GRAZ Engineering, L.L.C.

323 West Lake Road • Fitzwilliam, NH 03447 • Telephone (603) 585-6959 • Fax (603) 585-6960

Transmittal

To: Planning Board
Company: Town of Leicester
Address: 3 Washburn Square
City/State: Leicester, MA 01524

Subject: Parker Street Definitive Plans
Date: June 8, 2021
Transmitted: ☐ **Mail** ☐ **Fax** ☑ **Hand**

☑ **For Your Approval**	☑ **Which You requested**
☑ **For Your Review**	☐ **Approved**
☐ **For Your Signature**	☐ **Approved As Noted**
☑ **For Your Information**	☐ **Revise And Resubmit**
☐ **For Your Files**	☐ **Not Approved**

2	**copies**	**Form C, Application for Approval of Definitive Subdivision Plan**
2	**copies**	**Form D, Designer's Certificate**
2	**copies**	**Certified Abutters List**
2	**copies**	**Project Narrative Letter dated 6/8/21**
2	**copies**	**Waiver Request Letter dated 6/8/21**
2	**copies**	**Hydrology & Stormwater Report dated 6/8/21**
2	**copies**	**Parker Street Definitive Subdivision Plans dated 6/8/21 (Full Size Plans)**
2	**copies**	**Parker Street Definitive Subdivision Plans dated 6/8/21 (11" x 17" Plans)**
1	**CD**	**PDF Digital Copy of Submittal Materials dated 6/8/21**
1	**check**	**Definitive Application Fee Check for $1,050.00**
1	**check**	**Definitive Project Review Fee Check for $3,690.00**

Comments: Enclosed is the Form C, Definitive Subdivision Plan of Parker Street for Schold Development, LLC its property located on Parker Street and depicted on Assessors' Map 42 as Parcels A1.0 and B1.0.

The fee break down for the submittal filing checks is as follows:

- Application Fee: $1,050.00
- Project Review Fee: $6,300.00 - $2,611.00***** = $3,689.00

*****Remaining balance on account for Preliminary Plan from Town Planner

Should you have any questions or require any additional information, please call my cell at 508-769-9084.

Respectfully yours,
GRAZ Engineering, L.L.C.

Brian MacEwen, PLS, BSCE
Project Manager

cc: Schold Development, LLC (Matt Schold, Applicant/Owner)

GRAZ Engineering, L.L.C.

323 West Lake Road • Fitzwilliam, NH 03447 • Telephone (603) 585-6959 • Fax (603) 585-6960

June 9, 2021

Town Clerk
Town of Leicester
3 Washburn Square
Leicester, MA 01524

Subject: Definitive Subdivision Plan Submittal Notification for Parker Street (North, off Pine Street) Assessors Map 42, Parcels A1.0 & B1.0

To the Town Clerk:

Project Overview

In accordance with the Massachusetts Subdivision Control Law, Chapter 41, Section 81T and the Town of Leicester Subdivision Rules and Regulations, Section III, B.1.h, this letter shall serve as notice that on June 9, 2021, GRAZ Engineering, LLC submitted a Definitive Subdivision plan entitled "Parker Street (North)" with the Leicester Planning Board to subdivide land being off from the existing portion of Parker Street that has access from the southerly side of Pine Street on behalf of Schold-Development, LLC, Land Development Corp. with a business address at 77 Chickering Road, Spencer (Owner/Applicant). The land is depicted on Assessors' Map 42 as Parcels A1.0 & B1.0 with street addresses listed as Parker Street. The land is described in the Worcester District Registry of Deeds Plan Book 60004, Page 48. The submitted plan proposes the development of a public right-of-way and with maximum of five (5) lots with their legal frontages to be on the proposed roadway to be named Parker Street.

Should you require further information, please contact us as soon as possible.

Respectfully yours,
GRAZ Engineering, L.L.C.

Brian MacEwen, PLS, BSCE
Project Manager

BCM/bcm

cc: Matt Schold, Schold Development, LLC

FORM C. APPLICATION FOR APPROVAL OF DEFINITIVE SUBDIVISION PLAN

Date: June 8, 2021

To the Planning Board of the Town of Leicester:

The undersigned, being the applicant as defined under MGL Chapter 41, Section 81L, for approval of a proposed subdivision shown on a plan entitled : _____ Parker Street Definitive Subdivision, Leicester, MA and dated June 8, 2021, located Parker Street off Pine Street , showing 3 lots on ±72.7 total acres. Said applicant hereby submits said plan as a Definitive Subdivision Plan in accordance with the Rules and Regulations of the Leicester Planning Board and makes application to the Board for approval of said plan.

The owner's title to the land included within the proposed subdivision, is derived under deed from Webster First Federal Credit Uniton, dated February 1, 2019, and recorded in Worcester District Registry of Deeds, Book 60004, Page 48, or under Certificate of Title No. _____, registered in Worcester Land Registry District, Book _____, Page _____.

Assessors Map & Parcel # 42/A1.0 (±9.7 Ac) & 42/B1.0 (±63.0 Ac)

Check one of the following (and fill in where appropriate):

☐ A preliminary plan of the proposed subdivision has not been submitted to the Board.

☐ A preliminary plan of the proposed subdivision, to which the accompanying plan conforms, was approved by the Board on _____.

☒ A preliminary plan of the proposed subdivision was approved by the Board on August 4, 2020, with modifications, which modifications have been incorporated in the accompanying plan.

☐ A preliminary plan of the proposed subdivision was disapproved by the Board on _____.

Applicant Information		**Owner Information* (if not the Applicant)**	
Name:	Schold Development, LLC	Name:	
Signature:		Signature:	
Address:	77 Chickering Road	Address:	
	Spencer, MA 01562		
Phone #:	508-612-8777 (Mobile)	Phone #:	

Received by the Planning Board _____.
*If there is more than one owner, all must sign.

FORM D. DESIGNER'S CERTIFICATE

Date: June 8, 2021

To the Planning Board of the Town of Leicester:

I hereby certify that the accompanying plan, entitled Parker Street Definitive Subdivision, Leicester, MA
and dated June 8, 2021, is true and correct to the accuracy required by the Rules and Regulations of the Leicester Planning Board, and that all pertinent data are shown.

Brian C. MacEwen
Registered Land Surveyor

Registration No. 37736

Paul F. Grasewicz
Registered Professional Engineer

Registration No. 35306

Town of Leicester
Abutters List

CONCOM / PLANNING

ParcelID	Location	Owner	Co-Owner	Mailing Address	City	State	Zip
41 B6.2 0	RIVER ST	LARSON JR CHARLES G		317 RIVER STREET	LEICESTER	MA	01524
41 B7 0	PARKER ST	YWCA		1 SALEM SQ	WORCESTER	MA	01608
41 C3 0	PARKER ST	STILES LAKE WATER DISTRICT		PO BOX 401	ROCHDALE	MA	01542-0401
41 C4 0	PARKER ST	YWCA		1 SALEM SQ	WORCESTER	MA	01608
42 A2 0	49 SALMINEN DR	DOLAN MARK MARIE TRUSTEES	DOLAN LIVING TRUST	22 PONNAKIN HILL RD	CHARLTON	MA	01507
42 A3.5 0	PARKER ST	GENERELLI JR THOMAS A		7 BULLARD AV	WORCESTER	MA	01605
42 A4 0	57 PARKER ST	BLANCHARD MATTHEW C	BLANCHARD MARCIA L	57 PARKER ST	LEICESTER	MA	01524
42 A4.1 0	59 PARKER ST	GIFFEN BRIAN M	GIFFEN LISA M	34 HILLTOP DR	BELLINGHAM	MA	02019
42 A5 0	55 PARKER ST	GORGIEVSKI MICHAEL J		55 PARKER STREEET	LEICESTER	MA	01524-2200
42 B10.1 0	RIVER ST	ROBIDOUX PARE ROSE		301 RIVER ST	LEICESTER	MA	01524-1717
42 B10.2 0	RIVER ST	ETHIER RICHARD	ETHIER VICTORIA R	303 RIVER STREET	LEICESTER	MA	01524
42 B2 0	PARKER ST	BLANCHARD TRUST	BLANCHARD MARCIA L TRU	57 PARKER STREET	LEICESTER	MA	01524-2200
42 B3 0	62 PARKER ST	BLANCHARD TRUST	BLANCHARD MARCIA L TRU	57 PARKER STREET	LEICESTER	MA	01524-2200
42 B4 0	64 PARKER ST	BLANCHARD TRUST	BLANCHARD MARCIA L TRU	57 PARKER STREET	LEICESTER	MA	01524-2200
42 B4.1 0	58 PARKER ST	KINNEY DENA A		58 PARKER STREET	LEICESTER	MA	01524
42 B4.2 0	60 PARKER ST	BLANCHARD TRUST	BLANCHARD MARCIA L TRU	57 PARKER STREET	LEICESTER	MA	01524-2200
42 B5 0	190 BALDWIN ST	BROWN LINDA L		190 BALDWIN STREET	LEICESTER	MA	01524
42 B5.1 0	56 PARKER ST	USHER JOSEPH A		56 PARKER STREET	LEICESTER	MA	01524
42 B5.2 0	54 PARKER ST	MARCO WILLIAM J		54 PARKER STREET	LEICESTER	MA	01524
42 B5.4 0	164 BALDWIN ST	GRAHN STEVEN K	GRAHN MICHELLE R	164 BALDWIN ST	LEICESTER	MA	01524
42 B5.5 0	162 BALDWIN ST	PARISSI THOMAS F TRUSTEE	PARISSI ELIZABETH A TRUS	162 BALDWIN ST	LEICESTER	MA	01524
42 B6.1 0	BALDWIN ST	MUTUAL BUILDERS INC		660 PARK AVENUE	WORCESTER	MA	01603
42 B6.11 0	160 BALDWIN ST	LABRECQUE ROBERT J	LABRECQUE JUDITH M	BOX 207	ROCHDALE	MA	01542-0207
42 B6.12 0	144 BALDWIN ST	DURKIN JR JAMES P	KELLEY KRISTINE M	144 BALDWIN ST	LEICESTER	MA	01524
42 C4.1 0	189 BALDWIN ST	FULGINITI ROBERT F	FULGINITI DONNA M	189 BALDWIN ST	LEICESTER	MA	01524
42A B1 0	48 SALMINEN AV	MERCER MICHAEL E	MERCER KATELYN D	127 MANNVILLE ST	LEICESTER	MA	01524
42A B2 0	44 SALMINEN AV	HANNON JOHN P	MOISAN CHERYL A	44 SALMINEN AVE	LEICESTER	MA	01524
48 C12.4 0	191 BALDWIN ST	BURKS REDUS D	BURKS BONNY L	P O BOX 125	LEICESTER	MA	01524-0125

End of Report

Above is a certified list of abutters and abutters to abutters within 300 feet of subject.
Subject property: Parker Street, Assessors Map 42-A1-0, Deed Ref. 60004/48
Subject property: 89 Parker Street, Assessors Map 42-B1-0, Deed Ref. 60004/48
Subject owner(s): Schold Development LLC

Sandy Genna, Principal Assessor
Prepared by: Kathleen Asquith, Assistant

GRAZ Engineering, L.L.C.

323 West Lake Road • Fitzwilliam, NH 03447 • Telephone (603) 585-6959 • Fax (603) 585-6960

June 8, 2021

Planning Board
Town of Leicester
3 Washburn Square
Leicester, MA 01524

Subject: Project Narrative
Parker Street (North, off Pine Street)
Definitive Subdivision Plan

Dear Board Members:

Project Overview

In accordance with the Town of Leicester Zoning Bylaws, the Planning Board's Subdivision Rules and Regulations, and the Planning Board's Preliminary Plan approval dated August 4, 2020, Schold Development, LLC (Owner/Applicant) proposes a three (3) lot subdivision of the land located off from Parker Street and along the existing way which is currently comprised of a gravel and dirt road that is an extension to the south of the existing portion of Parker Street that was improved and laid out by the Town of Leicester in 2004 as depicted in Worcester District Registry of Deeds Plan Book 807, Plan 10. The approximate 72.7 acre site is currently depicted as Parcels A1.0 & B1.0 on Assessors Map 42 and currently with addresses of Parker Street and 89 Parker Street respectively.

For this submittal, the Applicant proposes only three (3) frontage lots, with two (2) of lots having sufficient frontages and areas to be further subdivided into two (2) additional lots. Therefore, the proposed roadway improvement and extension shall be limited to a maximum of only five (5) building lots total.

Existing Site Conditions

The existing property is a ±72.7 acre undeveloped woodland currently divided by a gravel and dirt cart road (right-of-way status unknown) named Parker Street that extends southerly from the southerly sideline of Pine Street to the northerly sideline of Baldwin Street.

The project site is the land described as recorded in the Worcester District Registry of Deeds (WDRD) in Book 60004, Page 48, and depicted as Parcels A and C in Plan Book 800, Plan 29. The entire project site is located in the Suburban/Agriculture (SA) zoning district.

The northerly boundary of the project site is bounded by lands owned by the Y.W.C.A., the easterly & southerly boundaries are bounded by multiple private owners, and the westerly boundary is bounded by the easterly edge of Stiles Lake. The site consists of a mix of oak, maple, and pine trees along with various mixed hard and soft woods as well as mountain laurel. The site generally slopes uphill in a south to southeasterly direction from the southerly end of the improved portion of Parker Street near the Stiles Lake spillway. There are several Bordering Vegetated Wetlands (BVW) located adjacent to and within portions of the project site.

The proposed work for the roadway improvement beginning at the end of the improved portion of Parker Street is within the 100-foot buffer zone adjacent wetlands. Therefore the project will be subject

to the jurisdiction of the MADEP Wetlands Protection Act and the Leicester Conservation Commission local wetlands regulations. Therefore, a Notice of Intent will be required for the project.

Proposed Site Conditions

The proposed lots will be provided with private septic systems & domestic water wells with overhead electrical and communication services from the existing public utilities located in the improved northerly portion of Parker Street. In addition to those utilities a proposed "country drainage" stormwater management system has been designed to conform to the maximum feasible extent of the Massachusetts DEP Stormwater Management Standards that have been incorporated in the Wetlands Protection Act Regulations. The existing graveled/dirt travelled way currently known as Parker Street shall be laid out and developed into a dead-end cul-de-sac (±1,480') right-of-way and roadway that shall meet the minimum requirements as set forth in the LPB for acceptance as a public way upon completion.

The majority of the remaining land lot shall remain as wooded upland. As depicted on the plans, ground cover for the majority of the proposed developed lots site will be residential lawns with the remainder being the proposed dwellings, driveways, roadway, and undisturbed woodlands.

I trust that this information will assist the Planning Board in their review of the Applicant's Definitive Subdivision Application submittal. Should you require further information, please contact us as soon as possible.

Respectfully yours,
GRAZ Engineering, L.L.C.

Brian MacEwen, PLS, BSCE
Project Manager

Paul Grasewicz, PE, PLS

BCM/PFG/bcm

cc: Matt Schold, Schold Development, LLC (Owner/Applicant)
Paul Grasewicz, GRAZ Engineering, LLC

GRAZ Engineering, L.L.C.

323 West Lake Road • Fitzwilliam, NH 03447 • Telephone (603) 585-6959 • Fax (603) 585-6960

June 8, 2021

Leicester Planning Board
3 Washburn Square
Leicester, MA 01524

Subject: Waiver Requests
Parker Street
Definitive Subdivision

Dear Board Members:

On behalf of Schold Development, LLC (Owner/Applicant), GRAZ Engineering, L.L.C. (GRAZ) requests the following waivers from the Leicester Subdivision Regulations adopted on September 19, 1995 as amended through September 20, 2006. Please note that the Applicant shall request that the proposed subdivision road be accepted as a public way upon completion.

Section V, A.Streets, 2.Width, (a):

Minimum width of travelled way shall be 28-feet.

To waive the minimum travelled way width of 28-feet and allow a travelled way width of 20-feet.

The Applicant requests a waiver to the 28-foot minimum travelled way width to minimize site disturbance and the amount of impervious pavement while maintaining a width consistent with that portion of Parker Street laid out and approved by the Town around 2004 as set forth in the Easement & Taking Plan recorded in the Worcester District Registry of Deeds Plan Book 807, Plan 10.

By allowing a travelled way width of 20-feet the amount of impervious pavement can be reduced, thereby minimizing the amount of site disturbance required for the proposed "rural country-style roadway shoulder" drainage swale improvements without compromising safe vehicular movements.

Section V, A.Streets, 4.Dead End Streets, (a):
Maximum length of dead end streets shall not exceed 500-feet.

To waive the requirement that dead end streets shall not exceed 500-feet and allow a dead end cul-de-sac length of ±2,205-feet.

The Applicant requests that a dead end cul-de-sac length of ±2,205-feet, as measured from the intersection of Parker Street with the southerly sideline of Pine Street, be allowed due to the local conditions for this site.

As background, we offer the following: the issue of limiting dead end cul-de-sac length is associated with the number of dwelling units served by the roadway and general public safety (i.e. ingress/egress with emergency apparatus). The Institute of Transportation Engineers (ITE) suggests in general a maximum limit of 25 dwelling units and 750-1000 feet for cul-de-sac in low-density developments. ITE more specifically suggests that the average daily trips/day (ADT) for dead end cul-de-sacs be limited to a maximum of 200. Studies indicate that the average dwelling produces 10 trips/day. Thus, the maximum potential number of building lots accounting for the Y.W.C.A. properties and the proposed project would be 7-9 lots. This would generate 70-90 trips/day. Thus the proposed development along with the full development of the Y.W.C.A. properties along this portion of Parker Street would have both the number of dwelling units (7-9) and an anticipated average daily trips/day (70-90) that are less than 50-percent of the recommended ITE maximums of 25 and 200 ADT respectively. It should be noted that a large portion (±500-feet) of the both sides of Parker Street between Pine Street and the proposed cul-de-sac is

undevelopable land due to the Stiles Lake spillway area to the west and the lake discharge stream and associated wetlands to the east.

Granting this waiver would not be inconsistent with the regulations as the proposed dead end street length is acceptable under standard engineering practice for the predicted traffic volume to be generated by the new and existing dwellings anticipated to use this proposed roadway.

Section V, A.Streets, 4.Cross-Section, (a):

Typical cross-section requires sidewalks on both sides of the roadway.

To waive the requirement for sidewalks.

The Applicant requests that sidewalks not be required for the proposed roadway to be consistent with the existing local public and private way conditions and to minimize the amount of impervious and thereby reduce the need for drainage infrastructures.

Section V, C.Drainage, (1-7):

The requirement for the drainage system to be designed in compliance with the Massachusetts DEP Stormwater Management policy.

To waive the requirement for a conventional catch basin roadway drainage system and allow the proposed roadway drainage system to be comprised of grassed roadway shoulder drainage swale consistent with the most northerly section of Parker Street as designed by the State for the Town of Leicester around 2003-2004.

The Applicant requests that the due to the number of proposed building lots that the roadway drainage system be allowed to be a roadway shoulder of grassed and riprap drainage swales with intermittent stone check dams that would be consistent with the existing northerly portion of Parker Street as improved previously by the Town. This would minimize the site disturbance areas for the project and provide mitigation for drainage velocities and site erosion associated with the runoff associated with the proposed roadway.

Section VI, E.Underground Wiring and Lighting, (1):

All wiring, cables and other appurtenances of electric power, and telephone shall be placed underground within the limits of the street right-of-way.

To waive the requirement for underground installation utilities (electrical, telephone, cable, & other communication cables) and allow the utilities to be installed overhead.

The Applicant requests that above noted utilities allowed to be installed as overhead so as to be consistent with existing utilities currently in place on the local public and private adjacent private ways of Pine Street and Parker Street.

Section VI, G.Sidwalks, 4.Cross-Section, (1-3):

Sidewalks shall be installed on both sides of the roadways.

To waive the requirement for sidewalks.

The Applicant requests that sidewalks not be required for the proposed roadway to be consistent with the local public and private way conditions and to minimize the amount of impervious and thereby reduce the requirements for drainage infrastructures.

Section VI, I., Planting:

Shade trees having a trunk diameter of at least two inches shall be planted, usually to be spaced not more than 40-feet apart on both sides of the roadway.

To waive the requirement for roadway shade tree plantings.

The Applicant requests that roadway shade tree plantings not be required for the proposed roadway given the rural nature of the proposed project and to be consistent with the existing improved portion of Parker Street and the other adjacent public and private way conditions.

I trust that this information will assist the Planning Board in their review and approval of the Applicant's Definitive Subdivision Plan submission. Should you require further information, please contact us as soon as possible.

Respectfully yours,
GRAZ Engineering, L.L.C.

Brian MacEwen, PLS, BSCE
Project Manager

Paul Grasewicz, PE, PLS

BCM/PFG/bcm

cc: Matt Schold, Schold Development, LLC (Owner/Applicant)
Paul Grasewicz, GRAZ Engineering, LLC

Proposed
PARKER STREET
DEFINITIVE SUBDIVISION

Off Pine Street
Leicester, Massachusetts

HYDROLOGY &
STORMWATER REPORT

For Leicester Planning Board Definitive Subdivision Approval
Leicester Conservation Commission Notice of Intent
Submittals

June 8, 2021

PREPARED FOR:

Schold Development, LLC
77 Chickering Road
Spencer, MA 01562

PREPARED BY:

GRAZ Engineering, L.L.C.
323 West Lake Road
Fitzwilliam, NH 03447

Proposed
PARKER STREET
DEFINITIVE SUBDIVISION

Off Pine Street, Leicester, MA

TABLE OF CONTENTS

June 8, 2021

STORMWATER REPORT SUMMARY

Project Overview

In accordance with the preliminary subdivision plan approval by the Leicester Planning Board on August 4, 2020 of the "Preliminary Plan – Parker Street (North)" dated June 30, 2020 and in compliance with the Board's conditions of approval, the current Town of Leicester "Rules & Regulations Governing the Subdivision of Land", and the "Zoning Bylaws" the Applicant and Owner, Schold Development, LLC proposes a three (3) lot subdivision of the land located on Parker Street along the existing way which is currently comprised of a gravel and dirt road that is an extension to the south of the existing portion of Parker Street that was improved and laid out by the Town of Leicester in 2004 as depicted in Worcester District Registry of Deeds Plan Book 807, Plan 10. This portion of Parker Street is located off the southerly side of Pine Street.

Existing Site Conditions

The existing property is a ±72.7 acre undeveloped woodland currently divided by a gravel and dirt cart road (right-of-way status unknown) named Parker Street that extends southerly from the southerly sideline of Pine Street to the northerly sideline of Baldwin Street.

The project site is the land described as recorded in the Worcester District Registry of Deeds (WDRD) in Book 60004, Page 48, and depicted as Parcels A and C in Plan Book 800, Plan 29. The entire project site is located in the Suburban/Agriculture (SA) zoning district.

The northerly boundary of the project site is bounded by lands owned by the Y.W.C.A., the easterly & southerly boundaries are bounded by multiple private owners, and the westerly boundary is bounded by the easterly edge of Stiles Lake. The site consists of a mix of oak, maple, and pine trees along with various mixed hard and soft woods as well as mountain laurel. The site generally slopes uphill in a south to southeasterly direction from the southerly end of the improved portion of Parker Street near the Stiles Lake spillway. There are several Bordering Vegetated Wetlands (BVW) located adjacent to and within portions of the project site. The site is bounded on the west by the shoreline of Stiles Lake, the north by undeveloped lands currently owned by the Y.W.C.A., the east by undeveloped lands of Larson & Mutual Builders, and south by several existing residential lots bordering on the southerly portion of Parker Street, Baldwin Street, and Salminen Avenue.

A review of the NCRS Soil Survey mappings indicates that the site soils are comprised of "C" soils for the majority of the upland areas while the portions of the adjacent wetlands are classified as "D" soils. Field investigation of the soils has not been performed to date.

Portions of the proposed roadway improvement work and the stormwater for the roadway and site development are within the 100-foot buffer zone of the said wetlands. Therefore the project is under the under the jurisdiction of the MADEP Wetlands Protection Act and the Leicester Conservation Commission local wetlands regulations. A Notice of Intent for the project will be submitted separately.

Proposed Site Conditions

The proposed lot sites will be provided with private septic systems & domestic water wells with overhead electrical and communication services from the existing public utilities located in improved northerly portion of Parker Street. In addition to those utilities a proposed "country drainage" stormwater system has been designed to provide control and treatment to the maximum feasible extent of the Massachusetts DEP Stormwater Management Standards. The existing graveled/dirt travelled way currently known as Parker Street shall be laid out into a dead-end cul-de-sac (±1,480') right-of-way and the roadway shall be improved such that it shall meet the minimum requirements as set forth by the LPB for acceptance as a public way upon completion.

The majority of the remaining land lot shall remain as a wooded upland. As depicted on the plans, ground cover for the majority of the proposed developed lot sites shall be residential lawns with the remainder being covered by the proposed dwellings, driveways, roadway, and undisturbed woodlands.

The proposed site has been designed to the maximum feasible extent to mimic as close as possible the existing conditions stormwater flows utilizing a "country minimum of stormwater management practices and to minimize releases and to treat runoff, thereby minimizing environmental impact. Several techniques were utilized from the Massachusetts Department of Environmental Protections' (DEP) revised Stormwater Management handbooks to help maintain and provide better water quality, minimize runoff, and to provide groundwater recharge. These techniques include the "country drainage" swale with stone check dams intermittently spaced along its length, sediment forebay, and detention/infiltration basin with rip-rapped outlet aprons.

Standard 1: No Untreated Discharges or Erosion to Wetlands

All discharges from the proposed site have been treated to the maximum feasible extent given the nature of the existing right-of-way width limitations and availability for additional drainage mitigation infrastructure on the adjacent privately owned lands. We would note that the level of treatment for the improved roadway portion of the project is consistent and exceeds the level of stormwater management that was provided for the most northerly section of the Parker Street as improved under by the Town of Leicester in 2004. Calculations for water quality have been provided under Standard 4.

Note that the majority of the proposed roadway improvement area will be collected via the "country drainage" swale located on the easterly side of the roadway and discharged to a combination sediment forebay and detention/infiltration basin to be located on the lands of the Y.W.C.A. The discharge from the detention/infiltration basin is to the adjacent wetland area similar to the current untreated roadway runoff discharge point. Outlets have been lined with Riprap and sizes based on a reference from the Erosion and Sediment Control Handbook, Fig 7.45, Design of riprap outlet protection from a round pipe flowing full; minimum tailwater conditions.

Standard 2: Peak Rate Attenuation

The analyses were made using SCS hydrological groups C soils sandy clay loam and silty clay loam using HydroCAD Software Solutions system for modeling the hydrology and hydraulics of stormwater runoff. The stormwater management system is designed to attenuate the 2 and 10-year frequency storms as required by the DEP Stormwater Management Guidelines, Standard 2. The 25-year storm has also been evaluated as required by the Town of Leicester for the design of the drainage pipe network. In addition, the 100-year frequency storm was analyzed and determined to have no adverse off-site impacts.

For the purpose of analyzing pre- and post-development stormwater peak rates of runoff, three (3) design points have been selected based on existing topographic conditions which were used for both the pre- and the post-peak rate calculations. The following table summarizes the pre versus post peak runoff rates for the above cited storm events for the various discharge points from the site with the respective HydroCAD node listings.

TABLE OF PRE AND POST TOTAL FLOWS FOR ANALYSIS POINTS OF 2, 10, 25, & 100 YR STORMS (CFS)				
	2	*10*	*25*	*100*
PRE (DP#1)	*10.09*	*24.65*	*33.34*	*47.10*
POST (DP#1)	*7.94*	*18.59*	*23.45*	*40.38*
PRE (DP#2)	*7.04*	*17.25*	*23.35*	*32.96*
POST (DP#2)	*7.48*	*17.78*	*23.88*	*33.46*
PRE (DP#3)	*0.70*	*1.53*	*2.01*	*2.76*
POST (DP#3)	*1.46*	*2.75*	*3.47*	*4.54*

Standard 3: Recharge

Prior to visiting the site a review of the NRCS Soil Survey was made to identify the soils and hydrologic groups. The majority of the upland site is mapped as Montauk fine sandy loam (C soils) with the wetland area along the northerly side of Baldwin Street being Whitman fine sandy loam (D soils). As the proposed storm water management basin is proposed adjacent to wetlands, the soil conditions and estimated seasonal high groundwater table will be further evaluated by onsite deep hole testing. Using the "Static Method" the required storage volumes of the infiltration basin (Pond #2P) was determined for the additional impervious areas proposed by this project. The recharge volume provided by Pond #2P along with the proposed roof runoff drywells exceeds the required recharge volume for the entire developed site. A mounding analysis has been provided for Pond #2P. The calculations for the proposed recharge volume including the drawdown time calculation for Pond #2P have been included with this report.

Site Recharge to Groundwater ***"Static Method"***

Soil type: C Rawls Rate: 0.27 In./Hr.
Impervious Area (A1): 55,072 s.f.

Hydrologic Group	Target Depth Factor (F)	
A	0.60	inches
B	0.35	inches
C	0.25	inches
D	0.1	inches

Determine the required recharge volume:

Rv = F x impervious area

Rv = Required Recharge Volume
F = Target Depth Factor

$$Rv = \frac{F"HSGC" \times A1}{12 \text{ in. / ft.}} = \frac{13{,}768}{12} = 1{,}147 \text{ Cu.Ft.}$$

From Hydrocad determine the elevation that will hold back the required recharge volume:

Below is a excerpt from the stage storage table of Infiltration Pond 71P.
Required Site Rv= 1,147 Cu.Ft., the minimum low level outlet required = 857.21

Stage Storage Volumes			
Elevation (Ft.)	Surface Area (Sq.Ft.)	Cum. Storage (Cu. Ft.)	
856.5	0	0	
856.7	884	88	
856.9	1,769	354	
857.1	2,749	801	857.21 El. At Rv Min.
857.3	3,825	1,458	1,458 Rv at LLO
857.5	4,902	2,331	

The Low Level Outlet (LLO) has been designed at elevation: 857.30

Determine if the infiltration BMP will drain completely within 72 hours:

$$\text{Time drawdown} = \frac{Rv}{(K)\ (\text{Bottom Area})}$$

Rv = Storage Volume at Low Level Outlet (LLO) Elevation
K = Saturated Hydraulic Conductivity (Rawls Rate)
Bottom area = Bottom surface area not including sidewall

$$\text{Time drawdown} = \frac{857.21}{\frac{0.27}{12 \text{ in. / ft.}} * 2{,}211} = 17 \text{ hours}$$

Result is satisfactory for design purposes 17 hrs. < 72 hrs.

Standard 4: Water Quality

The sediment forebays have been sized based on calculations using a ½-inch of runoff times the total impervious area of the post development project site. Calculations for the water quality volume and total suspended solids removal are provided.

The total site impervious area is 55,072 s.f., therefore the amount of volume to be treated for water quality is 2,295 c.f. The total supplied water quality volume from the sediment forebay is 2,378 c.f. which is greater than the requirement for the project.

Stormwater runoff volumes to be treated for water quality

- Stormwater Policy Standard 4: 1/2-inch of runoff x total impervious area of post-development site

Sediment Forebay 1P

Required Water Quality Volume:

Subcatchment	Impervious Area (SF)	Imp. Area x 0.5 in runoff (Cu.Ft.)	
1S	36,982		
2S	3,933		
3S	14,157		
	55,072	**2,295**	**Required W.Q.V.**

From Hydrocad determine the elevation that will hold back the required Water Quality Volume (WQV):

Below is a excerpt from the stage storage table of Sediment Forebay.
From Hydrocad determine the elevation that will hold back the required Water Quality Volume (WQV):

2,295 Cu.Ft., the min. W.Q.V. storage elevation required = 860.26

Stage Storage Volumes				
Elevation (Ft.)	Surface Area (Sq.Ft.)	Cum. Storage (Cu. Ft.)		
857.8	0	0		
858	416	42		
859	804	652		
860	1,588	1,848	860.26	El. At Req. W.Q.V
861	2,784	4,034	860.3	W.Q.V.at Weir El.
861.5	3,456	5,594		

The Weir Elevation has been designed at elevation: 860.30

Supplied Water Quality Volume: 2,378 Cu.Ft.

STORMWATER MANAGEMENT

Weighted 80% TSS REMOVAL

BMP'S			***% Removal***
- CB's = Catch Basin w/ 4' sump and outlet tee			25%
- SF/DB = Detention Basin with Sediment Forebay			80%
- SF/IB = Infiltration Basin with Sediment Forebay			80%
- GSW = Grassed Swale			70%
- N = No treatment			0%
AREAS	***BMP***	***IMP. AREA (SF)***	***TSS Removal***
1	GSW, SF/DB	36,982	94.0%
3	GSW	14,157	70.0%
2	N	3,933	0.0%
TOTAL IMPERVIOUS AREA (SF)		***55,072***	
TOTAL WEIGHTED TSS REMOVAL			***81.1%***

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

System

The proposed Parker Street Subdivision drainage system consists of a drainage network that collects and attenuates peak flows that will be generated from the proposed site development to the maximum extent possible. The network includes "country drainage" swales; sediment forebay; and a detention/infiltration basin. Ultimately the flow discharges toward both Stile Lake to the west and the wetlands located to the north and east of the site.

Responsible Parties

The stormwater management system shall be operated and maintained by the developer during construction. Once the development is complete and the town accepts the roadway, the Town of Leicester will take responsibility for the system.

Construction Operation and Maintenance

Sedimentation and erosion controls, such as haybales, siltfence, and the stabilized construction entrance shall be installed prior to the commencement of construction. The maintenance of the sedimentation and erosion controls during the construction and until the site is fully stabilized shall be the responsibility of the Owner through the site contractor.

Sedimentation and erosion controls shall be inspected on an ongoing basis and repaired and/or replaced as necessary throughout construction. Upon completion of construction, the sedimentation and erosion controls shall be maintained until the disturbed areas of the construction site are fully stabilized.

The stabilized construction entrance shall be maintained to prevent tracking and washing of sediment onto existing paved surfaces until the installation of the roadway bituminous concrete binder course. The entrance shall be top dressed with additional stone or length extended as necessary. Roads adjacent to the site shall be left clean at the end of each day by the removal of any sediment spilled, tracked, or washed onto the existing pavement.

All site runoff shall be routed through permanent drainage facilities where available. Temporary sediment basins shall be constructed to control disturbed area runoff where the permanent system is not in place. The controls shall be constructed and maintained to minimize erosion and sediment transport. Catch basins shall be equipped with a filter insert to trap sediment. Maintenance shall be weekly or as necessary.

Modified rock check dams shall be added to the drainage channels at 50’ intervals during construction. They shall be inspected on an ongoing basis and repaired and/or replaced as necessary throughout construction. As part of the mosquito prevention they shall be inspected 72 hours after storms for standing water ponding behind them. Take corrective action if standing water is found.

The infiltration basins shall not be used as temporary sediment traps. The sediment forebay shall be excavated to one-foot above finish grade until the site has become fully stabilized. After the site is stabilized the basin shall be excavated to the finished grade.

The Contractor shall control airborne dust with the use of sprayed water as required minimize the impacts to neighboring properties. The use of calcium chloride or other chemicals are prohibited.

Mosquito Control**:** During construction the contractor is responsible for maintenance to see that larvicides are applied as necessary to the following stormwater treatment practices, which include but are not limited to: catch basins, drainage channels with check dams, sediment forebays, and infiltration basins. larvicides shall be applied by a licensed pesticide applicator in full compliance with all pesticide label requirements and any requirements that the Town of Leicester may have including types of larvicides and times of application.

Construction Period Pollution Prevention Measures

The Construction Period Pollution Prevention measures implemented under the Construction Erosion and Sedimentation Control will focus on developing, implementing, and enforcing a program that will reduce or eliminate the impacts of storm water runoff from the construction site. They focus predominately on temporary pollution prevention practices and address long-term or permanent pollution prevention measures that are implemented during the construction phase.

As described previously, sedimentation and erosion controls, such as straw wattles, siltfence, and stabilized construction entrances will be installed prior to the commencement of construction. Temporary sediment traps and detention basins will be installed as required. Check dams have been added to the drainage channels to help prevent erosion and help with the water quality. Inspections and maintenance of these controls have been well documented in the Operation and Maintenance Plan. With the addition of the Construction Inspection and Maintenance Log Form the contractor can incorporate a regimented schedule that will aid in the prevention of sedimentation pollution throughout the construction phase.

Standard 9: Operation and Maintenance Plan

Long Term Operation and Long Term Maintenance

Riprap Outlets: Riprap outlets shall be inspected annually to determine if high flows have caused scour beneath the riprap and/or filter fabric or dislodged any of the riprap or filter fabric materials. Replace riprap and/or repair/replace filter fabric as required. Any tree growth or accumulated sediments shall be removed.

Check Dams: Inspect check dams after every significant rainfall event. Repair damage and remove sediment as needed. Coordinate inspections with the drainage channel cycle.

Drainage Channels and Culvert inlets and outlets: Initially, the drainage channel should be inspected after the first few months to make sure there is no rilling or gullying, and that vegetation in the channels is adequate. Thereafter, inspect the channel twice a year for slope integrity, soil moisture, vegetative health, soil stability, soil compaction, soil erosion, ponding, and sediment accumulation. Regular maintenance includes mowing, fertilizing, liming, watering, pruning, weeding, and pest control. Mow channels at least once annually. Grass heights shall be no greater than 6 inches and mower blade depth shall be no lower than 3 to 4 inches. Excessive mowing may cause an increase in the design flow velocity. Remove all trash and debris at least once per year. Re-seed periodically to maintain the dense growth of grass vegetation.

Sediment Forebay: Sediments and associated pollutants are removed only when sediment forebays are actually cleaned out, so regular maintenance is essential. Sediment markers have been added as a quick reference. Frequently removing accumulated sediments will make it less likely that sediments will be resuspended. Inspect and clean sediment forebays at least twice per year. Stabilize the floor and sidewalls of the sediment forebay before making it operational, otherwise the practice will discharge excess amounts of suspended sediments. When mowing grasses, keep the grass height no greater than 6 inches. Set mower blades no lower than 3 to 4 inches. Check for signs of rilling and gullying and repair as needed. After removing the sediment, replace any vegetation damaged during the clean-out by either reseeding or resodding. When reseeding, incorporate practices such as hydroseeding with a tackifier, blanket, or similar practice to ensure that no scour occurs in the forebay, while the seeds germinate and develop roots.

Infiltration/Detention Basin: An important part of the maintenance of the infiltration basin is the maintenance of the sediment forebay. The infiltration basin shall be inspected and maintained at least twice a year, and after every time drainage discharges through the high outlet orifice. Once the basin is in use, inspect it after every major storm for the first few months to ensure it is stabilized and functioning properly and if necessary take corrective action. Note how long water remains standing in the basin after a storm; standing water within the basin 48 to 72 hours after a storm indicates that the infiltration capacity may have been overestimated. If the ponding is due to clogging, immediately address the reasons for the clogging (such as upland sediment erosion, excessive compaction of soils, or low spots). Dewatering trench valves are located in the outlet control on each infiltration basin. Sediment markers have also been added as a quick reference. Thereafter, inspect the infiltration basin at least twice per year. Important items to check during the inspection include: Signs of differential settlement; Cracking; Erosion; Leakage in the embankments; Tree growth on the embankments; Condition of riprap; Sediment accumulation and the health of the turf. At least twice a year, mow the buffer area, side slopes, and basin bottom. Remove grass clippings and accumulated organic matter to prevent an impervious organic mat from forming. Remove trash and debris at the same time. Use deep tilling to break up clogged surfaces, and revegetate immediately. Remove sediment from the basin as necessary, but wait until the floor of the basin is thoroughly dry. Use light equipment to remove the top layer so as to not compact the underlying soil. Deeply till the remaining soil, and revegetate as soon as possible. Inspect and clean pretreatment devices associated with basins at least twice a year, and ideally every other month.

Public Safety Features: Fencing will be provided around all basins to limit access to these areas. The basins have been designed to preclude standing water which will be a deterrent to mosquito breeding.

Standard 10: Prohibition of Illicit Discharges

Long-Term Period Pollution Prevention Plan

As part of an effort to reduce or eliminate the negative impacts of stormwater runoff, Long-Term Period Pollution Prevention measures must be implemented. A long term Operation and Maintenance Plan has been described under Standard 9 for ongoing inspection and maintenance. In addition, an Operation and Maintenance Log Form was created to assist the owner. in a specific maintenance schedule.

Long-Term Period Pollution Prevention Plan

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Many people are not aware of Nonpoint-Source Pollution (NPS) and the effect it has on the environment. The owner will receive this report and be made aware of this information about NPS pollution prevention.

What you can do to prevent NPS pollution

Urban Stormwater Runoff

- Keep litter, pet wastes, leaves, and debris out of street gutters and storm drains--these outlets drain directly to lake, streams, rivers, and wetlands.
- Apply lawn and garden chemicals sparingly and according to directions.
- Dispose of used oil, antifreeze, paints, and other household chemicals properly, not in storm sewers or drains. If your community does not already have a program for collecting household hazardous wastes, ask your local government to establish one.
- Clean up spilled brake fluid, oil, grease, and antifreeze. Do not hose them into the street or parking lot where they can eventually reach local streams and lakes.
- Control soil erosion on your property by planting ground cover and stabilizing erosion-prone areas.

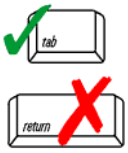
- Encourage local government officials to develop construction erosion/sediment control ordinances in your community.
- Purchase detergents and cleaners that are low in phosphorous to reduce the amount of nutrients discharged into our lakes, streams and coastal waters.

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.

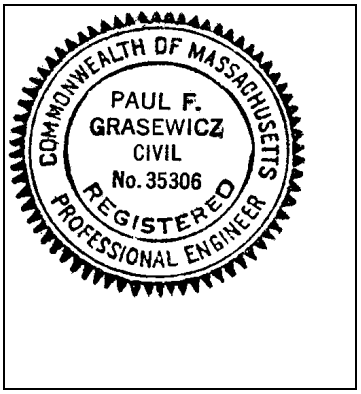
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



Signature and Date

Checklist

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

☒ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

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

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.

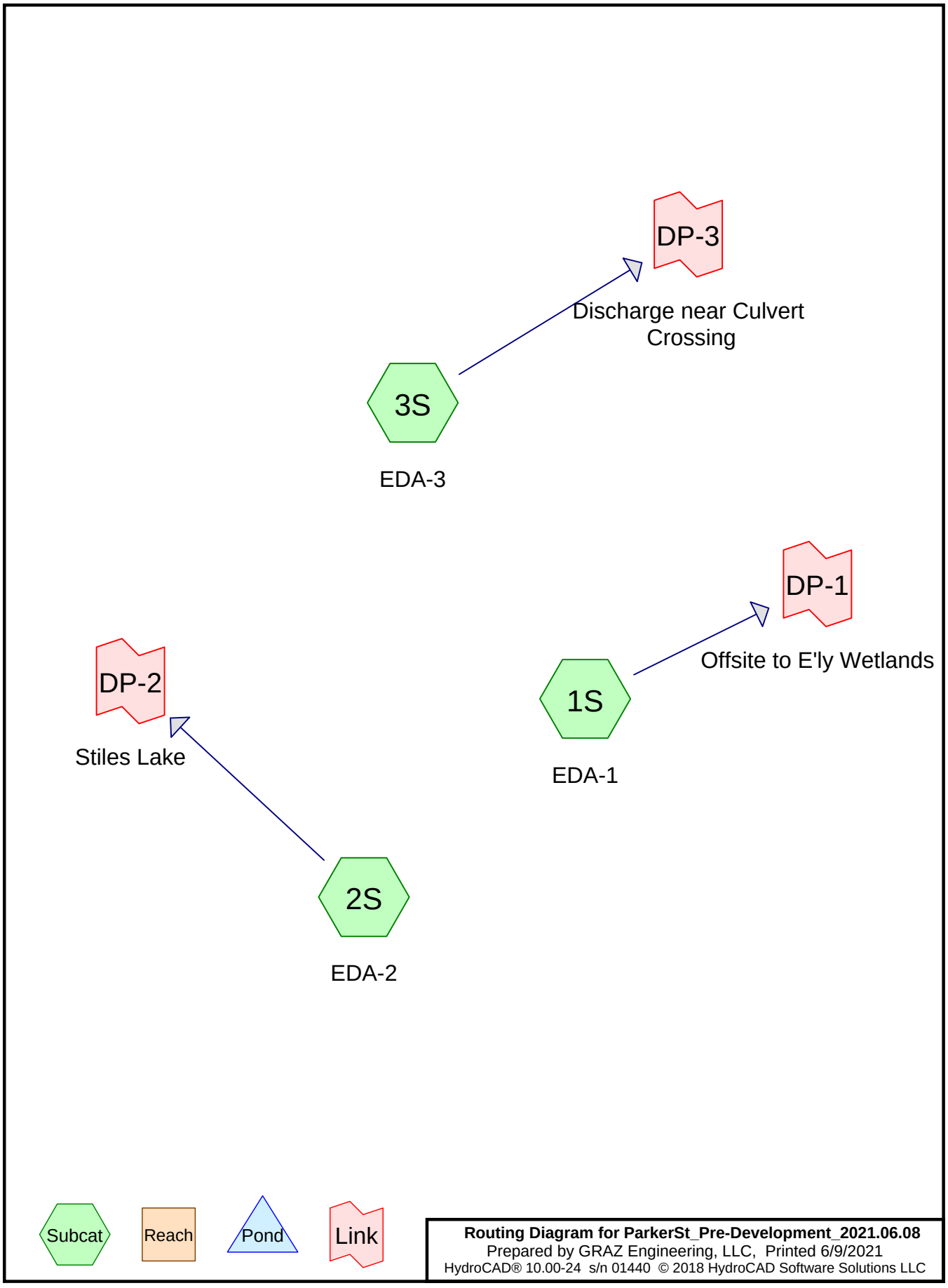
Standard 10: Prohibition of Illicit Discharges

☒ 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.

PRE-DEVELOPMENT CONDITIONS



Routing Diagram for ParkerSt_Pre-Development_2021.06.08
Prepared by GRAZ Engineering, LLC, Printed 6/9/2021

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
27,225	96	Gravel surface, HSG C (1S, 3S)
1,917	98	Roadway, HSG C (3S)
33,585	77	Wooded Wetlands, HSG C (1S, 2S)
544,631	73	Woods, Fair, HSG C (1S, 2S)
634,931	70	Woods, Good, HSG C (1S, 2S, 3S)
1,242,288	**72**	**TOTAL AREA**

Summary for Subcatchment 1S: EDA-1

Runoff = 10.09 cfs @ 12.35 hrs, Volume= 54,277 cf, Depth> 0.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.00"

	Area (ac)	CN	Description
	0.536	96	Gravel surface, HSG C
	11.402	70	Woods, Good, HSG C
	6.413	73	Woods, Fair, HSG C
*	0.279	77	Wooded Wetlands, HSG C
	18.630	72	Weighted Average
	18.630		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	92	0.0900	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.00"
1.3	702	0.1000	9.27	27.80	**Channel Flow, B-C, Ditch** Area= 3.0 sf Perim= 10.5' r= 0.29' n= 0.022 Earth, clean & straight
0.8	325	0.0600	7.18	21.53	**Channel Flow, C-D, Ditch** Area= 3.0 sf Perim= 10.5' r= 0.29' n= 0.022 Earth, clean & straight
1.4	570	0.0500	6.55	19.66	**Channel Flow, D-E, Ditch** Area= 3.0 sf Perim= 10.5' r= 0.29' n= 0.022 Earth, clean & straight
0.7	340	0.0700	7.75	23.26	**Channel Flow, E-F, Ditch** Area= 3.0 sf Perim= 10.5' r= 0.29' n= 0.022 Earth, clean & straight
0.4	108	0.0200	4.14	12.43	**Channel Flow, F-G, Ditch** Area= 3.0 sf Perim= 10.5' r= 0.29' n= 0.022 Earth, clean & straight
2.8	170	0.0400	1.00		**Shallow Concentrated Flow, G-H** Woodland Kv= 5.0 fps
4.3	383	0.0900	1.50		**Shallow Concentrated Flow, H-I** Woodland Kv= 5.0 fps
23.1	2,690	Total			

Summary for Subcatchment 2S: EDA-2

Runoff = 7.04 cfs @ 12.15 hrs, Volume= 27,125 cf, Depth> 0.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.00"

	Area (ac)	CN	Description
	2.690	70	Woods, Good, HSG C
	6.090	73	Woods, Fair, HSG C
*	0.492	77	Wooded Wetlands, HSG C
	9.272	72	Weighted Average
	9.272		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.3000	0.19		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.00"
0.8	140	0.3300	2.87		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
4.3	365	0.0800	1.41		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
9.4	555	Total			

Summary for Subcatchment 3S: EDA-3

Runoff = 0.70 cfs @ 12.10 hrs, Volume= 2,270 cf, Depth> 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.00"

	Area (ac)	CN	Description
*	0.044	98	Roadway, HSG C
	0.089	96	Gravel surface, HSG C
	0.484	70	Woods, Good, HSG C
	0.617	76	Weighted Average
	0.573		92.87% Pervious Area
	0.044		7.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	650		1.81		**Direct Entry, Minimum Tc**

Summary for Link DP-1: Offsite to E'ly Wetlands

Inflow Area = 811,523 sf, 0.00% Impervious, Inflow Depth > 0.80" for 2 yr event
Inflow = 10.09 cfs @ 12.35 hrs, Volume= 54,277 cf
Primary = 10.09 cfs @ 12.35 hrs, Volume= 54,277 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Stiles Lake

Inflow Area = 403,888 sf, 0.00% Impervious, Inflow Depth > 0.81" for 2 yr event
Inflow = 7.04 cfs @ 12.15 hrs, Volume= 27,125 cf
Primary = 7.04 cfs @ 12.15 hrs, Volume= 27,125 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Discharge near Culvert Crossing

Inflow Area = 26,877 sf, 7.13% Impervious, Inflow Depth > 1.01" for 2 yr event
Inflow = 0.70 cfs @ 12.10 hrs, Volume= 2,270 cf
Primary = 0.70 cfs @ 12.10 hrs, Volume= 2,270 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs

Summary for Subcatchment 1S: EDA-1

Runoff = 0.03 cfs @ 15.78 hrs, Volume= 791 cf, Depth> 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr First Flush Rainfall=1.00"

	Area (ac)	CN	Description
	0.536	96	Gravel surface, HSG C
	11.402	70	Woods, Good, HSG C
	6.413	73	Woods, Fair, HSG C
*	0.279	77	Wooded Wetlands, HSG C
	18.630	72	Weighted Average
	18.630		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	92	0.0900	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.00"
1.3	702	0.1000	9.27	27.80	**Channel Flow, B-C, Ditch** Area= 3.0 sf Perim= 10.5' r= 0.29' n= 0.022 Earth, clean & straight
0.8	325	0.0600	7.18	21.53	**Channel Flow, C-D, Ditch** Area= 3.0 sf Perim= 10.5' r= 0.29' n= 0.022 Earth, clean & straight
1.4	570	0.0500	6.55	19.66	**Channel Flow, D-E, Ditch** Area= 3.0 sf Perim= 10.5' r= 0.29' n= 0.022 Earth, clean & straight
0.7	340	0.0700	7.75	23.26	**Channel Flow, E-F, Ditch** Area= 3.0 sf Perim= 10.5' r= 0.29' n= 0.022 Earth, clean & straight
0.4	108	0.0200	4.14	12.43	**Channel Flow, F-G, Ditch** Area= 3.0 sf Perim= 10.5' r= 0.29' n= 0.022 Earth, clean & straight
2.8	170	0.0400	1.00		**Shallow Concentrated Flow, G-H** Woodland Kv= 5.0 fps
4.3	383	0.0900	1.50		**Shallow Concentrated Flow, H-I** Woodland Kv= 5.0 fps
23.1	2,690	Total			

Summary for Subcatchment 2S: EDA-2

Runoff = 0.01 cfs @ 15.55 hrs, Volume= 400 cf, Depth> 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr First Flush Rainfall=1.00"

	Area (ac)	CN	Description
	2.690	70	Woods, Good, HSG C
	6.090	73	Woods, Fair, HSG C
*	0.492	77	Wooded Wetlands, HSG C
	9.272	72	Weighted Average
	9.272		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.3000	0.19		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.00"
0.8	140	0.3300	2.87		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
4.3	365	0.0800	1.41		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
9.4	555	Total			

Summary for Subcatchment 3S: EDA-3

Runoff = 0.00 cfs @ 12.49 hrs, Volume= 86 cf, Depth> 0.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr First Flush Rainfall=1.00"

	Area (ac)	CN	Description
*	0.044	98	Roadway, HSG C
	0.089	96	Gravel surface, HSG C
	0.484	70	Woods, Good, HSG C
	0.617	76	Weighted Average
	0.573		92.87% Pervious Area
	0.044		7.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	650		1.81		**Direct Entry, Minimum Tc**

Summary for Link DP-1: Offsite to E'ly Wetlands

Inflow Area = 811,523 sf, 0.00% Impervious, Inflow Depth > 0.01" for First Flush event
Inflow = 0.03 cfs @ 15.78 hrs, Volume= 791 cf
Primary = 0.03 cfs @ 15.78 hrs, Volume= 791 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Stiles Lake

Inflow Area = 403,888 sf, 0.00% Impervious, Inflow Depth > 0.01" for First Flush event
Inflow = 0.01 cfs @ 15.55 hrs, Volume= 400 cf
Primary = 0.01 cfs @ 15.55 hrs, Volume= 400 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Discharge near Culvert Crossing

Inflow Area = 26,877 sf, 7.13% Impervious, Inflow Depth > 0.04" for First Flush event
Inflow = 0.00 cfs @ 12.49 hrs, Volume= 86 cf
Primary = 0.00 cfs @ 12.49 hrs, Volume= 86 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs

Time span=1.00-24.00 hrs, dt=0.01 hrs, 2301 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 1S: EDA-1 Runoff Area=18.630 ac 0.00% Impervious Runoff Depth>1.81"
Flow Length=2,690' Tc=23.1 min CN=72 Runoff=24.65 cfs 122,413 cf

Subcatchment 2S: EDA-2 Runoff Area=9.272 ac 0.00% Impervious Runoff Depth>1.82"
Flow Length=555' Tc=9.4 min CN=72 Runoff=17.25 cfs 61,133 cf

Subcatchment 3S: EDA-3 Runoff Area=0.617 ac 7.13% Impervious Runoff Depth>2.13"
Flow Length=650' Tc=6.0 min CN=76 Runoff=1.53 cfs 4,764 cf

Link DP-1: Offsite to E'ly Wetlands Inflow=24.65 cfs 122,413 cf
Primary=24.65 cfs 122,413 cf

Link DP-2: Stiles Lake Inflow=17.25 cfs 61,133 cf
Primary=17.25 cfs 61,133 cf

Link DP-3: Discharge near Culvert Crossing Inflow=1.53 cfs 4,764 cf
Primary=1.53 cfs 4,764 cf

Total Runoff Area = 1,242,288 sf Runoff Volume = 188,311 cf Average Runoff Depth = 1.82"
99.85% Pervious = 1,240,371 sf 0.15% Impervious = 1,917 sf

Time span=1.00-24.00 hrs, dt=0.01 hrs, 2301 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 1S: EDA-1 Runoff Area=18.630 ac 0.00% Impervious Runoff Depth>2.42"
Flow Length=2,690' Tc=23.1 min CN=72 Runoff=33.34 cfs 163,559 cf

Subcatchment 2S: EDA-2 Runoff Area=9.272 ac 0.00% Impervious Runoff Depth>2.43"
Flow Length=555' Tc=9.4 min CN=72 Runoff=23.35 cfs 81,664 cf

Subcatchment 3S: EDA-3 Runoff Area=0.617 ac 7.13% Impervious Runoff Depth>2.78"
Flow Length=650' Tc=6.0 min CN=76 Runoff=2.01 cfs 6,230 cf

Link DP-1: Offsite to E'ly Wetlands Inflow=33.34 cfs 163,559 cf
Primary=33.34 cfs 163,559 cf

Link DP-2: Stiles Lake Inflow=23.35 cfs 81,664 cf
Primary=23.35 cfs 81,664 cf

Link DP-3: Discharge near Culvert Crossing Inflow=2.01 cfs 6,230 cf
Primary=2.01 cfs 6,230 cf

Total Runoff Area = 1,242,288 sf Runoff Volume = 251,453 cf Average Runoff Depth = 2.43"
99.85% Pervious = 1,240,371 sf 0.15% Impervious = 1,917 sf

Time span=1.00-24.00 hrs, dt=0.01 hrs, 2301 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 1S: EDA-1 Runoff Area=18.630 ac 0.00% Impervious Runoff Depth>3.39"
Flow Length=2,690' Tc=23.1 min CN=72 Runoff=47.10 cfs 229,265 cf

Subcatchment 2S: EDA-2 Runoff Area=9.272 ac 0.00% Impervious Runoff Depth>3.40"
Flow Length=555' Tc=9.4 min CN=72 Runoff=32.96 cfs 114,446 cf

Subcatchment 3S: EDA-3 Runoff Area=0.617 ac 7.13% Impervious Runoff Depth>3.81"
Flow Length=650' Tc=6.0 min CN=76 Runoff=2.76 cfs 8,536 cf

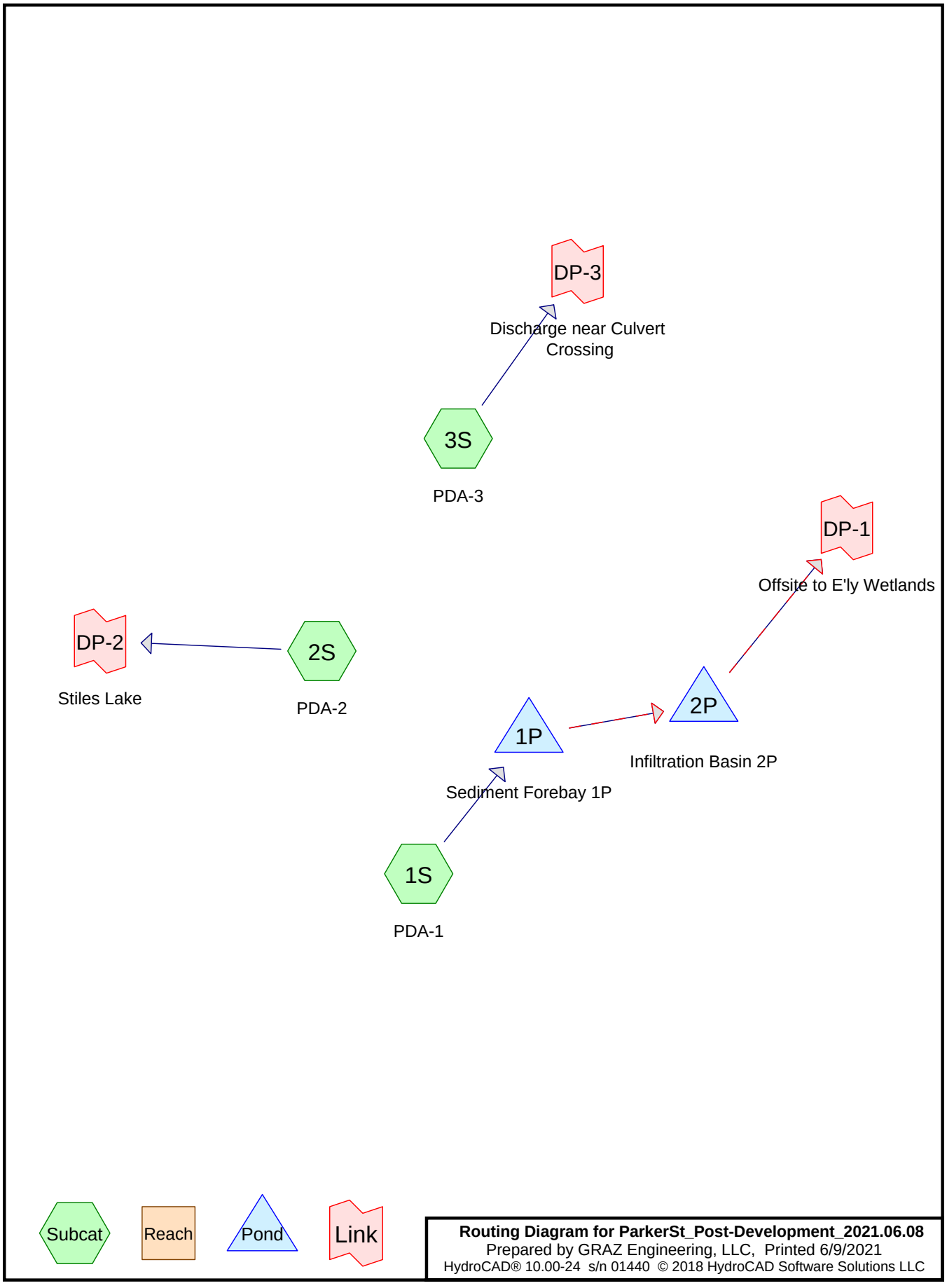
Link DP-1: Offsite to E'ly Wetlands Inflow=47.10 cfs 229,265 cf
Primary=47.10 cfs 229,265 cf

Link DP-2: Stiles Lake Inflow=32.96 cfs 114,446 cf
Primary=32.96 cfs 114,446 cf

Link DP-3: Discharge near Culvert Crossing Inflow=2.76 cfs 8,536 cf
Primary=2.76 cfs 8,536 cf

Total Runoff Area = 1,242,288 sf Runoff Volume = 352,246 cf Average Runoff Depth = 3.40"
99.85% Pervious = 1,240,371 sf 0.15% Impervious = 1,917 sf

POST-DEVELOPMENT CONDITIONS



Routing Diagram for ParkerSt_Post-Development_2021.06.08
Prepared by GRAZ Engineering, LLC, Printed 6/9/2021

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
297,907	74	>75% Grass cover, Good, HSG C (1S, 2S, 3S)
16,596	96	Gravel surface, HSG C (1S)
14,157	98	Paved Roadway, HSG C (3S)
40,915	98	Pavement & Roofs, HSG C (1S, 2S)
33,585	77	Wooded Wetlands, HSG C (1S, 2S)
397,790	73	Woods, Fair, HSG C (1S, 2S)
440,652	70	Woods, Good, HSG C (1S, 2S)
1,241,604	**74**	**TOTAL AREA**

Summary for Subcatchment 1S: PDA-1

Runoff = 11.36 cfs @ 12.37 hrs, Volume= 61,012 cf, Depth= 0.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-32.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.00"

	Area (ac)	CN	Description
*	0.849	98	Pavement & Roofs, HSG C
	0.381	96	Gravel surface, HSG C
	3.807	74	>75% Grass cover, Good, HSG C
	8.033	70	Woods, Good, HSG C
	5.157	73	Woods, Fair, HSG C
*	0.279	77	Wooded Wetlands, HSG C
	18.506	74	Weighted Average
	17.657		95.41% Pervious Area
	0.849		4.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	92	0.0400	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.00"
1.3	702	0.1000	9.33	27.98	**Channel Flow, B-C, Ditch** Area= 3.0 sf Perim= 10.4' r= 0.29' n= 0.022 Earth, clean & straight
0.7	325	0.0600	7.22	21.67	**Channel Flow, C-D, Ditch** Area= 3.0 sf Perim= 10.4' r= 0.29' n= 0.022 Earth, clean & straight
0.7	250	0.0400	5.90	17.69	**Channel Flow, D-E, Ditch** Area= 3.0 sf Perim= 10.4' r= 0.29' n= 0.022 Earth, clean & straight
0.5	211	0.0300	6.71	73.82	**Channel Flow, E-F, Swale** Area= 11.0 sf Perim= 20.9' r= 0.53' n= 0.025 Earth, clean & winding
0.7	462	0.0700	11.65	128.15	**Channel Flow, F-G, Swale** Area= 11.0 sf Perim= 20.9' r= 0.53' n= 0.022 Earth, clean & straight
0.3	135	0.0400	8.81	96.87	**Channel Flow, G-H, Swale** Area= 11.0 sf Perim= 20.9' r= 0.53' n= 0.022 Earth, clean & straight
4.4	372	0.0800	1.41		**Shallow Concentrated Flow, J-K, Wetland** Woodland Kv= 5.0 fps
24.3	2,549	Total			

Summary for Subcatchment 2S: PDA-2

Runoff = 7.48 cfs @ 12.14 hrs, Volume= 28,427 cf, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-32.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.00"

	Area (sf)	CN	Description
*	3,933	98	Pavement & Roofs, HSG C
	108,639	74	>75% Grass cover, Good, HSG C
	90,735	70	Woods, Good, HSG C
	173,151	73	Woods, Fair, HSG C
*	21,432	77	Wooded Wetlands, HSG C
	397,890	73	Weighted Average
	393,957		99.01% Pervious Area
	3,933		0.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.3000	0.19		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.00"
0.8	140	0.3300	2.87		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
4.3	365	0.0800	1.41		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
9.4	555	Total			

Summary for Subcatchment 3S: PDA-3

Runoff = 1.46 cfs @ 12.09 hrs, Volume= 4,532 cf, Depth= 1.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-32.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.00"

	Area (ac)	CN	Description
*	0.325	98	Paved Roadway, HSG C
	0.538	74	>75% Grass cover, Good, HSG C
	0.863	83	Weighted Average
	0.538		62.34% Pervious Area
	0.325		37.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	650		1.81		**Direct Entry, Minimum Tc**

Summary for Pond 1P: Sediment Forebay 1P

Inflow Area = 806,121 sf, 4.59% Impervious, Inflow Depth = 0.91" for 2 yr event
Inflow = 11.36 cfs @ 12.37 hrs, Volume= 61,012 cf
Outflow = 11.32 cfs @ 12.40 hrs, Volume= 58,634 cf, Atten= 0%, Lag= 1.4 min
Primary = 11.32 cfs @ 12.40 hrs, Volume= 58,634 cf
Secondary = 0.00 cfs @ 1.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 1.00-32.00 hrs, dt= 0.01 hrs
Peak Elev= 860.84' @ 12.40 hrs Surf.Area= 2,590 sf Storage= 3,598 cf
Flood Elev= 862.00' Surf.Area= 3,456 sf Storage= 5,594 cf

Plug-Flow detention time= 31.2 min calculated for 58,634 cf (96% of inflow)
Center-of-Mass det. time= 10.1 min (893.3 - 883.2)

Volume	Invert	Avail.Storage	Storage Description
#1	857.80'	5,594 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
857.80	0	0	0
858.00	416	42	42
859.00	804	610	652
860.00	1,588	1,196	1,848
861.00	2,784	2,186	4,034
861.50	3,456	1,560	5,594

Device	Routing	Invert	Outlet Devices
#1	Primary	860.30'	**143.1 deg x 8.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.47 (C= 3.09)
#2	Secondary	861.30'	**12.0' 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

Primary OutFlow Max=11.32 cfs @ 12.40 hrs HW=860.84' TW=858.30' (Dynamic Tailwater)
↑—**1=Sharp-Crested Vee/Trap Weir** (Weir Controls 11.32 cfs @ 2.19 fps)

Secondary OutFlow Max=0.00 cfs @ 1.00 hrs HW=857.80' TW=856.50' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2P: Infiltration Basin 2P

Inflow Area = 806,121 sf, 4.59% Impervious, Inflow Depth = 0.87" for 2 yr event
Inflow = 11.32 cfs @ 12.40 hrs, Volume= 58,634 cf
Outflow = 7.99 cfs @ 12.66 hrs, Volume= 57,161 cf, Atten= 29%, Lag= 15.7 min
Discarded = 0.05 cfs @ 12.66 hrs, Volume= 2,628 cf
Primary = 7.94 cfs @ 12.66 hrs, Volume= 54,533 cf
Secondary = 0.00 cfs @ 1.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 1.00-32.00 hrs, dt= 0.01 hrs
Peak Elev= 858.68' @ 12.66 hrs Surf.Area= 8,673 sf Storage= 11,008 cf
Flood Elev= 862.30' Surf.Area= 30,981 sf Storage= 57,262 cf

Plug-Flow detention time= 63.6 min calculated for 57,161 cf (97% of inflow)
Center-of-Mass det. time= 49.7 min (943.0 - 893.3)

Volume	Invert	Avail.Storage	Storage Description
#1	856.50'	57,262 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
856.50	0	0	0
857.00	2,211	553	553
858.00	7,592	4,902	5,454
859.00	9,175	8,384	13,838
860.00	10,816	9,996	23,833
861.00	12,512	11,664	35,497
862.00	16,710	14,611	50,108
862.30	30,981	7,154	57,262

Device	Routing	Invert	Outlet Devices
#1	Primary	851.20'	**18.0" Round Culvert** L= 74.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 851.20' / 850.00' S= 0.0162 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	857.30'	**70.0 deg x 1.50' rise Sharp-Crested Vee/Trap Weir X 2.00** Cv= 2.52 (C= 3.15)
#3	Device 1	860.60'	**1.2" x 7.3" Horiz. Orifice/Grate X 3.00 columns** X 11 rows C= 0.600 in 25.7" x 25.7" Grate (44% open area) Limited to weir flow at low heads
#4	Secondary	860.60'	**170.5 deg x 5.0' long x 1.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.46 (C= 3.08)
#5	Discarded	856.50'	**0.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 12.66 hrs HW=858.68' (Free Discharge)
└**5=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=7.93 cfs @ 12.66 hrs HW=858.68' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 7.93 cfs of 22.08 cfs potential flow)
  ├**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 7.93 cfs @ 2.96 fps)
  └**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 1.00 hrs HW=856.50' TW=0.00' (Dynamic Tailwater)
└**4=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Link DP-1: Offsite to E'ly Wetlands

Inflow Area = 806,121 sf, 4.59% Impervious, Inflow Depth = 0.81" for 2 yr event
Inflow = 7.94 cfs @ 12.66 hrs, Volume= 54,533 cf
Primary = 7.94 cfs @ 12.66 hrs, Volume= 54,533 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-32.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Stiles Lake

Inflow Area = 397,890 sf, 0.99% Impervious, Inflow Depth = 0.86" for 2 yr event
Inflow = 7.48 cfs @ 12.14 hrs, Volume= 28,427 cf
Primary = 7.48 cfs @ 12.14 hrs, Volume= 28,427 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-32.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Discharge near Culvert Crossing

Inflow Area = 37,592 sf, 37.66% Impervious, Inflow Depth = 1.45" for 2 yr event
Inflow = 1.46 cfs @ 12.09 hrs, Volume= 4,532 cf
Primary = 1.46 cfs @ 12.09 hrs, Volume= 4,532 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-32.00 hrs, dt= 0.01 hrs

Time span=1.00-32.00 hrs, dt=0.01 hrs, 3101 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 1S: PDA-1 Runoff Area=18.506 ac 4.59% Impervious Runoff Depth=1.97"
Flow Length=2,549' Tc=24.3 min CN=74 Runoff=26.24 cfs 132,496 cf

Subcatchment 2S: PDA-2 Runoff Area=397,890 sf 0.99% Impervious Runoff Depth=1.90"
Flow Length=555' Tc=9.4 min CN=73 Runoff=17.78 cfs 62,856 cf

Subcatchment 3S: PDA-3 Runoff Area=0.863 ac 37.66% Impervious Runoff Depth=2.73"
Flow Length=650' Tc=6.0 min CN=83 Runoff=2.75 cfs 8,538 cf

Pond 1P: Sediment Forebay 1P Peak Elev=861.19' Storage=4,578 cf Inflow=26.24 cfs 132,496 cf
Primary=26.13 cfs 130,118 cf Secondary=0.00 cfs 0 cf Outflow=26.13 cfs 130,118 cf

Pond 2P: Infiltration Basin 2P Peak Elev=859.88' Storage=22,534 cf Inflow=26.13 cfs 130,118 cf
Discarded=0.07 cfs 2,943 cf Primary=18.59 cfs 125,667 cf Secondary=0.00 cfs 0 cf Outflow=18.66 cfs 128,610 cf

Link DP-1: Offsite to E'ly Wetlands Inflow=18.59 cfs 125,667 cf
Primary=18.59 cfs 125,667 cf

Link DP-2: Stiles Lake Inflow=17.78 cfs 62,856 cf
Primary=17.78 cfs 62,856 cf

Link DP-3: Discharge near Culvert Crossing Inflow=2.75 cfs 8,538 cf
Primary=2.75 cfs 8,538 cf

Total Runoff Area = 1,241,604 sf Runoff Volume = 203,890 cf Average Runoff Depth = 1.97"
95.56% Pervious = 1,186,531 sf 4.44% Impervious = 55,072 sf

Time span=1.00-32.00 hrs, dt=0.01 hrs, 3101 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 1S: PDA-1 Runoff Area=18.506 ac 4.59% Impervious Runoff Depth=2.61"
Flow Length=2,549' Tc=24.3 min CN=74 Runoff=35.00 cfs 175,049 cf

Subcatchment 2S: PDA-2 Runoff Area=397,890 sf 0.99% Impervious Runoff Depth=2.52"
Flow Length=555' Tc=9.4 min CN=73 Runoff=23.88 cfs 83,491 cf

Subcatchment 3S: PDA-3 Runoff Area=0.863 ac 37.66% Impervious Runoff Depth=3.45"
Flow Length=650' Tc=6.0 min CN=83 Runoff=3.47 cfs 10,798 cf

Pond 1P: Sediment Forebay 1P Peak Elev=861.34' Storage=5,071 cf Inflow=35.00 cfs 175,049 cf
Primary=34.60 cfs 172,554 cf Secondary=0.30 cfs 118 cf Outflow=34.89 cfs 172,671 cf

Pond 2P: Infiltration Basin 2P Peak Elev=860.66' Storage=31,329 cf Inflow=34.89 cfs 172,671 cf
Discarded=0.07 cfs 3,125 cf Primary=23.21 cfs 167,937 cf Secondary=0.25 cfs 90 cf Outflow=23.53 cfs 171,153 cf

Link DP-1: Offsite to E'ly Wetlands Inflow=23.45 cfs 168,027 cf
Primary=23.45 cfs 168,027 cf

Link DP-2: Stiles Lake Inflow=23.88 cfs 83,491 cf
Primary=23.88 cfs 83,491 cf

Link DP-3: Discharge near Culvert Crossing Inflow=3.47 cfs 10,798 cf
Primary=3.47 cfs 10,798 cf

Total Runoff Area = 1,241,604 sf Runoff Volume = 269,338 cf Average Runoff Depth = 2.60"
95.56% Pervious = 1,186,531 sf 4.44% Impervious = 55,072 sf

Time span=1.00-32.00 hrs, dt=0.01 hrs, 3101 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 1S: PDA-1 Runoff Area=18.506 ac 4.59% Impervious Runoff Depth=3.61"
Flow Length=2,549' Tc=24.3 min CN=74 Runoff=48.71 cfs 242,484 cf

Subcatchment 2S: PDA-2 Runoff Area=397,890 sf 0.99% Impervious Runoff Depth=3.51"
Flow Length=555' Tc=9.4 min CN=73 Runoff=33.46 cfs 116,313 cf

Subcatchment 3S: PDA-3 Runoff Area=0.863 ac 37.66% Impervious Runoff Depth=4.56"
Flow Length=650' Tc=6.0 min CN=83 Runoff=4.54 cfs 14,278 cf

Pond 1P: Sediment Forebay 1P Peak Elev=861.56' Storage=5,594 cf Inflow=48.71 cfs 242,484 cf
Primary=45.44 cfs 235,452 cf Secondary=4.22 cfs 4,654 cf Outflow=49.01 cfs 240,106 cf

Pond 2P: Infiltration Basin 2P Peak Elev=861.18' Storage=37,856 cf Inflow=49.01 cfs 240,106 cf
Discarded=0.08 cfs 3,360 cf Primary=25.85 cfs 219,993 cf Secondary=14.52 cfs 15,223 cf Outflow=40.46 cfs 238,576 cf

Link DP-1: Offsite to E'ly Wetlands Inflow=40.38 cfs 235,216 cf
Primary=40.38 cfs 235,216 cf

Link DP-2: Stiles Lake Inflow=33.46 cfs 116,313 cf
Primary=33.46 cfs 116,313 cf

Link DP-3: Discharge near Culvert Crossing Inflow=4.54 cfs 14,278 cf
Primary=4.54 cfs 14,278 cf

Total Runoff Area = 1,241,604 sf Runoff Volume = 373,074 cf Average Runoff Depth = 3.61"
95.56% Pervious = 1,186,531 sf 4.44% Impervious = 55,072 sf