations will generally be maintained. Treatment of stormwater is proposed with best management practices (BMPs) including deep sump hooded catch basins, hydrodynamic separators, grassed infiltration basins, infiltration trenches, and a detention basin. The outfalls of all the systems will be reinforced with rip rap outlet protection to prevent erosion.

   CONCLUSION: The proposed development meets this standard.

2. **STANDARD:** The stormwater management system shall be designed such that post-development peak rates of stormwater runoff do not exceed pre-development rates for the 2- and 10-year storm events.

   SUMMARY OF MITIGATING MEASURES: The project will utilize several BMPs that include outlet structures to control the rate of release of stormwater. As a result, the peak rate of stormwater runoff in the post-development condition will match or reduce the rate under existing conditions. The 100-year storm event was also evaluated and the BMPs were designed to reduce the existing conditions peak 100-year storm rate of runoff to prevent storm damage and prevent off-site flooding. The 25-year and 50-year events were included in the analysis as required by the Boxford Stormwater Management Bylaw.

   CONCLUSION: The proposed development meets this standard.

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

   SUMMARY OF MITIGATING MEASURES: To promote groundwater recharge, the site has been designed to include numerous infiltration systems. The systems were strategically placed within the site in order to maximize the infiltration capacity and to spread out the groundwater recharge locations. The system will accept either pre-treated stormwater or direct roof runoff prior to infiltration. The BMPs will provide recharge to groundwater in excess of what is estimated in the existing condition.

   CONCLUSION: The proposed development meets this standard.

4. **STANDARD:** Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).

   SUMMARY OF MITIGATING MEASURES: The stormwater management system will use treatment trains of deep sump hooded catch basins, proprietary treatment structures and infiltration/detention systems to treat stormwater prior to discharge. Pre-treatment of stormwater is provided for all systems. All stormwater will be treated to a minimum of 80% TSS removal prior to discharging to the design points.

   CONCLUSION: The proposed development meets this standard.

5. **STANDARD:** For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.

   SUMMARY OF MITIGATING MEASURES: None.

   CONCLUSION: The proposed development meets this standard as it does not apply to this project.

6. **STANDARD:** Stormwater discharges within the Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area including vernal pools, 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 Management handbook.

   SUMMARY OF MITIGATING MEASURES: The project has been designed to provide the higher level of treatment including 44% pretreatment primary to the retention/detention BMP and treating for 1" of runoff.

   CONCLUSION: The proposed development meets this standard.

7. **STANDARD:** 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.

   SUMMARY OF MITIGATING MEASURES: None.

   CONCLUSION: The proposed development meets this standard as it does not apply to this project.

8. **STANDARD:** 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).

SUMMARY OF MITIGATING MEASURES: Refer to the Construction Phase Best Management Practices prepared by MCG, dated November 19, 2020. Since the project will disturb greater than one acre of land a SWPPP will be prepared and a NPDES Construction General Permit will be obtained prior to commencement of land disturbing activities on site.

CONCLUSION: The proposed development meets this standard.

9. **STANDARD:** A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

   SUMMARY OF MITIGATING MEASURES: Refer to the Long-Term Best Management Practices Operation and Maintenance Plan prepared by MCG, dated November 19, 2020.

   CONCLUSION: The proposed development meets this standard.

10. **STANDARD:** There shall be no new illicit discharges created as a result of the project.

    SUMMARY OF MITIGATING MEASURES: To the best of our knowledge and belief there are no illicit discharges being created as a result of the proposed project. An illicit discharge statement is included herein.

    CONCLUSION: The proposed development meets this standard.

V. CONCLUSION

The proposed site development project for Willows at Boxford, as proposed, is in full compliance with the MassDEP Stormwater Management Handbook and utilizes generally accepted engineering practices for site development. Peak rates of stormwater runoff and volume leaving the site under proposed conditions are no greater than under existing conditions. Recharge to groundwater will be increased by proposed stormwater management systems. All stormwater leaving the proposed development will be fully treated and there are no illicit discharges to the waters of the Commonwealth.

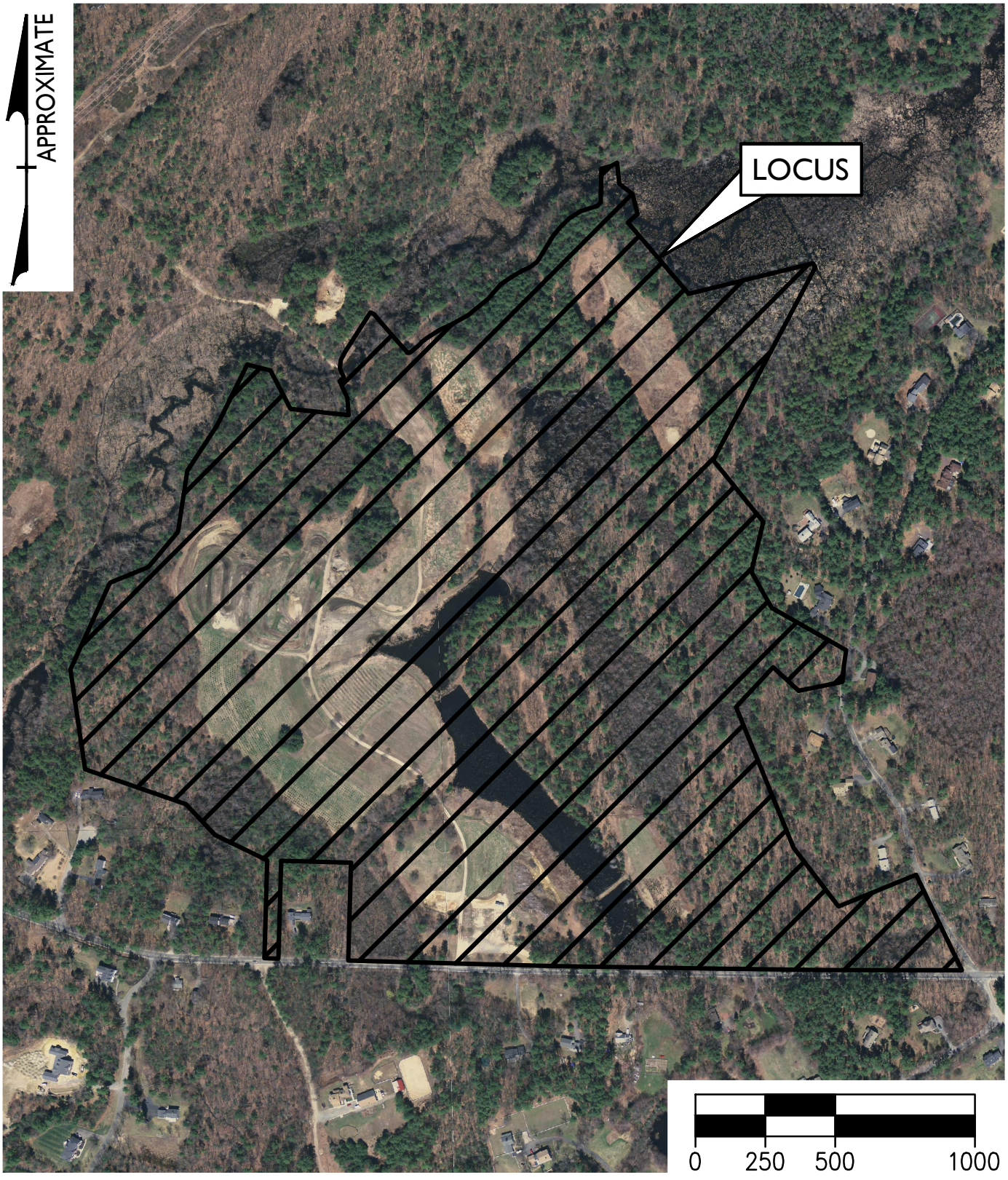
The clustered development footprint allows for the provision of local, age-restricted housing units while maximizing the protection of open space and natural resource areas. As such, the proposed project will be a benefit to the Town of Boxford by incorporating innovative land use techniques, providing local housing units in an active adult community and protecting the wetland and water resources of the Commonwealth.

For questions regarding this report, please contact The Morin-Cameron Group, Inc. between the hours of 7:30am to 4:30pm at (978) 373-0310.

FIGURES

APPENDICIES

FIGURES



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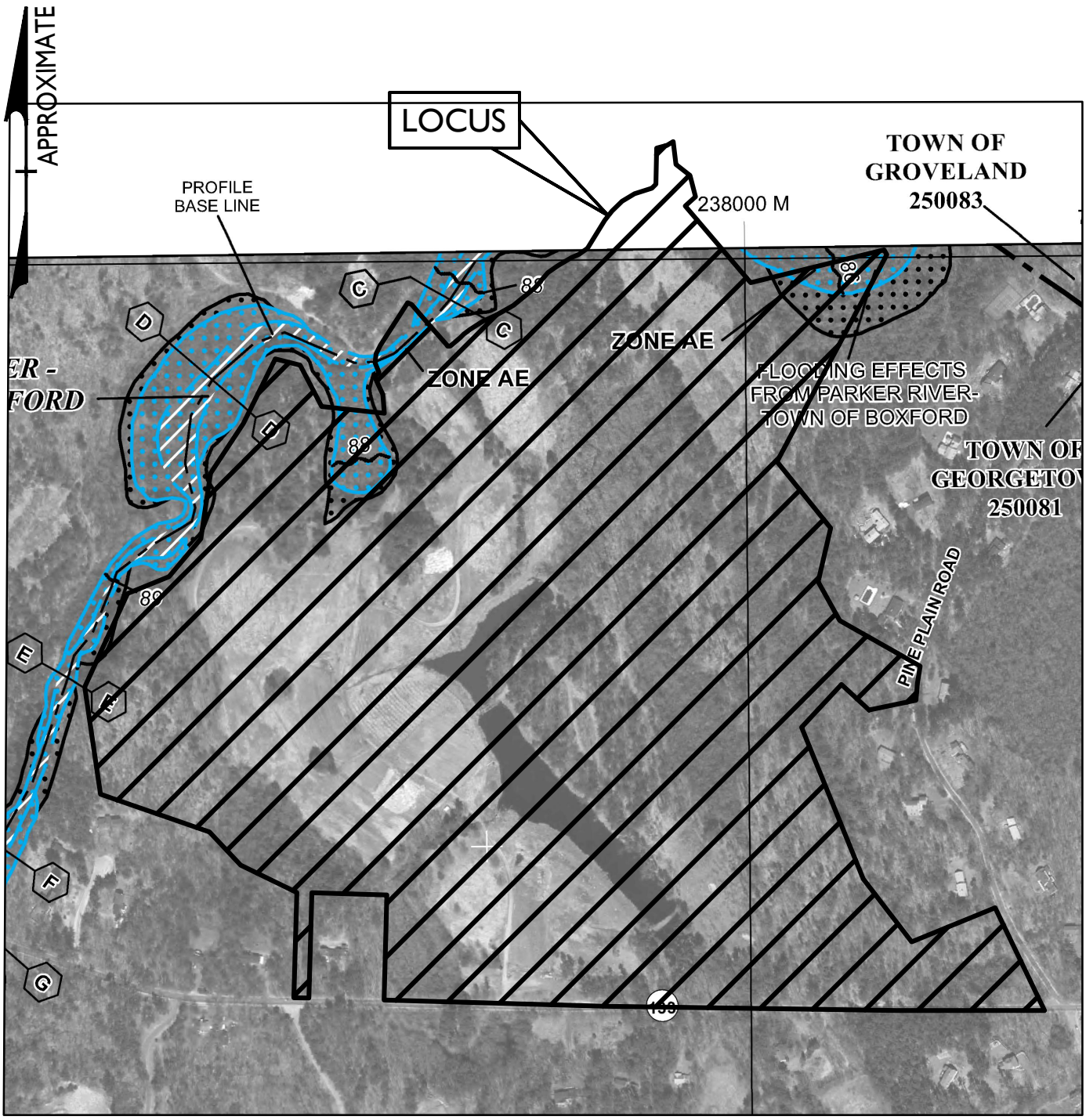
2013 ORTHO MAP
WILLOW ROAD
BOXFORD, MA

Date: November 19, 2020

SCALE: 1" = 500'

FIGURE #1



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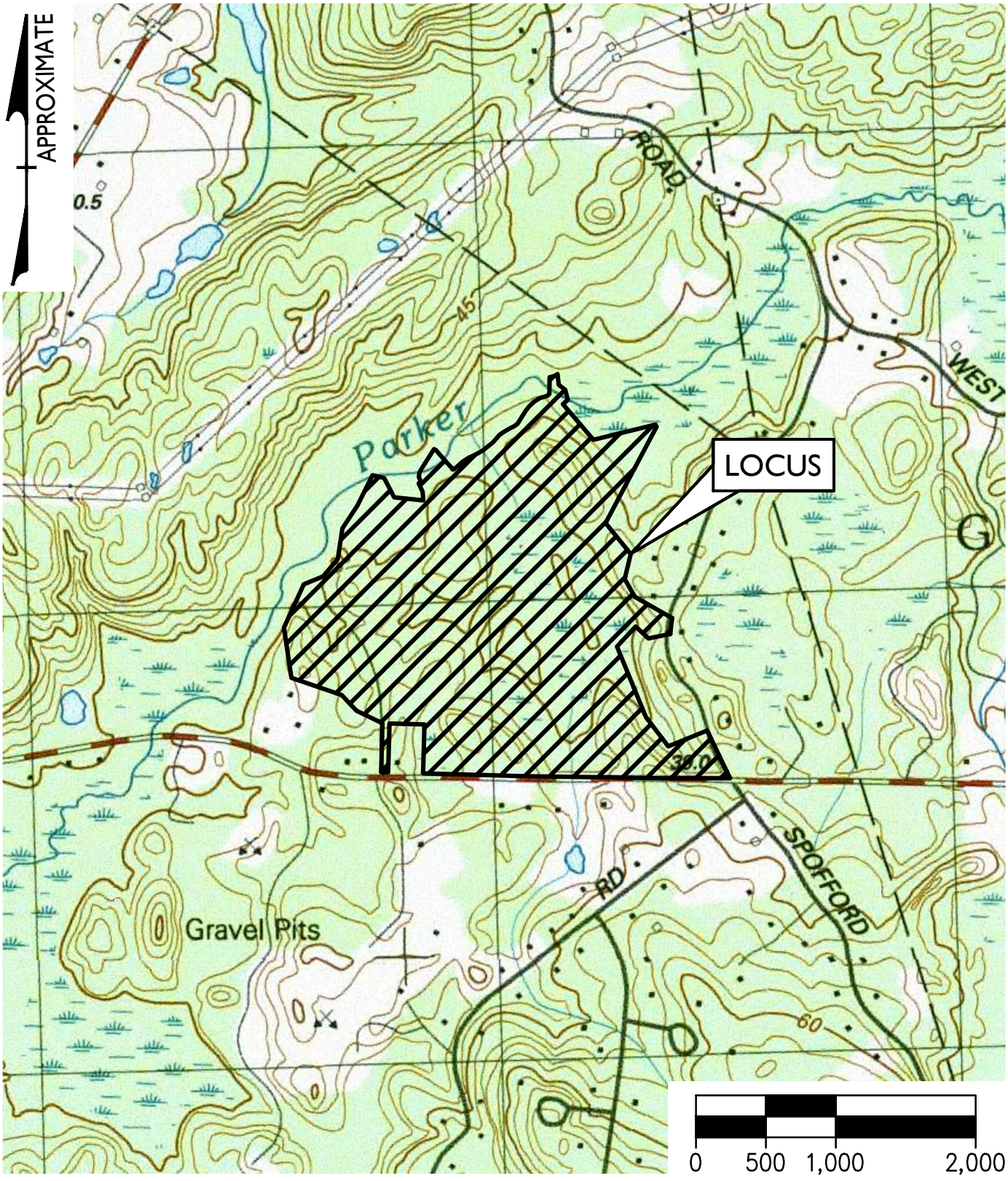
FEMA FLOOD MAP
WILLOW ROAD
BOXFORD, MA

Date: November 19, 2020

SCALE: 1" = 500'

FIGURE #2



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P | 978.373.0310 F | 978.774.3488
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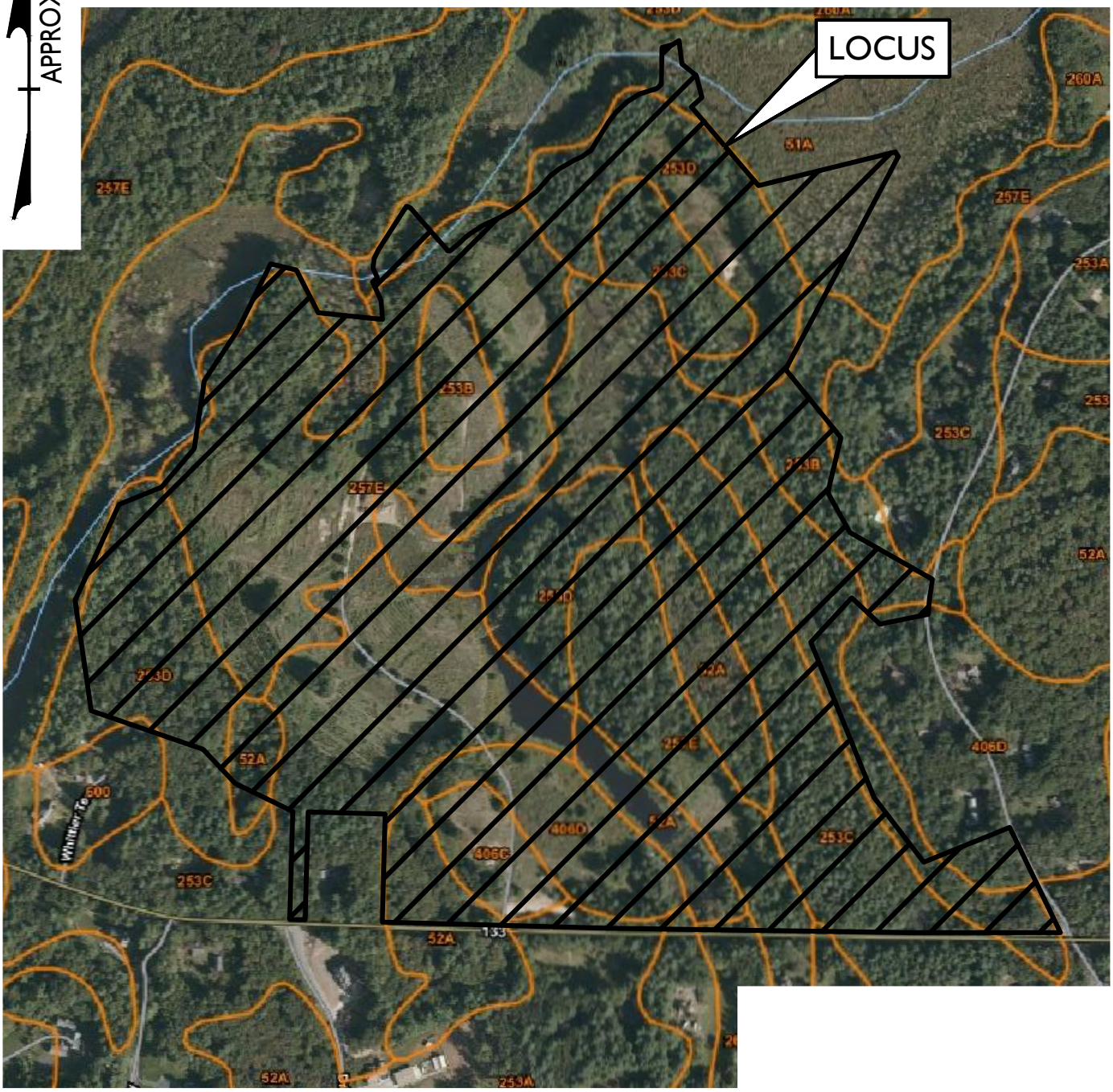
USGS LOCUS MAP
WILLOW ROAD
BOXFORD, MA

Date: November 19, 2020 | SCALE: 1" = 1000'

FIGURE #3



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SCS SOILS MAP
WILLOW ROAD
BOXFORD, MA

Date: November 19, 2020

SCALE: 1" = 500'

FIGURE #4

The Morin-Cameron GROUP, INC.
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LAND SURVEYORS | LAND USE PLANNERS
66 ELM STREET, DANVERS, MASSACHUSETTS 01923
P: 978-777-8586, F: 978-774-3488, W: WWW.MORINCAMERON.COM

PLAN
SCALE: 1" = 120'
0 60 120 240

N

PARKER RIVER
DP-1
EDGE OF BORDERING VEGETATED WETLAND
PARKER RIVER
DP-2
PARKER RIVER
TOP OF BANK
ES-1
N/F
PRICE FAMILY, LLC
MAP 6 BLOCK 2 LOT 2.2
AREA=117.6± AC
VP-1
DP-2A
ES-2
PARKER RIVER
DP-3
ES-2
ES-2A
EDGE OF BORDERING VEGETATED WETLAND
DP-4
ES-3
ES-4
DP-5
EDGE OF BORDERING VEGETATED WETLAND
VP-3
DP-3A
ES-3A
ES-5
EDGE OF BORDERING VEGETATED WETLAND
DP-5A
VP-2
ES-5A
WILLOW ROAD

SCOTT P. CAMERON
CIVIL
No. 47601
REGISTERED PROFESSIONAL ENGINEER
COMMONWEALTH OF MASSACHUSETTS
11-19-2020

EXISTING WATERSHED PLAN
IN
BOXFORD, MASSACHUSETTS
WILLOW ROAD
(ASSESSOR'S MAP 6, BLOCK 2, LOT 2.2)
PREPARED FOR:
TOLL BROS., INC.

FIGURE NO.	DATE: NOVEMBER 19, 2020
5	REVISED:

The Morin-Cameron GROUP, INC.
CIVIL ENGINEERS | ENVIRONMENTAL CONSULTANTS
LAND SURVEYORS | LAND USE PLANNERS
66 ELM STREET, DANVERS, MASSACHUSETTS 01923
P: 978-777-8586, F: 978-774-3488, W: WWW.MORINCAMERON.COM

PLAN
SCALE: 1" = 120'
0 60 120 240

N

PARKER RIVER
DP-1
EDGE OF BORDERING VEGETATED WETLAND
PARKER RIVER
DP-2
PARKER RIVER
TOP OF BANK
PS-1
PS-2
N/F
PRICE FAMILY, LLC
MAP 6 BLOCK 2 LOT 2.2
AREA=117.6± AC
PROP. INFILTRATION BASIN (2P)
PROP. DETENTION BASIN (1P)
VP-1
DP-2A
DP-3
PS-2
PS-2A
PS-15
PS-10
EDGE OF BORDERING VEGETATED WETLAND
PS-12
PS-13
PS-16
PS-9
PS-4
DP-4
PS-3
PS-16
PS-9
PROP. INFILTRATION BASIN (3P)
DP-5
PS-16
PS-17
EDGE OF BORDERING VEGETATED WETLAND
PS-9
PS-3A
PS-14
PS-11
PROP. RECHARGE TRENCH (6P)
PROP. INFILTRATION BASIN (4P)
TIME OF CONCENTRATION (TYP.)
DP-3A
VP-3
PS-5
PS-6
PS-8
PS-5A
PS-7
EDGE OF BORDERING VEGETATED WETLAND
DP-5A
VP-2
PROP. INFILTRATION BASIN (5P)
WILLOW ROAD

COMMONWEALTH OF MASSACHUSETTS
SCOTT P. CAMERON
CIVIL
No. 47601
REGISTERED PROFESSIONAL ENGINEER
11-19-2020

PROPOSED WATERSHED PLAN
IN
BOXFORD, MASSACHUSETTS
WILLOW ROAD
(ASSESSOR'S MAP 6, BLOCK 2, LOT 2.2)
PREPARED FOR:
TOLL BROS., INC.

FIGURE NO.	DATE: NOVEMBER 19, 2020
6	REVISED:

The
Morin-Cameron
GROUP, INC.
CIVIL ENGINEERS | ENVIRONMENTAL CONSULTANTS
LAND SURVEYORS | LAND USE PLANNERS
66 ELM STREET, DANVERS, MASSACHUSETTS 01923
P: 978-777-8586, F: 978-774-3488, W: WWW.MORINCAMERON.COM

PLAN
SCALE: 1" = 120'
0 60 120 240

N

N/F
PRICE FAMILY, LLC
MAP 6 BLOCK 2 LOT 2.2
AREA=117.6± AC

CB-16
CB-15
CB-14
CB-13
CB-11
CB-12
CB-5
CB-6
CB-10
CB-9
CB-7
CB-8
CB-4
CB-3
CB-1
CB-2
P-5
P-4
P-3
P-1
P-7
WILLOW ROAD

COMMONWEALTH OF MASSACHUSETTS
SCOTT P. CAMERON
CIVIL
No. 47601
REGISTERED PROFESSIONAL ENGINEER
11-19-2020

RATIONAL METHOD PLAN
IN
BOXFORD, MASSACHUSETTS
WILLOW ROAD
(ASSESSOR'S MAP 6, BLOCK 2, LOT 2.2)
PREPARED FOR:
TOLL BROS., INC.

FIGURE NO.	DATE: NOVEMBER 19, 2020
7	REVISED:

APPENDIX A:

MASSDEP STORMWATER

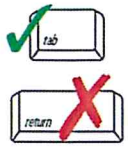
MANAGEMENT REPORT CHECKLIST

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

11-19-2020

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) (Reduced Pavement)
- ☒ 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):

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;

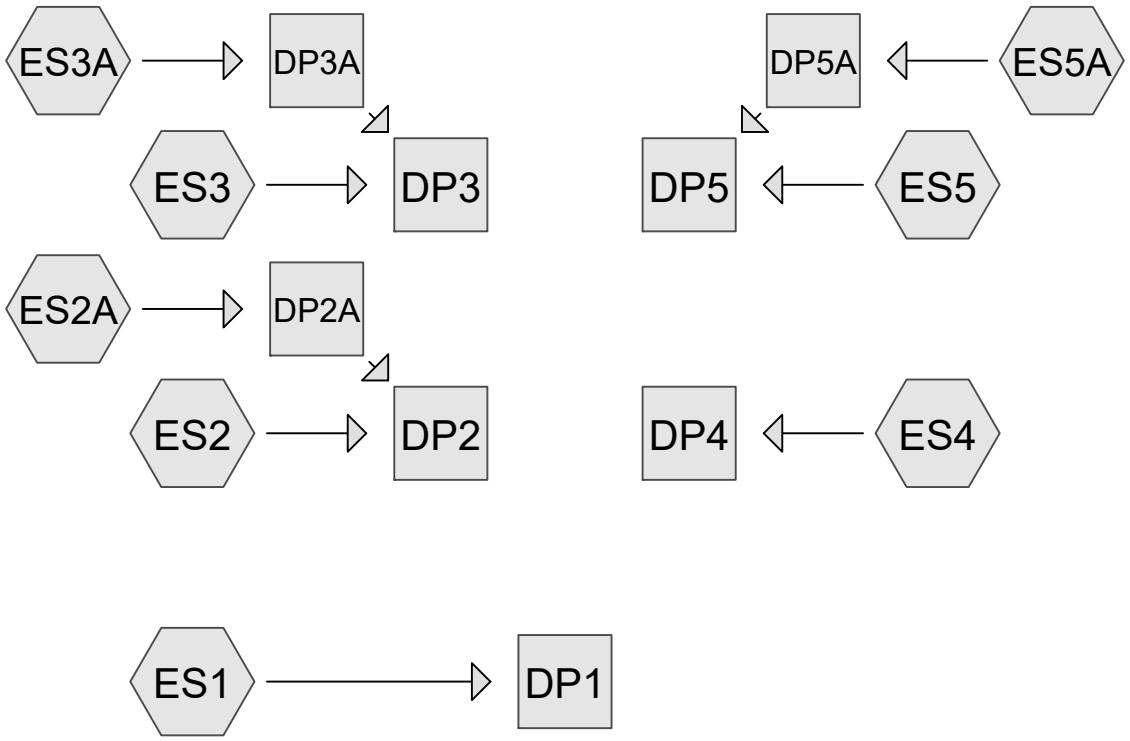
☒ An Illicit Discharge Compliance Statement is attached;

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

APPENDIX B:

EXISTING CONDITIONS

HYDROLOGIC ANALYSIS



Subcat Reach Pond Link

Routing Diagram for Willow Road Existing Conditions
Prepared by The Morin-Cameron Group, Inc., Printed 11/18/2020

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
1,252,784	61	>75% Grass cover, Good, HSG B (ES1, ES2, ES2A, ES3, ES3A, ES4, ES5, ES5A)
537,203	55	Woods, Good, HSG B (ES1, ES2, ES2A, ES3, ES3A, ES4, ES5, ES5A)
1,789,987	**59**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
1,789,987	HSG B	ES1, ES2, ES2A, ES3, ES3A, ES4, ES5, ES5A
0	HSG C	
0	HSG D	
0	Other	
1,789,987		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Num
0	1,252,784	0	0	0	1,252,784	>75% Grass cover, Good	
0	537,203	0	0	0	537,203	Woods, Good	
0	**1,789,987**	**0**	**0**	**0**	**1,789,987**	**TOTAL AREA**	

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ES1: Runoff Area=338,407 sf 0.00% Impervious Runoff Depth=0.39"
Flow Length=350' Tc=23.4 min CN=59 Runoff=1.4 cfs 10,971 cf

Subcatchment ES2: Runoff Area=201,899 sf 0.00% Impervious Runoff Depth=0.36"
Flow Length=615' Tc=13.8 min CN=58 Runoff=0.8 cfs 5,979 cf

Subcatchment ES2A: Runoff Area=84,051 sf 0.00% Impervious Runoff Depth=0.42"
Flow Length=150' Tc=13.5 min CN=60 Runoff=0.5 cfs 2,970 cf

Subcatchment ES3: Runoff Area=160,395 sf 0.00% Impervious Runoff Depth=0.39"
Flow Length=540' Tc=16.8 min CN=59 Runoff=0.7 cfs 5,200 cf

Subcatchment ES3A: Runoff Area=115,072 sf 0.00% Impervious Runoff Depth=0.32"
Flow Length=210' Tc=22.4 min CN=57 Runoff=0.3 cfs 3,099 cf

Subcatchment ES4: Runoff Area=420,097 sf 0.00% Impervious Runoff Depth=0.46"
Flow Length=650' Tc=19.7 min CN=61 Runoff=2.3 cfs 16,119 cf

Subcatchment ES5: Runoff Area=301,140 sf 0.00% Impervious Runoff Depth=0.42"
Flow Length=230' Tc=19.4 min CN=60 Runoff=1.5 cfs 10,641 cf

Subcatchment ES5A: Runoff Area=168,926 sf 0.00% Impervious Runoff Depth=0.39"
Flow Length=180' Tc=18.9 min CN=59 Runoff=0.7 cfs 5,476 cf

Reach DP1: Parker River Inflow=1.4 cfs 10,971 cf
Outflow=1.4 cfs 10,971 cf

Reach DP2: Inflow=1.2 cfs 8,949 cf
Outflow=1.2 cfs 8,949 cf

Reach DP2A: Inflow=0.5 cfs 2,970 cf
Outflow=0.5 cfs 2,970 cf

Reach DP3: Inflow=1.0 cfs 8,298 cf
Outflow=1.0 cfs 8,298 cf

Reach DP3A: Inflow=0.3 cfs 3,099 cf
Outflow=0.3 cfs 3,099 cf

Reach DP4: Inflow=2.3 cfs 16,119 cf
Outflow=2.3 cfs 16,119 cf

Reach DP5: Inflow=2.2 cfs 16,117 cf
Outflow=2.2 cfs 16,117 cf

Reach DP5A: Inflow=0.7 cfs 5,476 cf
Outflow=0.7 cfs 5,476 cf

Total Runoff Area = 1,789,987 sf Runoff Volume = 60,455 cf Average Runoff Depth = 0.41"
100.00% Pervious = 1,789,987 sf 0.00% Impervious = 0 sf

Summary for Subcatchment ES1:

Runoff = 1.4 cfs @ 12.50 hrs, Volume= 10,971 cf, Depth= 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Description
200,998	61	>75% Grass cover, Good, HSG B
137,409	55	Woods, Good, HSG B
338,407	59	Weighted Average
338,407		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
1.6	300	0.0400	3.22		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
23.4	350	Total			

Summary for Subcatchment ES2:

Runoff = 0.8 cfs @ 12.37 hrs, Volume= 5,979 cf, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Description
100,828	61	>75% Grass cover, Good, HSG B
101,071	55	Woods, Good, HSG B
201,899	58	Weighted Average
201,899		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.1000	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
2.3	565	0.0670	4.17		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.8	615	Total			

Summary for Subcatchment ES2A:

Runoff = 0.5 cfs @ 12.28 hrs, Volume= 2,970 cf, Depth= 0.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Description
63,556	61	>75% Grass cover, Good, HSG B
20,495	55	Woods, Good, HSG B
84,051	60	Weighted Average
84,051		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	50	0.0700	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.3	100	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.5	150	Total			

Summary for Subcatchment ES3:

Runoff = 0.7 cfs @ 12.38 hrs, Volume= 5,200 cf, Depth= 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Description
106,813	61	>75% Grass cover, Good, HSG B
53,582	55	Woods, Good, HSG B
160,395	59	Weighted Average
160,395		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	50	0.0600	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
2.7	490	0.0350	3.01		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.8	540	Total			

Summary for Subcatchment ES3A:

Runoff = 0.3 cfs @ 12.52 hrs, Volume= 3,099 cf, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Description
36,688	61	>75% Grass cover, Good, HSG B
78,384	55	Woods, Good, HSG B
115,072	57	Weighted Average
115,072		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.6	160	0.0750	4.41		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
22.4	210	Total			

Summary for Subcatchment ES4:

Runoff = 2.3 cfs @ 12.39 hrs, Volume= 16,119 cf, Depth= 0.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Description
409,301	61	>75% Grass cover, Good, HSG B
10,796	55	Woods, Good, HSG B
420,097	61	Weighted Average
420,097		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0400	0.05		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
3.2	600	0.0380	3.14		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
19.7	650	Total			

Summary for Subcatchment ES5:

Runoff = 1.5 cfs @ 12.40 hrs, Volume= 10,641 cf, Depth= 0.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Description
230,675	61	>75% Grass cover, Good, HSG B
70,465	55	Woods, Good, HSG B
301,140	60	Weighted Average
301,140		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	50	0.0300	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.8	180	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
19.4	230	Total			

Summary for Subcatchment ES5A:

Runoff = 0.7 cfs @ 12.42 hrs, Volume= 5,476 cf, Depth= 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Description
103,925	61	>75% Grass cover, Good, HSG B
65,001	55	Woods, Good, HSG B
168,926	59	Weighted Average
168,926		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	50	0.0300	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.3	130	0.1600	6.44		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
18.9	180	Total			

Summary for Reach DP1: Parker River

Inflow Area = 338,407 sf, 0.00% Impervious, Inflow Depth = 0.39" for 2 Year event
Inflow = 1.4 cfs @ 12.50 hrs, Volume= 10,971 cf
Outflow = 1.4 cfs @ 12.50 hrs, Volume= 10,971 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2:

Inflow Area = 285,950 sf, 0.00% Impervious, Inflow Depth = 0.38" for 2 Year event
Inflow = 1.2 cfs @ 12.34 hrs, Volume= 8,949 cf
Outflow = 1.2 cfs @ 12.34 hrs, Volume= 8,949 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2A:

Inflow Area = 84,051 sf, 0.00% Impervious, Inflow Depth = 0.42" for 2 Year event
Inflow = 0.5 cfs @ 12.28 hrs, Volume= 2,970 cf
Outflow = 0.5 cfs @ 12.28 hrs, Volume= 2,970 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP3:

Inflow Area = 275,467 sf, 0.00% Impervious, Inflow Depth = 0.36" for 2 Year event
Inflow = 1.0 cfs @ 12.45 hrs, Volume= 8,298 cf
Outflow = 1.0 cfs @ 12.45 hrs, Volume= 8,298 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP3A:

Inflow Area = 115,072 sf, 0.00% Impervious, Inflow Depth = 0.32" for 2 Year event
Inflow = 0.3 cfs @ 12.52 hrs, Volume= 3,099 cf
Outflow = 0.3 cfs @ 12.52 hrs, Volume= 3,099 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP4:

Inflow Area = 420,097 sf, 0.00% Impervious, Inflow Depth = 0.46" for 2 Year event
Inflow = 2.3 cfs @ 12.39 hrs, Volume= 16,119 cf
Outflow = 2.3 cfs @ 12.39 hrs, Volume= 16,119 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP5:

Inflow Area = 470,066 sf, 0.00% Impervious, Inflow Depth = 0.41" for 2 Year event
Inflow = 2.2 cfs @ 12.41 hrs, Volume= 16,117 cf
Outflow = 2.2 cfs @ 12.41 hrs, Volume= 16,117 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP5A:

Inflow Area = 168,926 sf, 0.00% Impervious, Inflow Depth = 0.39" for 2 Year event
Inflow = 0.7 cfs @ 12.42 hrs, Volume= 5,476 cf
Outflow = 0.7 cfs @ 12.42 hrs, Volume= 5,476 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ES1: Runoff Area=338,407 sf 0.00% Impervious Runoff Depth=1.30"
Flow Length=350' Tc=23.4 min CN=59 Runoff=6.6 cfs 36,743 cf

Subcatchment ES2: Runoff Area=201,899 sf 0.00% Impervious Runoff Depth=1.24"
Flow Length=615' Tc=13.8 min CN=58 Runoff=4.5 cfs 20,785 cf

Subcatchment ES2A: Runoff Area=84,051 sf 0.00% Impervious Runoff Depth=1.37"
Flow Length=150' Tc=13.5 min CN=60 Runoff=2.2 cfs 9,608 cf

Subcatchment ES3: Runoff Area=160,395 sf 0.00% Impervious Runoff Depth=1.30"
Flow Length=540' Tc=16.8 min CN=59 Runoff=3.6 cfs 17,415 cf

Subcatchment ES3A: Runoff Area=115,072 sf 0.00% Impervious Runoff Depth=1.17"
Flow Length=210' Tc=22.4 min CN=57 Runoff=2.0 cfs 11,211 cf

Subcatchment ES4: Runoff Area=420,097 sf 0.00% Impervious Runoff Depth=1.44"
Flow Length=650' Tc=19.7 min CN=61 Runoff=10.0 cfs 50,472 cf

Subcatchment ES5: Runoff Area=301,140 sf 0.00% Impervious Runoff Depth=1.37"
Flow Length=230' Tc=19.4 min CN=60 Runoff=6.8 cfs 34,423 cf

Subcatchment ES5A: Runoff Area=168,926 sf 0.00% Impervious Runoff Depth=1.30"
Flow Length=180' Tc=18.9 min CN=59 Runoff=3.6 cfs 18,341 cf

Reach DP1: Parker River Inflow=6.6 cfs 36,743 cf
Outflow=6.6 cfs 36,743 cf

Reach DP2: Inflow=6.7 cfs 30,392 cf
Outflow=6.7 cfs 30,392 cf

Reach DP2A: Inflow=2.2 cfs 9,608 cf
Outflow=2.2 cfs 9,608 cf

Reach DP3: Inflow=5.4 cfs 28,625 cf
Outflow=5.4 cfs 28,625 cf

Reach DP3A: Inflow=2.0 cfs 11,211 cf
Outflow=2.0 cfs 11,211 cf

Reach DP4: Inflow=10.0 cfs 50,472 cf
Outflow=10.0 cfs 50,472 cf

Reach DP5: Inflow=10.4 cfs 52,764 cf
Outflow=10.4 cfs 52,764 cf

Reach DP5A: Inflow=3.6 cfs 18,341 cf
Outflow=3.6 cfs 18,341 cf

Total Runoff Area = 1,789,987 sf Runoff Volume = 198,997 cf Average Runoff Depth = 1.33"
100.00% Pervious = 1,789,987 sf 0.00% Impervious = 0 sf

Summary for Subcatchment ES1:

Runoff = 6.6 cfs @ 12.37 hrs, Volume= 36,743 cf, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description
200,998	61	>75% Grass cover, Good, HSG B
137,409	55	Woods, Good, HSG B
338,407	59	Weighted Average
338,407		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
1.6	300	0.0400	3.22		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
23.4	350	Total			

Summary for Subcatchment ES2:

Runoff = 4.5 cfs @ 12.22 hrs, Volume= 20,785 cf, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description
100,828	61	>75% Grass cover, Good, HSG B
101,071	55	Woods, Good, HSG B
201,899	58	Weighted Average
201,899		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.1000	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
2.3	565	0.0670	4.17		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.8	615	Total			

Summary for Subcatchment ES2A:

Runoff = 2.2 cfs @ 12.20 hrs, Volume= 9,608 cf, Depth= 1.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description
63,556	61	>75% Grass cover, Good, HSG B
20,495	55	Woods, Good, HSG B
84,051	60	Weighted Average
84,051		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	50	0.0700	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.3	100	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.5	150	Total			

Summary for Subcatchment ES3:

Runoff = 3.6 cfs @ 12.26 hrs, Volume= 17,415 cf, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description
106,813	61	>75% Grass cover, Good, HSG B
53,582	55	Woods, Good, HSG B
160,395	59	Weighted Average
160,395		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	50	0.0600	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
2.7	490	0.0350	3.01		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.8	540	Total			

Summary for Subcatchment ES3A:

Runoff = 2.0 cfs @ 12.37 hrs, Volume= 11,211 cf, Depth= 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description
36,688	61	>75% Grass cover, Good, HSG B
78,384	55	Woods, Good, HSG B
115,072	57	Weighted Average
115,072		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.6	160	0.0750	4.41		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
22.4	210	Total			

Summary for Subcatchment ES4:

Runoff = 10.0 cfs @ 12.30 hrs, Volume= 50,472 cf, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description
409,301	61	>75% Grass cover, Good, HSG B
10,796	55	Woods, Good, HSG B
420,097	61	Weighted Average
420,097		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0400	0.05		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
3.2	600	0.0380	3.14		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
19.7	650	Total			

Summary for Subcatchment ES5:

Runoff = 6.8 cfs @ 12.31 hrs, Volume= 34,423 cf, Depth= 1.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description
230,675	61	>75% Grass cover, Good, HSG B
70,465	55	Woods, Good, HSG B
301,140	60	Weighted Average
301,140		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	50	0.0300	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.8	180	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
19.4	230	Total			

Summary for Subcatchment ES5A:

Runoff = 3.6 cfs @ 12.29 hrs, Volume= 18,341 cf, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description
103,925	61	>75% Grass cover, Good, HSG B
65,001	55	Woods, Good, HSG B
168,926	59	Weighted Average
168,926		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	50	0.0300	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.3	130	0.1600	6.44		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
18.9	180	Total			

Summary for Reach DP1: Parker River

Inflow Area = 338,407 sf, 0.00% Impervious, Inflow Depth = 1.30" for 10 Year event
Inflow = 6.6 cfs @ 12.37 hrs, Volume= 36,743 cf
Outflow = 6.6 cfs @ 12.37 hrs, Volume= 36,743 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2:

Inflow Area = 285,950 sf, 0.00% Impervious, Inflow Depth = 1.28" for 10 Year event
Inflow = 6.7 cfs @ 12.21 hrs, Volume= 30,392 cf
Outflow = 6.7 cfs @ 12.21 hrs, Volume= 30,392 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2A:

Inflow Area = 84,051 sf, 0.00% Impervious, Inflow Depth = 1.37" for 10 Year event
Inflow = 2.2 cfs @ 12.20 hrs, Volume= 9,608 cf
Outflow = 2.2 cfs @ 12.20 hrs, Volume= 9,608 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP3:

Inflow Area = 275,467 sf, 0.00% Impervious, Inflow Depth = 1.25" for 10 Year event
Inflow = 5.4 cfs @ 12.30 hrs, Volume= 28,625 cf
Outflow = 5.4 cfs @ 12.30 hrs, Volume= 28,625 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP3A:

Inflow Area = 115,072 sf, 0.00% Impervious, Inflow Depth = 1.17" for 10 Year event
Inflow = 2.0 cfs @ 12.37 hrs, Volume= 11,211 cf
Outflow = 2.0 cfs @ 12.37 hrs, Volume= 11,211 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP4:

Inflow Area = 420,097 sf, 0.00% Impervious, Inflow Depth = 1.44" for 10 Year event
Inflow = 10.0 cfs @ 12.30 hrs, Volume= 50,472 cf
Outflow = 10.0 cfs @ 12.30 hrs, Volume= 50,472 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP5:

Inflow Area = 470,066 sf, 0.00% Impervious, Inflow Depth = 1.35" for 10 Year event
Inflow = 10.4 cfs @ 12.30 hrs, Volume= 52,764 cf
Outflow = 10.4 cfs @ 12.30 hrs, Volume= 52,764 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP5A:

Inflow Area = 168,926 sf, 0.00% Impervious, Inflow Depth = 1.30" for 10 Year event
Inflow = 3.6 cfs @ 12.29 hrs, Volume= 18,341 cf
Outflow = 3.6 cfs @ 12.29 hrs, Volume= 18,341 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ES1: Runoff Area=338,407 sf 0.00% Impervious Runoff Depth=2.03"
Flow Length=350' Tc=23.4 min CN=59 Runoff=11.0 cfs 57,146 cf

Subcatchment ES2: Runoff Area=201,899 sf 0.00% Impervious Runoff Depth=1.94"
Flow Length=615' Tc=13.8 min CN=58 Runoff=7.6 cfs 32,642 cf

Subcatchment ES2A: Runoff Area=84,051 sf 0.00% Impervious Runoff Depth=2.11"
Flow Length=150' Tc=13.5 min CN=60 Runoff=3.6 cfs 14,805 cf

Subcatchment ES3: Runoff Area=160,395 sf 0.00% Impervious Runoff Depth=2.03"
Flow Length=540' Tc=16.8 min CN=59 Runoff=5.9 cfs 27,086 cf

Subcatchment ES3A: Runoff Area=115,072 sf 0.00% Impervious Runoff Depth=1.85"
Flow Length=210' Tc=22.4 min CN=57 Runoff=3.4 cfs 17,786 cf

Subcatchment ES4: Runoff Area=420,097 sf 0.00% Impervious Runoff Depth=2.20"
Flow Length=650' Tc=19.7 min CN=61 Runoff=16.1 cfs 77,088 cf

Subcatchment ES5: Runoff Area=301,140 sf 0.00% Impervious Runoff Depth=2.11"
Flow Length=230' Tc=19.4 min CN=60 Runoff=11.1 cfs 53,044 cf

Subcatchment ES5A: Runoff Area=168,926 sf 0.00% Impervious Runoff Depth=2.03"
Flow Length=180' Tc=18.9 min CN=59 Runoff=6.0 cfs 28,526 cf

Reach DP1: Parker River Inflow=11.0 cfs 57,146 cf
Outflow=11.0 cfs 57,146 cf

Reach DP2: Inflow=11.2 cfs 47,447 cf
Outflow=11.2 cfs 47,447 cf

Reach DP2A: Inflow=3.6 cfs 14,805 cf
Outflow=3.6 cfs 14,805 cf

Reach DP3: Inflow=9.1 cfs 44,872 cf
Outflow=9.1 cfs 44,872 cf

Reach DP3A: Inflow=3.4 cfs 17,786 cf
Outflow=3.4 cfs 17,786 cf

Reach DP4: Inflow=16.1 cfs 77,088 cf
Outflow=16.1 cfs 77,088 cf

Reach DP5: Inflow=17.0 cfs 81,570 cf
Outflow=17.0 cfs 81,570 cf

Reach DP5A: Inflow=6.0 cfs 28,526 cf
Outflow=6.0 cfs 28,526 cf

Total Runoff Area = 1,789,987 sf Runoff Volume = 308,122 cf Average Runoff Depth = 2.07"
100.00% Pervious = 1,789,987 sf 0.00% Impervious = 0 sf

Summary for Subcatchment ES1:

Runoff = 11.0 cfs @ 12.35 hrs, Volume= 57,146 cf, Depth= 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Description
200,998	61	>75% Grass cover, Good, HSG B
137,409	55	Woods, Good, HSG B
338,407	59	Weighted Average
338,407		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
1.6	300	0.0400	3.22		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
23.4	350	Total			

Summary for Subcatchment ES2:

Runoff = 7.6 cfs @ 12.20 hrs, Volume= 32,642 cf, Depth= 1.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Description
100,828	61	>75% Grass cover, Good, HSG B
101,071	55	Woods, Good, HSG B
201,899	58	Weighted Average
201,899		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.1000	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
2.3	565	0.0670	4.17		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.8	615	Total			

Summary for Subcatchment ES2A:

Runoff = 3.6 cfs @ 12.20 hrs, Volume= 14,805 cf, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Description
63,556	61	>75% Grass cover, Good, HSG B
20,495	55	Woods, Good, HSG B
84,051	60	Weighted Average
84,051		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	50	0.0700	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.3	100	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.5	150	Total			

Summary for Subcatchment ES3:

Runoff = 5.9 cfs @ 12.25 hrs, Volume= 27,086 cf, Depth= 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Description
106,813	61	>75% Grass cover, Good, HSG B
53,582	55	Woods, Good, HSG B
160,395	59	Weighted Average
160,395		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	50	0.0600	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
2.7	490	0.0350	3.01		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.8	540	Total			

Summary for Subcatchment ES3A:

Runoff = 3.4 cfs @ 12.34 hrs, Volume= 17,786 cf, Depth= 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Description
36,688	61	>75% Grass cover, Good, HSG B
78,384	55	Woods, Good, HSG B
115,072	57	Weighted Average
115,072		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.6	160	0.0750	4.41		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
22.4	210	Total			

Summary for Subcatchment ES4:

Runoff = 16.1 cfs @ 12.28 hrs, Volume= 77,088 cf, Depth= 2.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Description
409,301	61	>75% Grass cover, Good, HSG B
10,796	55	Woods, Good, HSG B
420,097	61	Weighted Average
420,097		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0400	0.05		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
3.2	600	0.0380	3.14		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
19.7	650	Total			

Summary for Subcatchment ES5:

Runoff = 11.1 cfs @ 12.29 hrs, Volume= 53,044 cf, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Description
230,675	61	>75% Grass cover, Good, HSG B
70,465	55	Woods, Good, HSG B
301,140	60	Weighted Average
301,140		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	50	0.0300	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.8	180	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
19.4	230	Total			

Summary for Subcatchment ES5A:

Runoff = 6.0 cfs @ 12.28 hrs, Volume= 28,526 cf, Depth= 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Description
103,925	61	>75% Grass cover, Good, HSG B
65,001	55	Woods, Good, HSG B
168,926	59	Weighted Average
168,926		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	50	0.0300	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.3	130	0.1600	6.44		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
18.9	180	Total			

Summary for Reach DP1: Parker River

Inflow Area = 338,407 sf, 0.00% Impervious, Inflow Depth = 2.03" for 25 Year event
Inflow = 11.0 cfs @ 12.35 hrs, Volume= 57,146 cf
Outflow = 11.0 cfs @ 12.35 hrs, Volume= 57,146 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2:

Inflow Area = 285,950 sf, 0.00% Impervious, Inflow Depth = 1.99" for 25 Year event
Inflow = 11.2 cfs @ 12.20 hrs, Volume= 47,447 cf
Outflow = 11.2 cfs @ 12.20 hrs, Volume= 47,447 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2A:

Inflow Area = 84,051 sf, 0.00% Impervious, Inflow Depth = 2.11" for 25 Year event
Inflow = 3.6 cfs @ 12.20 hrs, Volume= 14,805 cf
Outflow = 3.6 cfs @ 12.20 hrs, Volume= 14,805 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP3:

Inflow Area = 275,467 sf, 0.00% Impervious, Inflow Depth = 1.95" for 25 Year event
Inflow = 9.1 cfs @ 12.27 hrs, Volume= 44,872 cf
Outflow = 9.1 cfs @ 12.27 hrs, Volume= 44,872 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP3A:

Inflow Area = 115,072 sf, 0.00% Impervious, Inflow Depth = 1.85" for 25 Year event
Inflow = 3.4 cfs @ 12.34 hrs, Volume= 17,786 cf
Outflow = 3.4 cfs @ 12.34 hrs, Volume= 17,786 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP4:

Inflow Area = 420,097 sf, 0.00% Impervious, Inflow Depth = 2.20" for 25 Year event
Inflow = 16.1 cfs @ 12.28 hrs, Volume= 77,088 cf
Outflow = 16.1 cfs @ 12.28 hrs, Volume= 77,088 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP5:

Inflow Area = 470,066 sf, 0.00% Impervious, Inflow Depth = 2.08" for 25 Year event
Inflow = 17.0 cfs @ 12.29 hrs, Volume= 81,570 cf
Outflow = 17.0 cfs @ 12.29 hrs, Volume= 81,570 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP5A:

Inflow Area = 168,926 sf, 0.00% Impervious, Inflow Depth = 2.03" for 25 Year event
Inflow = 6.0 cfs @ 12.28 hrs, Volume= 28,526 cf
Outflow = 6.0 cfs @ 12.28 hrs, Volume= 28,526 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ES1: Runoff Area=338,407 sf 0.00% Impervious Runoff Depth=2.61"
Flow Length=350' Tc=23.4 min CN=59 Runoff=14.5 cfs 73,622 cf

Subcatchment ES2: Runoff Area=201,899 sf 0.00% Impervious Runoff Depth=2.51"
Flow Length=615' Tc=13.8 min CN=58 Runoff=10.2 cfs 42,260 cf

Subcatchment ES2A: Runoff Area=84,051 sf 0.00% Impervious Runoff Depth=2.71"
Flow Length=150' Tc=13.5 min CN=60 Runoff=4.7 cfs 18,984 cf

Subcatchment ES3: Runoff Area=160,395 sf 0.00% Impervious Runoff Depth=2.61"
Flow Length=540' Tc=16.8 min CN=59 Runoff=7.8 cfs 34,895 cf

Subcatchment ES3A: Runoff Area=115,072 sf 0.00% Impervious Runoff Depth=2.41"
Flow Length=210' Tc=22.4 min CN=57 Runoff=4.6 cfs 23,145 cf

Subcatchment ES4: Runoff Area=420,097 sf 0.00% Impervious Runoff Depth=2.81"
Flow Length=650' Tc=19.7 min CN=61 Runoff=21.0 cfs 98,397 cf

Subcatchment ES5: Runoff Area=301,140 sf 0.00% Impervious Runoff Depth=2.71"
Flow Length=230' Tc=19.4 min CN=60 Runoff=14.5 cfs 68,015 cf

Subcatchment ES5A: Runoff Area=168,926 sf 0.00% Impervious Runoff Depth=2.61"
Flow Length=180' Tc=18.9 min CN=59 Runoff=7.9 cfs 36,751 cf

Reach DP1: Parker River Inflow=14.5 cfs 73,622 cf
Outflow=14.5 cfs 73,622 cf

Reach DP2: Inflow=14.8 cfs 61,243 cf
Outflow=14.8 cfs 61,243 cf

Reach DP2A: Inflow=4.7 cfs 18,984 cf
Outflow=4.7 cfs 18,984 cf

Reach DP3: Inflow=12.1 cfs 58,039 cf
Outflow=12.1 cfs 58,039 cf

Reach DP3A: Inflow=4.6 cfs 23,145 cf
Outflow=4.6 cfs 23,145 cf

Reach DP4: Inflow=21.0 cfs 98,397 cf
Outflow=21.0 cfs 98,397 cf

Reach DP5: Inflow=22.4 cfs 104,766 cf
Outflow=22.4 cfs 104,766 cf

Reach DP5A: Inflow=7.9 cfs 36,751 cf
Outflow=7.9 cfs 36,751 cf

Total Runoff Area = 1,789,987 sf Runoff Volume = 396,067 cf Average Runoff Depth = 2.66"
100.00% Pervious = 1,789,987 sf 0.00% Impervious = 0 sf

Summary for Subcatchment ES1:

Runoff = 14.5 cfs @ 12.35 hrs, Volume= 73,622 cf, Depth= 2.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Description
200,998	61	>75% Grass cover, Good, HSG B
137,409	55	Woods, Good, HSG B
338,407	59	Weighted Average
338,407		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
1.6	300	0.0400	3.22		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
23.4	350	Total			

Summary for Subcatchment ES2:

Runoff = 10.2 cfs @ 12.20 hrs, Volume= 42,260 cf, Depth= 2.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Description
100,828	61	>75% Grass cover, Good, HSG B
101,071	55	Woods, Good, HSG B
201,899	58	Weighted Average
201,899		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.1000	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
2.3	565	0.0670	4.17		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.8	615	Total			

Summary for Subcatchment ES2A:

Runoff = 4.7 cfs @ 12.19 hrs, Volume= 18,984 cf, Depth= 2.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Description
63,556	61	>75% Grass cover, Good, HSG B
20,495	55	Woods, Good, HSG B
84,051	60	Weighted Average
84,051		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	50	0.0700	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.3	100	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.5	150	Total			

Summary for Subcatchment ES3:

Runoff = 7.8 cfs @ 12.24 hrs, Volume= 34,895 cf, Depth= 2.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Description
106,813	61	>75% Grass cover, Good, HSG B
53,582	55	Woods, Good, HSG B
160,395	59	Weighted Average
160,395		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	50	0.0600	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
2.7	490	0.0350	3.01		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.8	540	Total			

Summary for Subcatchment ES3A:

Runoff = 4.6 cfs @ 12.33 hrs, Volume= 23,145 cf, Depth= 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Description
36,688	61	>75% Grass cover, Good, HSG B
78,384	55	Woods, Good, HSG B
115,072	57	Weighted Average
115,072		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.6	160	0.0750	4.41		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
22.4	210	Total			

Summary for Subcatchment ES4:

Runoff = 21.0 cfs @ 12.28 hrs, Volume= 98,397 cf, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Description
409,301	61	>75% Grass cover, Good, HSG B
10,796	55	Woods, Good, HSG B
420,097	61	Weighted Average
420,097		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0400	0.05		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
3.2	600	0.0380	3.14		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
19.7	650	Total			

Summary for Subcatchment ES5:

Runoff = 14.5 cfs @ 12.28 hrs, Volume= 68,015 cf, Depth= 2.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Description
230,675	61	>75% Grass cover, Good, HSG B
70,465	55	Woods, Good, HSG B
301,140	60	Weighted Average
301,140		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	50	0.0300	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.8	180	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
19.4	230	Total			

Summary for Subcatchment ES5A:

Runoff = 7.9 cfs @ 12.28 hrs, Volume= 36,751 cf, Depth= 2.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Description
103,925	61	>75% Grass cover, Good, HSG B
65,001	55	Woods, Good, HSG B
168,926	59	Weighted Average
168,926		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	50	0.0300	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.3	130	0.1600	6.44		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
18.9	180	Total			

Summary for Reach DP1: Parker River

Inflow Area = 338,407 sf, 0.00% Impervious, Inflow Depth = 2.61" for 50 Year event
Inflow = 14.5 cfs @ 12.35 hrs, Volume= 73,622 cf
Outflow = 14.5 cfs @ 12.35 hrs, Volume= 73,622 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2:

Inflow Area = 285,950 sf, 0.00% Impervious, Inflow Depth = 2.57" for 50 Year event
Inflow = 14.8 cfs @ 12.20 hrs, Volume= 61,243 cf
Outflow = 14.8 cfs @ 12.20 hrs, Volume= 61,243 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2A:

Inflow Area = 84,051 sf, 0.00% Impervious, Inflow Depth = 2.71" for 50 Year event
Inflow = 4.7 cfs @ 12.19 hrs, Volume= 18,984 cf
Outflow = 4.7 cfs @ 12.19 hrs, Volume= 18,984 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP3:

Inflow Area = 275,467 sf, 0.00% Impervious, Inflow Depth = 2.53" for 50 Year event
Inflow = 12.1 cfs @ 12.27 hrs, Volume= 58,039 cf
Outflow = 12.1 cfs @ 12.27 hrs, Volume= 58,039 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP3A:

Inflow Area = 115,072 sf, 0.00% Impervious, Inflow Depth = 2.41" for 50 Year event
Inflow = 4.6 cfs @ 12.33 hrs, Volume= 23,145 cf
Outflow = 4.6 cfs @ 12.33 hrs, Volume= 23,145 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP4:

Inflow Area = 420,097 sf, 0.00% Impervious, Inflow Depth = 2.81" for 50 Year event
Inflow = 21.0 cfs @ 12.28 hrs, Volume= 98,397 cf
Outflow = 21.0 cfs @ 12.28 hrs, Volume= 98,397 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP5:

Inflow Area = 470,066 sf, 0.00% Impervious, Inflow Depth = 2.67" for 50 Year event
Inflow = 22.4 cfs @ 12.28 hrs, Volume= 104,766 cf
Outflow = 22.4 cfs @ 12.28 hrs, Volume= 104,766 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP5A:

Inflow Area = 168,926 sf, 0.00% Impervious, Inflow Depth = 2.61" for 50 Year event
Inflow = 7.9 cfs @ 12.28 hrs, Volume= 36,751 cf
Outflow = 7.9 cfs @ 12.28 hrs, Volume= 36,751 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ES1: Runoff Area=338,407 sf 0.00% Impervious Runoff Depth=3.30"
Flow Length=350' Tc=23.4 min CN=59 Runoff=18.5 cfs 92,960 cf

Subcatchment ES2: Runoff Area=201,899 sf 0.00% Impervious Runoff Depth=3.18"
Flow Length=615' Tc=13.8 min CN=58 Runoff=13.2 cfs 53,582 cf

Subcatchment ES2A: Runoff Area=84,051 sf 0.00% Impervious Runoff Depth=3.41"
Flow Length=150' Tc=13.5 min CN=60 Runoff=6.0 cfs 23,874 cf

Subcatchment ES3: Runoff Area=160,395 sf 0.00% Impervious Runoff Depth=3.30"
Flow Length=540' Tc=16.8 min CN=59 Runoff=10.1 cfs 44,060 cf

Subcatchment ES3A: Runoff Area=115,072 sf 0.00% Impervious Runoff Depth=3.07"
Flow Length=210' Tc=22.4 min CN=57 Runoff=5.9 cfs 29,473 cf

Subcatchment ES4: Runoff Area=420,097 sf 0.00% Impervious Runoff Depth=3.52"
Flow Length=650' Tc=19.7 min CN=61 Runoff=26.6 cfs 123,266 cf

Subcatchment ES5: Runoff Area=301,140 sf 0.00% Impervious Runoff Depth=3.41"
Flow Length=230' Tc=19.4 min CN=60 Runoff=18.5 cfs 85,537 cf

Subcatchment ES5A: Runoff Area=168,926 sf 0.00% Impervious Runoff Depth=3.30"
Flow Length=180' Tc=18.9 min CN=59 Runoff=10.1 cfs 46,404 cf

Reach DP1: Parker River Inflow=18.5 cfs 92,960 cf
Outflow=18.5 cfs 92,960 cf

Reach DP2: Inflow=19.1 cfs 77,457 cf
Outflow=19.1 cfs 77,457 cf

Reach DP2A: Inflow=6.0 cfs 23,874 cf
Outflow=6.0 cfs 23,874 cf

Reach DP3: Inflow=15.6 cfs 73,533 cf
Outflow=15.6 cfs 73,533 cf

Reach DP3A: Inflow=5.9 cfs 29,473 cf
Outflow=5.9 cfs 29,473 cf

Reach DP4: Inflow=26.6 cfs 123,266 cf
Outflow=26.6 cfs 123,266 cf

Reach DP5: Inflow=28.6 cfs 131,941 cf
Outflow=28.6 cfs 131,941 cf

Reach DP5A: Inflow=10.1 cfs 46,404 cf
Outflow=10.1 cfs 46,404 cf

Total Runoff Area = 1,789,987 sf Runoff Volume = 499,157 cf Average Runoff Depth = 3.35"
100.00% Pervious = 1,789,987 sf 0.00% Impervious = 0 sf

Summary for Subcatchment ES1:

Runoff = 18.5 cfs @ 12.35 hrs, Volume= 92,960 cf, Depth= 3.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Description
200,998	61	>75% Grass cover, Good, HSG B
137,409	55	Woods, Good, HSG B
338,407	59	Weighted Average
338,407		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
1.6	300	0.0400	3.22		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
23.4	350	Total			

Summary for Subcatchment ES2:

Runoff = 13.2 cfs @ 12.19 hrs, Volume= 53,582 cf, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Description
100,828	61	>75% Grass cover, Good, HSG B
101,071	55	Woods, Good, HSG B
201,899	58	Weighted Average
201,899		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.1000	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
2.3	565	0.0670	4.17		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.8	615	Total			

Summary for Subcatchment ES2A:

Runoff = 6.0 cfs @ 12.19 hrs, Volume= 23,874 cf, Depth= 3.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Description
63,556	61	>75% Grass cover, Good, HSG B
20,495	55	Woods, Good, HSG B
84,051	60	Weighted Average
84,051		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	50	0.0700	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.3	100	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.5	150	Total			

Summary for Subcatchment ES3:

Runoff = 10.1 cfs @ 12.24 hrs, Volume= 44,060 cf, Depth= 3.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Description
106,813	61	>75% Grass cover, Good, HSG B
53,582	55	Woods, Good, HSG B
160,395	59	Weighted Average
160,395		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	50	0.0600	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
2.7	490	0.0350	3.01		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.8	540	Total			

Summary for Subcatchment ES3A:

Runoff = 5.9 cfs @ 12.32 hrs, Volume= 29,473 cf, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Description
36,688	61	>75% Grass cover, Good, HSG B
78,384	55	Woods, Good, HSG B
115,072	57	Weighted Average
115,072		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.6	160	0.0750	4.41		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
22.4	210	Total			

Summary for Subcatchment ES4:

Runoff = 26.6 cfs @ 12.28 hrs, Volume= 123,266 cf, Depth= 3.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Description
409,301	61	>75% Grass cover, Good, HSG B
10,796	55	Woods, Good, HSG B
420,097	61	Weighted Average
420,097		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0400	0.05		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
3.2	600	0.0380	3.14		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
19.7	650	Total			

Summary for Subcatchment ES5:

Runoff = 18.5 cfs @ 12.27 hrs, Volume= 85,537 cf, Depth= 3.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Description
230,675	61	>75% Grass cover, Good, HSG B
70,465	55	Woods, Good, HSG B
301,140	60	Weighted Average
301,140		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	50	0.0300	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.8	180	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
19.4	230	Total			

Summary for Subcatchment ES5A:

Runoff = 10.1 cfs @ 12.28 hrs, Volume= 46,404 cf, Depth= 3.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Description
103,925	61	>75% Grass cover, Good, HSG B
65,001	55	Woods, Good, HSG B
168,926	59	Weighted Average
168,926		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	50	0.0300	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.3	130	0.1600	6.44		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
18.9	180	Total			

Summary for Reach DP1: Parker River

Inflow Area = 338,407 sf, 0.00% Impervious, Inflow Depth = 3.30" for 100 Year event
Inflow = 18.5 cfs @ 12.35 hrs, Volume= 92,960 cf
Outflow = 18.5 cfs @ 12.35 hrs, Volume= 92,960 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2:

Inflow Area = 285,950 sf, 0.00% Impervious, Inflow Depth = 3.25" for 100 Year event
Inflow = 19.1 cfs @ 12.19 hrs, Volume= 77,457 cf
Outflow = 19.1 cfs @ 12.19 hrs, Volume= 77,457 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2A:

Inflow Area = 84,051 sf, 0.00% Impervious, Inflow Depth = 3.41" for 100 Year event
Inflow = 6.0 cfs @ 12.19 hrs, Volume= 23,874 cf
Outflow = 6.0 cfs @ 12.19 hrs, Volume= 23,874 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP3:

Inflow Area = 275,467 sf, 0.00% Impervious, Inflow Depth = 3.20" for 100 Year event
Inflow = 15.6 cfs @ 12.27 hrs, Volume= 73,533 cf
Outflow = 15.6 cfs @ 12.27 hrs, Volume= 73,533 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP3A:

Inflow Area = 115,072 sf, 0.00% Impervious, Inflow Depth = 3.07" for 100 Year event
Inflow = 5.9 cfs @ 12.32 hrs, Volume= 29,473 cf
Outflow = 5.9 cfs @ 12.32 hrs, Volume= 29,473 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP4:

Inflow Area = 420,097 sf, 0.00% Impervious, Inflow Depth = 3.52" for 100 Year event
Inflow = 26.6 cfs @ 12.28 hrs, Volume= 123,266 cf
Outflow = 26.6 cfs @ 12.28 hrs, Volume= 123,266 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP5:

Inflow Area = 470,066 sf, 0.00% Impervious, Inflow Depth = 3.37" for 100 Year event
Inflow = 28.6 cfs @ 12.27 hrs, Volume= 131,941 cf
Outflow = 28.6 cfs @ 12.27 hrs, Volume= 131,941 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP5A:

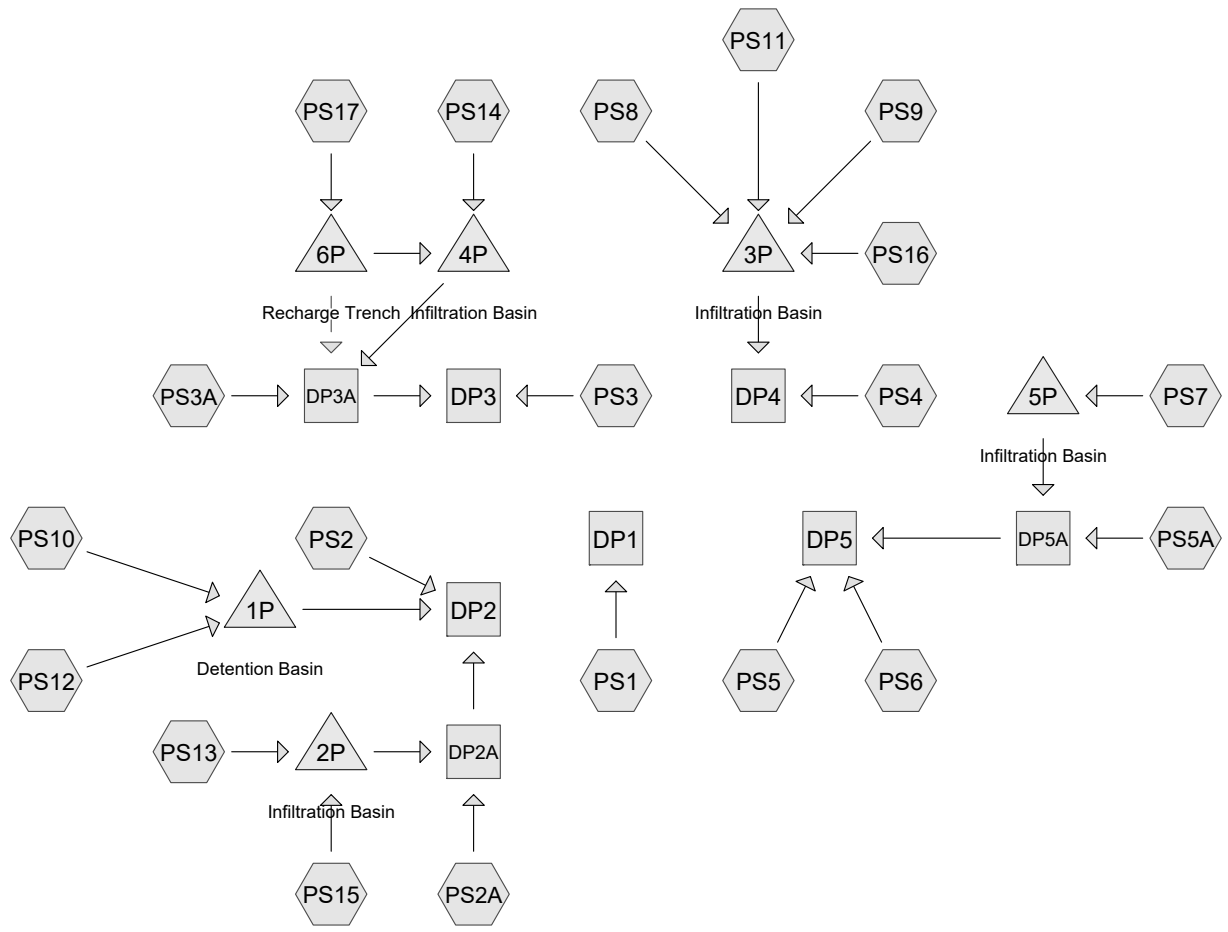
Inflow Area = 168,926 sf, 0.00% Impervious, Inflow Depth = 3.30" for 100 Year event
Inflow = 10.1 cfs @ 12.28 hrs, Volume= 46,404 cf
Outflow = 10.1 cfs @ 12.28 hrs, Volume= 46,404 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

APPENDIX C:

PROPOSED CONDITIONS

HYDROLOGIC ANALYSIS



Subcat Reach Pond Link

Routing Diagram for Willow Road Proposed Conditions

Prepared by The Morin-Cameron Group, Inc., Printed 11/19/2020

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
760,819	61	>75% Grass cover, Good, HSG B (PS1, PS10, PS11, PS12, PS13, PS14, PS2, PS2A, PS3, PS3A, PS4, PS5, PS5A, PS6, PS7, PS8, PS9)
10,734	96	Gravel surface, HSG B (PS11)
115,808	98	Paved roads w/curbs & sewers, HSG B (PS10, PS11, PS6, PS7, PS8, PS9)
171,380	98	Roofs, HSG B (PS11, PS13, PS15, PS16, PS17, PS6, PS7, PS9)
62,140	98	Unconnected pavement, HSG B (PS1, PS10, PS12, PS13, PS14, PS2, PS2A, PS3, PS3A, PS4, PS5, PS5A, PS6, PS7, PS8, PS9)
10,888	98	Unconnected roofs, HSG B (PS1, PS2, PS4)
658,218	55	Woods, Good, HSG B (PS1, PS11, PS2, PS2A, PS3, PS3A, PS4, PS5, PS5A, PS6)
1,789,987	**66**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
1,789,987	HSG B	PS1, PS10, PS11, PS12, PS13, PS14, PS15, PS16, PS17, PS2, PS2A, PS3, PS3A, PS4, PS5, PS5A, PS6, PS7, PS8, PS9
0	HSG C	
0	HSG D	
0	Other	
1,789,987		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
0	760,819	0	0	0	760,819	>75% Grass cover, Good
0	10,734	0	0	0	10,734	Gravel surface
0	115,808	0	0	0	115,808	Paved roads w/curbs & sewers
0	171,380	0	0	0	171,380	Roofs
0	62,140	0	0	0	62,140	Unconnected pavement
0	10,888	0	0	0	10,888	Unconnected roofs
0	658,218	0	0	0	658,218	Woods, Good
0	**1,789,987**	**0**	**0**	**0**	**1,789,987**	**TOTAL AREA**

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PS1: Runoff Area=343,774 sf 1.74% Impervious Runoff Depth=0.36"
Flow Length=197' Tc=22.5 min CN=58 Runoff=1.2 cfs 10,181 cf

Subcatchment PS10: Runoff Area=78,810 sf 59.90% Impervious Runoff Depth=1.64"
Tc=6.0 min CN=83 Runoff=3.5 cfs 10,784 cf

Subcatchment PS11: Runoff Area=72,767 sf 37.18% Impervious Runoff Depth=1.37"
Tc=6.0 min CN=79 Runoff=2.6 cfs 8,288 cf

Subcatchment PS12: Runoff Area=45,344 sf 3.81% Impervious Runoff Depth=0.50"
Tc=6.0 min CN=62 Runoff=0.4 cfs 1,883 cf

Subcatchment PS13: Runoff Area=25,606 sf 30.26% Impervious Runoff Depth=0.95"
Tc=6.0 min CN=72 Runoff=0.6 cfs 2,037 cf

Subcatchment PS14: Runoff Area=22,124 sf 10.42% Impervious Runoff Depth=0.54"
Tc=6.0 min UI Adjusted CN=63 Runoff=0.2 cfs 991 cf

Subcatchment PS15: Runoff Area=21,777 sf 100.00% Impervious Runoff Depth=3.01"
Tc=6.0 min CN=98 Runoff=1.6 cfs 5,458 cf

Subcatchment PS16: Runoff Area=21,777 sf 100.00% Impervious Runoff Depth=3.01"
Tc=6.0 min CN=98 Runoff=1.6 cfs 5,458 cf

Subcatchment PS17: Runoff Area=27,221 sf 100.00% Impervious Runoff Depth=3.01"
Tc=6.0 min CN=98 Runoff=2.0 cfs 6,822 cf

Subcatchment PS2: Runoff Area=119,197 sf 5.18% Impervious Runoff Depth=0.39"
Flow Length=520' Tc=13.7 min UI Adjusted CN=59 Runoff=0.5 cfs 3,864 cf

Subcatchment PS2A: Runoff Area=52,258 sf 2.20% Impervious Runoff Depth=0.32"
Flow Length=180' Tc=11.2 min UI Adjusted CN=57 Runoff=0.2 cfs 1,407 cf

Subcatchment PS3: Runoff Area=97,067 sf 3.56% Impervious Runoff Depth=0.36"
Flow Length=785' Tc=16.3 min UI Adjusted CN=58 Runoff=0.4 cfs 2,875 cf

Subcatchment PS3A: Runoff Area=67,954 sf 3.39% Impervious Runoff Depth=0.32"
Flow Length=130' Tc=22.0 min UI Adjusted CN=57 Runoff=0.2 cfs 1,830 cf

Subcatchment PS4: Runoff Area=171,976 sf 9.20% Impervious Runoff Depth=0.46"
Flow Length=100' Tc=7.6 min UI Adjusted CN=61 Runoff=1.3 cfs 6,599 cf

Subcatchment PS5: Runoff Area=73,892 sf 3.12% Impervious Runoff Depth=0.36"
Flow Length=230' Tc=19.4 min CN=58 Runoff=0.3 cfs 2,188 cf

Subcatchment PS5A: Runoff Area=95,000 sf 1.21% Impervious Runoff Depth=0.29"
Flow Length=150' Tc=18.9 min UI Adjusted CN=56 Runoff=0.3 cfs 2,314 cf

Subcatchment PS6: Runoff Area=168,938 sf 15.67% Impervious Runoff Depth=0.54"
Flow Length=220' Tc=9.2 min UI Adjusted CN=63 Runoff=1.6 cfs 7,565 cf

Subcatchment PS7: Runoff Area=95,556 sf 32.02% Impervious Runoff Depth=1.01"
Tc=6.0 min CN=73 Runoff=2.4 cfs 8,030 cf

Subcatchment PS8: Runoff Area=39,073 sf 71.28% Impervious Runoff Depth=1.95"
Tc=6.0 min CN=87 Runoff=2.0 cfs 6,350 cf

Subcatchment PS9: Runoff Area=149,876 sf 53.46% Impervious Runoff Depth=1.50"
Tc=6.0 min CN=81 Runoff=6.0 cfs 18,742 cf

Reach DP1: Inflow=1.2 cfs 10,181 cf
Outflow=1.2 cfs 10,181 cf

Reach DP2: Inflow=1.1 cfs 17,860 cf
Outflow=1.1 cfs 17,860 cf

Reach DP2A: Inflow=0.2 cfs 1,407 cf
Outflow=0.2 cfs 1,407 cf

Reach DP3: Inflow=0.7 cfs 4,927 cf
Outflow=0.7 cfs 4,927 cf

Reach DP3A: Inflow=0.4 cfs 2,052 cf
Outflow=0.4 cfs 2,052 cf

Reach DP4: Inflow=1.3 cfs 6,599 cf
Outflow=1.3 cfs 6,599 cf

Reach DP5: Inflow=1.7 cfs 12,067 cf
Outflow=1.7 cfs 12,067 cf

Reach DP5A: Inflow=0.3 cfs 2,314 cf
Outflow=0.3 cfs 2,314 cf

Pond 1P: Detention Basin Peak Elev=106.45' Storage=5,436 cf Inflow=3.9 cfs 12,667 cf
Outflow=0.5 cfs 12,589 cf

Pond 2P: Infiltration Basin Peak Elev=108.38' Storage=3,619 cf Inflow=2.2 cfs 7,494 cf
Discarded=0.1 cfs 7,494 cf Primary=0.0 cfs 0 cf Outflow=0.1 cfs 7,494 cf

Pond 3P: Infiltration Basin Peak Elev=106.69' Storage=26,169 cf Inflow=12.3 cfs 38,838 cf
Discarded=0.3 cfs 25,031 cf Primary=0.0 cfs 0 cf Outflow=0.3 cfs 25,031 cf

Pond 4P: Infiltration Basin Peak Elev=117.94' Storage=2,521 cf Inflow=2.1 cfs 4,910 cf
Discarded=0.2 cfs 4,688 cf Primary=0.2 cfs 222 cf Outflow=0.4 cfs 4,910 cf

Pond 5P: Infiltration Basin Peak Elev=122.02' Storage=2,508 cf Inflow=2.4 cfs 8,030 cf
Discarded=0.4 cfs 8,030 cf Primary=0.0 cfs 0 cf Outflow=0.4 cfs 8,030 cf

Pond 6P: Recharge Trench Peak Elev=119.31' Storage=489 cf Inflow=2.0 cfs 6,822 cf
Discarded=0.0 cfs 2,903 cf Primary=1.9 cfs 3,919 cf Secondary=0.0 cfs 0 cf Outflow=2.0 cfs 6,822 cf

Total Runoff Area = 1,789,987 sf Runoff Volume = 113,665 cf Average Runoff Depth = 0.76"
79.88% Pervious = 1,429,771 sf 20.12% Impervious = 360,216 sf

Summary for Subcatchment PS1:

Runoff = 1.2 cfs @ 12.50 hrs, Volume= 10,181 cf, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Description
202,359	55	Woods, Good, HSG B
135,428	61	>75% Grass cover, Good, HSG B
3,265	98	Unconnected pavement, HSG B
2,722	98	Unconnected roofs, HSG B
343,774	58	Weighted Average
337,787		98.26% Pervious Area
5,987		1.74% Impervious Area
5,987		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.7	147	0.0480	3.53		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
22.5	197	Total			

Summary for Subcatchment PS10:

Runoff = 3.5 cfs @ 12.09 hrs, Volume= 10,784 cf, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Description
43,871	98	Paved roads w/curbs & sewers, HSG B
31,599	61	>75% Grass cover, Good, HSG B
3,340	98	Unconnected pavement, HSG B
78,810	83	Weighted Average
31,599		40.10% Pervious Area
47,211		59.90% Impervious Area
3,340		7.07% Unconnected

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

Summary for Subcatchment PS11:

Runoff = 2.6 cfs @ 12.09 hrs, Volume= 8,288 cf, Depth= 1.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Description
13,154	55	Woods, Good, HSG B
21,827	61	>75% Grass cover, Good, HSG B
10,719	98	Paved roads w/curbs & sewers, HSG B
16,333	98	Roofs, HSG B
10,734	96	Gravel surface, HSG B
72,767	79	Weighted Average
45,715		62.82% Pervious Area
27,052		37.18% Impervious Area

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

Summary for Subcatchment PS12:

Runoff = 0.4 cfs @ 12.12 hrs, Volume= 1,883 cf, Depth= 0.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Description
43,615	61	>75% Grass cover, Good, HSG B
1,729	98	Unconnected pavement, HSG B
45,344	62	Weighted Average
43,615		96.19% Pervious Area
1,729		3.81% Impervious Area
1,729		100.00% Unconnected

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

Summary for Subcatchment PS13:

Runoff = 0.6 cfs @ 12.10 hrs, Volume= 2,037 cf, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Description
17,857	61	>75% Grass cover, Good, HSG B
5,444	98	Roofs, HSG B
2,305	98	Unconnected pavement, HSG B
25,606	72	Weighted Average
17,857		69.74% Pervious Area
7,749		30.26% Impervious Area
2,305		29.75% Unconnected

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

Summary for Subcatchment PS14:

Runoff = 0.2 cfs @ 12.11 hrs, Volume= 991 cf, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Adj	Description
19,819	61		>75% Grass cover, Good, HSG B
2,305	98		Unconnected pavement, HSG B
22,124	65	63	Weighted Average, UI Adjusted
19,819			89.58% Pervious Area
2,305			10.42% Impervious Area
2,305			100.00% Unconnected

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

Summary for Subcatchment PS15:

Runoff = 1.6 cfs @ 12.08 hrs, Volume= 5,458 cf, Depth= 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Description
21,777	98	Roofs, HSG B
21,777		100.00% Impervious Area

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

Summary for Subcatchment PS16:

Runoff = 1.6 cfs @ 12.08 hrs, Volume= 5,458 cf, Depth= 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Description
21,777	98	Roofs, HSG B
21,777		100.00% Impervious Area

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

Summary for Subcatchment PS17:

Runoff = 2.0 cfs @ 12.08 hrs, Volume= 6,822 cf, Depth= 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Description
27,221	98	Roofs, HSG B
27,221		100.00% Impervious Area

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

Summary for Subcatchment PS2:

Runoff = 0.5 cfs @ 12.32 hrs, Volume= 3,864 cf, Depth= 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Adj	Description
61,041	55		Woods, Good, HSG B
51,977	61		>75% Grass cover, Good, HSG B
3,457	98		Unconnected pavement, HSG B
2,722	98		Unconnected roofs, HSG B
119,197	60	59	Weighted Average, UI Adjusted
113,018			94.82% Pervious Area
6,179			5.18% Impervious Area
6,179			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.1000	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
2.2	470	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.7	520	Total			

Summary for Subcatchment PS2A:

Runoff = 0.2 cfs @ 12.36 hrs, Volume= 1,407 cf, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Adj	Description
35,762	55		Woods, Good, HSG B
15,344	61		>75% Grass cover, Good, HSG B
1,152	98		Unconnected pavement, HSG B
52,258	58	57	Weighted Average, UI Adjusted
51,106			97.80% Pervious Area
1,152			2.20% Impervious Area
1,152			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.1200	0.08		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.5	130	0.0850	4.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.2	180	Total			

Summary for Subcatchment PS3:

Runoff = 0.4 cfs @ 12.41 hrs, Volume= 2,875 cf, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Adj	Description
50,666	55		Woods, Good, HSG B
42,944	61		>75% Grass cover, Good, HSG B
3,457	98		Unconnected pavement, HSG B
97,067	59	58	Weighted Average, UI Adjusted
93,610			96.44% Pervious Area
3,457			3.56% Impervious Area
3,457			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.1000	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
4.8	735	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.3	785	Total			

Summary for Subcatchment PS3A:

Runoff = 0.2 cfs @ 12.52 hrs, Volume= 1,830 cf, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Adj	Description
53,432	55		Woods, Good, HSG B
12,217	61		>75% Grass cover, Good, HSG B
2,305	98		Unconnected pavement, HSG B
67,954	58	57	Weighted Average, UI Adjusted
65,649			96.61% Pervious Area
2,305			3.39% Impervious Area
2,305			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.2	80	0.1250	5.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
22.0	130	Total			

Summary for Subcatchment PS4:

Runoff = 1.3 cfs @ 12.15 hrs, Volume= 6,599 cf, Depth= 0.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Adj	Description
48,637	55		Woods, Good, HSG B
107,523	61		>75% Grass cover, Good, HSG B
10,372	98		Unconnected pavement, HSG B
5,444	98		Unconnected roofs, HSG B
171,976	63	61	Weighted Average, UI Adjusted
156,160			90.80% Pervious Area
15,816			9.20% Impervious Area
15,816			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.1	50	0.2400	7.89		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.6	100	Total			

Summary for Subcatchment PS5:

Runoff = 0.3 cfs @ 12.46 hrs, Volume= 2,188 cf, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Description
48,067	55	Woods, Good, HSG B
23,521	61	>75% Grass cover, Good, HSG B
2,304	98	Unconnected pavement, HSG B
73,892	58	Weighted Average
71,588		96.88% Pervious Area
2,304		3.12% Impervious Area
2,304		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	50	0.0300	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.8	180	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
19.4	230	Total			

Summary for Subcatchment PS5A:

Runoff = 0.3 cfs @ 12.50 hrs, Volume= 2,314 cf, Depth= 0.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Adj	Description
77,272	55		Woods, Good, HSG B
16,576	61		>75% Grass cover, Good, HSG B
1,152	98		Unconnected pavement, HSG B
95,000	57	56	Weighted Average, UI Adjusted
93,848			98.79% Pervious Area
1,152			1.21% Impervious Area
1,152			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	50	0.0300	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.3	100	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
18.9	150	Total			

Summary for Subcatchment PS6:

Runoff = 1.6 cfs @ 12.16 hrs, Volume= 7,565 cf, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Adj	Description
67,828	55		Woods, Good, HSG B
74,644	61		>75% Grass cover, Good, HSG B
11,625	98		Unconnected pavement, HSG B
13,498	98		Roofs, HSG B
1,343	98		Paved roads w/curbs & sewers, HSG B
168,938	64	63	Weighted Average, UI Adjusted
142,472			84.33% Pervious Area
26,466			15.67% Impervious Area
11,625			43.92% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	170	0.1120	5.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.2	220	Total			

Summary for Subcatchment PS7:

Runoff = 2.4 cfs @ 12.10 hrs, Volume= 8,030 cf, Depth= 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Description
64,959	61	>75% Grass cover, Good, HSG B
10,888	98	Roofs, HSG B
7,062	98	Unconnected pavement, HSG B
12,647	98	Paved roads w/curbs & sewers, HSG B
95,556	73	Weighted Average
64,959		67.98% Pervious Area
30,597		32.02% Impervious Area
7,062		23.08% Unconnected

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

Summary for Subcatchment PS8:

Runoff = 2.0 cfs @ 12.09 hrs, Volume= 6,350 cf, Depth= 1.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Description
25,064	98	Paved roads w/curbs & sewers, HSG B
2,787	98	Unconnected pavement, HSG B
11,222	61	>75% Grass cover, Good, HSG B
39,073	87	Weighted Average
11,222		28.72% Pervious Area
27,851		71.28% Impervious Area
2,787		10.01% Unconnected

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

Summary for Subcatchment PS9:

Runoff = 6.0 cfs @ 12.09 hrs, Volume= 18,742 cf, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.24"

Area (sf)	CN	Description
22,164	98	Paved roads w/curbs & sewers, HSG B
69,747	61	>75% Grass cover, Good, HSG B
3,523	98	Unconnected pavement, HSG B
54,442	98	Roofs, HSG B
149,876	81	Weighted Average
69,747		46.54% Pervious Area
80,129		53.46% Impervious Area
3,523		4.40% Unconnected

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

Summary for Reach DP1:

Inflow Area = 343,774 sf, 1.74% Impervious, Inflow Depth = 0.36" for 2 Year event
Inflow = 1.2 cfs @ 12.50 hrs, Volume= 10,181 cf
Outflow = 1.2 cfs @ 12.50 hrs, Volume= 10,181 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2:

Inflow Area = 342,992 sf, 25.01% Impervious, Inflow Depth > 0.62" for 2 Year event
Inflow = 1.1 cfs @ 12.41 hrs, Volume= 17,860 cf
Outflow = 1.1 cfs @ 12.41 hrs, Volume= 17,860 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2A:

Inflow Area = 99,641 sf, 30.79% Impervious, Inflow Depth = 0.17" for 2 Year event
Inflow = 0.2 cfs @ 12.36 hrs, Volume= 1,407 cf
Outflow = 0.2 cfs @ 12.36 hrs, Volume= 1,407 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP3:

Inflow Area = 214,366 sf, 16.46% Impervious, Inflow Depth = 0.28" for 2 Year event
Inflow = 0.7 cfs @ 12.51 hrs, Volume= 4,927 cf
Outflow = 0.7 cfs @ 12.51 hrs, Volume= 4,927 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP3A:

Inflow Area = 117,299 sf, 27.14% Impervious, Inflow Depth = 0.21" for 2 Year event
Inflow = 0.4 cfs @ 12.53 hrs, Volume= 2,052 cf
Outflow = 0.4 cfs @ 12.53 hrs, Volume= 2,052 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP4:

Inflow Area = 455,469 sf, 37.90% Impervious, Inflow Depth = 0.17" for 2 Year event
Inflow = 1.3 cfs @ 12.15 hrs, Volume= 6,599 cf
Outflow = 1.3 cfs @ 12.15 hrs, Volume= 6,599 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP5:

Inflow Area = 433,386 sf, 13.96% Impervious, Inflow Depth = 0.33" for 2 Year event
Inflow = 1.7 cfs @ 12.18 hrs, Volume= 12,067 cf
Outflow = 1.7 cfs @ 12.18 hrs, Volume= 12,067 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP5A:

Inflow Area = 190,556 sf, 16.66% Impervious, Inflow Depth = 0.15" for 2 Year event
Inflow = 0.3 cfs @ 12.50 hrs, Volume= 2,314 cf
Outflow = 0.3 cfs @ 12.50 hrs, Volume= 2,314 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Detention Basin

Inflow Area = 124,154 sf, 39.42% Impervious, Inflow Depth = 1.22" for 2 Year event
Inflow = 3.9 cfs @ 12.09 hrs, Volume= 12,667 cf
Outflow = 0.5 cfs @ 12.88 hrs, Volume= 12,589 cf, Atten= 87%, Lag= 47.4 min
Primary = 0.5 cfs @ 12.88 hrs, Volume= 12,589 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 106.45' @ 12.88 hrs Surf.Area= 4,645 sf Storage= 5,436 cf

Plug-Flow detention time= 201.5 min calculated for 12,589 cf (99% of inflow)
Center-of-Mass det. time= 197.8 min (1,041.4 - 843.6)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	26,987 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
105.00	2,562	0	0
106.00	4,302	3,432	3,432
108.00	5,832	10,134	13,566
110.00	7,589	13,421	26,987

Device	Routing	Invert	Outlet Devices
#1	Primary	98.00'	**12.0" Round Culvert** L= 40.0' Ke= 0.500 Inlet / Outlet Invert= 98.00' / 96.00' S= 0.0500 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	105.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	106.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	107.60'	**10.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	108.90'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.5 cfs @ 12.88 hrs HW=106.45' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.5 cfs of 10.7 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.3 cfs @ 5.54 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.2 cfs @ 2.55 fps)
  ├─**4=Orifice/Grate** (Controls 0.0 cfs)
  └─**5=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 2P: Infiltration Basin

Inflow Area = 47,383 sf, 62.31% Impervious, Inflow Depth = 1.90" for 2 Year event
Inflow = 2.2 cfs @ 12.09 hrs, Volume= 7,494 cf
Outflow = 0.1 cfs @ 14.03 hrs, Volume= 7,494 cf, Atten= 94%, Lag= 116.4 min
Discarded = 0.1 cfs @ 14.03 hrs, Volume= 7,494 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 108.38' @ 14.03 hrs Surf.Area= 2,412 sf Storage= 3,619 cf

Plug-Flow detention time= 302.2 min calculated for 7,492 cf (100% of inflow)
Center-of-Mass det. time= 302.2 min (1,088.7 - 786.5)

Volume	Invert	Avail.Storage	Storage Description
#1	106.00'	8,799 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
106.00	781	0	0	781
108.00	2,086	2,762	2,762	2,112
110.00	4,059	6,037	8,799	4,123

Device	Routing	Invert	Outlet Devices
#1	Primary	109.50'	**20.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	106.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.1 cfs @ 14.03 hrs HW=108.38' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=106.00' TW=0.00' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 3P: Infiltration Basin

Inflow Area = 283,493 sf, 55.31% Impervious, Inflow Depth = 1.64" for 2 Year event
Inflow = 12.3 cfs @ 12.09 hrs, Volume= 38,838 cf
Outflow = 0.3 cfs @ 17.90 hrs, Volume= 25,031 cf, Atten= 98%, Lag= 348.8 min
Discarded = 0.3 cfs @ 17.90 hrs, Volume= 25,031 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 106.69' @ 17.90 hrs Surf.Area= 12,068 sf Storage= 26,169 cf

Plug-Flow detention time= 624.5 min calculated for 25,031 cf (64% of inflow)
Center-of-Mass det. time= 517.4 min (1,342.7 - 825.3)

Volume	Invert	Avail.Storage	Storage Description
#1	104.00'	83,598 cf	**Custom Stage Data (Conic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
104.00	8,168	0	0	8,168
105.00	9,203	8,680	8,680	9,254
106.00	10,294	9,743	18,424	10,400
108.00	15,794	25,893	44,316	15,959
110.00	23,758	39,282	83,598	23,984

Device	Routing	Invert	Outlet Devices
#1	Primary	106.50'	**12.0" Round Culvert** L= 34.0' Ke= 0.600 Inlet / Outlet Invert= 106.50' / 106.00' S= 0.0147 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 1	107.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	108.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	109.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	109.50'	**20.0' long x 4.0' 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#6	Discarded	104.00'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.3 cfs @ 17.90 hrs HW=106.69' (Free Discharge)
└**6=Exfiltration** (Exfiltration Controls 0.3 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=104.00' TW=0.00' (Dynamic Tailwater)
├**1=Culvert** (Controls 0.0 cfs)
│ ├**2=Orifice/Grate** (Controls 0.0 cfs)
│ ├**3=Orifice/Grate** (Controls 0.0 cfs)
│ └**4=Orifice/Grate** (Controls 0.0 cfs)
└**5=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 4P: Infiltration Basin

Inflow Area = 49,345 sf, 59.84% Impervious, Inflow Depth = 1.19" for 2 Year event
Inflow = 2.1 cfs @ 12.09 hrs, Volume= 4,910 cf
Outflow = 0.4 cfs @ 12.53 hrs, Volume= 4,910 cf, Atten= 81%, Lag= 26.3 min
Discarded = 0.2 cfs @ 12.53 hrs, Volume= 4,688 cf
Primary = 0.2 cfs @ 12.53 hrs, Volume= 222 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 117.94' @ 12.53 hrs Surf.Area= 3,836 sf Storage= 2,521 cf

Plug-Flow detention time= 121.7 min calculated for 4,910 cf (100% of inflow)
Center-of-Mass det. time= 121.7 min (898.9 - 777.2)

Volume	Invert	Avail.Storage	Storage Description
#1	117.00'	4,951 cf	**Custom Stage Data (Conic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
117.00	1,691	0	0	1,691
118.00	4,012	2,769	2,769	4,019
118.50	4,726	2,182	4,951	4,743

Device	Routing	Invert	Outlet Devices
#1	Primary	117.90'	**10.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#2	Primary	118.10'	**25.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#3	Discarded	117.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.2 cfs @ 12.53 hrs HW=117.94' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.2 cfs)

Primary OutFlow Max=0.2 cfs @ 12.53 hrs HW=117.94' TW=0.00' (Dynamic Tailwater)
├**1=Broad-Crested Rectangular Weir** (Weir Controls 0.2 cfs @ 0.52 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 5P: Infiltration Basin

Inflow Area = 95,556 sf, 32.02% Impervious, Inflow Depth = 1.01" for 2 Year event
Inflow = 2.4 cfs @ 12.10 hrs, Volume= 8,030 cf
Outflow = 0.4 cfs @ 12.66 hrs, Volume= 8,030 cf, Atten= 83%, Lag= 34.0 min
Discarded = 0.4 cfs @ 12.66 hrs, Volume= 8,030 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Peak Elev= 122.02' @ 12.66 hrs Surf.Area= 7,450 sf Storage= 2,508 cf

Plug-Flow detention time= 59.7 min calculated for 8,030 cf (100% of inflow)
Center-of-Mass det. time= 59.7 min (924.3 - 864.6)

Volume	Invert	Avail.Storage	Storage Description
#1	121.50'	20,863 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
121.50	2,680	0	0
121.75	4,316	875	875
122.00	7,408	1,466	2,340
124.00	11,115	18,523	20,863

Device	Routing	Invert	Outlet Devices
#1	Primary	122.75'	**10.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	121.50'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.4 cfs @ 12.66 hrs HW=122.02' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.4 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=121.50' TW=0.00' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

Summary for Pond 6P: Recharge Trench

Inflow Area = 27,221 sf,100.00% Impervious, Inflow Depth = 3.01" for 2 Year event
Inflow = 2.0 cfs @ 12.08 hrs, Volume= 6,822 cf
Outflow = 2.0 cfs @ 12.08 hrs, Volume= 6,822 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.0 cfs @ 8.70 hrs, Volume= 2,903 cf
Primary = 1.9 cfs @ 12.08 hrs, Volume= 3,919 cf
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 119.31' @ 12.08 hrs Surf.Area= 720 sf Storage= 489 cf

Plug-Flow detention time= 52.6 min calculated for 6,822 cf (100% of inflow)
Center-of-Mass det. time= 52.6 min (808.8 - 756.1)

Volume	Invert	Avail.Storage	Storage Description
#1	115.50'	392 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 1,080 cf Overall - 101 cf Embedded = 979 cf x 40.0% Voids
#2	116.17'	94 cf	**6.0" Round Pipe Storage** Inside #1 L= 480.0' 101 cf Overall - 0.1" Wall Thickness = 94 cf
#3	117.00'	12 cf	**0.50'D x 10.00'H Vertical Cone/Cylinder** x 6 -Impervious
		498 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.50	720	0	0
117.00	720	1,080	1,080

Device	Routing	Invert	Outlet Devices	
#1	Discarded	115.50'	**2.410 in/hr Exfiltration over Surface area**	Phase-In= 0.01'
#2	Primary	118.00'	**4.0" Horiz. Orifice/Grate X 4.00** C= 0.600 Limited to weir flow at low heads	
#3	Secondary	120.00'	**4.0" Horiz. Orifice/Grate X 4.00** C= 0.600 Limited to weir flow at low heads	

Discarded OutFlow Max=0.0 cfs @ 8.70 hrs HW=115.62' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=1.9 cfs @ 12.08 hrs HW=119.31' TW=117.57' (Dynamic Tailwater)
└**2=Orifice/Grate** (Orifice Controls 1.9 cfs @ 5.51 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=115.50' TW=0.00' (Dynamic Tailwater)
└**3=Orifice/Grate** (Controls 0.0 cfs)

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PS1: Runoff Area=343,774 sf 1.74% Impervious Runoff Depth=1.24"
Flow Length=197' Tc=22.5 min CN=58 Runoff=6.4 cfs 35,390 cf

Subcatchment PS10: Runoff Area=78,810 sf 59.90% Impervious Runoff Depth=3.28"
Tc=6.0 min CN=83 Runoff=6.9 cfs 21,560 cf

Subcatchment PS11: Runoff Area=72,767 sf 37.18% Impervious Runoff Depth=2.91"
Tc=6.0 min CN=79 Runoff=5.7 cfs 17,617 cf

Subcatchment PS12: Runoff Area=45,344 sf 3.81% Impervious Runoff Depth=1.51"
Tc=6.0 min CN=62 Runoff=1.7 cfs 5,717 cf

Subcatchment PS13: Runoff Area=25,606 sf 30.26% Impervious Runoff Depth=2.29"
Tc=6.0 min CN=72 Runoff=1.6 cfs 4,888 cf

Subcatchment PS14: Runoff Area=22,124 sf 10.42% Impervious Runoff Depth=1.59"
Tc=6.0 min UI Adjusted CN=63 Runoff=0.9 cfs 2,923 cf

Subcatchment PS15: Runoff Area=21,777 sf 100.00% Impervious Runoff Depth=4.88"
Tc=6.0 min CN=98 Runoff=2.5 cfs 8,861 cf

Subcatchment PS16: Runoff Area=21,777 sf 100.00% Impervious Runoff Depth=4.88"
Tc=6.0 min CN=98 Runoff=2.5 cfs 8,861 cf

Subcatchment PS17: Runoff Area=27,221 sf 100.00% Impervious Runoff Depth=4.88"
Tc=6.0 min CN=98 Runoff=3.1 cfs 11,077 cf

Subcatchment PS2: Runoff Area=119,197 sf 5.18% Impervious Runoff Depth=1.30"
Flow Length=520' Tc=13.7 min UI Adjusted CN=59 Runoff=2.9 cfs 12,942 cf

Subcatchment PS2A: Runoff Area=52,258 sf 2.20% Impervious Runoff Depth=1.17"
Flow Length=180' Tc=11.2 min UI Adjusted CN=57 Runoff=1.2 cfs 5,091 cf

Subcatchment PS3: Runoff Area=97,067 sf 3.56% Impervious Runoff Depth=1.24"
Flow Length=785' Tc=16.3 min UI Adjusted CN=58 Runoff=2.0 cfs 9,993 cf

Subcatchment PS3A: Runoff Area=67,954 sf 3.39% Impervious Runoff Depth=1.17"
Flow Length=130' Tc=22.0 min UI Adjusted CN=57 Runoff=1.2 cfs 6,620 cf

Subcatchment PS4: Runoff Area=171,976 sf 9.20% Impervious Runoff Depth=1.44"
Flow Length=100' Tc=7.6 min UI Adjusted CN=61 Runoff=5.8 cfs 20,662 cf

Subcatchment PS5: Runoff Area=73,892 sf 3.12% Impervious Runoff Depth=1.24"
Flow Length=230' Tc=19.4 min CN=58 Runoff=1.5 cfs 7,607 cf

Subcatchment PS5A: Runoff Area=95,000 sf 1.21% Impervious Runoff Depth=1.10"
Flow Length=150' Tc=18.9 min UI Adjusted CN=56 Runoff=1.6 cfs 8,740 cf

Subcatchment PS6: Runoff Area=168,938 sf 15.67% Impervious Runoff Depth=1.59"
Flow Length=220' Tc=9.2 min UI Adjusted CN=63 Runoff=6.0 cfs 22,320 cf

Subcatchment PS7: Runoff Area=95,556 sf 32.02% Impervious Runoff Depth=2.37"
Tc=6.0 min CN=73 Runoff=6.1 cfs 18,912 cf

Subcatchment PS8: Runoff Area=39,073 sf 71.28% Impervious Runoff Depth=3.68"
Tc=6.0 min CN=87 Runoff=3.8 cfs 11,984 cf

Subcatchment PS9: Runoff Area=149,876 sf 53.46% Impervious Runoff Depth=3.09"
Tc=6.0 min CN=81 Runoff=12.5 cfs 38,613 cf

Reach DP1: Inflow=6.4 cfs 35,390 cf
Outflow=6.4 cfs 35,390 cf

Reach DP2: Inflow=4.8 cfs 45,853 cf
Outflow=4.8 cfs 45,853 cf

Reach DP2A: Inflow=1.2 cfs 5,737 cf
Outflow=1.2 cfs 5,737 cf

Reach DP3: Inflow=5.1 cfs 20,266 cf
Outflow=5.1 cfs 20,266 cf

Reach DP3A: Inflow=3.1 cfs 10,273 cf
Outflow=3.1 cfs 10,273 cf

Reach DP4: Inflow=5.8 cfs 38,315 cf
Outflow=5.8 cfs 38,315 cf

Reach DP5: Inflow=8.0 cfs 38,667 cf
Outflow=8.0 cfs 38,667 cf

Reach DP5A: Inflow=1.6 cfs 8,740 cf
Outflow=1.6 cfs 8,740 cf

Pond 1P: Detention Basin Peak Elev=107.79' Storage=12,351 cf Inflow=8.6 cfs 27,277 cf
Outflow=1.1 cfs 27,175 cf

Pond 2P: Infiltration Basin Peak Elev=109.53' Storage=6,998 cf Inflow=4.1 cfs 13,749 cf
Discarded=0.2 cfs 13,015 cf Primary=0.2 cfs 646 cf Outflow=0.4 cfs 13,660 cf

Pond 3P: Infiltration Basin Peak Elev=108.35' Storage=50,106 cf Inflow=24.4 cfs 77,075 cf
Discarded=0.4 cfs 33,907 cf Primary=0.6 cfs 17,653 cf Outflow=1.0 cfs 51,560 cf

Pond 4P: Infiltration Basin Peak Elev=118.09' Storage=3,140 cf Inflow=3.3 cfs 10,360 cf
Discarded=0.2 cfs 6,886 cf Primary=2.2 cfs 3,474 cf Outflow=2.5 cfs 10,360 cf

Pond 5P: Infiltration Basin Peak Elev=122.74' Storage=8,325 cf Inflow=6.1 cfs 18,912 cf
Discarded=0.5 cfs 18,912 cf Primary=0.0 cfs 0 cf Outflow=0.5 cfs 18,912 cf

Pond 6P: Recharge Trench Peak Elev=120.14' Storage=490 cf Inflow=3.1 cfs 11,077 cf
Discarded=0.0 cfs 3,460 cf Primary=2.5 cfs 7,437 cf Secondary=0.6 cfs 179 cf Outflow=3.1 cfs 11,077 cf

Total Runoff Area = 1,789,987 sf Runoff Volume = 280,378 cf Average Runoff Depth = 1.88"
79.88% Pervious = 1,429,771 sf 20.12% Impervious = 360,216 sf

Summary for Subcatchment PS1:

Runoff = 6.4 cfs @ 12.37 hrs, Volume= 35,390 cf, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description
202,359	55	Woods, Good, HSG B
135,428	61	>75% Grass cover, Good, HSG B
3,265	98	Unconnected pavement, HSG B
2,722	98	Unconnected roofs, HSG B
343,774	58	Weighted Average
337,787		98.26% Pervious Area
5,987		1.74% Impervious Area
5,987		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.7	147	0.0480	3.53		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
22.5	197	Total			

Summary for Subcatchment PS10:

Runoff = 6.9 cfs @ 12.09 hrs, Volume= 21,560 cf, Depth= 3.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description
43,871	98	Paved roads w/curbs & sewers, HSG B
31,599	61	>75% Grass cover, Good, HSG B
3,340	98	Unconnected pavement, HSG B
78,810	83	Weighted Average
31,599		40.10% Pervious Area
47,211		59.90% Impervious Area
3,340		7.07% Unconnected

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

Summary for Subcatchment PS11:

Runoff = 5.7 cfs @ 12.09 hrs, Volume= 17,617 cf, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description
13,154	55	Woods, Good, HSG B
21,827	61	>75% Grass cover, Good, HSG B
10,719	98	Paved roads w/curbs & sewers, HSG B
16,333	98	Roofs, HSG B
10,734	96	Gravel surface, HSG B
72,767	79	Weighted Average
45,715		62.82% Pervious Area
27,052		37.18% Impervious Area

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

Summary for Subcatchment PS12:

Runoff = 1.7 cfs @ 12.10 hrs, Volume= 5,717 cf, Depth= 1.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description
43,615	61	>75% Grass cover, Good, HSG B
1,729	98	Unconnected pavement, HSG B
45,344	62	Weighted Average
43,615		96.19% Pervious Area
1,729		3.81% Impervious Area
1,729		100.00% Unconnected

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

Summary for Subcatchment PS13:

Runoff = 1.6 cfs @ 12.09 hrs, Volume= 4,888 cf, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description
17,857	61	>75% Grass cover, Good, HSG B
5,444	98	Roofs, HSG B
2,305	98	Unconnected pavement, HSG B
25,606	72	Weighted Average
17,857		69.74% Pervious Area
7,749		30.26% Impervious Area
2,305		29.75% Unconnected

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

Summary for Subcatchment PS14:

Runoff = 0.9 cfs @ 12.10 hrs, Volume= 2,923 cf, Depth= 1.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Adj	Description
19,819	61		>75% Grass cover, Good, HSG B
2,305	98		Unconnected pavement, HSG B
22,124	65	63	Weighted Average, UI Adjusted
19,819			89.58% Pervious Area
2,305			10.42% Impervious Area
2,305			100.00% Unconnected

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

Summary for Subcatchment PS15:

Runoff = 2.5 cfs @ 12.08 hrs, Volume= 8,861 cf, Depth= 4.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description
21,777	98	Roofs, HSG B
21,777		100.00% Impervious Area

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

Summary for Subcatchment PS16:

Runoff = 2.5 cfs @ 12.08 hrs, Volume= 8,861 cf, Depth= 4.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description
21,777	98	Roofs, HSG B
21,777		100.00% Impervious Area

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

Summary for Subcatchment PS17:

Runoff = 3.1 cfs @ 12.08 hrs, Volume= 11,077 cf, Depth= 4.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description
27,221	98	Roofs, HSG B
27,221		100.00% Impervious Area

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

Summary for Subcatchment PS2:

Runoff = 2.9 cfs @ 12.21 hrs, Volume= 12,942 cf, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Adj	Description
61,041	55		Woods, Good, HSG B
51,977	61		>75% Grass cover, Good, HSG B
3,457	98		Unconnected pavement, HSG B
2,722	98		Unconnected roofs, HSG B
119,197	60	59	Weighted Average, UI Adjusted
113,018			94.82% Pervious Area
6,179			5.18% Impervious Area
6,179			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.1000	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
2.2	470	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.7	520	Total			

Summary for Subcatchment PS2A:

Runoff = 1.2 cfs @ 12.18 hrs, Volume= 5,091 cf, Depth= 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Adj	Description
35,762	55		Woods, Good, HSG B
15,344	61		>75% Grass cover, Good, HSG B
1,152	98		Unconnected pavement, HSG B
52,258	58	57	Weighted Average, UI Adjusted
51,106			97.80% Pervious Area
1,152			2.20% Impervious Area
1,152			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.1200	0.08		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.5	130	0.0850	4.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.2	180	Total			

Summary for Subcatchment PS3:

Runoff = 2.0 cfs @ 12.26 hrs, Volume= 9,993 cf, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Adj	Description
50,666	55		Woods, Good, HSG B
42,944	61		>75% Grass cover, Good, HSG B
3,457	98		Unconnected pavement, HSG B
97,067	59	58	Weighted Average, UI Adjusted
93,610			96.44% Pervious Area
3,457			3.56% Impervious Area
3,457			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.1000	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
4.8	735	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.3	785	Total			

Summary for Subcatchment PS3A:

Runoff = 1.2 cfs @ 12.35 hrs, Volume= 6,620 cf, Depth= 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Adj	Description
53,432	55		Woods, Good, HSG B
12,217	61		>75% Grass cover, Good, HSG B
2,305	98		Unconnected pavement, HSG B
67,954	58	57	Weighted Average, UI Adjusted
65,649			96.61% Pervious Area
2,305			3.39% Impervious Area
2,305			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.2	80	0.1250	5.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
22.0	130	Total			

Summary for Subcatchment PS4:

Runoff = 5.8 cfs @ 12.12 hrs, Volume= 20,662 cf, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Adj	Description
48,637	55		Woods, Good, HSG B
107,523	61		>75% Grass cover, Good, HSG B
10,372	98		Unconnected pavement, HSG B
5,444	98		Unconnected roofs, HSG B
171,976	63	61	Weighted Average, UI Adjusted
156,160			90.80% Pervious Area
15,816			9.20% Impervious Area
15,816			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.1	50	0.2400	7.89		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.6	100	Total			

Summary for Subcatchment PS5:

Runoff = 1.5 cfs @ 12.31 hrs, Volume= 7,607 cf, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description
48,067	55	Woods, Good, HSG B
23,521	61	>75% Grass cover, Good, HSG B
2,304	98	Unconnected pavement, HSG B
73,892	58	Weighted Average
71,588		96.88% Pervious Area
2,304		3.12% Impervious Area
2,304		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	50	0.0300	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.8	180	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
19.4	230	Total			

Summary for Subcatchment PS5A:

Runoff = 1.6 cfs @ 12.31 hrs, Volume= 8,740 cf, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Adj	Description
77,272	55		Woods, Good, HSG B
16,576	61		>75% Grass cover, Good, HSG B
1,152	98		Unconnected pavement, HSG B
95,000	57	56	Weighted Average, UI Adjusted
93,848			98.79% Pervious Area
1,152			1.21% Impervious Area
1,152			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	50	0.0300	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.3	100	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
18.9	150	Total			

Summary for Subcatchment PS6:

Runoff = 6.0 cfs @ 12.14 hrs, Volume= 22,320 cf, Depth= 1.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Adj	Description
67,828	55		Woods, Good, HSG B
74,644	61		>75% Grass cover, Good, HSG B
11,625	98		Unconnected pavement, HSG B
13,498	98		Roofs, HSG B
1,343	98		Paved roads w/curbs & sewers, HSG B
168,938	64	63	Weighted Average, UI Adjusted
142,472			84.33% Pervious Area
26,466			15.67% Impervious Area
11,625			43.92% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	170	0.1120	5.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.2	220	Total			

Summary for Subcatchment PS7:

Runoff = 6.1 cfs @ 12.09 hrs, Volume= 18,912 cf, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description
64,959	61	>75% Grass cover, Good, HSG B
10,888	98	Roofs, HSG B
7,062	98	Unconnected pavement, HSG B
12,647	98	Paved roads w/curbs & sewers, HSG B
95,556	73	Weighted Average
64,959		67.98% Pervious Area
30,597		32.02% Impervious Area
7,062		23.08% Unconnected

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

Summary for Subcatchment PS8:

Runoff = 3.8 cfs @ 12.09 hrs, Volume= 11,984 cf, Depth= 3.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description
25,064	98	Paved roads w/curbs & sewers, HSG B
2,787	98	Unconnected pavement, HSG B
11,222	61	>75% Grass cover, Good, HSG B
39,073	87	Weighted Average
11,222		28.72% Pervious Area
27,851		71.28% Impervious Area
2,787		10.01% Unconnected

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

Summary for Subcatchment PS9:

Runoff = 12.5 cfs @ 12.09 hrs, Volume= 38,613 cf, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description
22,164	98	Paved roads w/curbs & sewers, HSG B
69,747	61	>75% Grass cover, Good, HSG B
3,523	98	Unconnected pavement, HSG B
54,442	98	Roofs, HSG B
149,876	81	Weighted Average
69,747		46.54% Pervious Area
80,129		53.46% Impervious Area
3,523		4.40% Unconnected

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

Summary for Reach DP1:

Inflow Area = 343,774 sf, 1.74% Impervious, Inflow Depth = 1.24" for 10 Year event
Inflow = 6.4 cfs @ 12.37 hrs, Volume= 35,390 cf
Outflow = 6.4 cfs @ 12.37 hrs, Volume= 35,390 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2:

Inflow Area = 342,992 sf, 25.01% Impervious, Inflow Depth > 1.60" for 10 Year event
Inflow = 4.8 cfs @ 12.20 hrs, Volume= 45,853 cf
Outflow = 4.8 cfs @ 12.20 hrs, Volume= 45,853 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2A:

Inflow Area = 99,641 sf, 30.79% Impervious, Inflow Depth = 0.69" for 10 Year event
Inflow = 1.2 cfs @ 12.18 hrs, Volume= 5,737 cf
Outflow = 1.2 cfs @ 12.18 hrs, Volume= 5,737 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP3:

Inflow Area = 214,366 sf, 16.46% Impervious, Inflow Depth = 1.13" for 10 Year event
Inflow = 5.1 cfs @ 12.23 hrs, Volume= 20,266 cf
Outflow = 5.1 cfs @ 12.23 hrs, Volume= 20,266 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP3A:

Inflow Area = 117,299 sf, 27.14% Impervious, Inflow Depth = 1.05" for 10 Year event
Inflow = 3.1 cfs @ 12.22 hrs, Volume= 10,273 cf
Outflow = 3.1 cfs @ 12.22 hrs, Volume= 10,273 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP4:

Inflow Area = 455,469 sf, 37.90% Impervious, Inflow Depth = 1.01" for 10 Year event
Inflow = 5.8 cfs @ 12.12 hrs, Volume= 38,315 cf
Outflow = 5.8 cfs @ 12.12 hrs, Volume= 38,315 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP5:

Inflow Area = 433,386 sf, 13.96% Impervious, Inflow Depth = 1.07" for 10 Year event
Inflow = 8.0 cfs @ 12.17 hrs, Volume= 38,667 cf
Outflow = 8.0 cfs @ 12.17 hrs, Volume= 38,667 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP5A:

Inflow Area = 190,556 sf, 16.66% Impervious, Inflow Depth = 0.55" for 10 Year event
Inflow = 1.6 cfs @ 12.31 hrs, Volume= 8,740 cf
Outflow = 1.6 cfs @ 12.31 hrs, Volume= 8,740 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Detention Basin

Inflow Area = 124,154 sf, 39.42% Impervious, Inflow Depth = 2.64" for 10 Year event
Inflow = 8.6 cfs @ 12.09 hrs, Volume= 27,277 cf
Outflow = 1.1 cfs @ 12.72 hrs, Volume= 27,175 cf, Atten= 87%, Lag= 37.8 min
Primary = 1.1 cfs @ 12.72 hrs, Volume= 27,175 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 107.79' @ 12.72 hrs Surf.Area= 5,670 sf Storage= 12,351 cf

Plug-Flow detention time= 198.5 min calculated for 27,167 cf (100% of inflow)
Center-of-Mass det. time= 196.4 min (1,020.5 - 824.1)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	26,987 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
105.00	2,562	0	0
106.00	4,302	3,432	3,432
108.00	5,832	10,134	13,566
110.00	7,589	13,421	26,987

Device	Routing	Invert	Outlet Devices
#1	Primary	98.00'	**12.0" Round Culvert** L= 40.0' Ke= 0.500 Inlet / Outlet Invert= 98.00' / 96.00' S= 0.0500 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	105.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	106.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	107.60'	**10.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	108.90'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.1 cfs @ 12.72 hrs HW=107.79' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 1.1 cfs of 11.5 cfs potential flow)
  └**2=Orifice/Grate** (Orifice Controls 0.4 cfs @ 7.86 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.5 cfs @ 6.13 fps)
  └**4=Orifice/Grate** (Orifice Controls 0.2 cfs @ 1.39 fps)
  └**5=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 2P: Infiltration Basin

Inflow Area = 47,383 sf, 62.31% Impervious, Inflow Depth = 3.48" for 10 Year event
Inflow = 4.1 cfs @ 12.09 hrs, Volume= 13,749 cf
Outflow = 0.4 cfs @ 12.95 hrs, Volume= 13,660 cf, Atten= 90%, Lag= 51.8 min
Discarded = 0.2 cfs @ 12.95 hrs, Volume= 13,015 cf
Primary = 0.2 cfs @ 12.95 hrs, Volume= 646 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 109.53' @ 12.95 hrs Surf.Area= 3,532 sf Storage= 6,998 cf

Plug-Flow detention time= 401.5 min calculated for 13,657 cf (99% of inflow)
Center-of-Mass det. time= 397.4 min (1,178.4 - 780.9)

Volume	Invert	Avail.Storage	Storage Description
#1	106.00'	8,799 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
106.00	781	0	0	781
108.00	2,086	2,762	2,762	2,112
110.00	4,059	6,037	8,799	4,123

Device	Routing	Invert	Outlet Devices
#1	Primary	109.50'	**20.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	106.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.2 cfs @ 12.95 hrs HW=109.53' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.2 cfs)

Primary OutFlow Max=0.2 cfs @ 12.95 hrs HW=109.53' TW=0.00' (Dynamic Tailwater)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 0.2 cfs @ 0.40 fps)

Summary for Pond 3P: Infiltration Basin

Inflow Area = 283,493 sf, 55.31% Impervious, Inflow Depth = 3.26" for 10 Year event
Inflow = 24.4 cfs @ 12.09 hrs, Volume= 77,075 cf
Outflow = 1.0 cfs @ 15.50 hrs, Volume= 51,560 cf, Atten= 96%, Lag= 205.0 min
Discarded = 0.4 cfs @ 15.50 hrs, Volume= 33,907 cf
Primary = 0.6 cfs @ 15.50 hrs, Volume= 17,653 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 108.35' @ 15.50 hrs Surf.Area= 17,079 sf Storage= 50,106 cf

Plug-Flow detention time= 542.5 min calculated for 51,545 cf (67% of inflow)
Center-of-Mass det. time= 443.1 min (1,251.5 - 808.4)

Volume	Invert	Avail.Storage	Storage Description
#1	104.00'	83,598 cf	**Custom Stage Data (Conic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
104.00	8,168	0	0	8,168
105.00	9,203	8,680	8,680	9,254
106.00	10,294	9,743	18,424	10,400
108.00	15,794	25,893	44,316	15,959
110.00	23,758	39,282	83,598	23,984

Device	Routing	Invert	Outlet Devices
#1	Primary	106.50'	**12.0" Round Culvert** L= 34.0' Ke= 0.600 Inlet / Outlet Invert= 106.50' / 106.00' S= 0.0147 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 1	107.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	108.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	109.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	109.50'	**20.0' long x 4.0' 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#6	Discarded	104.00'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.4 cfs @ 15.50 hrs HW=108.35' (Free Discharge)
└**6=Exfiltration** (Exfiltration Controls 0.4 cfs)

Primary OutFlow Max=0.6 cfs @ 15.50 hrs HW=108.35' TW=0.00' (Dynamic Tailwater)
├**1=Culvert** (Passes 0.6 cfs of 4.1 cfs potential flow)
│ ├**2=Orifice/Grate** (Orifice Controls 0.3 cfs @ 5.33 fps)
│ ├**3=Orifice/Grate** (Orifice Controls 0.3 cfs @ 2.02 fps)
│ └**4=Orifice/Grate** (Controls 0.0 cfs)
└**5=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 4P: Infiltration Basin

Inflow Area = 49,345 sf, 59.84% Impervious, Inflow Depth = 2.52" for 10 Year event
Inflow = 3.3 cfs @ 12.09 hrs, Volume= 10,360 cf
Outflow = 2.5 cfs @ 12.18 hrs, Volume= 10,360 cf, Atten= 26%, Lag= 5.6 min
Discarded = 0.2 cfs @ 12.18 hrs, Volume= 6,886 cf
Primary = 2.2 cfs @ 12.18 hrs, Volume= 3,474 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 118.09' @ 12.18 hrs Surf.Area= 4,138 sf Storage= 3,140 cf

Plug-Flow detention time= 88.9 min calculated for 10,358 cf (100% of inflow)
Center-of-Mass det. time= 88.9 min (868.3 - 779.3)

Volume	Invert	Avail.Storage	Storage Description
#1	117.00'	4,951 cf	**Custom Stage Data (Conic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
117.00	1,691	0	0	1,691
118.00	4,012	2,769	2,769	4,019
118.50	4,726	2,182	4,951	4,743

Device	Routing	Invert	Outlet Devices
#1	Primary	117.90'	**10.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#2	Primary	118.10'	**25.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#3	Discarded	117.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.2 cfs @ 12.18 hrs HW=118.09' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.2 cfs)

Primary OutFlow Max=2.2 cfs @ 12.18 hrs HW=118.09' TW=0.00' (Dynamic Tailwater)
├**1=Broad-Crested Rectangular Weir** (Weir Controls 2.2 cfs @ 1.18 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 5P: Infiltration Basin

Inflow Area = 95,556 sf, 32.02% Impervious, Inflow Depth = 2.37" for 10 Year event
Inflow = 6.1 cfs @ 12.09 hrs, Volume= 18,912 cf
Outflow = 0.5 cfs @ 13.63 hrs, Volume= 18,912 cf, Atten= 92%, Lag= 92.3 min
Discarded = 0.5 cfs @ 13.63 hrs, Volume= 18,912 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Peak Elev= 122.74' @ 13.63 hrs Surf.Area= 8,779 sf Storage= 8,325 cf

Plug-Flow detention time= 179.1 min calculated for 18,906 cf (100% of inflow)
Center-of-Mass det. time= 179.0 min (1,017.8 - 838.8)

Volume	Invert	Avail.Storage	Storage Description
#1	121.50'	20,863 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
121.50	2,680	0	0
121.75	4,316	875	875
122.00	7,408	1,466	2,340
124.00	11,115	18,523	20,863

Device	Routing	Invert	Outlet Devices
#1	Primary	122.75'	**10.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	121.50'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.5 cfs @ 13.63 hrs HW=122.74' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.5 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=121.50' TW=0.00' (Dynamic Tailwater)
└**1=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 6P: Recharge Trench

Inflow Area = 27,221 sf,100.00% Impervious, Inflow Depth = 4.88" for 10 Year event
Inflow = 3.1 cfs @ 12.08 hrs, Volume= 11,077 cf
Outflow = 3.1 cfs @ 12.08 hrs, Volume= 11,077 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.0 cfs @ 6.83 hrs, Volume= 3,460 cf
Primary = 2.5 cfs @ 12.08 hrs, Volume= 7,437 cf
Secondary = 0.6 cfs @ 12.08 hrs, Volume= 179 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 120.14' @ 12.08 hrs Surf.Area= 720 sf Storage= 490 cf

Plug-Flow detention time= 44.0 min calculated for 11,077 cf (100% of inflow)
Center-of-Mass det. time= 44.0 min (791.7 - 747.6)

Volume	Invert	Avail.Storage	Storage Description
#1	115.50'	392 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 1,080 cf Overall - 101 cf Embedded = 979 cf x 40.0% Voids
#2	116.17'	94 cf	**6.0" Round Pipe Storage** Inside #1 L= 480.0' 101 cf Overall - 0.1" Wall Thickness = 94 cf
#3	117.00'	12 cf	**0.50'D x 10.00'H Vertical Cone/Cylinder** x 6 -Impervious
		498 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.50	720	0	0
117.00	720	1,080	1,080

Device	Routing	Invert	Outlet Devices	
#1	Discarded	115.50'	**2.410 in/hr Exfiltration over Surface area**	Phase-In= 0.01'
#2	Primary	118.00'	**4.0" Horiz. Orifice/Grate X 4.00** C= 0.600 Limited to weir flow at low heads	
#3	Secondary	120.00'	**4.0" Horiz. Orifice/Grate X 4.00** C= 0.600 Limited to weir flow at low heads	

Discarded OutFlow Max=0.0 cfs @ 6.83 hrs HW=115.62' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=2.5 cfs @ 12.08 hrs HW=120.14' TW=117.99' (Dynamic Tailwater)
└**2=Orifice/Grate** (Orifice Controls 2.5 cfs @ 7.04 fps)

Secondary OutFlow Max=0.6 cfs @ 12.08 hrs HW=120.14' TW=0.00' (Dynamic Tailwater)
└**3=Orifice/Grate** (Orifice Controls 0.6 cfs @ 1.80 fps)

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PS1: Runoff Area=343,774 sf 1.74% Impervious Runoff Depth=1.94"
Flow Length=197' Tc=22.5 min CN=58 Runoff=10.7 cfs 55,579 cf

Subcatchment PS10: Runoff Area=78,810 sf 59.90% Impervious Runoff Depth=4.36"
Tc=6.0 min CN=83 Runoff=9.1 cfs 28,643 cf

Subcatchment PS11: Runoff Area=72,767 sf 37.18% Impervious Runoff Depth=3.94"
Tc=6.0 min CN=79 Runoff=7.7 cfs 23,890 cf

Subcatchment PS12: Runoff Area=45,344 sf 3.81% Impervious Runoff Depth=2.29"
Tc=6.0 min CN=62 Runoff=2.7 cfs 8,658 cf

Subcatchment PS13: Runoff Area=25,606 sf 30.26% Impervious Runoff Depth=3.23"
Tc=6.0 min CN=72 Runoff=2.2 cfs 6,897 cf

Subcatchment PS14: Runoff Area=22,124 sf 10.42% Impervious Runoff Depth=2.38"
Tc=6.0 min UI Adjusted CN=63 Runoff=1.4 cfs 4,390 cf

Subcatchment PS15: Runoff Area=21,777 sf 100.00% Impervious Runoff Depth=6.05"
Tc=6.0 min CN=98 Runoff=3.1 cfs 10,982 cf

Subcatchment PS16: Runoff Area=21,777 sf 100.00% Impervious Runoff Depth=6.05"
Tc=6.0 min CN=98 Runoff=3.1 cfs 10,982 cf

Subcatchment PS17: Runoff Area=27,221 sf 100.00% Impervious Runoff Depth=6.05"
Tc=6.0 min CN=98 Runoff=3.9 cfs 13,727 cf

Subcatchment PS2: Runoff Area=119,197 sf 5.18% Impervious Runoff Depth=2.03"
Flow Length=520' Tc=13.7 min UI Adjusted CN=59 Runoff=4.8 cfs 20,129 cf

Subcatchment PS2A: Runoff Area=52,258 sf 2.20% Impervious Runoff Depth=1.85"
Flow Length=180' Tc=11.2 min UI Adjusted CN=57 Runoff=2.0 cfs 8,077 cf

Subcatchment PS3: Runoff Area=97,067 sf 3.56% Impervious Runoff Depth=1.94"
Flow Length=785' Tc=16.3 min UI Adjusted CN=58 Runoff=3.4 cfs 15,693 cf

Subcatchment PS3A: Runoff Area=67,954 sf 3.39% Impervious Runoff Depth=1.85"
Flow Length=130' Tc=22.0 min UI Adjusted CN=57 Runoff=2.0 cfs 10,503 cf

Subcatchment PS4: Runoff Area=171,976 sf 9.20% Impervious Runoff Depth=2.20"
Flow Length=100' Tc=7.6 min UI Adjusted CN=61 Runoff=9.3 cfs 31,558 cf

Subcatchment PS5: Runoff Area=73,892 sf 3.12% Impervious Runoff Depth=1.94"
Flow Length=230' Tc=19.4 min CN=58 Runoff=2.4 cfs 11,946 cf

Subcatchment PS5A: Runoff Area=95,000 sf 1.21% Impervious Runoff Depth=1.77"
Flow Length=150' Tc=18.9 min UI Adjusted CN=56 Runoff=2.8 cfs 14,016 cf

Subcatchment PS6: Runoff Area=168,938 sf 15.67% Impervious Runoff Depth=2.38"
Flow Length=220' Tc=9.2 min UI Adjusted CN=63 Runoff=9.4 cfs 33,525 cf

Subcatchment PS7: Runoff Area=95,556 sf 32.02% Impervious Runoff Depth=3.33"
Tc=6.0 min CN=73 Runoff=8.6 cfs 26,523 cf

Subcatchment PS8: Runoff Area=39,073 sf 71.28% Impervious Runoff Depth=4.80"
Tc=6.0 min CN=87 Runoff=4.9 cfs 15,614 cf

Subcatchment PS9: Runoff Area=149,876 sf 53.46% Impervious Runoff Depth=4.15"
Tc=6.0 min CN=81 Runoff=16.6 cfs 51,819 cf

Reach DP1: Inflow=10.7 cfs 55,579 cf
Outflow=10.7 cfs 55,579 cf

Reach DP2: Inflow=9.5 cfs 69,162 cf
Outflow=9.5 cfs 69,162 cf

Reach DP2A: Inflow=3.5 cfs 11,846 cf
Outflow=3.5 cfs 11,846 cf

Reach DP3: Inflow=8.0 cfs 32,577 cf
Outflow=8.0 cfs 32,577 cf

Reach DP3A: Inflow=5.3 cfs 16,884 cf
Outflow=5.3 cfs 16,884 cf

Reach DP4: Inflow=9.4 cfs 69,765 cf
Outflow=9.4 cfs 69,765 cf

Reach DP5: Inflow=13.0 cfs 64,256 cf
Outflow=13.0 cfs 64,256 cf

Reach DP5A: Inflow=4.3 cfs 18,784 cf
Outflow=4.3 cfs 18,784 cf

Pond 1P: Detention Basin Peak Elev=108.48' Storage=16,491 cf Inflow=11.8 cfs 37,300 cf
Outflow=1.9 cfs 37,187 cf

Pond 2P: Infiltration Basin Peak Elev=109.61' Storage=7,317 cf Inflow=5.3 cfs 17,879 cf
Discarded=0.2 cfs 13,859 cf Primary=2.0 cfs 3,769 cf Outflow=2.2 cfs 17,628 cf

Pond 3P: Infiltration Basin Peak Elev=109.02' Storage=62,346 cf Inflow=32.3 cfs 102,304 cf
Discarded=0.5 cfs 36,917 cf Primary=1.2 cfs 38,207 cf Outflow=1.7 cfs 75,124 cf

Pond 4P: Infiltration Basin Peak Elev=118.13' Storage=3,313 cf Inflow=4.0 cfs 13,999 cf
Discarded=0.2 cfs 8,102 cf Primary=3.4 cfs 5,898 cf Outflow=3.7 cfs 13,999 cf

Pond 5P: Infiltration Basin Peak Elev=122.93' Storage=10,008 cf Inflow=8.6 cfs 26,523 cf
Discarded=0.5 cfs 21,754 cf Primary=1.9 cfs 4,768 cf Outflow=2.4 cfs 26,523 cf

Pond 6P: Recharge Trench Peak Elev=120.52' Storage=490 cf Inflow=3.9 cfs 13,727 cf
Discarded=0.0 cfs 3,635 cf Primary=2.6 cfs 9,609 cf Secondary=1.2 cfs 483 cf Outflow=3.9 cfs 13,727 cf

Total Runoff Area = 1,789,987 sf Runoff Volume = 403,151 cf Average Runoff Depth = 2.70"
79.88% Pervious = 1,429,771 sf 20.12% Impervious = 360,216 sf

Summary for Subcatchment PS1:

Runoff = 10.7 cfs @ 12.33 hrs, Volume= 55,579 cf, Depth= 1.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Description
202,359	55	Woods, Good, HSG B
135,428	61	>75% Grass cover, Good, HSG B
3,265	98	Unconnected pavement, HSG B
2,722	98	Unconnected roofs, HSG B
343,774	58	Weighted Average
337,787		98.26% Pervious Area
5,987		1.74% Impervious Area
5,987		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.7	147	0.0480	3.53		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
22.5	197	Total			

Summary for Subcatchment PS10:

Runoff = 9.1 cfs @ 12.09 hrs, Volume= 28,643 cf, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Description
43,871	98	Paved roads w/curbs & sewers, HSG B
31,599	61	>75% Grass cover, Good, HSG B
3,340	98	Unconnected pavement, HSG B
78,810	83	Weighted Average
31,599		40.10% Pervious Area
47,211		59.90% Impervious Area
3,340		7.07% Unconnected

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

Summary for Subcatchment PS11:

Runoff = 7.7 cfs @ 12.09 hrs, Volume= 23,890 cf, Depth= 3.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Description
13,154	55	Woods, Good, HSG B
21,827	61	>75% Grass cover, Good, HSG B
10,719	98	Paved roads w/curbs & sewers, HSG B
16,333	98	Roofs, HSG B
10,734	96	Gravel surface, HSG B
72,767	79	Weighted Average
45,715		62.82% Pervious Area
27,052		37.18% Impervious Area

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

Summary for Subcatchment PS12:

Runoff = 2.7 cfs @ 12.09 hrs, Volume= 8,658 cf, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Description
43,615	61	>75% Grass cover, Good, HSG B
1,729	98	Unconnected pavement, HSG B
45,344	62	Weighted Average
43,615		96.19% Pervious Area
1,729		3.81% Impervious Area
1,729		100.00% Unconnected

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

Summary for Subcatchment PS13:

Runoff = 2.2 cfs @ 12.09 hrs, Volume= 6,897 cf, Depth= 3.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Description
17,857	61	>75% Grass cover, Good, HSG B
5,444	98	Roofs, HSG B
2,305	98	Unconnected pavement, HSG B
25,606	72	Weighted Average
17,857		69.74% Pervious Area
7,749		30.26% Impervious Area
2,305		29.75% Unconnected

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

Summary for Subcatchment PS14:

Runoff = 1.4 cfs @ 12.09 hrs, Volume= 4,390 cf, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Adj	Description
19,819	61		>75% Grass cover, Good, HSG B
2,305	98		Unconnected pavement, HSG B
22,124	65	63	Weighted Average, UI Adjusted
19,819			89.58% Pervious Area
2,305			10.42% Impervious Area
2,305			100.00% Unconnected

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

Summary for Subcatchment PS15:

Runoff = 3.1 cfs @ 12.08 hrs, Volume= 10,982 cf, Depth= 6.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Description
21,777	98	Roofs, HSG B
21,777		100.00% Impervious Area

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

Summary for Subcatchment PS16:

Runoff = 3.1 cfs @ 12.08 hrs, Volume= 10,982 cf, Depth= 6.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Description
21,777	98	Roofs, HSG B
21,777		100.00% Impervious Area

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

Summary for Subcatchment PS17:

Runoff = 3.9 cfs @ 12.08 hrs, Volume= 13,727 cf, Depth= 6.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Description
27,221	98	Roofs, HSG B
27,221		100.00% Impervious Area

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

Summary for Subcatchment PS2:

Runoff = 4.8 cfs @ 12.20 hrs, Volume= 20,129 cf, Depth= 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Adj	Description
61,041	55		Woods, Good, HSG B
51,977	61		>75% Grass cover, Good, HSG B
3,457	98		Unconnected pavement, HSG B
2,722	98		Unconnected roofs, HSG B
119,197	60	59	Weighted Average, UI Adjusted
113,018			94.82% Pervious Area
6,179			5.18% Impervious Area
6,179			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.1000	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
2.2	470	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.7	520	Total			

Summary for Subcatchment PS2A:

Runoff = 2.0 cfs @ 12.17 hrs, Volume= 8,077 cf, Depth= 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Adj	Description
35,762	55		Woods, Good, HSG B
15,344	61		>75% Grass cover, Good, HSG B
1,152	98		Unconnected pavement, HSG B
52,258	58	57	Weighted Average, UI Adjusted
51,106			97.80% Pervious Area
1,152			2.20% Impervious Area
1,152			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.1200	0.08		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.5	130	0.0850	4.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.2	180	Total			

Summary for Subcatchment PS3:

Runoff = 3.4 cfs @ 12.24 hrs, Volume= 15,693 cf, Depth= 1.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Adj	Description
50,666	55		Woods, Good, HSG B
42,944	61		>75% Grass cover, Good, HSG B
3,457	98		Unconnected pavement, HSG B
97,067	59	58	Weighted Average, UI Adjusted
93,610			96.44% Pervious Area
3,457			3.56% Impervious Area
3,457			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.1000	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
4.8	735	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.3	785	Total			

Summary for Subcatchment PS3A:

Runoff = 2.0 cfs @ 12.34 hrs, Volume= 10,503 cf, Depth= 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Adj	Description
53,432	55		Woods, Good, HSG B
12,217	61		>75% Grass cover, Good, HSG B
2,305	98		Unconnected pavement, HSG B
67,954	58	57	Weighted Average, UI Adjusted
65,649			96.61% Pervious Area
2,305			3.39% Impervious Area
2,305			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.2	80	0.1250	5.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
22.0	130	Total			

Summary for Subcatchment PS4:

Runoff = 9.3 cfs @ 12.12 hrs, Volume= 31,558 cf, Depth= 2.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Adj	Description
48,637	55		Woods, Good, HSG B
107,523	61		>75% Grass cover, Good, HSG B
10,372	98		Unconnected pavement, HSG B
5,444	98		Unconnected roofs, HSG B
171,976	63	61	Weighted Average, UI Adjusted
156,160			90.80% Pervious Area
15,816			9.20% Impervious Area
15,816			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.1	50	0.2400	7.89		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.6	100	Total			

Summary for Subcatchment PS5:

Runoff = 2.4 cfs @ 12.29 hrs, Volume= 11,946 cf, Depth= 1.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Description
48,067	55	Woods, Good, HSG B
23,521	61	>75% Grass cover, Good, HSG B
2,304	98	Unconnected pavement, HSG B
73,892	58	Weighted Average
71,588		96.88% Pervious Area
2,304		3.12% Impervious Area
2,304		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	50	0.0300	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.8	180	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
19.4	230	Total			

Summary for Subcatchment PS5A:

Runoff = 2.8 cfs @ 12.29 hrs, Volume= 14,016 cf, Depth= 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Adj	Description
77,272	55		Woods, Good, HSG B
16,576	61		>75% Grass cover, Good, HSG B
1,152	98		Unconnected pavement, HSG B
95,000	57	56	Weighted Average, UI Adjusted
93,848			98.79% Pervious Area
1,152			1.21% Impervious Area
1,152			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	50	0.0300	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.3	100	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
18.9	150	Total			

Summary for Subcatchment PS6:

Runoff = 9.4 cfs @ 12.14 hrs, Volume= 33,525 cf, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Adj	Description
67,828	55		Woods, Good, HSG B
74,644	61		>75% Grass cover, Good, HSG B
11,625	98		Unconnected pavement, HSG B
13,498	98		Roofs, HSG B
1,343	98		Paved roads w/curbs & sewers, HSG B
168,938	64	63	Weighted Average, UI Adjusted
142,472			84.33% Pervious Area
26,466			15.67% Impervious Area
11,625			43.92% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	170	0.1120	5.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.2	220	Total			

Summary for Subcatchment PS7:

Runoff = 8.6 cfs @ 12.09 hrs, Volume= 26,523 cf, Depth= 3.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Description
64,959	61	>75% Grass cover, Good, HSG B
10,888	98	Roofs, HSG B
7,062	98	Unconnected pavement, HSG B
12,647	98	Paved roads w/curbs & sewers, HSG B
95,556	73	Weighted Average
64,959		67.98% Pervious Area
30,597		32.02% Impervious Area
7,062		23.08% Unconnected

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

Summary for Subcatchment PS8:

Runoff = 4.9 cfs @ 12.09 hrs, Volume= 15,614 cf, Depth= 4.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Description
25,064	98	Paved roads w/curbs & sewers, HSG B
2,787	98	Unconnected pavement, HSG B
11,222	61	>75% Grass cover, Good, HSG B
39,073	87	Weighted Average
11,222		28.72% Pervious Area
27,851		71.28% Impervious Area
2,787		10.01% Unconnected

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

Summary for Subcatchment PS9:

Runoff = 16.6 cfs @ 12.09 hrs, Volume= 51,819 cf, Depth= 4.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.29"

Area (sf)	CN	Description
22,164	98	Paved roads w/curbs & sewers, HSG B
69,747	61	>75% Grass cover, Good, HSG B
3,523	98	Unconnected pavement, HSG B
54,442	98	Roofs, HSG B
149,876	81	Weighted Average
69,747		46.54% Pervious Area
80,129		53.46% Impervious Area
3,523		4.40% Unconnected

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

Summary for Reach DP1:

Inflow Area = 343,774 sf, 1.74% Impervious, Inflow Depth = 1.94" for 25 Year event
Inflow = 10.7 cfs @ 12.33 hrs, Volume= 55,579 cf
Outflow = 10.7 cfs @ 12.33 hrs, Volume= 55,579 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2:

Inflow Area = 342,992 sf, 25.01% Impervious, Inflow Depth > 2.42" for 25 Year event
Inflow = 9.5 cfs @ 12.26 hrs, Volume= 69,162 cf
Outflow = 9.5 cfs @ 12.26 hrs, Volume= 69,162 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2A:

Inflow Area = 99,641 sf, 30.79% Impervious, Inflow Depth = 1.43" for 25 Year event
Inflow = 3.5 cfs @ 12.29 hrs, Volume= 11,846 cf
Outflow = 3.5 cfs @ 12.29 hrs, Volume= 11,846 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP3:

Inflow Area = 214,366 sf, 16.46% Impervious, Inflow Depth = 1.82" for 25 Year event
Inflow = 8.0 cfs @ 12.22 hrs, Volume= 32,577 cf
Outflow = 8.0 cfs @ 12.22 hrs, Volume= 32,577 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP3A:

Inflow Area = 117,299 sf, 27.14% Impervious, Inflow Depth = 1.73" for 25 Year event
Inflow = 5.3 cfs @ 12.12 hrs, Volume= 16,884 cf
Outflow = 5.3 cfs @ 12.12 hrs, Volume= 16,884 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP4:

Inflow Area = 455,469 sf, 37.90% Impervious, Inflow Depth = 1.84" for 25 Year event
Inflow = 9.4 cfs @ 12.12 hrs, Volume= 69,765 cf
Outflow = 9.4 cfs @ 12.12 hrs, Volume= 69,765 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP5:

Inflow Area = 433,386 sf, 13.96% Impervious, Inflow Depth = 1.78" for 25 Year event
Inflow = 13.0 cfs @ 12.16 hrs, Volume= 64,256 cf
Outflow = 13.0 cfs @ 12.16 hrs, Volume= 64,256 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP5A:

Inflow Area = 190,556 sf, 16.66% Impervious, Inflow Depth = 1.18" for 25 Year event
Inflow = 4.3 cfs @ 12.40 hrs, Volume= 18,784 cf
Outflow = 4.3 cfs @ 12.40 hrs, Volume= 18,784 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Detention Basin

Inflow Area = 124,154 sf, 39.42% Impervious, Inflow Depth = 3.61" for 25 Year event
Inflow = 11.8 cfs @ 12.09 hrs, Volume= 37,300 cf
Outflow = 1.9 cfs @ 12.58 hrs, Volume= 37,187 cf, Atten= 84%, Lag= 29.3 min
Primary = 1.9 cfs @ 12.58 hrs, Volume= 37,187 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 108.48' @ 12.58 hrs Surf.Area= 6,257 sf Storage= 16,491 cf

Plug-Flow detention time= 180.5 min calculated for 37,187 cf (100% of inflow)
Center-of-Mass det. time= 178.6 min (994.8 - 816.1)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	26,987 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
105.00	2,562	0	0
106.00	4,302	3,432	3,432
108.00	5,832	10,134	13,566
110.00	7,589	13,421	26,987

Device	Routing	Invert	Outlet Devices
#1	Primary	98.00'	**12.0" Round Culvert** L= 40.0' Ke= 0.500 Inlet / Outlet Invert= 98.00' / 96.00' S= 0.0500 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	105.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	106.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	107.60'	**10.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	108.90'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.9 cfs @ 12.58 hrs HW=108.48' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 1.9 cfs of 11.9 cfs potential flow)
  └**2=Orifice/Grate** (Orifice Controls 0.4 cfs @ 8.82 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.6 cfs @ 7.33 fps)
  └**4=Orifice/Grate** (Orifice Controls 0.9 cfs @ 4.19 fps)
  └**5=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 2P: Infiltration Basin

Inflow Area = 47,383 sf, 62.31% Impervious, Inflow Depth = 4.53" for 25 Year event
Inflow = 5.3 cfs @ 12.09 hrs, Volume= 17,879 cf
Outflow = 2.2 cfs @ 12.31 hrs, Volume= 17,628 cf, Atten= 59%, Lag= 13.3 min
Discarded = 0.2 cfs @ 12.31 hrs, Volume= 13,859 cf
Primary = 2.0 cfs @ 12.31 hrs, Volume= 3,769 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 109.61' @ 12.31 hrs Surf.Area= 3,628 sf Storage= 7,317 cf

Plug-Flow detention time= 334.2 min calculated for 17,623 cf (99% of inflow)
Center-of-Mass det. time= 325.3 min (1,103.3 - 778.0)

Volume	Invert	Avail.Storage	Storage Description
#1	106.00'	8,799 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
106.00	781	0	0	781
108.00	2,086	2,762	2,762	2,112
110.00	4,059	6,037	8,799	4,123

Device	Routing	Invert	Outlet Devices
#1	Primary	109.50'	**20.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	106.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.2 cfs @ 12.31 hrs HW=109.61' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.2 cfs)

Primary OutFlow Max=2.0 cfs @ 12.31 hrs HW=109.61' TW=0.00' (Dynamic Tailwater)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 2.0 cfs @ 0.86 fps)

Summary for Pond 3P: Infiltration Basin

Inflow Area = 283,493 sf, 55.31% Impervious, Inflow Depth = 4.33" for 25 Year event
Inflow = 32.3 cfs @ 12.09 hrs, Volume= 102,304 cf
Outflow = 1.7 cfs @ 14.44 hrs, Volume= 75,124 cf, Atten= 95%, Lag= 141.1 min
Discarded = 0.5 cfs @ 14.44 hrs, Volume= 36,917 cf
Primary = 1.2 cfs @ 14.44 hrs, Volume= 38,207 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 109.02' @ 14.44 hrs Surf.Area= 19,651 sf Storage= 62,346 cf

Plug-Flow detention time= 469.3 min calculated for 75,103 cf (73% of inflow)
Center-of-Mass det. time= 380.5 min (1,181.8 - 801.3)

Volume	Invert	Avail.Storage	Storage Description
#1	104.00'	83,598 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
104.00	8,168	0	0	8,168
105.00	9,203	8,680	8,680	9,254
106.00	10,294	9,743	18,424	10,400
108.00	15,794	25,893	44,316	15,959
110.00	23,758	39,282	83,598	23,984

Device	Routing	Invert	Outlet Devices
#1	Primary	106.50'	**12.0" Round Culvert** L= 34.0' Ke= 0.600 Inlet / Outlet Invert= 106.50' / 106.00' S= 0.0147 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 1	107.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	108.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	109.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	109.50'	**20.0' long x 4.0' 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#6	Discarded	104.00'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.5 cfs @ 14.44 hrs HW=109.02' (Free Discharge)
└**6=Exfiltration** (Exfiltration Controls 0.5 cfs)

Primary OutFlow Max=1.2 cfs @ 14.44 hrs HW=109.02' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 1.2 cfs of 5.0 cfs potential flow)
  └**2=Orifice/Grate** (Orifice Controls 0.3 cfs @ 6.63 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.8 cfs @ 4.22 fps)
  └**4=Orifice/Grate** (Weir Controls 0.1 cfs @ 0.45 fps)
└**5=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 4P: Infiltration Basin

Inflow Area = 49,345 sf, 59.84% Impervious, Inflow Depth = 3.40" for 25 Year event
Inflow = 4.0 cfs @ 12.09 hrs, Volume= 13,999 cf
Outflow = 3.7 cfs @ 12.14 hrs, Volume= 13,999 cf, Atten= 8%, Lag= 2.8 min
Discarded = 0.2 cfs @ 12.14 hrs, Volume= 8,102 cf
Primary = 3.4 cfs @ 12.14 hrs, Volume= 5,898 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 118.13' @ 12.14 hrs Surf.Area= 4,196 sf Storage= 3,313 cf

Plug-Flow detention time= 79.7 min calculated for 13,995 cf (100% of inflow)
Center-of-Mass det. time= 79.6 min (860.1 - 780.5)

Volume	Invert	Avail.Storage	Storage Description
#1	117.00'	4,951 cf	**Custom Stage Data (Conic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
117.00	1,691	0	0	1,691
118.00	4,012	2,769	2,769	4,019
118.50	4,726	2,182	4,951	4,743

Device	Routing	Invert	Outlet Devices
#1	Primary	117.90'	**10.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#2	Primary	118.10'	**25.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#3	Discarded	117.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.2 cfs @ 12.14 hrs HW=118.13' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.2 cfs)

Primary OutFlow Max=3.4 cfs @ 12.14 hrs HW=118.13' TW=0.00' (Dynamic Tailwater)
├**1=Broad-Crested Rectangular Weir** (Weir Controls 3.0 cfs @ 1.30 fps)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 0.4 cfs @ 0.48 fps)

Summary for Pond 5P: Infiltration Basin

Inflow Area = 95,556 sf, 32.02% Impervious, Inflow Depth = 3.33" for 25 Year event
Inflow = 8.6 cfs @ 12.09 hrs, Volume= 26,523 cf
Outflow = 2.4 cfs @ 12.46 hrs, Volume= 26,523 cf, Atten= 72%, Lag= 22.3 min
Discarded = 0.5 cfs @ 12.46 hrs, Volume= 21,754 cf
Primary = 1.9 cfs @ 12.46 hrs, Volume= 4,768 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Peak Elev= 122.93' @ 12.46 hrs Surf.Area= 9,127 sf Storage= 10,008 cf

Plug-Flow detention time= 159.7 min calculated for 26,523 cf (100% of inflow)
Center-of-Mass det. time= 159.7 min (988.7 - 829.0)

Volume	Invert	Avail.Storage	Storage Description
#1	121.50'	20,863 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
121.50	2,680	0	0
121.75	4,316	875	875
122.00	7,408	1,466	2,340
124.00	11,115	18,523	20,863

Device	Routing	Invert	Outlet Devices
#1	Primary	122.75'	**10.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	121.50'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.5 cfs @ 12.46 hrs HW=122.93' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.5 cfs)

Primary OutFlow Max=1.9 cfs @ 12.46 hrs HW=122.93' TW=0.00' (Dynamic Tailwater)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 1.9 cfs @ 1.07 fps)

Summary for Pond 6P: Recharge Trench

Inflow Area =	27,221 sf,	100.00% Impervious,	Inflow Depth =	6.05" for 25 Year event
Inflow =	3.9 cfs @	12.08 hrs, Volume=	13,727 cf	
Outflow =	3.9 cfs @	12.09 hrs, Volume=	13,727 cf, Atten= 0%, Lag= 0.1 min	
Discarded =	0.0 cfs @	5.51 hrs, Volume=	3,635 cf	
Primary =	2.6 cfs @	12.08 hrs, Volume=	9,609 cf	
Secondary =	1.2 cfs @	12.09 hrs, Volume=	483 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 120.52' @ 12.09 hrs Surf.Area= 720 sf Storage= 490 cf

Plug-Flow detention time= 38.8 min calculated for 13,724 cf (100% of inflow)
Center-of-Mass det. time= 38.9 min (783.3 - 744.5)

Volume	Invert	Avail.Storage	Storage Description
#1	115.50'	392 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 1,080 cf Overall - 101 cf Embedded = 979 cf x 40.0% Voids
#2	116.17'	94 cf	**6.0" Round Pipe Storage** Inside #1 L= 480.0' 101 cf Overall - 0.1" Wall Thickness = 94 cf
#3	117.00'	12 cf	**0.50'D x 10.00'H Vertical Cone/Cylinder** x 6 -Impervious
		498 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.50	720	0	0
117.00	720	1,080	1,080

Device	Routing	Invert	Outlet Devices
#1	Discarded	115.50'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	118.00'	**4.0" Horiz. Orifice/Grate X 4.00** C= 0.600 Limited to weir flow at low heads
#3	Secondary	120.00'	**4.0" Horiz. Orifice/Grate X 4.00** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 5.51 hrs HW=115.62' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=2.6 cfs @ 12.08 hrs HW=120.51' TW=118.11' (Dynamic Tailwater)
└**2=Orifice/Grate** (Orifice Controls 2.6 cfs @ 7.45 fps)

Secondary OutFlow Max=1.2 cfs @ 12.09 hrs HW=120.51' TW=0.00' (Dynamic Tailwater)
└**3=Orifice/Grate** (Orifice Controls 1.2 cfs @ 3.44 fps)

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PS1: Runoff Area=343,774 sf 1.74% Impervious Runoff Depth=2.51"
Flow Length=197' Tc=22.5 min CN=58 Runoff=14.3 cfs 71,956 cf

Subcatchment PS10: Runoff Area=78,810 sf 59.90% Impervious Runoff Depth=5.17"
Tc=6.0 min CN=83 Runoff=10.7 cfs 33,951 cf

Subcatchment PS11: Runoff Area=72,767 sf 37.18% Impervious Runoff Depth=4.72"
Tc=6.0 min CN=79 Runoff=9.2 cfs 28,633 cf

Subcatchment PS12: Runoff Area=45,344 sf 3.81% Impervious Runoff Depth=2.91"
Tc=6.0 min CN=62 Runoff=3.5 cfs 11,003 cf

Subcatchment PS13: Runoff Area=25,606 sf 30.26% Impervious Runoff Depth=3.96"
Tc=6.0 min CN=72 Runoff=2.7 cfs 8,444 cf

Subcatchment PS14: Runoff Area=22,124 sf 10.42% Impervious Runoff Depth=3.01"
Tc=6.0 min UI Adjusted CN=63 Runoff=1.8 cfs 5,556 cf

Subcatchment PS15: Runoff Area=21,777 sf 100.00% Impervious Runoff Depth=6.91"
Tc=6.0 min CN=98 Runoff=3.5 cfs 12,541 cf

Subcatchment PS16: Runoff Area=21,777 sf 100.00% Impervious Runoff Depth=6.91"
Tc=6.0 min CN=98 Runoff=3.5 cfs 12,541 cf

Subcatchment PS17: Runoff Area=27,221 sf 100.00% Impervious Runoff Depth=6.91"
Tc=6.0 min CN=98 Runoff=4.4 cfs 15,677 cf

Subcatchment PS2: Runoff Area=119,197 sf 5.18% Impervious Runoff Depth=2.61"
Flow Length=520' Tc=13.7 min UI Adjusted CN=59 Runoff=6.3 cfs 25,932 cf

Subcatchment PS2A: Runoff Area=52,258 sf 2.20% Impervious Runoff Depth=2.41"
Flow Length=180' Tc=11.2 min UI Adjusted CN=57 Runoff=2.7 cfs 10,511 cf

Subcatchment PS3: Runoff Area=97,067 sf 3.56% Impervious Runoff Depth=2.51"
Flow Length=785' Tc=16.3 min UI Adjusted CN=58 Runoff=4.6 cfs 20,317 cf

Subcatchment PS3A: Runoff Area=67,954 sf 3.39% Impervious Runoff Depth=2.41"
Flow Length=130' Tc=22.0 min UI Adjusted CN=57 Runoff=2.7 cfs 13,668 cf

Subcatchment PS4: Runoff Area=171,976 sf 9.20% Impervious Runoff Depth=2.81"
Flow Length=100' Tc=7.6 min UI Adjusted CN=61 Runoff=12.0 cfs 40,281 cf

Subcatchment PS5: Runoff Area=73,892 sf 3.12% Impervious Runoff Depth=2.51"
Flow Length=230' Tc=19.4 min CN=58 Runoff=3.3 cfs 15,466 cf

Subcatchment PS5A: Runoff Area=95,000 sf 1.21% Impervious Runoff Depth=2.32"
Flow Length=150' Tc=18.9 min UI Adjusted CN=56 Runoff=3.8 cfs 18,337 cf

Subcatchment PS6: Runoff Area=168,938 sf 15.67% Impervious Runoff Depth=3.01"
Flow Length=220' Tc=9.2 min UI Adjusted CN=63 Runoff=12.1 cfs 42,425 cf

Subcatchment PS7: Runoff Area=95,556 sf 32.02% Impervious Runoff Depth=4.06"
Tc=6.0 min CN=73 Runoff=10.5 cfs 32,369 cf

Subcatchment PS8: Runoff Area=39,073 sf 71.28% Impervious Runoff Depth=5.62"
Tc=6.0 min CN=87 Runoff=5.7 cfs 18,314 cf

Subcatchment PS9: Runoff Area=149,876 sf 53.46% Impervious Runoff Depth=4.94"
Tc=6.0 min CN=81 Runoff=19.7 cfs 61,758 cf

Reach DP1: Inflow=14.3 cfs 71,956 cf
Outflow=14.3 cfs 71,956 cf

Reach DP2: Inflow=14.5 cfs 87,507 cf
Outflow=14.5 cfs 87,507 cf

Reach DP2A: Inflow=6.4 cfs 16,741 cf
Outflow=6.4 cfs 16,741 cf

Reach DP3: Inflow=10.3 cfs 42,581 cf
Outflow=10.3 cfs 42,581 cf

Reach DP3A: Inflow=6.9 cfs 22,264 cf
Outflow=6.9 cfs 22,264 cf

Reach DP4: Inflow=12.2 cfs 95,857 cf
Outflow=12.2 cfs 95,857 cf

Reach DP5: Inflow=18.8 cfs 85,175 cf
Outflow=18.8 cfs 85,175 cf

Reach DP5A: Inflow=7.3 cfs 27,283 cf
Outflow=7.3 cfs 27,283 cf

Pond 1P: Detention Basin Peak Elev=109.00' Storage=19,845 cf Inflow=14.2 cfs 44,953 cf
Outflow=2.7 cfs 44,834 cf

Pond 2P: Infiltration Basin Peak Elev=109.67' Storage=7,536 cf Inflow=6.2 cfs 20,985 cf
Discarded=0.2 cfs 14,394 cf Primary=3.7 cfs 6,230 cf Outflow=3.9 cfs 20,624 cf

Pond 3P: Infiltration Basin Peak Elev=109.24' Storage=66,868 cf Inflow=38.0 cfs 121,246 cf
Discarded=0.5 cfs 38,017 cf Primary=3.8 cfs 55,576 cf Outflow=4.3 cfs 93,594 cf

Pond 4P: Infiltration Basin Peak Elev=118.15' Storage=3,385 cf Inflow=4.5 cfs 16,790 cf
Discarded=0.2 cfs 8,928 cf Primary=4.1 cfs 7,861 cf Outflow=4.3 cfs 16,790 cf

Pond 5P: Infiltration Basin Peak Elev=123.02' Storage=10,855 cf Inflow=10.5 cfs 32,369 cf
Discarded=0.5 cfs 23,422 cf Primary=3.6 cfs 8,946 cf Outflow=4.1 cfs 32,369 cf

Pond 6P: Recharge Trench Peak Elev=120.87' Storage=491 cf Inflow=4.4 cfs 15,677 cf
Discarded=0.0 cfs 3,708 cf Primary=2.8 cfs 11,234 cf Secondary=1.6 cfs 735 cf Outflow=4.4 cfs 15,677 cf

Total Runoff Area = 1,789,987 sf Runoff Volume = 499,678 cf Average Runoff Depth = 3.35"
79.88% Pervious = 1,429,771 sf 20.12% Impervious = 360,216 sf

Summary for Subcatchment PS1:

Runoff = 14.3 cfs @ 12.33 hrs, Volume= 71,956 cf, Depth= 2.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Description
202,359	55	Woods, Good, HSG B
135,428	61	>75% Grass cover, Good, HSG B
3,265	98	Unconnected pavement, HSG B
2,722	98	Unconnected roofs, HSG B
343,774	58	Weighted Average
337,787		98.26% Pervious Area
5,987		1.74% Impervious Area
5,987		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.7	147	0.0480	3.53		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
22.5	197	Total			

Summary for Subcatchment PS10:

Runoff = 10.7 cfs @ 12.09 hrs, Volume= 33,951 cf, Depth= 5.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Description
43,871	98	Paved roads w/curbs & sewers, HSG B
31,599	61	>75% Grass cover, Good, HSG B
3,340	98	Unconnected pavement, HSG B
78,810	83	Weighted Average
31,599		40.10% Pervious Area
47,211		59.90% Impervious Area
3,340		7.07% Unconnected

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

Summary for Subcatchment PS11:

Runoff = 9.2 cfs @ 12.09 hrs, Volume= 28,633 cf, Depth= 4.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Description
13,154	55	Woods, Good, HSG B
21,827	61	>75% Grass cover, Good, HSG B
10,719	98	Paved roads w/curbs & sewers, HSG B
16,333	98	Roofs, HSG B
10,734	96	Gravel surface, HSG B
72,767	79	Weighted Average
45,715		62.82% Pervious Area
27,052		37.18% Impervious Area

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

Summary for Subcatchment PS12:

Runoff = 3.5 cfs @ 12.09 hrs, Volume= 11,003 cf, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Description
43,615	61	>75% Grass cover, Good, HSG B
1,729	98	Unconnected pavement, HSG B
45,344	62	Weighted Average
43,615		96.19% Pervious Area
1,729		3.81% Impervious Area
1,729		100.00% Unconnected

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

Summary for Subcatchment PS13:

Runoff = 2.7 cfs @ 12.09 hrs, Volume= 8,444 cf, Depth= 3.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Description
17,857	61	>75% Grass cover, Good, HSG B
5,444	98	Roofs, HSG B
2,305	98	Unconnected pavement, HSG B
25,606	72	Weighted Average
17,857		69.74% Pervious Area
7,749		30.26% Impervious Area
2,305		29.75% Unconnected

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

Summary for Subcatchment PS14:

Runoff = 1.8 cfs @ 12.09 hrs, Volume= 5,556 cf, Depth= 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Adj	Description
19,819	61		>75% Grass cover, Good, HSG B
2,305	98		Unconnected pavement, HSG B
22,124	65	63	Weighted Average, UI Adjusted
19,819			89.58% Pervious Area
2,305			10.42% Impervious Area
2,305			100.00% Unconnected

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

Summary for Subcatchment PS15:

Runoff = 3.5 cfs @ 12.08 hrs, Volume= 12,541 cf, Depth= 6.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Description
21,777	98	Roofs, HSG B
21,777		100.00% Impervious Area

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

Summary for Subcatchment PS16:

Runoff = 3.5 cfs @ 12.08 hrs, Volume= 12,541 cf, Depth= 6.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Description
21,777	98	Roofs, HSG B
21,777		100.00% Impervious Area

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

Summary for Subcatchment PS17:

Runoff = 4.4 cfs @ 12.08 hrs, Volume= 15,677 cf, Depth= 6.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Description
27,221	98	Roofs, HSG B
27,221		100.00% Impervious Area

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

Summary for Subcatchment PS2:

Runoff = 6.3 cfs @ 12.20 hrs, Volume= 25,932 cf, Depth= 2.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Adj	Description
61,041	55		Woods, Good, HSG B
51,977	61		>75% Grass cover, Good, HSG B
3,457	98		Unconnected pavement, HSG B
2,722	98		Unconnected roofs, HSG B
119,197	60	59	Weighted Average, UI Adjusted
113,018			94.82% Pervious Area
6,179			5.18% Impervious Area
6,179			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.1000	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
2.2	470	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.7	520	Total			

Summary for Subcatchment PS2A:

Runoff = 2.7 cfs @ 12.16 hrs, Volume= 10,511 cf, Depth= 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Adj	Description
35,762	55		Woods, Good, HSG B
15,344	61		>75% Grass cover, Good, HSG B
1,152	98		Unconnected pavement, HSG B
52,258	58	57	Weighted Average, UI Adjusted
51,106			97.80% Pervious Area
1,152			2.20% Impervious Area
1,152			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.1200	0.08		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.5	130	0.0850	4.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.2	180	Total			

Summary for Subcatchment PS3:

Runoff = 4.6 cfs @ 12.23 hrs, Volume= 20,317 cf, Depth= 2.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Adj	Description
50,666	55		Woods, Good, HSG B
42,944	61		>75% Grass cover, Good, HSG B
3,457	98		Unconnected pavement, HSG B
97,067	59	58	Weighted Average, UI Adjusted
93,610			96.44% Pervious Area
3,457			3.56% Impervious Area
3,457			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.1000	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
4.8	735	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.3	785	Total			

Summary for Subcatchment PS3A:

Runoff = 2.7 cfs @ 12.33 hrs, Volume= 13,668 cf, Depth= 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Adj	Description
53,432	55		Woods, Good, HSG B
12,217	61		>75% Grass cover, Good, HSG B
2,305	98		Unconnected pavement, HSG B
67,954	58	57	Weighted Average, UI Adjusted
65,649			96.61% Pervious Area
2,305			3.39% Impervious Area
2,305			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.2	80	0.1250	5.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
22.0	130	Total			

Summary for Subcatchment PS4:

Runoff = 12.0 cfs @ 12.11 hrs, Volume= 40,281 cf, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Adj	Description
48,637	55		Woods, Good, HSG B
107,523	61		>75% Grass cover, Good, HSG B
10,372	98		Unconnected pavement, HSG B
5,444	98		Unconnected roofs, HSG B
171,976	63	61	Weighted Average, UI Adjusted
156,160			90.80% Pervious Area
15,816			9.20% Impervious Area
15,816			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.1	50	0.2400	7.89		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.6	100	Total			

Summary for Subcatchment PS5:

Runoff = 3.3 cfs @ 12.29 hrs, Volume= 15,466 cf, Depth= 2.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Description
48,067	55	Woods, Good, HSG B
23,521	61	>75% Grass cover, Good, HSG B
2,304	98	Unconnected pavement, HSG B
73,892	58	Weighted Average
71,588		96.88% Pervious Area
2,304		3.12% Impervious Area
2,304		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	50	0.0300	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.8	180	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
19.4	230	Total			

Summary for Subcatchment PS5A:

Runoff = 3.8 cfs @ 12.28 hrs, Volume= 18,337 cf, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Adj	Description
77,272	55		Woods, Good, HSG B
16,576	61		>75% Grass cover, Good, HSG B
1,152	98		Unconnected pavement, HSG B
95,000	57	56	Weighted Average, UI Adjusted
93,848			98.79% Pervious Area
1,152			1.21% Impervious Area
1,152			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	50	0.0300	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.3	100	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
18.9	150	Total			

Summary for Subcatchment PS6:

Runoff = 12.1 cfs @ 12.13 hrs, Volume= 42,425 cf, Depth= 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Adj	Description
67,828	55		Woods, Good, HSG B
74,644	61		>75% Grass cover, Good, HSG B
11,625	98		Unconnected pavement, HSG B
13,498	98		Roofs, HSG B
1,343	98		Paved roads w/curbs & sewers, HSG B
168,938	64	63	Weighted Average, UI Adjusted
142,472			84.33% Pervious Area
26,466			15.67% Impervious Area
11,625			43.92% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	170	0.1120	5.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.2	220	Total			

Summary for Subcatchment PS7:

Runoff = 10.5 cfs @ 12.09 hrs, Volume= 32,369 cf, Depth= 4.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Description
64,959	61	>75% Grass cover, Good, HSG B
10,888	98	Roofs, HSG B
7,062	98	Unconnected pavement, HSG B
12,647	98	Paved roads w/curbs & sewers, HSG B
95,556	73	Weighted Average
64,959		67.98% Pervious Area
30,597		32.02% Impervious Area
7,062		23.08% Unconnected

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

Summary for Subcatchment PS8:

Runoff = 5.7 cfs @ 12.08 hrs, Volume= 18,314 cf, Depth= 5.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Description
25,064	98	Paved roads w/curbs & sewers, HSG B
2,787	98	Unconnected pavement, HSG B
11,222	61	>75% Grass cover, Good, HSG B
39,073	87	Weighted Average
11,222		28.72% Pervious Area
27,851		71.28% Impervious Area
2,787		10.01% Unconnected

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

Summary for Subcatchment PS9:

Runoff = 19.7 cfs @ 12.09 hrs, Volume= 61,758 cf, Depth= 4.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 Year Rainfall=7.15"

Area (sf)	CN	Description
22,164	98	Paved roads w/curbs & sewers, HSG B
69,747	61	>75% Grass cover, Good, HSG B
3,523	98	Unconnected pavement, HSG B
54,442	98	Roofs, HSG B
149,876	81	Weighted Average
69,747		46.54% Pervious Area
80,129		53.46% Impervious Area
3,523		4.40% Unconnected

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

Summary for Reach DP1:

Inflow Area = 343,774 sf, 1.74% Impervious, Inflow Depth = 2.51" for 50 Year event
Inflow = 14.3 cfs @ 12.33 hrs, Volume= 71,956 cf
Outflow = 14.3 cfs @ 12.33 hrs, Volume= 71,956 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2:

Inflow Area = 342,992 sf, 25.01% Impervious, Inflow Depth > 3.06" for 50 Year event
Inflow = 14.5 cfs @ 12.19 hrs, Volume= 87,507 cf
Outflow = 14.5 cfs @ 12.19 hrs, Volume= 87,507 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2A:

Inflow Area = 99,641 sf, 30.79% Impervious, Inflow Depth = 2.02" for 50 Year event
Inflow = 6.4 cfs @ 12.18 hrs, Volume= 16,741 cf
Outflow = 6.4 cfs @ 12.18 hrs, Volume= 16,741 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP3:

Inflow Area = 214,366 sf, 16.46% Impervious, Inflow Depth = 2.38" for 50 Year event
Inflow = 10.3 cfs @ 12.15 hrs, Volume= 42,581 cf
Outflow = 10.3 cfs @ 12.15 hrs, Volume= 42,581 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP3A:

Inflow Area = 117,299 sf, 27.14% Impervious, Inflow Depth = 2.28" for 50 Year event
Inflow = 6.9 cfs @ 12.11 hrs, Volume= 22,264 cf
Outflow = 6.9 cfs @ 12.11 hrs, Volume= 22,264 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP4:

Inflow Area = 455,469 sf, 37.90% Impervious, Inflow Depth = 2.53" for 50 Year event
Inflow = 12.2 cfs @ 12.12 hrs, Volume= 95,857 cf
Outflow = 12.2 cfs @ 12.12 hrs, Volume= 95,857 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP5:

Inflow Area = 433,386 sf, 13.96% Impervious, Inflow Depth = 2.36" for 50 Year event
Inflow = 18.8 cfs @ 12.20 hrs, Volume= 85,175 cf
Outflow = 18.8 cfs @ 12.20 hrs, Volume= 85,175 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP5A:

Inflow Area = 190,556 sf, 16.66% Impervious, Inflow Depth = 1.72" for 50 Year event
Inflow = 7.3 cfs @ 12.31 hrs, Volume= 27,283 cf
Outflow = 7.3 cfs @ 12.31 hrs, Volume= 27,283 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Detention Basin

Inflow Area = 124,154 sf, 39.42% Impervious, Inflow Depth = 4.34" for 50 Year event
Inflow = 14.2 cfs @ 12.09 hrs, Volume= 44,953 cf
Outflow = 2.7 cfs @ 12.54 hrs, Volume= 44,834 cf, Atten= 81%, Lag= 27.4 min
Primary = 2.7 cfs @ 12.54 hrs, Volume= 44,834 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 109.00' @ 12.54 hrs Surf.Area= 6,712 sf Storage= 19,845 cf

Plug-Flow detention time= 172.2 min calculated for 44,834 cf (100% of inflow)
Center-of-Mass det. time= 170.6 min (982.0 - 811.4)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	26,987 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
105.00	2,562	0	0
106.00	4,302	3,432	3,432
108.00	5,832	10,134	13,566
110.00	7,589	13,421	26,987

Device	Routing	Invert	Outlet Devices
#1	Primary	98.00'	**12.0" Round Culvert** L= 40.0' Ke= 0.500 Inlet / Outlet Invert= 98.00' / 96.00' S= 0.0500 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	105.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	106.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	107.60'	**10.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	108.90'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=2.7 cfs @ 12.54 hrs HW=109.00' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 2.7 cfs of 12.3 cfs potential flow)
  └**2=Orifice/Grate** (Orifice Controls 0.5 cfs @ 9.48 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.7 cfs @ 8.11 fps)
  └**4=Orifice/Grate** (Orifice Controls 1.1 cfs @ 5.44 fps)
  └**5=Broad-Crested Rectangular Weir** (Weir Controls 0.4 cfs @ 0.89 fps)

Summary for Pond 2P: Infiltration Basin

Inflow Area = 47,383 sf, 62.31% Impervious, Inflow Depth = 5.31" for 50 Year event
Inflow = 6.2 cfs @ 12.09 hrs, Volume= 20,985 cf
Outflow = 3.9 cfs @ 12.18 hrs, Volume= 20,624 cf, Atten= 37%, Lag= 5.9 min
Discarded = 0.2 cfs @ 12.18 hrs, Volume= 14,394 cf
Primary = 3.7 cfs @ 12.18 hrs, Volume= 6,230 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 109.67' @ 12.18 hrs Surf.Area= 3,693 sf Storage= 7,536 cf

Plug-Flow detention time= 298.0 min calculated for 20,618 cf (98% of inflow)
Center-of-Mass det. time= 287.2 min (1,063.1 - 776.0)

Volume	Invert	Avail.Storage	Storage Description
#1	106.00'	8,799 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
106.00	781	0	0	781
108.00	2,086	2,762	2,762	2,112
110.00	4,059	6,037	8,799	4,123

Device	Routing	Invert	Outlet Devices
#1	Primary	109.50'	**20.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	106.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.2 cfs @ 12.18 hrs HW=109.67' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.2 cfs)

Primary OutFlow Max=3.7 cfs @ 12.18 hrs HW=109.67' TW=0.00' (Dynamic Tailwater)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 3.7 cfs @ 1.06 fps)

Summary for Pond 3P: Infiltration Basin

Inflow Area = 283,493 sf, 55.31% Impervious, Inflow Depth = 5.13" for 50 Year event
Inflow = 38.0 cfs @ 12.09 hrs, Volume= 121,246 cf
Outflow = 4.3 cfs @ 12.79 hrs, Volume= 93,594 cf, Atten= 89%, Lag= 42.3 min
Discarded = 0.5 cfs @ 12.79 hrs, Volume= 38,017 cf
Primary = 3.8 cfs @ 12.79 hrs, Volume= 55,576 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 109.24' @ 12.79 hrs Surf.Area= 20,558 sf Storage= 66,868 cf

Plug-Flow detention time= 406.7 min calculated for 93,568 cf (77% of inflow)
Center-of-Mass det. time= 324.9 min (1,121.9 - 797.0)

Volume	Invert	Avail.Storage	Storage Description
#1	104.00'	83,598 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
104.00	8,168	0	0	8,168
105.00	9,203	8,680	8,680	9,254
106.00	10,294	9,743	18,424	10,400
108.00	15,794	25,893	44,316	15,959
110.00	23,758	39,282	83,598	23,984

Device	Routing	Invert	Outlet Devices
#1	Primary	106.50'	**12.0" Round Culvert** L= 34.0' Ke= 0.600 Inlet / Outlet Invert= 106.50' / 106.00' S= 0.0147 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 1	107.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	108.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	109.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	109.50'	**20.0' long x 4.0' 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#6	Discarded	104.00'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.5 cfs @ 12.79 hrs HW=109.24' (Free Discharge)
└**6=Exfiltration** (Exfiltration Controls 0.5 cfs)

Primary OutFlow Max=3.8 cfs @ 12.79 hrs HW=109.24' TW=0.00' (Dynamic Tailwater)
├**1=Culvert** (Passes 3.8 cfs of 5.3 cfs potential flow)
│ ├**2=Orifice/Grate** (Orifice Controls 0.3 cfs @ 7.01 fps)
│ ├**3=Orifice/Grate** (Orifice Controls 0.9 cfs @ 4.80 fps)
│ └**4=Orifice/Grate** (Weir Controls 2.5 cfs @ 1.62 fps)
└**5=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 4P: Infiltration Basin

Inflow Area = 49,345 sf, 59.84% Impervious, Inflow Depth = 4.08" for 50 Year event
Inflow = 4.5 cfs @ 12.09 hrs, Volume= 16,790 cf
Outflow = 4.3 cfs @ 12.12 hrs, Volume= 16,790 cf, Atten= 4%, Lag= 1.8 min
Discarded = 0.2 cfs @ 12.12 hrs, Volume= 8,928 cf
Primary = 4.1 cfs @ 12.12 hrs, Volume= 7,861 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 118.15' @ 12.12 hrs Surf.Area= 4,219 sf Storage= 3,385 cf

Plug-Flow detention time= 74.6 min calculated for 16,785 cf (100% of inflow)
Center-of-Mass det. time= 74.5 min (855.5 - 781.0)

Volume	Invert	Avail.Storage	Storage Description
#1	117.00'	4,951 cf	**Custom Stage Data (Conic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
117.00	1,691	0	0	1,691
118.00	4,012	2,769	2,769	4,019
118.50	4,726	2,182	4,951	4,743

Device	Routing	Invert	Outlet Devices
#1	Primary	117.90'	**10.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#2	Primary	118.10'	**25.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#3	Discarded	117.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.2 cfs @ 12.12 hrs HW=118.15' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.2 cfs)

Primary OutFlow Max=4.1 cfs @ 12.12 hrs HW=118.15' TW=0.00' (Dynamic Tailwater)
├**1=Broad-Crested Rectangular Weir** (Weir Controls 3.4 cfs @ 1.35 fps)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 0.7 cfs @ 0.60 fps)

Summary for Pond 5P: Infiltration Basin

Inflow Area = 95,556 sf, 32.02% Impervious, Inflow Depth = 4.06" for 50 Year event
Inflow = 10.5 cfs @ 12.09 hrs, Volume= 32,369 cf
Outflow = 4.1 cfs @ 12.34 hrs, Volume= 32,369 cf, Atten= 61%, Lag= 15.2 min
Discarded = 0.5 cfs @ 12.34 hrs, Volume= 23,422 cf
Primary = 3.6 cfs @ 12.34 hrs, Volume= 8,946 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Peak Elev= 123.02' @ 12.34 hrs Surf.Area= 9,297 sf Storage= 10,855 cf

Plug-Flow detention time= 144.8 min calculated for 32,369 cf (100% of inflow)
Center-of-Mass det. time= 144.8 min (968.1 - 823.3)

Volume	Invert	Avail.Storage	Storage Description
#1	121.50'	20,863 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
121.50	2,680	0	0
121.75	4,316	875	875
122.00	7,408	1,466	2,340
124.00	11,115	18,523	20,863

Device	Routing	Invert	Outlet Devices
#1	Primary	122.75'	**10.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	121.50'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.5 cfs @ 12.34 hrs HW=123.02' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.5 cfs)

Primary OutFlow Max=3.6 cfs @ 12.34 hrs HW=123.02' TW=0.00' (Dynamic Tailwater)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 3.6 cfs @ 1.33 fps)

Summary for Pond 6P: Recharge Trench

Inflow Area = 27,221 sf,100.00% Impervious, Inflow Depth = 6.91" for 50 Year event
Inflow = 4.4 cfs @ 12.08 hrs, Volume= 15,677 cf
Outflow = 4.4 cfs @ 12.08 hrs, Volume= 15,677 cf, Atten= 0%, Lag= 0.1 min
Discarded = 0.0 cfs @ 4.66 hrs, Volume= 3,708 cf
Primary = 2.8 cfs @ 12.08 hrs, Volume= 11,234 cf
Secondary = 1.6 cfs @ 12.08 hrs, Volume= 735 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 120.87' @ 12.08 hrs Surf.Area= 720 sf Storage= 491 cf

Plug-Flow detention time= 35.6 min calculated for 15,677 cf (100% of inflow)
Center-of-Mass det. time= 35.6 min (778.3 - 742.7)

Volume	Invert	Avail.Storage	Storage Description
#1	115.50'	392 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 1,080 cf Overall - 101 cf Embedded = 979 cf x 40.0% Voids
#2	116.17'	94 cf	**6.0" Round Pipe Storage** Inside #1 L= 480.0' 101 cf Overall - 0.1" Wall Thickness = 94 cf
#3	117.00'	12 cf	**0.50'D x 10.00'H Vertical Cone/Cylinder** x 6 -Impervious
		498 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.50	720	0	0
117.00	720	1,080	1,080

Device	Routing	Invert	Outlet Devices
#1	Discarded	115.50'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	118.00'	**4.0" Horiz. Orifice/Grate X 4.00** C= 0.600 Limited to weir flow at low heads
#3	Secondary	120.00'	**4.0" Horiz. Orifice/Grate X 4.00** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 4.66 hrs HW=115.62' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=2.8 cfs @ 12.08 hrs HW=120.86' TW=118.14' (Dynamic Tailwater)
└**2=Orifice/Grate** (Orifice Controls 2.8 cfs @ 7.94 fps)

Secondary OutFlow Max=1.6 cfs @ 12.08 hrs HW=120.86' TW=0.00' (Dynamic Tailwater)
└**3=Orifice/Grate** (Orifice Controls 1.6 cfs @ 4.47 fps)

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PS1: Runoff Area=343,774 sf 1.74% Impervious Runoff Depth=3.18"
Flow Length=197' Tc=22.5 min CN=58 Runoff=18.4 cfs 91,235 cf

Subcatchment PS10: Runoff Area=78,810 sf 59.90% Impervious Runoff Depth=6.07"
Tc=6.0 min CN=83 Runoff=12.5 cfs 39,884 cf

Subcatchment PS11: Runoff Area=72,767 sf 37.18% Impervious Runoff Depth=5.60"
Tc=6.0 min CN=79 Runoff=10.8 cfs 33,965 cf

Subcatchment PS12: Runoff Area=45,344 sf 3.81% Impervious Runoff Depth=3.63"
Tc=6.0 min CN=62 Runoff=4.4 cfs 13,732 cf

Subcatchment PS13: Runoff Area=25,606 sf 30.26% Impervious Runoff Depth=4.78"
Tc=6.0 min CN=72 Runoff=3.3 cfs 10,205 cf

Subcatchment PS14: Runoff Area=22,124 sf 10.42% Impervious Runoff Depth=3.75"
Tc=6.0 min UI Adjusted CN=63 Runoff=2.2 cfs 6,909 cf

Subcatchment PS15: Runoff Area=21,777 sf 100.00% Impervious Runoff Depth=7.86"
Tc=6.0 min CN=98 Runoff=4.0 cfs 14,264 cf

Subcatchment PS16: Runoff Area=21,777 sf 100.00% Impervious Runoff Depth=7.86"
Tc=6.0 min CN=98 Runoff=4.0 cfs 14,264 cf

Subcatchment PS17: Runoff Area=27,221 sf 100.00% Impervious Runoff Depth=7.86"
Tc=6.0 min CN=98 Runoff=5.0 cfs 17,830 cf

Subcatchment PS2: Runoff Area=119,197 sf 5.18% Impervious Runoff Depth=3.30"
Flow Length=520' Tc=13.7 min UI Adjusted CN=59 Runoff=8.1 cfs 32,743 cf

Subcatchment PS2A: Runoff Area=52,258 sf 2.20% Impervious Runoff Depth=3.07"
Flow Length=180' Tc=11.2 min UI Adjusted CN=57 Runoff=3.5 cfs 13,385 cf

Subcatchment PS3: Runoff Area=97,067 sf 3.56% Impervious Runoff Depth=3.18"
Flow Length=785' Tc=16.3 min UI Adjusted CN=58 Runoff=5.9 cfs 25,761 cf

Subcatchment PS3A: Runoff Area=67,954 sf 3.39% Impervious Runoff Depth=3.07"
Flow Length=130' Tc=22.0 min UI Adjusted CN=57 Runoff=3.5 cfs 17,405 cf

Subcatchment PS4: Runoff Area=171,976 sf 9.20% Impervious Runoff Depth=3.52"
Flow Length=100' Tc=7.6 min UI Adjusted CN=61 Runoff=15.2 cfs 50,462 cf

Subcatchment PS5: Runoff Area=73,892 sf 3.12% Impervious Runoff Depth=3.18"
Flow Length=230' Tc=19.4 min CN=58 Runoff=4.2 cfs 19,610 cf

Subcatchment PS5A: Runoff Area=95,000 sf 1.21% Impervious Runoff Depth=2.96"
Flow Length=150' Tc=18.9 min UI Adjusted CN=56 Runoff=5.0 cfs 23,456 cf

Subcatchment PS6: Runoff Area=168,938 sf 15.67% Impervious Runoff Depth=3.75"
Flow Length=220' Tc=9.2 min UI Adjusted CN=63 Runoff=15.2 cfs 52,757 cf

Subcatchment PS7: Runoff Area=95,556 sf 32.02% Impervious Runoff Depth=4.90"
Tc=6.0 min CN=73 Runoff=12.6 cfs 39,008 cf

Subcatchment PS8: Runoff Area=39,073 sf 71.28% Impervious Runoff Depth=6.55"
Tc=6.0 min CN=87 Runoff=6.6 cfs 21,318 cf

Subcatchment PS9: Runoff Area=149,876 sf 53.46% Impervious Runoff Depth=5.84"
Tc=6.0 min CN=81 Runoff=23.1 cfs 72,898 cf

Reach DP1: Inflow=18.4 cfs 91,235 cf
Outflow=18.4 cfs 91,235 cf

Reach DP2: Inflow=19.1 cfs 108,682 cf
Outflow=19.1 cfs 108,682 cf

Reach DP2A: Inflow=9.4 cfs 22,447 cf
Outflow=9.4 cfs 22,447 cf

Reach DP3: Inflow=12.9 cfs 54,353 cf
Outflow=12.9 cfs 54,353 cf

Reach DP3A: Inflow=8.4 cfs 28,592 cf
Outflow=8.4 cfs 28,592 cf

Reach DP4: Inflow=16.0 cfs 125,817 cf
Outflow=16.0 cfs 125,817 cf

Reach DP5: Inflow=26.9 cfs 109,719 cf
Outflow=26.9 cfs 109,719 cf

Reach DP5A: Inflow=10.8 cfs 37,351 cf
Outflow=10.8 cfs 37,351 cf

Pond 1P: Detention Basin Peak Elev=109.29' Storage=21,824 cf Inflow=16.9 cfs 53,616 cf
Outflow=5.3 cfs 53,492 cf

Pond 2P: Infiltration Basin Peak Elev=109.74' Storage=7,780 cf Inflow=7.3 cfs 24,469 cf
Discarded=0.2 cfs 14,929 cf Primary=6.0 cfs 9,063 cf Outflow=6.2 cfs 23,992 cf

Pond 3P: Infiltration Basin Peak Elev=109.60' Storage=74,483 cf Inflow=44.4 cfs 142,445 cf
Discarded=0.5 cfs 39,017 cf Primary=7.3 cfs 75,356 cf Outflow=7.8 cfs 114,373 cf

Pond 4P: Infiltration Basin Peak Elev=118.16' Storage=3,449 cf Inflow=5.2 cfs 19,946 cf
Discarded=0.2 cfs 9,794 cf Primary=4.8 cfs 10,152 cf Outflow=5.0 cfs 19,946 cf

Pond 5P: Infiltration Basin Peak Elev=123.12' Storage=11,794 cf Inflow=12.6 cfs 39,008 cf
Discarded=0.5 cfs 25,112 cf Primary=5.8 cfs 13,896 cf Outflow=6.4 cfs 39,008 cf

Pond 6P: Recharge Trench Peak Elev=121.33' Storage=491 cf Inflow=5.0 cfs 17,830 cf
Discarded=0.0 cfs 3,758 cf Primary=3.0 cfs 13,037 cf Secondary=1.9 cfs 1,035 cf Outflow=5.0 cfs 17,830 cf

Total Runoff Area = 1,789,987 sf Runoff Volume = 611,090 cf Average Runoff Depth = 4.10"
79.88% Pervious = 1,429,771 sf 20.12% Impervious = 360,216 sf

Summary for Subcatchment PS1:

Runoff = 18.4 cfs @ 12.33 hrs, Volume= 91,235 cf, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Description
202,359	55	Woods, Good, HSG B
135,428	61	>75% Grass cover, Good, HSG B
3,265	98	Unconnected pavement, HSG B
2,722	98	Unconnected roofs, HSG B
343,774	58	Weighted Average
337,787		98.26% Pervious Area
5,987		1.74% Impervious Area
5,987		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.7	147	0.0480	3.53		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
22.5	197	Total			

Summary for Subcatchment PS10:

Runoff = 12.5 cfs @ 12.09 hrs, Volume= 39,884 cf, Depth= 6.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Description
43,871	98	Paved roads w/curbs & sewers, HSG B
31,599	61	>75% Grass cover, Good, HSG B
3,340	98	Unconnected pavement, HSG B
78,810	83	Weighted Average
31,599		40.10% Pervious Area
47,211		59.90% Impervious Area
3,340		7.07% Unconnected

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

Summary for Subcatchment PS11:

Runoff = 10.8 cfs @ 12.09 hrs, Volume= 33,965 cf, Depth= 5.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Description
13,154	55	Woods, Good, HSG B
21,827	61	>75% Grass cover, Good, HSG B
10,719	98	Paved roads w/curbs & sewers, HSG B
16,333	98	Roofs, HSG B
10,734	96	Gravel surface, HSG B
72,767	79	Weighted Average
45,715		62.82% Pervious Area
27,052		37.18% Impervious Area

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

Summary for Subcatchment PS12:

Runoff = 4.4 cfs @ 12.09 hrs, Volume= 13,732 cf, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Description
43,615	61	>75% Grass cover, Good, HSG B
1,729	98	Unconnected pavement, HSG B
45,344	62	Weighted Average
43,615		96.19% Pervious Area
1,729		3.81% Impervious Area
1,729		100.00% Unconnected

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

Summary for Subcatchment PS13:

Runoff = 3.3 cfs @ 12.09 hrs, Volume= 10,205 cf, Depth= 4.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Description
17,857	61	>75% Grass cover, Good, HSG B
5,444	98	Roofs, HSG B
2,305	98	Unconnected pavement, HSG B
25,606	72	Weighted Average
17,857		69.74% Pervious Area
7,749		30.26% Impervious Area
2,305		29.75% Unconnected

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

Summary for Subcatchment PS14:

Runoff = 2.2 cfs @ 12.09 hrs, Volume= 6,909 cf, Depth= 3.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Adj	Description
19,819	61		>75% Grass cover, Good, HSG B
2,305	98		Unconnected pavement, HSG B
22,124	65	63	Weighted Average, UI Adjusted
19,819			89.58% Pervious Area
2,305			10.42% Impervious Area
2,305			100.00% Unconnected

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

Summary for Subcatchment PS15:

Runoff = 4.0 cfs @ 12.08 hrs, Volume= 14,264 cf, Depth= 7.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Description
21,777	98	Roofs, HSG B
21,777		100.00% Impervious Area

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

Summary for Subcatchment PS16:

Runoff = 4.0 cfs @ 12.08 hrs, Volume= 14,264 cf, Depth= 7.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Description
21,777	98	Roofs, HSG B
21,777		100.00% Impervious Area

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

Summary for Subcatchment PS17:

Runoff = 5.0 cfs @ 12.08 hrs, Volume= 17,830 cf, Depth= 7.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Description
27,221	98	Roofs, HSG B
27,221		100.00% Impervious Area

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

Summary for Subcatchment PS2:

Runoff = 8.1 cfs @ 12.19 hrs, Volume= 32,743 cf, Depth= 3.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Adj	Description
61,041	55		Woods, Good, HSG B
51,977	61		>75% Grass cover, Good, HSG B
3,457	98		Unconnected pavement, HSG B
2,722	98		Unconnected roofs, HSG B
119,197	60	59	Weighted Average, UI Adjusted
113,018			94.82% Pervious Area
6,179			5.18% Impervious Area
6,179			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.1000	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
2.2	470	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.7	520	Total			

Summary for Subcatchment PS2A:

Runoff = 3.5 cfs @ 12.16 hrs, Volume= 13,385 cf, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Adj	Description
35,762	55		Woods, Good, HSG B
15,344	61		>75% Grass cover, Good, HSG B
1,152	98		Unconnected pavement, HSG B
52,258	58	57	Weighted Average, UI Adjusted
51,106			97.80% Pervious Area
1,152			2.20% Impervious Area
1,152			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.1200	0.08		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.5	130	0.0850	4.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.2	180	Total			

Summary for Subcatchment PS3:

Runoff = 5.9 cfs @ 12.23 hrs, Volume= 25,761 cf, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Adj	Description
50,666	55		Woods, Good, HSG B
42,944	61		>75% Grass cover, Good, HSG B
3,457	98		Unconnected pavement, HSG B
97,067	59	58	Weighted Average, UI Adjusted
93,610			96.44% Pervious Area
3,457			3.56% Impervious Area
3,457			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.1000	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
4.8	735	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.3	785	Total			

Summary for Subcatchment PS3A:

Runoff = 3.5 cfs @ 12.32 hrs, Volume= 17,405 cf, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Adj	Description
53,432	55		Woods, Good, HSG B
12,217	61		>75% Grass cover, Good, HSG B
2,305	98		Unconnected pavement, HSG B
67,954	58	57	Weighted Average, UI Adjusted
65,649			96.61% Pervious Area
2,305			3.39% Impervious Area
2,305			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.2	80	0.1250	5.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
22.0	130	Total			

Summary for Subcatchment PS4:

Runoff = 15.2 cfs @ 12.11 hrs, Volume= 50,462 cf, Depth= 3.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Adj	Description
48,637	55		Woods, Good, HSG B
107,523	61		>75% Grass cover, Good, HSG B
10,372	98		Unconnected pavement, HSG B
5,444	98		Unconnected roofs, HSG B
171,976	63	61	Weighted Average, UI Adjusted
156,160			90.80% Pervious Area
15,816			9.20% Impervious Area
15,816			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.1	50	0.2400	7.89		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.6	100	Total			

Summary for Subcatchment PS5:

Runoff = 4.2 cfs @ 12.27 hrs, Volume= 19,610 cf, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Description
48,067	55	Woods, Good, HSG B
23,521	61	>75% Grass cover, Good, HSG B
2,304	98	Unconnected pavement, HSG B
73,892	58	Weighted Average
71,588		96.88% Pervious Area
2,304		3.12% Impervious Area
2,304		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	50	0.0300	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.8	180	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
19.4	230	Total			

Summary for Subcatchment PS5A:

Runoff = 5.0 cfs @ 12.28 hrs, Volume= 23,456 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Adj	Description
77,272	55		Woods, Good, HSG B
16,576	61		>75% Grass cover, Good, HSG B
1,152	98		Unconnected pavement, HSG B
95,000	57	56	Weighted Average, UI Adjusted
93,848			98.79% Pervious Area
1,152			1.21% Impervious Area
1,152			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	50	0.0300	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.3	100	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
18.9	150	Total			

Summary for Subcatchment PS6:

Runoff = 15.2 cfs @ 12.13 hrs, Volume= 52,757 cf, Depth= 3.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Adj	Description
67,828	55		Woods, Good, HSG B
74,644	61		>75% Grass cover, Good, HSG B
11,625	98		Unconnected pavement, HSG B
13,498	98		Roofs, HSG B
1,343	98		Paved roads w/curbs & sewers, HSG B
168,938	64	63	Weighted Average, UI Adjusted
142,472			84.33% Pervious Area
26,466			15.67% Impervious Area
11,625			43.92% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	170	0.1120	5.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.2	220	Total			

Summary for Subcatchment PS7:

Runoff = 12.6 cfs @ 12.09 hrs, Volume= 39,008 cf, Depth= 4.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Description
64,959	61	>75% Grass cover, Good, HSG B
10,888	98	Roofs, HSG B
7,062	98	Unconnected pavement, HSG B
12,647	98	Paved roads w/curbs & sewers, HSG B
95,556	73	Weighted Average
64,959		67.98% Pervious Area
30,597		32.02% Impervious Area
7,062		23.08% Unconnected

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

Summary for Subcatchment PS8:

Runoff = 6.6 cfs @ 12.08 hrs, Volume= 21,318 cf, Depth= 6.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Description
25,064	98	Paved roads w/curbs & sewers, HSG B
2,787	98	Unconnected pavement, HSG B
11,222	61	>75% Grass cover, Good, HSG B
39,073	87	Weighted Average
11,222		28.72% Pervious Area
27,851		71.28% Impervious Area
2,787		10.01% Unconnected

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

Summary for Subcatchment PS9:

Runoff = 23.1 cfs @ 12.09 hrs, Volume= 72,898 cf, Depth= 5.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.10"

Area (sf)	CN	Description
22,164	98	Paved roads w/curbs & sewers, HSG B
69,747	61	>75% Grass cover, Good, HSG B
3,523	98	Unconnected pavement, HSG B
54,442	98	Roofs, HSG B
149,876	81	Weighted Average
69,747		46.54% Pervious Area
80,129		53.46% Impervious Area
3,523		4.40% Unconnected

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

Summary for Reach DP1:

Inflow Area = 343,774 sf, 1.74% Impervious, Inflow Depth = 3.18" for 100 Year event
Inflow = 18.4 cfs @ 12.33 hrs, Volume= 91,235 cf
Outflow = 18.4 cfs @ 12.33 hrs, Volume= 91,235 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2:

Inflow Area = 342,992 sf, 25.01% Impervious, Inflow Depth > 3.80" for 100 Year event
Inflow = 19.1 cfs @ 12.16 hrs, Volume= 108,682 cf
Outflow = 19.1 cfs @ 12.16 hrs, Volume= 108,682 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2A:

Inflow Area = 99,641 sf, 30.79% Impervious, Inflow Depth = 2.70" for 100 Year event
Inflow = 9.4 cfs @ 12.14 hrs, Volume= 22,447 cf
Outflow = 9.4 cfs @ 12.14 hrs, Volume= 22,447 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP3:

Inflow Area = 214,366 sf, 16.46% Impervious, Inflow Depth = 3.04" for 100 Year event
Inflow = 12.9 cfs @ 12.15 hrs, Volume= 54,353 cf
Outflow = 12.9 cfs @ 12.15 hrs, Volume= 54,353 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP3A:

Inflow Area = 117,299 sf, 27.14% Impervious, Inflow Depth = 2.93" for 100 Year event
Inflow = 8.4 cfs @ 12.11 hrs, Volume= 28,592 cf
Outflow = 8.4 cfs @ 12.11 hrs, Volume= 28,592 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP4:

Inflow Area = 455,469 sf, 37.90% Impervious, Inflow Depth = 3.31" for 100 Year event
Inflow = 16.0 cfs @ 12.12 hrs, Volume= 125,817 cf
Outflow = 16.0 cfs @ 12.12 hrs, Volume= 125,817 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP5:

Inflow Area = 433,386 sf, 13.96% Impervious, Inflow Depth = 3.04" for 100 Year event
Inflow = 26.9 cfs @ 12.18 hrs, Volume= 109,719 cf
Outflow = 26.9 cfs @ 12.18 hrs, Volume= 109,719 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP5A:

Inflow Area = 190,556 sf, 16.66% Impervious, Inflow Depth = 2.35" for 100 Year event
Inflow = 10.8 cfs @ 12.26 hrs, Volume= 37,351 cf
Outflow = 10.8 cfs @ 12.26 hrs, Volume= 37,351 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Detention Basin

Inflow Area = 124,154 sf, 39.42% Impervious, Inflow Depth = 5.18" for 100 Year event
Inflow = 16.9 cfs @ 12.09 hrs, Volume= 53,616 cf
Outflow = 5.3 cfs @ 12.41 hrs, Volume= 53,492 cf, Atten= 69%, Lag= 19.3 min
Primary = 5.3 cfs @ 12.41 hrs, Volume= 53,492 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 109.29' @ 12.41 hrs Surf.Area= 6,966 sf Storage= 21,824 cf

Plug-Flow detention time= 157.8 min calculated for 53,477 cf (100% of inflow)
Center-of-Mass det. time= 156.5 min (963.4 - 807.0)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	26,987 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
105.00	2,562	0	0
106.00	4,302	3,432	3,432
108.00	5,832	10,134	13,566
110.00	7,589	13,421	26,987

Device	Routing	Invert	Outlet Devices
#1	Primary	98.00'	**12.0" Round Culvert** L= 40.0' Ke= 0.500 Inlet / Outlet Invert= 98.00' / 96.00' S= 0.0500 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	105.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	106.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	107.60'	**10.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	108.90'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=5.3 cfs @ 12.41 hrs HW=109.29' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 5.3 cfs of 12.4 cfs potential flow)
  └**2=Orifice/Grate** (Orifice Controls 0.5 cfs @ 9.83 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.7 cfs @ 8.51 fps)
  └**4=Orifice/Grate** (Orifice Controls 1.3 cfs @ 6.02 fps)
  └**5=Broad-Crested Rectangular Weir** (Weir Controls 2.8 cfs @ 1.82 fps)

Summary for Pond 2P: Infiltration Basin

Inflow Area = 47,383 sf, 62.31% Impervious, Inflow Depth = 6.20" for 100 Year event
Inflow = 7.3 cfs @ 12.09 hrs, Volume= 24,469 cf
Outflow = 6.2 cfs @ 12.13 hrs, Volume= 23,992 cf, Atten= 15%, Lag= 3.0 min
Discarded = 0.2 cfs @ 12.13 hrs, Volume= 14,929 cf
Primary = 6.0 cfs @ 12.13 hrs, Volume= 9,063 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 109.74' @ 12.13 hrs Surf.Area= 3,765 sf Storage= 7,780 cf

Plug-Flow detention time= 267.0 min calculated for 23,985 cf (98% of inflow)
Center-of-Mass det. time= 254.9 min (1,028.9 - 774.0)

Volume	Invert	Avail.Storage	Storage Description
#1	106.00'	8,799 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
106.00	781	0	0	781
108.00	2,086	2,762	2,762	2,112
110.00	4,059	6,037	8,799	4,123

Device	Routing	Invert	Outlet Devices
#1	Primary	109.50'	**20.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	106.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.2 cfs @ 12.13 hrs HW=109.74' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.2 cfs)

Primary OutFlow Max=6.0 cfs @ 12.13 hrs HW=109.74' TW=0.00' (Dynamic Tailwater)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 6.0 cfs @ 1.25 fps)

Summary for Pond 3P: Infiltration Basin

Inflow Area = 283,493 sf, 55.31% Impervious, Inflow Depth = 6.03" for 100 Year event
Inflow = 44.4 cfs @ 12.09 hrs, Volume= 142,445 cf
Outflow = 7.8 cfs @ 12.55 hrs, Volume= 114,373 cf, Atten= 82%, Lag= 27.7 min
Discarded = 0.5 cfs @ 12.55 hrs, Volume= 39,017 cf
Primary = 7.3 cfs @ 12.55 hrs, Volume= 75,356 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 109.60' @ 12.55 hrs Surf.Area= 22,043 sf Storage= 74,483 cf

Plug-Flow detention time= 355.7 min calculated for 114,373 cf (80% of inflow)
Center-of-Mass det. time= 280.2 min (1,073.1 - 793.0)

Volume	Invert	Avail.Storage	Storage Description
#1	104.00'	83,598 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
104.00	8,168	0	0	8,168
105.00	9,203	8,680	8,680	9,254
106.00	10,294	9,743	18,424	10,400
108.00	15,794	25,893	44,316	15,959
110.00	23,758	39,282	83,598	23,984

Device	Routing	Invert	Outlet Devices
#1	Primary	106.50'	**12.0" Round Culvert** L= 34.0' Ke= 0.600 Inlet / Outlet Invert= 106.50' / 106.00' S= 0.0147 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 1	107.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	108.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	109.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Primary	109.50'	**20.0' long x 4.0' 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#6	Discarded	104.00'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.5 cfs @ 12.55 hrs HW=109.60' (Free Discharge)
└**6=Exfiltration** (Exfiltration Controls 0.5 cfs)

Primary OutFlow Max=7.3 cfs @ 12.55 hrs HW=109.60' TW=0.00' (Dynamic Tailwater)
├**1=Culvert** (Inlet Controls 5.7 cfs @ 7.28 fps)
│ ├**2=Orifice/Grate** (Passes < 0.4 cfs potential flow)
│ ├**3=Orifice/Grate** (Passes < 1.1 cfs potential flow)
│ └**4=Orifice/Grate** (Passes < 9.6 cfs potential flow)
└**5=Broad-Crested Rectangular Weir** (Weir Controls 1.5 cfs @ 0.76 fps)

Summary for Pond 4P: Infiltration Basin

Inflow Area = 49,345 sf, 59.84% Impervious, Inflow Depth = 4.85" for 100 Year event
Inflow = 5.2 cfs @ 12.09 hrs, Volume= 19,946 cf
Outflow = 5.0 cfs @ 12.11 hrs, Volume= 19,946 cf, Atten= 3%, Lag= 1.5 min
Discarded = 0.2 cfs @ 12.11 hrs, Volume= 9,794 cf
Primary = 4.8 cfs @ 12.11 hrs, Volume= 10,152 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 118.16' @ 12.11 hrs Surf.Area= 4,241 sf Storage= 3,449 cf

Plug-Flow detention time= 70.3 min calculated for 19,940 cf (100% of inflow)
Center-of-Mass det. time= 70.3 min (851.3 - 781.0)

Volume	Invert	Avail.Storage	Storage Description
#1	117.00'	4,951 cf	**Custom Stage Data (Conic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
117.00	1,691	0	0	1,691
118.00	4,012	2,769	2,769	4,019
118.50	4,726	2,182	4,951	4,743

Device	Routing	Invert	Outlet Devices
#1	Primary	117.90'	**10.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#2	Primary	118.10'	**25.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#3	Discarded	117.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.2 cfs @ 12.11 hrs HW=118.16' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.2 cfs)

Primary OutFlow Max=4.8 cfs @ 12.11 hrs HW=118.16' TW=0.00' (Dynamic Tailwater)
├**1=Broad-Crested Rectangular Weir** (Weir Controls 3.7 cfs @ 1.39 fps)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 1.1 cfs @ 0.68 fps)

Summary for Pond 5P: Infiltration Basin

Inflow Area = 95,556 sf, 32.02% Impervious, Inflow Depth = 4.90" for 100 Year event
Inflow = 12.6 cfs @ 12.09 hrs, Volume= 39,008 cf
Outflow = 6.4 cfs @ 12.24 hrs, Volume= 39,008 cf, Atten= 49%, Lag= 9.1 min
Discarded = 0.5 cfs @ 12.24 hrs, Volume= 25,112 cf
Primary = 5.8 cfs @ 12.24 hrs, Volume= 13,896 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Peak Elev= 123.12' @ 12.24 hrs Surf.Area= 9,483 sf Storage= 11,794 cf

Plug-Flow detention time= 132.1 min calculated for 38,997 cf (100% of inflow)
Center-of-Mass det. time= 132.1 min (950.0 - 817.9)

Volume	Invert	Avail.Storage	Storage Description
#1	121.50'	20,863 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
121.50	2,680	0	0
121.75	4,316	875	875
122.00	7,408	1,466	2,340
124.00	11,115	18,523	20,863

Device	Routing	Invert	Outlet Devices
#1	Primary	122.75'	**10.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	121.50'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.5 cfs @ 12.24 hrs HW=123.12' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.5 cfs)

Primary OutFlow Max=5.8 cfs @ 12.24 hrs HW=123.12' TW=0.00' (Dynamic Tailwater)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 5.8 cfs @ 1.58 fps)

Summary for Pond 6P: Recharge Trench

Inflow Area = 27,221 sf,100.00% Impervious, Inflow Depth = 7.86" for 100 Year event
Inflow = 5.0 cfs @ 12.08 hrs, Volume= 17,830 cf
Outflow = 5.0 cfs @ 12.08 hrs, Volume= 17,830 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.0 cfs @ 3.94 hrs, Volume= 3,758 cf
Primary = 3.0 cfs @ 12.08 hrs, Volume= 13,037 cf
Secondary = 1.9 cfs @ 12.08 hrs, Volume= 1,035 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 121.33' @ 12.08 hrs Surf.Area= 720 sf Storage= 491 cf

Plug-Flow detention time= 32.5 min calculated for 17,830 cf (100% of inflow)
Center-of-Mass det. time= 32.5 min (773.6 - 741.1)

Volume	Invert	Avail.Storage	Storage Description
#1	115.50'	392 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 1,080 cf Overall - 101 cf Embedded = 979 cf x 40.0% Voids
#2	116.17'	94 cf	**6.0" Round Pipe Storage** Inside #1 L= 480.0' 101 cf Overall - 0.1" Wall Thickness = 94 cf
#3	117.00'	12 cf	**0.50'D x 10.00'H Vertical Cone/Cylinder** x 6 -Impervious
		498 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.50	720	0	0
117.00	720	1,080	1,080

Device	Routing	Invert	Outlet Devices	
#1	Discarded	115.50'	**2.410 in/hr Exfiltration over Surface area**	Phase-In= 0.01'
#2	Primary	118.00'	**4.0" Horiz. Orifice/Grate X 4.00** C= 0.600 Limited to weir flow at low heads	
#3	Secondary	120.00'	**4.0" Horiz. Orifice/Grate X 4.00** C= 0.600 Limited to weir flow at low heads	

Discarded OutFlow Max=0.0 cfs @ 3.94 hrs HW=115.62' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=3.0 cfs @ 12.08 hrs HW=121.32' TW=118.16' (Dynamic Tailwater)
└**2=Orifice/Grate** (Orifice Controls 3.0 cfs @ 8.56 fps)

Secondary OutFlow Max=1.9 cfs @ 12.08 hrs HW=121.32' TW=0.00' (Dynamic Tailwater)
└**3=Orifice/Grate** (Orifice Controls 1.9 cfs @ 5.53 fps)

APPENDIX D:

STORMWATER

MANAGEMENT CALCULATIONS

November 19, 2020

Stormwater Management Calculations

STANDARD 3: Recharge To Groundwater: Static Method

- Calculate Impervious Area *(From HydroCAD Model)*
  Proposed Impervious Area (HSG B Soil) = 370,950 SF

- Determine Rainfall Depth to be Recharged
  (MassDEP Stormwater Management Handbook: Table 2.3.2)

Hydrologic Soil Group	Recharge Rainfall Depth
B	0.35"

- Calculate Recharge Volume
  '*Rv*' = [0.35" x 370,950 SF] / 12 SF-In = 10,820 CF
  '*Rv*' = 10,820 CF

- Capture Area Adjustment
  Schedule of Areas Tributary to Recharge Systems

HCAD System ID	Tributary Impervious Area
PS7	30,597 sf
PS8	27,851 sf
PS9	80,129 sf
PS11	37,786 sf
PS13	7,749 sf
PS14	2,305 sf
PS15	21,777 sf
PS16	21,777 sf
PS17	27,221 sf
Total:	**257,192 sf**

Total Impervious Area = 370,950 SF

Capture Area Adjustment = 370,950 sf / 257,192 sf = 1.44
Required Recharge Volume **'*Rv*'** = 1.44 x Rv = 1.44 x 10,820 CF = **15,581 CF**

- Calculate Provided Recharge
  Schedule of Proposed Recharge System Volumes

HCAD System ID	Bottom of System	Lowest System Outlet or Top of Galley	Total Recharge Volume Provided
2P	106.00′	109.50′	6,910 CF
3P	104.00′	107.00′	29,995 CF
4P	117.00′	117.50′	1,094 CF
5P	121.50′	122.75′	8,417 CF
6P	115.50′	118.00′	486 CF
		Total Volume: 47,660 CF	

Recharge volume provided measured to lowest system outlet.

Required Recharge Volume Summary

Total Volume Provided Below Outlets = 47,660 CF
Total Volume Required = 15,581 CF

Verify Drawdown, Maximum 72-Hours: Static Method

HCAD System ID	Recharge Volume (CF)	Bottom Surface Area (SF)	Rawls Rate (Inches/Hour)	Drawdown Time Rv / (K x A) (Hours)	Description
2P	6,910	781	2.41	44.1	Infiltration Basin
3P	29,995	8,168	1.02	43.2	Infiltration Basin
4P	1,094	1,691	2.41	3.2	Infiltration Basin
5P	8,417	2,680	2.41	15.6	Infiltration Basin
6P	486	720	2.41	3.4	Stone Trench

Design Complies with Recharge Volume Standard*

STANDARD 4: Water Quality Volume

- **3P – Infiltration Basin**
  - Tributary Impervious Area = 68,681 SF
  - Calculate required water quality volume (1″ depth)
    WQV = [1″ x 68,681 SF] / 12 SF-In = **5,723 CF**
  - Lowest outlet elevation = 107.00′
    WQV provided below lowest outlet = **29,995 CF (OK)**

- **5P – Infiltration Basin**
  - Tributary Impervious Area = 12,647 SF
  - Calculate required water quality volume (1" depth)
    WQV = [1" x 12,647 SF] / 12 SF-In = **1,054 CF**
  - Lowest outlet elevation = 122.75'
    WQV provided below lowest outlet = **8,417 CF (OK)**

- **3P – Infiltration Basin Forebay**
  - Tributary Impervious Area = 68,681 SF
  - Calculate required treatment volume (0.1" depth)
    WQV = [0.1" x 68,681 SF] / 12 SF-In = **572 CF**
  - Lowest outlet elevation = 107.00'
    WQV provided below forebay outlet = **1,297 CF (OK)**

- **5P – Infiltration Basin Forebay**
  - Tributary Impervious Area = 12,647 SF
  - Calculate required treatment volume (0.1" depth)
    WQV = [0.1" x 12,647 SF] / 12 SF-In = **105 CF**
  - Lowest outlet elevation = 121.50'
    WQV provided below forebay outlet = **376 CF (OK)**

Pipe Sizing Calculation Spreadsheet:

THE MORIN-CAMERON GROUP, INC.
25 Kenoza Avenue
Haverhill, MA
P: (978) 373-0310
F: (978) 774-3488
W: www.morincameron.com

Name: The Willows at Boxford
Location: Willow Road
Boxford, MA
County: Essex County
Owner: Toll Brothers, Inc.

Proj. No.: 3717
Date: 11/19/2020
Revised:
Computed by: Annie Raftery, EIT
Checked by: Scott P, Cameron, P.E.

Design Parameters:
IDF Curve
25 **Year Storm** Boston, MA
k_e= **0.2**

DESCRIPTION	LOCATION		AREA (AC.)	C	C x A	SUM C x A	FLOW TIME (MIN)		i*	DESIGN					CAPACITY		PIPE PROFILE				
	FROM	TO					PIPE	CONC. TIME		Q cfs	V fps	n	PIPE SIZE	SLOPE	Q full ft^3/s	V full ft/s	LENGTH ft	FALL ft	RIM	INV UPPER	INV LOWER
CB-1	CB-1	DMH-1	0.21	0.85	0.17	0.17	0.09	6.0	5.7	1.0	3.4	0.012	12	0.010	3.9	4.9	18	0.18	**124.90**	121.80	121.62
CB-2	CB-2	DMH-2	0.15	0.90	0.13	0.13	0.02	6.0	5.7	0.8	3.1	0.012	12	0.010	3.9	4.9	3	0.03	**124.90**	121.80	121.77
DMH-1	DMH-1	FES-1	0.35	0.87	0.31	0.31	0.36	6.1	5.7	1.8	3.2	0.012	12	0.005	2.7	3.5	68	0.34	**124.82**	121.67	121.33
CB-3	CB-3	DMH-2	0.30	0.75	0.22	0.22	0.11	6.0	5.7	1.3	3.7	0.012	12	0.010	3.8	4.8	24	0.23	**121.33**	118.23	118.00
CB-4	CB-4	DMH-2	0.24	0.77	0.18	0.18	0.09	6.0	5.7	1.0	4.5	0.012	12	0.021	5.6	7.1	23	0.48	**121.33**	118.23	117.75
DMH-2	DMH-2	DMH-3	0.53	0.76	0.40	0.40	0.20	6.1	5.7	2.3	4.9	0.012	12	0.014	4.5	5.7	58	0.79	**121.60**	117.65	116.86
DMH-3	DMH-3	DMH-4	0.53	0.76	0.40	0.40	0.71	6.3	5.7	2.3	5.1	0.012	12	0.016	4.8	6.2	219	3.45	**120.23**	116.76	113.31
CB-5	CB-5	DMH-4	0.23	0.78	0.18	0.18	0.05	6.0	5.7	1.0	3.5	0.012	12	0.010	3.9	4.9	11	0.11	**116.55**	113.45	113.34
CB-6	CB-6	DMH-4	0.15	0.70	0.10	0.10	0.07	6.0	5.7	0.6	3.4	0.012	12	0.017	5.1	6.4	14	0.24	**116.55**	113.45	113.21
DMH-4	DMH-4	DMH-8	0.90	0.76	0.68	0.68	0.29	7.0	5.5	3.8	6.3	0.012	12	0.019	5.3	6.7	108	2.01	**116.83**	113.11	111.10
CB-7	CB-7	DMH-5	0.04	0.90	0.04	0.04	0.50	6.0	5.7	0.2	1.7	0.012	12	0.006	3.1	4.0	51	0.33	**118.48**	115.38	115.05
CB-8	CB-8	DMH-5	0.33	0.46	0.15	0.15	0.37	6.0	5.7	0.9	2.3	0.012	12	0.004	2.4	3.0	52	0.20	**118.48**	115.38	115.18
DMH-5	DMH-5	DMH-6	0.37	0.51	0.19	0.19	0.76	6.5	5.6	1.1	3.5	0.012	12	0.010	3.9	4.9	160	1.60	**119.66**	115.05	113.45
DMH-6	DMH-6	DMH-7	0.37	0.51	0.19	0.19	0.48	7.3	5.5	1.0	3.5	0.012	12	0.010	3.9	4.9	102	1.03	**118.99**	113.35	112.32
CB-9	CB-9	DMH-7	0.31	0.57	0.18	0.18	0.08	6.0	5.7	1.0	3.6	0.012	12	0.011	4.1	5.2	18	0.20	**116.52**	113.42	113.22
CB-10	CB-10	DMH-7	0.05	0.90	0.05	0.05	0.09	6.0	5.7	0.3	2.2	0.012	12	0.011	4.0	5.1	12	0.13	**116.52**	113.42	113.29
DMH-7	DMH-7	DMH-8	0.74	0.56	0.41	0.41	0.19	7.7	5.3	2.2	6.4	0.012	12	0.028	6.5	8.3	71	2.02	**116.23**	113.12	111.10
DMH-8	DMH-8	FES-2	1.64	0.67	1.09	1.09	0.19	7.9	5.3	5.8	8.9	0.012	12	0.034	7.1	9.0	104	3.50	**115.07**	111.00	107.50
CB-11	CB-11	DMH-9	0.35	0.79	0.28	0.28	0.06	6.0	5.7	1.6	4.1	0.012	12	0.011	4.0	5.1	15	0.16	**112.69**	109.59	109.43
CB-12	CB-12	DMH-9	0.56	0.65	0.36	0.36	0.09	6.0	5.7	2.1	4.3	0.012	12	0.010	3.9	5.0	22	0.23	**112.69**	109.59	109.36
DMH-9	DMH-9	FES-3	0.91	0.70	0.64	0.64	0.08	6.1	5.7	3.7	8.5	0.012	12	0.044	8.1	10.3	40	1.76	**112.80**	109.26	107.50
CB-16	CB-16	DMH-11	0.32	0.69	0.22	0.22	0.05	6.0	5.7	1.3	5.8	0.012	12	0.038	7.5	9.6	16	0.61	**120.11**	117.01	116.40
CB-15	CB-15	DMH-11	0.37	0.69	0.26	0.26	0.04	6.0	5.7	1.5	6.5	0.012	12	0.044	8.1	10.3	14	0.61	**120.11**	117.01	116.40
DMH-11	DMH-11	DMH-10	0.69	0.69	0.47	0.47	0.29	6.0	5.7	2.7	8.2	0.012	12	0.048	8.4	10.8	142	6.80	**119.56**	116.30	109.50
DMH-10	DMH-10	DMH-12	0.69	0.69	0.47	0.47	0.35	6.3	5.7	2.7	5.4	0.012	12	0.016	4.9	6.3	114	1.87	**112.67**	109.40	107.53

Pipe Sizing Calculation Spreadsheet:

THE MORIN-CAMERON GROUP, INC.
25 Kenoza Avenue
Haverhill, MA
P: (978) 373-0310
F: (978) 774-3488
W: www.morincameron.com

Name: The Willows at Boxford
Location: Willow Road
Boxford, MA
County: Essex County
Owner: Toll Brothers, Inc.

Proj. No.: 3717
Date: 11/19/2020
Revised:
Computed by: Annie Raftery, EIT
Checked by: Scott P, Cameron, P.E.

Design Parameters:
IDF Curve
25 **Year Storm** Boston, MA
k_e= **0.2**

DESCRIPTION	LOCATION		AREA (AC.)	C	C x A	SUM C x A	FLOW TIME (MIN)		i*	DESIGN					CAPACITY		PIPE PROFILE				
	FROM	TO					PIPE	CONC. TIME		Q cfs	V fps	n	PIPE SIZE	SLOPE	Q full ft^3/s	V full ft/s	LENGTH ft	FALL ft	**RIM**	INV UPPER	INV LOWER
CB-13	CB-13	DMH-12	0.58	0.73	0.42	0.42	0.06	6.0	5.7	2.4	4.5	0.012	12	0.011	4.0	5.1	16	0.17	**110.85**	107.70	107.53
CB-14	CB-14	DMH-12	0.55	0.67	0.36	0.36	0.01	6.0	5.7	2.1	6.6	0.012	12	0.034	7.1	9.1	5	0.17	**110.85**	107.70	107.53
DMH-12	DMH-12	CDS-1	1.81	0.70	1.26	1.26	0.10	6.7	5.6	7.0	7.7	0.012	18	0.022	17.0	9.6	46	1.03	**110.85**	106.93	105.90
CDS-1	CDS-1	FES-4	1.81	0.70	1.26	1.26	0.79	6.8	5.6	7.0	4.8	0.012	18	0.006	8.6	4.9	226	1.30	**111.38**	105.80	104.50

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C'- Coefficients

Pervious Soil	0.35
Impervious	0.9

Rainfall Intensity (i) **5.7**

Description of Area CB-1	Area (acres)	Runoff Coefficient	A x C
Pervious	0.020	0.35	0.01
Impervious	0.185	0.90	0.17
Totals =	**0.205**		0.17

Weighted Runoff Coefficient = **S(AxC) / SA = 0.85**

Description of Area CB-2	Area (acres)	Runoff Coefficient	A x C
Pervious	0.000	0.35	0.00
Impervious	0.148	0.90	0.13
Totals =	**0.148**		0.13

Weighted Runoff Coefficient = **S(AxC) / SA = 0.90**

Description of Area CB-3	Area (acres)	Runoff Coefficient	A x C
Pervious	0.080	0.35	0.03
Impervious	0.215	0.90	0.19
Totals =	**0.295**		0.22

Weighted Runoff Coefficient = **S(AxC) / SA = 0.75**

Description of Area CB-4	Area (acres)	Runoff Coefficient	A x C
Pervious	0.054	0.35	0.02
Impervious	0.182	0.90	0.16
Totals =	**0.236**		0.18

Weighted Runoff Coefficient = **S(AxC) / SA = 0.77**

Description of Area CB-5	Area (acres)	Runoff Coefficient	A x C
Pervious	0.049	0.35	0.02
Impervious	0.176	0.90	0.16
Totals =	**0.225**		0.18

Weighted Runoff Coefficient = **S(AxC) / SA = 0.78**

Description of Area CB-6	Area (acres)	Runoff Coefficient	A x C
Pervious	0.053	0.35	0.02
Impervious	0.092	0.90	0.08
Totals =	**0.145**		0.10

Weighted Runoff Coefficient = **S(AxC) / SA = 0.70**

Description of Area CB-7	Area (acres)	Runoff Coefficient	A x C
Pervious	0.000	0.35	0.00
Impervious	0.042	0.90	0.04
Totals =	**0.042**		0.04

Weighted Runoff Coefficient = **S(AxC) / SA = 0.90**

Description of Area CB-8	Area (acres)	Runoff Coefficient	A x C
Pervious	0.266	0.35	0.09
Impervious	0.067	0.90	0.06
Totals =	**0.333**		0.15

Weighted Runoff Coefficient = **S(AxC) / SA = 0.46**

Description of Area CB-9	Area (acres)	Runoff Coefficient	A x C
Pervious	0.187	0.35	0.07
Impervious	0.122	0.90	0.11
Totals =	**0.309**		0.18

Weighted Runoff Coefficient = **S(AxC) / SA = 0.57**

Description of Area CB-10	Area (acres)	Runoff Coefficient	A x C
Pervious	0.000	0.35	0.00
Impervious	0.052	0.90	0.05
Totals =	**0.052**		0.05

Weighted Runoff Coefficient = **S(AxC) / SA = 0.90**

Description of Area CB-11	Area (acres)	Runoff Coefficient	A x C
Pervious	0.068	0.35	0.02
Impervious	0.282	0.90	0.25
Totals =	**0.350**		0.28

Weighted Runoff Coefficient = **S(AxC) / SA = 0.79**

Description of Area CB-12	Area (acres)	Runoff Coefficient	A x C
Pervious	0.254	0.35	0.09
Impervious	0.303	0.90	0.27
Totals =	**0.557**		0.36

Weighted Runoff Coefficient = **S(AxC) / SA = 0.65**

Description of Area CB-13	Area (acres)	Runoff Coefficient	A x C
Pervious	0.182	0.35	0.06
Impervious	0.393	0.90	0.35
Totals =	**0.575**		0.42

Weighted Runoff Coefficient = **S(AxC) / SA = 0.73**

Description of Area CB-14	Area (acres)	Runoff Coefficient	A x C
Pervious	0.230	0.35	0.08
Impervious	0.315	0.90	0.28
Totals =	**0.545**		0.36

Weighted Runoff Coefficient = **S(AxC) / SA = 0.67**

Description of Area CB-15	Area (acres)	Runoff Coefficient	A x C
Pervious	0.139	0.35	0.05
Impervious	0.230	0.90	0.21
Totals =	**0.369**		0.26

Weighted Runoff Coefficient = **S(AxC) / SA = 0.69**

Description of Area CB-16	Area (acres)	Runoff Coefficient	A x C
Pervious	0.122	0.35	0.04
Impervious	0.196	0.90	0.18
Totals =	**0.318**		0.22

Weighted Runoff Coefficient = **S(AxC) / SA = 0.69**

THE MORIN-CAMERON GROUP, INC.
66 Elm Street,
Danvers, MA 01923
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Standard 4: Total Suspended Solids Calculation
Detention Basin (1P)

Name: The Willows at Boxford
Location: Willow Road
Boxford, MA
County: Essex
Applicant: Toll Brothers, Inc.

Proj. No.: 3717
Date: 11/19/2020
Revised:
Computed by: Daniel Powers, E.I.T.
Checked by: Scott P. Cameron, P.E.

TSS Removal Calculation Worksheet

B BMP	C TSS Removal Rate	D Starting TSS Load (*F)	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Proprietary Treatment Practice	**0.80**	**0.75**	**0.60**	**0.15**
Dry Detention Basin	**0.00**	**0.15**	**0.00**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**

Total TSS Removal = **85%**

*Equals remaining load from previous BMP (E)
which enters the BMP

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

THE MORIN-CAMERON GROUP, INC.
66 Elm Street,
Danvers, MA 01923
p | 978.777.8586

Standard 4: Total Suspended Solids Calculation
Infiltration Basin (3P) Pretreatment

Name: The Willows at Boxford
Location: Willow Road
Boxford, MA
County: Essex
Applicant: Toll Brothers, Inc.

Proj. No.: 3717
Date: 11/19/2020
Revised:
Computed by: Daniel Powers, E.I.T.
Checked by: Scott P. Cameron, P.E.

TSS Removal Calculation Worksheet

B BMP	C TSS Removal Rate	D Starting TSS Load (*F)	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**
	0.00	**0.56**	**0.00**	**0.56**
	0.00	**0.56**	**0.00**	**0.56**
	0.00	**0.56**	**0.00**	**0.56**

Total TSS Removal = **44%**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

THE MORIN-CAMERON GROUP, INC.
66 Elm Street,
Danvers, MA 01923
p | 978.777.8586

Standard 4: Total Suspended Solids Calculation
Infiltration Basin (3P)

Name: The Willows at Boxford
Location: Willow Road
Boxford, MA
County: Essex
Applicant: Toll Brothers, Inc.

Proj. No.: 3717
Date: 11/19/2020
Revised:
Computed by: Daniel Powers, E.I.T.
Checked by: Scott P. Cameron, P.E.

TSS Removal Calculation Worksheet

B BMP	C TSS Removal Rate	D Starting TSS Load (*F)	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**
Infiltration Basin	**0.80**	**0.56**	**0.45**	**0.11**
	0.00	**0.11**	**0.00**	**0.11**
	0.00	**0.11**	**0.00**	**0.11**

Total TSS Removal = **89%**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

THE MORIN-CAMERON GROUP, INC.
66 Elm Street,
Danvers, MA 01923
p | 978.777.8586

Standard 4: Total Suspended Solids Calculation
Infiltration Basin (5P) Pretreatment

Name: The Willows at Boxford
Location: Willow Road
Boxford, MA
County: Essex
Applicant: Toll Brothers, Inc.

Proj. No.: 3717
Date: 11/19/2020
Revised:
Computed by: Daniel Powers, E.I.T.
Checked by: Scott P. Cameron, P.E.

TSS Removal Calculation Worksheet

B BMP	C TSS Removal Rate	D Starting TSS Load (*F)	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**
	0.00	**0.56**	**0.00**	**0.56**
	0.00	**0.56**	**0.00**	**0.56**
	0.00	**0.56**	**0.00**	**0.56**

Total TSS Removal = **44%**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

THE MORIN-CAMERON GROUP, INC.
66 Elm Street,
Danvers, MA 01923
p | 978.777.8586

Standard 4: Total Suspended Solids Calculation
Infiltration Basin (5P)

Name: The Willows at Boxford
Location: Willow Road
Boxford, MA
County: Essex
Applicant: Toll Brothers, Inc.

Proj. No.: 3717
Date: 11/19/2020
Revised:
Computed by: Daniel Powers, E.I.T.
Checked by: Scott P. Cameron, P.E.

TSS Removal Calculation Worksheet

B BMP	C TSS Removal Rate	D Starting TSS Load (*F)	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**
Infiltration Basin	**0.80**	**0.56**	**0.45**	**0.11**
	0.00	**0.11**	**0.00**	**0.11**
	0.00	**0.11**	**0.00**	**0.11**

Total TSS Removal = **89%**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

APPENDIX E:

VERNAL POOL WATER

BUDGET SUMMARY

Existing Conditions

2-Year	Subcatchment	Area	Rainfall	Total Volume	Surface Flow	Infiltration
Vernal Pool 1						
DP2A	ES2A	84051	0.27	22,694	2,970	19,724
Vernal Pool 2						
DP5A	ES5A	168926	0.27	45,610	5,476	40,134
Vernal Pool 3						
DP3A	ES3A	115072	0.27	31,069	3,099	27,970

10-Year	Subcatchment	Area	Rainfall	Total Volume	Surface Flow	Infiltration
Vernal Pool 1						
DP2A	ES2A	84051	0.4267	35,865	9,608	26,257
Vernal Pool 2						
DP5A	ES5A	168926	0.4267	72,081	18,341	53,740
Vernal Pool 3						
DP5A	ES3A	115072	0.4267	49,101	11,211	37,890

100-Year	Subcatchment	Area	Rainfall	Total Volume	Surface Flow	Infiltration
Vernal Pool 1						
DP2A	ES2A	84051	0.675	56,734	23,874	32,860
Vernal Pool 2						
DP5A	ES5A	168926	0.675	114,025	56,404	57,621
Vernal Pool 3						
DP3A	ES3A	115072	0.675	77,674	29,473	48,201

Proposed Conditions

2-Year	Subcatchment	Area	Rainfall	Total Volume	Surface Flow	Infiltration
Vernal Pool 1						
DP2A	PS2A	52,258	0.27	14,110	1407	12,703
	PS13	25,606	0.27	6,914	2037	4,877
	2P	-	-	7,494	0	7,494
Vernal Pool 2						
DP5A	PS5A	95,000	0.27	25,650	2314	23,336
	PS7	95,556	0.27	25,800	8030	17,770
	5P	-	-	8,030	0	8,030
Vernal Pool 3						
DP3A	PS3A	67,954	0.27	18,348	1830	16,518
	PS14	22,124	0.27	5,973	991	4,982
	4P	-	-	4,910	222	4,688
	6P	-	-	2,903	0	2,903

10-Year	Subcatchment	Area	Rainfall	Total Volume	Surface Flow	Infiltration
Vernal Pool 1						
DP2A	PS2A	52,258	0.4267	22,298	5091	17,207
	PS13	25,606	0.4267	10,926	4888	6,038
	2P	-	-	13,749	646	13,103
Vernal Pool 2						
DP5A	PS5A	95,000	0.4267	40,537	8740	31,797
	PS7	95,556	0.4267	40,774	18912	21,862
	5P	-	-	18,912	0	18,912
Vernal Pool 3						
DP3A	PS3A	67,954	0.4267	28,996	6,620	22,376
	PS14	22,124	0.4267	9,440	2,923	6,517
	4P	-	-	10,360	3474	6,886
	6P	-	-	3,566	176	3,390

100-Year	Subcatchment	Area	Rainfall	Total Volume	Surface Flow	Infiltration
Vernal Pool 1						
DP2A	PS2A	52,258	0.675	35,274	13385	21,889
	PS13	25,606	0.675	17,284	10205	7,079
	2P	-	-	24,469	9063	15,406
Vernal Pool 2						
DP5A	PS5A	95,000	0.675	64,125	23456	40,669
	PS7	95,556	0.675	64,500	39008	25,492
	5P	-	-	39,008	13896	25,112

Vernal Pool 3

DP3A	PS3A	67,954	0.675	45,869	17405	28,464
	PS14	22,124	0.675	14,934	6909	8,025
	4P	-	-	19,946	10152	9,794
	6P	-	-	4776	1018	3,758

Infiltration Comparison

		Existing	Proposed	Delta	%
Vernal Pool 1					
	2-Year	19,724	25,073	5,350	27.1%
	10-Year	26,257	36,349	10,092	38.4%
	100-Year	32,860	44,374	11,514	35.0%
Vernal Pool 2					
	2-Year	40,134	49,136	9,002	22.4%
	10-Year	53,740	72,570	18,831	35.0%
	100-Year	57,621	91,273	33,652	58.4%
Vernal Pool 3					
	2-Year	27,970	29,091	1,121	4.0%
	10-Year	37,890	39,169	1,279	3.4%
	100-Year	48,201	50,041	1,840	3.8%

Total Volume Comparison

		Existing	Proposed	Delta	
Vernal Pool 1					
	2-Year	22,694	26,480	3,787	16.7%
	10-Year	35,865	42,086	6,221	17.3%
	100-Year	56,734	66,822	10,088	17.8%
Vernal Pool 2					
	2-Year	45,610	51,450	5,840	12.8%
	10-Year	72,081	81,310	9,230	12.8%
	100-Year	114,025	128,625	14,600	12.8%
Vernal Pool 3					
	2-Year	31,069	31,143	74	0.2%
	10-Year	49,101	49,263	162	0.3%
	100-Year	77,674	77,598	-76	-0.1%

APPENDIX F:

CONSTRUCTION PHASE

BEST MANAGEMENT PRACTICES

Construction Phase Best Management Practices (BMP's)

Erosion and Sedimentation will be controlled at the site by utilizing Structural Practices, Stabilization Practices, and Dust Control. These practices correspond with plans entitled "Site Plan of Land for the Willows at Boxford" in Boxford, Massachusetts, Willow Road prepared by The Morin-Cameron Group, Inc. dated November 19, 2020 as revised and approved by the Boxford Planning Board, hereinafter referred to as the Site Plans.

Responsible Party Contact Information:

Stormwater Management System Owner:	Toll Brothers, Inc. 134 Flanders Road Westborough, MA 01581 P: (508) 366-1440
Boxford Department of Public Works:	7B Spofford Road Boxford MA 01921 P: (978) 685-0950
Boxford Planning Board:	7A Spofford Road Boxford MA 01921 P: (978) 887 6000
Boxford Zoning Board of Appeals:	7A Spofford Road Boxford MA 01921 P: (978) 887-6401
Boxford Conservation Commission:	7A Spofford Road Boxford MA 01921 P: (978) 887-6000 ext. 181
Site Design Engineer Information:	The Morin-Cameron Group, Inc. 66 Elm Street Danvers, MA 01923 Phone: (978) 777-8586

Structural Practices:

1) **Silt Fence & Silt Sock** – A siltation fence and sock barrier shall be installed in accordance with the approved plans where high rates of stormwater runoff are anticipated.
   a) Installation Schedule: Prior to Start of land disturbance

   a) Maintenance and Inspection: The site supervisor shall inspect the barrier at least once per week or after a major storm (3.15 inches of rainfall within a twenty-four-hour period). event and shall repair any damaged or affected areas of the barrier at the time they are noted. Remove sediment deposits promptly after storm events to provide adequate storage volume for the next rain and to reduce pressure on the barrier. Sediment will be removed from in front of the barrier when it becomes about 4" deep at the barrier. Take care to avoid undermining the barrier during cleanout.

2) **Inlet Protection** – Inlet Protection will be utilized around the catch basin grates in the street layout in the closest down gradient structure. The inlet protection will allow the storm drain inlets to be used before final stabilization. This structural practice will allow early use of the drainage system. Siltsack or equivalent will be utilized for the inlet protection. Siltsack is manufactured by ACF Environmental. The telephone number is 800-448-3636. Regular flow siltsack will be utilized, and if it does not allow enough storm water flow, hi-flow siltsack will be utilized.

Silt Sack (or equivalent) Inlet Protection Inspection/Maintenance Requirements *

a) The silt sack trapping devices and the catch basins should be inspected after every rain storm and repairs made as necessary.

b) Sediment should be removed from the silt sack after the sediment has reached a maximum depth of one-half the depth of the trap.

c) Sediment should be disposed of in a suitable area and protected from erosion by either structural or vegetative means. Sediment material removed shall be disposed of in accordance with all applicable local, state, and federal regulations.

d) The silt sack must be replaced if it is ripped or torn in any way.

e) Temporary traps should be removed and the area repaired as soon as the contributing drainage area to the inlet has been completely stabilized.

3) **Sediment Track-Out:** The site supervisor will inspect and ensure that sediment is not tracked into the roadway. If tracking onto the roadway is noted, it shall be removed immediately via by hand or a mechanical street sweeper. (If Required: Stabilized Construction Exit: Crushed stone anti-tracking pads will be installed at the entrance to the site. This will prevent trucks from tracking material onto the road from the construction site. If, at any point during the project, the tracking pad becomes ineffective due to accumulation of soil, the crushed stone shall be replaced. Details for construction of the stabilized entrance can be found in the details sheet that is part of the permit plan set associated with the project. The site supervisor will inspect the tracking pads weekly to ensure that they are properly limiting the tracking of soil onto the road. If tracking onto the roadway is noted, it shall be removed immediately via by hand or a mechanical street sweeper.)

Stabilization Practices:

Stabilization measures shall be implemented as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased, with the following exceptions.

- Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently cease is precluded by snow cover, stabilization measures shall be initiated as soon as practicable.

- Where construction activity will resume on a portion of the site within 21 days from when activities ceased, (e.g. the total time period that construction activity is temporarily ceased is less than 21 days) then stabilization measures do not have to be initiated on that portion of the site by the 14th day after construction activity temporarily ceased.

1) **Temporary Seeding** – Temporary seeding will allow a short-term vegetative cover on disturbed site areas that may be in danger of erosion. Temporary seeding will be done at stock piles and disturbed portions of the site where construction activity will temporarily cease for at least 21 days. The temporary seeding will stabilize cleared and unvegetated areas that will not be brought into final grade for several weeks or months.

   Temporary Seeding Planting Procedures *

   a) Planting should preferably be done between April 1st and June 30th, and September 1st through September 31st. If planting is done in the months of July and August, irrigation may be required. If planting is done between October 1st and March 31st, mulching should be applied immediately after planting.

b) Before seeding, install structural practice controls. Utilize Amoco supergro or equivalent.

c) Select the appropriate seed species for temporary cover from the following table.

Species	Seeding Rate (lbs./1,000 sq.)	Seeding Rate (lbs./acre)	Recommended Seeding Dates	Seed Cover required
Annual Ryegrass	1	40	April 1st to June 1st August 15th to Sept. 15th	¼ inch
Foxtail Millet	0.7	30	May 1st to June 30th	½ to ¾ inch
Oats	2	80	April 1st to July 1st August 15th to Sept. 15th	1 to 1-½ inch
Winter Rye	3	120	August 15th to Oct. 15th	1 to 1-½ inch

Apply the seed uniformly by hydroseeding, broadcasting, or by hand.

d) Use effective mulch, such as clean grain straw; tacked and/or tied with netting to protect seedbed and encourage plant growth.

Temporary Seeding Inspection/Maintenance *

a) Inspect within 6 weeks of planting to see if stands are adequate. Check for damage within 24 hours of the end to a heavy rainfall, defined as a 2-year storm event (i.e., 3.15 inches of rainfall within a twenty-four-hour period). Stands should be uniform and dense. Reseed and mulch damaged and sparse areas immediately. Tack or tie down mulch as necessary.

b) Seeds should be supplied with adequate moisture. Furnish water as needed, especially in abnormally hot or dry weather. Water application rates should be controlled to prevent runoff.

2) **Geotextiles** - Geotextiles such as jute netting will be used in combination with other practices such as mulching to stabilize slopes. The following geotextile materials or equivalent are to be utilized for structural and nonstructural controls as shown in the following table.

Practice	Manufacturer	Product	Remarks
Sediment Fence	Amoco	Woven polypropylene 1198 or equivalent	0.425 mm opening
Construction Entrance	Amoco	Woven polypropylene 2002 or equivalent	0.300 mm opening

Outlet Protection	Amoco	Nonwoven polypropylene 4551 or equivalent	0.150 mm opening
Erosion Control (slope stability)	Amoco	Supergro or equivalent	Erosion control revegetation mix, open polypropylene fiber on degradable polypropylene net scrim

Amoco may be reached at (800) 445-7732

Geotextile Installation

a) Netting and matting require firm, continuous contact between the materials and the soil. If there is no contact, the material will not hold the soil and erosion will occur underneath the material.

Geotextile Inspection/Maintenance *

a) In the field, regular inspections should be made to check for cracks, tears, or breaches in the fabric. The appropriate repairs should be made.

3) **Mulching and Netting** – Mulching will provide immediate protection to exposed soils during the period of short construction delays, or over winter months through the application of plant residues, or other suitable materials, to exposed soil areas. In areas, which have been seeded either for temporary or permanent cover, mulching should immediately follow seeding. On steep slopes, mulch must be supplemented with netting. The preferred mulching material is straw.

Mulch (Hay or Straw) Materials and Installation

a) Straw has been found to be one of the most effective organic mulch materials. The specifications for straw are described below, but other material may be appropriate. The straw should be air-dried; free of undesirable seeds & coarse materials. The application rate per 1,000 sq. is 90-100 lbs. (2-3 bales) and the application rate per acre is 2 tons (100-120 bales). The application should cover about 90% of the surface. The use of straw mulch is appropriate where mulch is maintained for more than three months. Straw mulch is subject to wind blowing unless anchored, is the most commonly used mulching material, and has the best microenvironment for germinating seeds.

Mulch Maintenance *

a) Inspect after rainstorms to check for movement of mulch or erosion. If washout, breakage, or erosion occurs, repair surface, reseed, remulch, and install new netting.

b) Straw or grass mulches that blow or wash away should be repaired promptly.

c) If plastic netting is used to anchor mulch, care should be taken during initial mowing to keep the mower height high. Otherwise, the netting can wrap up on the mower blade shafts. After a period of time, the netting degrades and becomes less of a problem.

d) Continue inspections until vegetation is well established.

4) **Land Grading** – Grading on fill slopes, cut slopes, and stockpile areas will be done with full siltation controls in place.

Land Grading Design/Installation Requirements

a) Areas to be graded should be cleared and grubbed of all timber, logs, brush, rubbish, and vegetated matter that will interfere with the grading operation. Topsoil should be stripped and stockpiled for use on critical disturbed areas for establishment of vegetation. Cut slopes to be topsoiled should be thoroughly scarified to a minimum depth of 3-inches prior to placement of topsoil.

b) Fill materials should be generally free of brush, rubbish, rocks, and stumps. Frozen materials or soft and easily compressible materials should not be used in fills intended to support buildings, parking lots, roads, conduits, or other structures.

c) Earth fill intended to support structural measures should be compacted to a minimum of 90 percent of Standard Proctor Test density with proper moisture control, or as otherwise specified by the engineer responsible for the design. Compaction of other fills should be to the density required to control sloughing, erosion or excessive moisture content. Maximum thickness of fill layers prior to compaction should not exceed 9 inches.

d) The uppermost one foot of fill slopes should be compacted to at least 85 percent of the maximum unit weight (based on the modified AASHTO compaction test). This is usually accomplished by running heavy equipment over the fill.

e) Fill should consist of material from borrow areas and excess cut will be stockpiled on site. All disturbed areas should be free draining, left with a neat and finished appearance, and should be protected from erosion.

Land Grading Stabilization Inspection/Maintenance *

a) All slopes should be checked periodically to see that vegetation is in good condition. Any rills or damage from erosion and animal burrowing should be repaired immediately to avoid further damage.

b) If seeps develop on the slopes, the area should be evaluated to determine if the seep will cause an unstable condition. Subsurface drains or a gravel mulch may be required to solve seep problems.

c) Areas requiring revegetation should be repaired immediately. Control undesirable vegetation such as weeds and woody growth to avoid bank stability problems in the future.

5) **Topsoiling *** – Topsoiling will help establish vegetation on all disturbed areas throughout the site during the seeding process. The soil texture of the topsoil to be used will be a sandy loam to a silt loam texture with 15% to 20% organic content.

Topsoiling Placement

a) Topsoil should not be placed while in a frozen or muddy condition, when the subgrade is excessively wet, or when conditions exist that may otherwise be detrimental to proper grading or proposed seeding.

b) Do not place topsoil on slopes steeper than 2.5:1, as it will tend to erode.

c) If topsoil and subsoil are not properly bonded, water will not infiltrate the soil profile evenly and it will be difficult to establish vegetation. The best method is to actually work the topsoil into the layer below for a depth of at least 6 inches.

6) **Permanent Seeding** – Permanent Seeding should be done immediately after the final design grades are achieved. Native species of plants should be used to establish perennial vegetative cover on disturbed areas. The revegetation should be done early enough in the fall so that a good cover is established before cold weather comes and growth stops until the spring. A good cover is defined as vegetation covering 75 percent or more of the ground surface.

Permanent Seeding Seedbed Preparation

a) In infertile or coarse-textured subsoil, it is best to stockpile topsoil and re-spread it over the finished slope at a minimum 2 to 6-inch depth and roll it to provide a firm seedbed. The topsoil must have a sandy loam to silt loam texture with 15% to 20% organic content. If construction fill operations have left soil exposed with a loose, rough, or irregular surface, smooth with blade and roll.

b) Loosen the soil to a depth of 3-5 inches with suitable agricultural or construction equipment.

c) Areas not to receive topsoil shall be treated to firm the seedbed after incorporation of the lime and fertilizer so that it is depressed no more than ½ - 1 inch when stepped on with a shoe. Areas to receive topsoil shall not be firmed until after topsoiling and lime and fertilizer is applied and incorporated, at which time it shall be treated to firm the seedbed as described above.

Permanent Seeding Grass Selection/Application

a) Select an appropriate cool or warm season grass based on site conditions and seeding date. Apply the seed uniformly by hydro-seeding, broadcasting, or by hand. Uniform seed distribution is essential. On steep slopes, hydroseeding may be the most effective seeding method. Surface roughening is particularly important when preparing slopes for hydroseeding.

b) Lime and fertilize. Organic fertilizer shall be utilized in areas within the 100-foot buffer zone to a wetland resource area.

c) Mulch the seedings with straw applied at the rate of ½ tons per acre. Anchor the mulch with erosion control netting or fabric on sloping areas. Amoco supergro or equivalent should be utilized.

Permanent Seeding Inspection/Maintenance *

a) Frequently inspect seeded areas for failure and make necessary repairs and reseed immediately. Conduct or follow-up survey after one year and replace failed plants where necessary.

b) If vegetative cover is inadequate to prevent rill erosion, overseed and fertilize in accordance with soil test results.

c) If a stand has less than 40% cover, reevaluate choice of plant materials and quantities of lime and fertilizer. Re-establish the stand following seedbed preparation and seeding recommendations, omitting lime and fertilizer in the absence of soil test results. If the season prevents resowing, mulch or jute netting is an effective temporary cover.

d) Seeded areas should be fertilized during the second growing season. Lime and fertilize thereafter at periodic intervals, as needed. Organic fertilizer shall be utilized in areas within the 100-foot buffer zone to a wetland resource area.

Dust Control:

Dust control will be utilized throughout the entire construction process of the site. For example, keeping disturbed surfaces moist during windy periods will be an effective control measure, especially for construction access roads. The use of dust control will prevent the movement of soil to offsite areas. However, care must be taken to not create runoff from excessive use of water to control dust. The following are methods of Dust Control that may be used on-site:

- Vegetative Cover – The most practical method for disturbed areas not subject to traffic.
- Calcium Chloride – Calcium chloride may be applied by mechanical spreader as loose, dry granules or flakes at a rate that keeps the surface moist but not so high as to cause water pollution or plant damage.
- Sprinkling – The site may be sprinkled until the surface is wet. Sprinkling will be effective for dust control on haul roads and other traffic routes.
- Stone – Stone will be used to stabilize construction roads and will provide dust control.

The general contractor shall employ an on-site water vehicle for the control of dust as necessary.

Non-Stormwater Discharges:

The construction de-watering and all non-stormwater discharges will be directed into a sediment dirt bag (or equivalent inlet protection) or a sediment basin. Sediment material removed shall be disposed of in accordance with all applicable local, state, and federal regulations.

The developer and site general contractor will comply with the E.P.A.'s Final General Permit for Construction De-watering Discharges, (N.P.D.E.S., Section 402 and 40 C.F.R. 122.26(b) (14) (x).

Inspection/Maintenance:

Operator personnel must inspect the construction site at least once every 14 calendar days and within 24 hours of a storm event of ½-inch or greater. The applicant shall be responsible to secure the services of a design professional or similar professional (inspector) on an on-going basis throughout all phases of the project. Refer to the Inspection/Maintenance Requirements presented earlier in the "Structural and Stabilization Practices." The inspector should review the erosion and sediment controls with respect to the following:

- Whether or not the measure was installed/performed correctly.

- Whether or not there has been damage to the measure since it was installed or performed.
- What should be done to correct any problems with the measure.

The inspector should document the findings and should request the required maintenance or repair for the pollution prevention measures when the inspector finds that it is necessary for the measure to be effective. The inspector should notify the appropriate person to make the required changes.

It is essential that the inspector document the inspection of the pollution prevention measures. These records will be used to request maintenance and repair and to prove that the inspection and maintenance were performed. The forms list each of the measures to be inspected on the site, the inspector's name, the date of the inspection, the condition of the measure/area inspected, maintenance or repair performed and any changes which should be made to the Operation and Maintenance Plan to control or eliminate unforeseen pollution of storm water.

APPENDIX G:

LONG TERM BEST MANAGEMENT PRACTICES O&M PLAN

Long Term Stormwater Best Management Practices
Operation and Maintenance Plan
for
Willow Road
Boxford, Massachusetts
November 19, 2020

The following operation and maintenance plan has been provided to satisfy the requirements of Standard 9 of the Mass DEP Stormwater Management Handbook associated with development of the site and associated infrastructure. The success of the Stormwater Management Plan depends on the proper implementation, operation and maintenance of several management components. The following procedures shall be implemented to ensure success of the Stormwater Management Plan:

1. The contractor shall comply with the details of construction of the site as shown on the approved plans.
2. The stormwater management system shall be inspected and maintained as indicated below.
3. Effective erosion control measurers during and after construction shall be maintained until a stable turf is established on all altered areas.
4. A Stormwater Management Maintenance Log is included at the end of this Appendix.

Basic Information

Stormwater Management System Owner:	Toll Brothers, Inc. 134 Flanders Road Westborough, MA 01581 P: (508) 366-1440
Boxford Stormwater Advisory Committee:	7A Spofford Road Boxford, MA 01921 P: (978) 887-6000 ext. 181
Boxford Planning Board:	7A Spofford Road Boxford, MA 01921 P: (978) 887-6000 ext. 181
Boxford Conservation Commission:	7A Spofford Road Boxford, MA 01921 P: (978) 887-6000 ext. 181

Erosion and Sedimentation Controls during Construction:

The site and drainage construction contractor shall be responsible for managing stormwater during construction. Routine monitoring of disturbed soils shall be performed to ensure adequate runoff and pollution control during construction.

A sediment and erosion control barrier will be placed as shown on the Grading & Drainage Plan prior to the commencement of any clearing, grubbing, and earth removal or construction activity. The integrity of the erosion control barrier will be maintained by periodic inspection and replacement as necessary. The erosion control barrier will remain in place until the first course of pavement has been placed and all side slopes have been loamed and seeded and vegetation has been established.

Operations and maintenance plans for the Stormwater Management construction phase and long term operation of the system have been attached to this report.

General Conditions

1. The site contractor shall be responsible for scheduling regular inspections and maintenance of the stormwater BMP's until the project has been completed. The BMP maintenance shall be conducted as detailed in the following long-term pollution prevention plan and on the approved design plans:
   "Site Plan of Land for the Willows at Boxford, Located at Boxford, Massachusetts" by The Morin Cameron Group, Inc. dated November 19, 2020.
2. All Stormwater BMP's shall be operated and maintained in accordance with the design plans and the following Long-Term Pollution Prevention Plan.
3. The owner shall:
   a. Maintain an Operation and Maintenance Log for the last three years. The Log shall include all BMP inspections, repairs, replacement activities and disposal activities (disposal material and disposal location shall be included in the Log);
   b. Make the log available to the Boxford Planning Board and Conservation Commission upon request;
   c. Allow members and agents of the Boxford Planning Board and Conservation Commission to enter the premises and ensure that the Owner has complied with the Operation and Maintenance Plan requirements for each BMP.
4. A recommended inspection and maintenance schedule is outlined below based on statewide averages. This inspection and maintenance schedule shall be adhered to at a minimum for the first year of service of all BMP's referenced in this document. At the commencement of the first year of service, a more accurate inspection/maintenance schedule shall be determined based on the level of service for this site.

Long-Term Pollution Prevention Plan (LTPPP)

Vegetated Areas:

Immediately after construction, monitoring of the erosion control systems shall occur until establishment of natural vegetation. Afterwards, vegetated areas shall be maintained as such. Vegetation shall be replaced as necessary to ensure proper stabilization of the site.

Cost: Included with annual landscaping budget. Consult with local landscape contractors.

Paved Areas:

Sweepers shall sweep paved areas periodically during dry weather to remove excess sediments and to reduce the amount of sediments that the drainage system shall have to remove from the runoff. The sweeping shall be conducted primarily between March 15th and November 15th. Special attention should be made to sweeping paved surfaces in March and April before spring rains wash residual sand into the drainage system.

Cost: Consult with local landscaping companies for associated costs if necessary.

Salt used for de-icing on the roadway during winter months shall be limited as much as possible as this will reduce the need for removal and treatment. Sand containing the minimum amount of calcium chloride (or approved equivalent) needed for handling may be applied as part of the routine winter maintenance activities.

Deep Sump Hooded Catch Basins:

The Catch basin grates shall be checked quarterly and following heavy rainfalls to verify that the inlet openings are not clogged by debris. Debris shall be removed from the grates and disposed of properly. Deep sump catch basins shall be inspected twice per year and cleaned as needed when accumulated sediments exceeds 2' from the bottom of the sump (approximately 1/2 of the sump capacity). Catch basins with hoods shall be inspected annually to check oil build-up and outlet obstructions. Material shall be removed from catch basins and disposed of in accordance with all applicable regulations

Cost: Estimated $50 - $100 per cleaning per catch basin as needed. The Owner shall consult local vacuum cleaning contractors for detailed cost estimates.

Public Safety Concerns: Catch basins shall not be left open and unattended at any time during inspection, cleaning or otherwise. Broken or missing grates or frames shall be replaced immediately. At no time shall any person enter the basin structure unless measures have been taken to ensure safe access in accordance with OSHA enclosed space regulations.

CDS Water Quality Units:

The CDS and Vortsentry water quality pretreatment units shall be inspected twice per year in April and October. The unit shall be cleaned per manufacturer instructions included herein.

Subsurface Stone Trench System:

The subsurface stone trench and pipe recharge systems shall be checked for debris accumulation twice per year. Each system is equipped with inspection ports. Additional inspections should be scheduled during the first few months to make sure that the facility is functioning as intended. Silt, sand and sediment, if significant accumulation occurs, shall be removed annually. Material removed from the stone trench and pipe shall be disposed of in accordance with all applicable local, state, and federal regulations. In the case that water remains in the infiltration facilities for greater than three (3) days after a storm event, an inspection is warranted and necessary maintenance or repairs should be addressed as necessary.

Cost: $500-$2,500 per cleaning depending on the volume of material/liquids that need to be removed.

Public Safety Concerns: The inspection port covers shall not be left open and unattended at any time during inspection, cleaning or otherwise. Broken covers shall be replaced immediately.

Infiltration/Detention Basins:

The infiltration basin shall be inspected after every major storm event for the first 3 months after construction; a major storm event is 3.9 inches of rainfall in a 24 hour period (2 year storm). Thereafter, the basin shall be inspected twice per year, typically in the spring and fall. If erosion or loss of vegetation is observed in the basin, it shall be repaired immediately and new vegetation shall be established. Trash, leaves, branches, etc. shall be removed from facility.

The outlet structures and overflow spillways shall be inspected annually for obstructions and structural integrity. The inspections shall be conducted by qualified personnel.

Cost: Consult with local landscaping companies for associated costs if necessary.

Sediment Forebay:

The forebay shall be inspected after every major storm event for the first 3 months after construction; a major storm event is 3.9 inches of rainfall in a 24 hour period (2 year storm). Thereafter, the basin shall be inspected twice per year. All forebays shall be inspected on an annual basis, typically in the spring months, and sediment shall be removed when depth exceeds 6 inches.

Cost: Consult with local landscaping or pumping companies for associated costs if necessary.

Debris & Litter:

All debris and litter shall be removed from the roadway and parking lots as necessary to prevent migration into the drainage system.

Pesticides, Herbicides, and Fertilizers:

Pesticides and herbicides shall be used sparingly. Fertilizers shall be restricted to the use of organic fertilizers only. All fertilizers, herbicides, pesticides, sand and salt for deicing and the like shall be stored in dry area that is protected from weather.

Cost: Included in the routine landscaping maintenance schedule. The Owner shall consult local landscaping contractors for details.

Public Safety Concerns: Chemicals shall be stored in a secure area to prevent children from obtaining access to them. Any major spills shall be reported to municipal officials.

Prevention of Illicit Discharges:

Illicit discharges to the stormwater management system are not allowed. Illicit discharges are discharges that are not comprised entirely of stormwater. Pursuant to Mass DEP Stormwater Standards the following activities or facilities are not considered illicit discharges: firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential building without detergents.

To prevent illicit discharges to the stormwater management system the following policies should be implemented:

1. Provisions For Storing Materials And Waste Products Inside Or Under Cover
2. Vehicle Maintenance And Washing Controls
3. Requirements for Routine Inspections of the Stormwater Management System (i.e.: subsurface infiltration system and outlet control structure.)
4. Spill Prevention and Response Plans.

Snow Storage:

Property owner shall inform their snow removal contractor of the designated areas for snow storage shown on the Site Layout Plans in the Site Plan of Land.

Project Location: Willow Road, Boxford, MA

Date:

Stormwater Management Maintenance Log

Long Term Practices

Best Management Practice	Inspection Frequency	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check	Cleaning/Repair Needed: (List Items)	Date of Cleaning/ Repair	Performed by
Infiltration/ Detention Basins	Inspect after every major storm event for first 3 months after construction Thereafter, twice per year (April / October)			• Check for standing water in basins 72 hours after a storm to verify if structure is draining • Is there erosion or loss of vegetation • Remove leaves, trash, debris, etc. from facilities • Rehabilitate structure if it fails due to clogging			
Sediment Forebays	Inspect after every major storm event for first 3 months after construction Thereafter, annually (during Spring months)			• Check for standing water in forebay 72 hours after a storm to verify if draining • Remove accumulated sediment when depth exceeds 6” • Remove leaves, trash, debris, etc. from facility			
Deep Sump Hooded Catch Basins	Inspect inlet grate quarterly Inspect structure twice per year (April / October)			• Check inlet grate for obstructions • Check that sediment depth in sump is less than 2’ • Check hood for signs of oil build-up or blockages			
Water Quality Unit	Inspect after every major storm event for first 3 months after construction Inspect twice per year (April / October)			• Refer to CDS Inspection and Maintenance Guide by Contech			

Subsurface Stone Trenches	Inspect after every major storm event for first 3 months after construction Thereafter, twice per year (April / October)			• Check for standing water in Stone Trench 72 hours after a storm to verify if structure is draining • Rehabilitate structure if it fails due to clogging			

(1) Refer to the Massachusetts Stormwater Handbook issued January 2, 2008

Notes (Include deviations from: Site Plan Approval and Order of Conditions and Approved Plans):

1. **Limited or no use of sodium chloride slats, fertilizers or pesticides recommended. Slow release fertilizer recommended if necessary.**
2. **Major Storm Event: 3.9" of rainfall in a 24 hour period (2 year storm)**

Stormwater Control Manager _____

CONTECH®
ENGINEERED SOLUTIONS

CDS® Inspection and Maintenance Guide

CDS TECHNOLOGIES

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y^3	m^3
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.3	3.0	0.9	1.3	1.0
CDS2020	5	1.3	3.5	1.1	1.3	1.0
CDS2025	5	1.3	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, earth stabilization and wastewater treament products. For information, visit www.ContechES.com or call 800.338.1122

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CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

APPENDIX H:

ILLICIT DISCHARGE STATEMENT

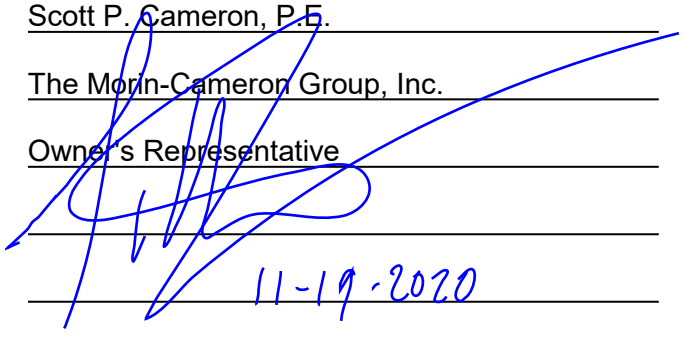
Illicit Discharge Compliance Statement

I, Scott P. Cameron, P.E., hereby notify the Boxford Planning Board & Conservation Commission that I have not witnessed, nor am aware of any existing illicit discharges at the site known as Willow Road in Boxford, Massachusetts. I also hereby certify that the development of said property as illustrated on the final plans entitled "Site Plan of Land for the Willows At Boxford," prepared by The Morin-Cameron Group, Inc. dated November 19, 2020 and as revised and approved by the Boxford Planning Board & Conservation Commission and maintenance thereof in accordance with the "Construction Phase Best Management Practices Plan" and "Long-Term Pollution Prevention Plan" prepared by The Morin-Cameron Group, Inc dated November 19, 2020 and as revised and approved by the Boxford Planning Board & Conservation Commission will not create any new illicit discharges. There is no warranty implied regarding future illicit discharges that may occur as a result of improper construction or maintenance of the stormwater management system or unforeseen accidents.

Name: Scott P. Cameron, P.E.

Company: The Morin-Cameron Group, Inc.

Title: Owner's Representative

Signature: 

Date: 11-19-2020