NOTICE OF INTENT **EXHIBIT 6**

STORMWATER MANAGEMENT REPORT

ETHAN CIRCLE SUBDIVISION

SOUTH HADLEY, MA

Applicant:
Ethan Bagg

Prepared by:

Shawn K. Kimberley, P.E.
S. K. Kimberley Engineering
309 Thompson Road
Colrain, MA 01340
&
Charles H. Dauchy
Environmental Consultant
24 Old Long Plain Rd.
Leverett, MA 01054

1/20/14

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for
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SUMMARY:

The project is a single family subdivision of 8 lots, including two existing homes, on a proposed cul-de-sac off of Hadley Street, between existing house # 57 and #61. The Stormwater Management System consists of deep-sump catch basins that collect runoff, to be piped to a proposed infiltration/detention basin. Two small rain-gardens are also proposed to provide additional recharge and runoff control. The stormwater management system complies with DEP standards in preventing increases in peak runoff, providing for groundwater recharge, removing pollutants, controlling erosion and sediment during construction, and providing for long-term management.

EXISTING CONDITIONS:

Land Use and vegetative cover: Except for the two existing house lots fronting on Hadley Street, the area is currently forested. The forest vegetation is predominantly deciduous, with understory shrubs and vines, dispersed ground cover of ferns, seedlings, and herbaceous growth, and detrital litter and debris.

Soils: The soils on the site have been mapped by the USDA. Our field investigations confirm the general character of the mapped soils, but we have adjusted the mapped boundaries based on our soils investigations and detailed topographic mapping. Adjusted soil boundaries and map codes are shown on the accompanying tributary area maps. The soil series present are all formed on glacial outwash materials. The difference in hydrologic characteristics is due to both the soil texture and the depth to underlying silty soils and the water table. Windsor loamy sand (Wo) is excessively drained and rated as Hydrologic Soil Group (HSG) “A”, with little direct runoff except in major storms. Agawam fine sandy loam (Ag) soil is well drained and rated as HSG B, yeilding somewhat higher runoff rates. Amostown fine sandy loam (Am) is moderately well drained, with underlying silty material closer to the surface. It is rated as HSG C, with relatively high runoff rate. A small area of wetland in the southeast corner of the property is typically saturated and we have mapped that area as HSG D.

Hydrologic Setting: (See Tributary Area Maps - 2 pages) Drainage from the site flows in four different directions. The central and eastern portions of the site drain to a wetland along the easterly property line. A smaller area in the northwest drains to the northwest boundary. The front of the existing houses drains to Hadley Street, while a small area in the northeast drains to the abutting lots to the north. There is very little off-site area that drains onto or through the site.

PROPOSED CONDITIONS AND STORMWATER MANAGEMENT SYSTEM:

Low Impact Development:
The use of “Low Impact Development” practices is limited by both the Town’s zoning and subdivision regulations, and by the topography and soils of the site. The Town of South Hadley

Zoning Bylaw provides for a “Flexible Development” which can allow for flexibility from the normal zoning lot sizes and configurations, and from standard subdivision design standards. However, this provision is limited to sites of 5 acres or larger. The site in question is 3.624 acres, and therefore not eligible for “Flexible Development” under the town’s zoning. A preliminary plan for the proposed subdivision was approved in 2007, prior to the LID requirement in the Mass. Stormwater Standards.

Although slopes and limited yard areas on the lots make use of on-lot rain-gardens or direction of runoff over “qualifying pervious areas” difficult, two rain-gardens are proposed where site conditions allow. Favorable soils and groundwater depth in the northeastern portion of the site allow an infiltration/detention basin that provides groundwater recharge in excess of Stormwater Management requirements.

Of the total project area of 158,667 sq. ft., approximately 36,133 sq.ft., or 22.77% will be impervious. This is over the 15% limit for Environmentally Sensitive Development credit and does not qualify for the credit.

Stormwater Management System Summary:
Runoff from most of the lots and roofs, and all but 15 ft. of the roadway is captured in deep-sump catch basins and routed through a conventional storm drain system to the infiltration/detention basin. A forebay provides pre-treatment by removal of coarser sediments before flows reach the basin. The lowest 0.3 ft. of the basin provides final water quality treatment by infiltration and also provides groundwater recharge in excess of DEP requirements. Above that level, flows are controlled by a 6" diameter control orifice and 12" diameter high-level standpipe overflow for large storms. The outlet structure is designed with the 6" control orifice at the bottom of a submerged pipe “T” which protects the orifice from clogging by floating debris. The discharge from the detention basin is directed to a stone spreader to assure that flows are dispersed and non-erosive.

Runoff to Hadley Street is reduced slightly by reduction of the tributary area that compensates for the added impervious surface of the new street entrance. Runoff to the north is calculated as zero (below the limit of estimates) because of the highly permeable soils and reduction in the tributary area. In the northwest, the tributary area is reduced and two rain-gardens provide additional runoff control, keeping proposed runoff rates to abutting properties below existing.

DESIGN CRITERIA

Detention Basin: No increase in peak discharge for 2 through 100 year storms. Embankment slopes 4:1 interior and 3:1 exterior. Maximum depth in 100 year storm = 1.5 ft. Groundwater separation 3 feet or more, based on 4 deep observation holes.

Forebay: volume over 0.1 inch of runoff from tributary impervious surfaces

Water quality treatment: over 80% TSS removal for over 0.5" of runoff from impervious surfaces, by deep-sump-catchbasins, forebay and infiltration.

Groundwater Recharge: 1127 cu. ft. required. 1456 cu. ft. is provided by the main infiltration basin, with an additional 498 cu. ft. provided by the two rain gardens. Infiltration calculations

for recharge are based on the “Static” method. Drain time for the infiltration basin is less than 72 hours (estimated 3.6 hours). Assumed infiltration rate = 1 in./hr, allowing for compaction due to use of the basin as lawn and yard area. Capture area of the main infiltration basin includes 93.7% of all new impervious surfaces, far exceeding the DEP requirement of 65%. When the rain-gardens are considered, the capture area is 100%

DESIGN METHODOLOGY:

For watershed modeling and design of the detention/infiltration basin, Natural Resource Conservation Service methods, based on TR-55 and TR-20, were followed using the "HydroCad" computer program (ver. 10.0 build 10), an adaptation of SCS TR-20 and TR-55 methods. The drainage basin characteristics of Curve Number (CN) and time of concentration (Tc) are described and calculated based on NRCS methodology. To facilitate calculations, a separate spreadsheet was used for Tc and area calculations, which was then input to the HydroCad model. Appendix E provides the principal calculations normally needed for review. Summaries are provided for the 2 and 10 year storms. Detail of parameters used for the model are provided in the section on the 100 year storm. All input parameters for the model nodes are the same except for the rainfall. If additional information or the Hydrocad computer model are needed for review, please contact Charles H. Dauchy at 413-548-8005 or cdauchy@wildblue.net

COMPLIANCE WITH DEP STANDARDS:

The project design complies fully with MA DEP stormwater management standards, as summarized below.

1. *No new untreated discharge or erosion*: The new point source discharge from the project will receive over 80% TSS removal for water quality treatment in compliance with DEP guidelines. Erosion controls will be implemented during construction to prevent sediment discharge from the site (see Appendix C and plans). The flow rate from the detention basin to the upland swale leading to the wetland is lower than under current conditions, and the discharge is dispersed by a stone spreader, eliminating erosion hazard.

2. *Post-development peak discharge rates do not exceed pre-development*: Proposed peak flows from the site are reduced compared to existing flows as summarized below:

Rainfall return period:		2 yr	10 yr	100 yr
To southeast property line & wetland:				
Existing-	ESUM2	0.60 cfs	1.59 cfs	3.23 cfs
Proposed-	PSUM2	0.42 cfs	1.50 cfs	2.61 cfs
To northwest property line:				
Existing -	ESUM3	0.11 cfs	0.51 cfs	1.24 cfs
Proposed-	PSUM3	0.10 cfs	0.47 cfs	1.00 cfs
To northeast property line				
Existing	E3	0.0 cfs	0.0 cfs	0.0 cfs
Proposed	P3	0.0 cfs	0.0 cfs	0.0 cfs
To Hadley Street				

Existing	E4	0.20 cfs	0.46 cfs	0.87 cfs
Proposed	P4	0.12 cfs	0.31 cfs	0.60 cfs

See Appendix E for Hydrocad model calculations of peak flows and detention.

3. *Annual recharge of groundwater should approximate current conditions*: The proposed recharge requirement is based on DEP's differential requirements for each hydrologic soil group and is tabulated in Appendix C, totaling 1127 cubic feet . The proposed infiltration basin provides 1456 cubic feet of volume below the outlet structure invert. The two rain-gardens provide an additional 498 cubic feet. Therefore, the recharge volume requirement is substantially exceeded

4. *80% Total Suspended Solids (TSS) removal*: All point source discharges from impervious surfaces are treated to remove over 80% of Total Suspended Solids (TSS). Runoff from most of the developed site and roadway is routed through the stormwater detention/infiltration basin. Treatment is provided by deep sump catch basins, a forebay, and infiltration. The required runoff volume to be treated is 1267 cu. ft.,based on 0.5" of runoff over 30412 sq. ft. of impervious tributary area. The infiltration volume provided is 1456 cu. ft. (infiltration below the detention basin outlet invert). Calculated TSS removal will be 85.0% (See Appendix C).

5. *Higher potential pollutant loadings prohibit certain practices*: Not Applicable

6. *Discharges to critical areas treat 1" of runoff and prohibit certain practices*: Not Applicable

7. *Redevelopment sites must meet standards to maximum extent practicable and improve existing conditions*: Not Applicable

8. *Construction related Impacts including Erosion and Sediment Controls must be implemented*: See Appendix B.
A detailed erosion and sediment control procedure is spelled out for the project on the Erosion & Sediment Control detail sheet. This includes a perimeter sediment barrier, temporary use of a partially excavated detention basin as a sediment basin, rough grading of lots to provide depressions for sediment capture, and interim seeding of rough graded lots for stabilization until final construction is done on the lots. Until construction is completed and all tributary areas are stabilized, frequent inspection and maintenance of the erosion controls is required. Construction period maintenance will be the responsibility of the site work contractor. A construction period "Stormwater Pollution Prevention Plan" (SWPPP) will be prepared and submitted by the ultimate developer and site contractor before any site work begins.

9. *Long Term Operation and Maintenance Plan required*: See Appendix A.
After construction, a minimum of annual inspection and maintenance of all system components is recommended. Post-construction maintenance of stormwater facilities in the public way will be the responsibility of the Town of South Hadley. Maintenance of stormwater facilities outside of the public way will be the responsibility of the homeowners' association. In compliance with the Town of South Hadley Stormwater Bylaw, an operation, maintenance, and inspection agreement will be submitted for approval before any site work.

The only vegetation management required is annual mowing of the detention/infiltration basin

and adjacent slopes to prevent development of large woody vegetation and maintain a good sod cover. Slopes to be mown are 3:1 or flatter, allowing safe mowing by tractor or riding mower. The basin is designed so that it can be maintained as lawn by the owner of Lot #5 if desired. The assumed infiltration rate makes allowance for compaction by regular mowing and foot traffic.
The forebay should be inspected at least annually in the spring and cleaned when sediment depth reaches 6". The stone level spreader at the detention basin outlet should also be inspected annually and repaired as needed.

With proper construction and maintenance, clogging of the infiltration surface of the detention basin is not expected to be a problem. However, if ponding persists in the basin for over 72 hours, the basin should be de-watered (pump to the stone spreader) and roto-tilled to restore the infiltration capacity, and reseeded.

10. *Illicit discharges prohibited*: No illicit discharges are known to exist on the site, and the proposed project has no potential sources of illicit discharge. Sanitary sewerage will be pumped to the municipal sewer system as shown on the plans. An Illicit Discharge Compliance Statement will be submitted to the South Hadley Conservation Commission prior to any discharge from the proposed stormwater management system.

APPENDIX A

LONG TERM OPERATION & MAINTENANCE PLAN

ETHAN CIRCLE SUBDIVISION

SOUTH HADLEY, MA

LONG TERM OPERATION AND MAINTENANCE PLAN **APPENDIX A**
FOR STORMWATER MANAGEMENT SYSTEM

ETHAN CIRCLE SUBDIVISION, SOUTH HADLEY, MA

OWNERS: For the street Right of Way - The Town of South Hadley (after acceptance)
For the Stormwater Basin - the Homeowners Association

RESPONSIBILITY: The Homeowners Association shall be responsible for effective operation and maintenance of stormwater management facilities and related parts of the site other than those within the Street Right of Way. The association may contract the required work to outside parties, but retains responsibility for effective maintenance. The responsible party shall maintain an operation and maintenance log for the last three years. Logs shall include inspections, repairs, replacement, and disposal. Records for disposal shall include type of material and disposal location.

PUBLIC SAFETY: The stormwater infiltration/detention basin is designed to avoid potential safety hazards. The side slopes within the stormwater basin are 4 horizontal to 1 vertical. This is flatter than the DEP standard of 3 horizontal to 1 vertical, which is flat enough for mowing by riding mower or tractor and does not present a hazard of "falling in". The maximum prolonged ponding depth is less than 4" for less than 4 hours. Maximum depth in a 100 year storm is 1.5 feet. No fencing should be required.

MAINTENANCE TASKS and BUDGET - ROUTINE AND NON-ROUTINE:

SYSTEM COMPONENT	WHEN NEEDED	REQUIRED MAINTENANCE	ESTIMATED COST - 2009 $
Infiltration Basin (below elev 93.8)	If ponded over 72 hours after end of rainfall	Pump to outlet spreader to de-water. Rototill basin surface, re-seed, and mulch.	$1000/occurrence
	Typically, every 10 yrs, if needed - (when average grade in basin bottom is 93.6 or higher)	-Remove accumulated sediment to design grade. Rototill, reseed and mulch. -Avoid traffic on basin during wet conditions	$3000/occurrence
Detention Basin	After major storms	Check for prolonged ponding above outlet invert. Clear blockage if necessary	$30/inspection when combined with other inspections
	Annually, in the Fall or more frequently if uses as lawn.	-Mow basin, slopes, and fill embankment not shorter than 3". Remove debris.	$200/yr
Forebay	Annually in Spring	Inspect and clean-out when sediment 6" deep	$200/yr avg. cost

Stone in Forebay	Annually and after major rainfall	-Check for displacement of stone and repair as needed	$30/inspection when combined with other inspections
Stone Level Spreader	Annually, in Spring	-Check for displacement of stone and repair as needed	$30/inspection when combined with other inspections

LAWN AND LANDSCAPE MAINTENANCE: Use of fertilizers, herbicides, and pesticides will be at the discretion of individual lot owners and should be accordance with manufacturer's recommendations and regulatory requirements. All lawn or landscaped areas are over 50 feet from the wetlands.

SNOW PLOWING AND DISPOSAL: Snow plowing of the street will be done by the Town of South Hadley and snow will normally be plowed to the treebelt. Meltwater from snow in the street or on driveways will be routed through the stormwater management system.

PLAN OF STORMWATER MANAGEMENT SYSTEM: See project plans.

SAMPLE DRAFT - OPERATION AND MAINTENANCE LOG FORM:

ETHAN CIRCLE, SOUTH HADLEY, MA

SYSTEM COMPONENT	WHEN NEEDED	REQUIRED MAINTENANCE	COMMENTS, DATE DONE, BY WHOM
Infiltration Basin (below elev 93.8)	If ponded over 72 hours after end of rainfall	Pump to outlet culvert to de-water. Rototill basin surface, re-seed, and mulch.	
	Typically, every 10 yrs, if needed - (when average grade in basin bottom is 93.6 or higher)	-Remove accumulated sediment to design grade. Rototill, reseed and mulch. -Avoid traffic on basin during wet conditions	
Detention Basin	After major storms	Check for prolonged ponding above outlet inverts. Clear blockage if necessary	
	Annually, in the Fall	-Mow basin, slopes, and fill embankment not shorter than 3". Remove debris.	
Forebay	Annually in Spring	Inspect and clean-out when sediment 6" deep	
Stone in Forebay	Annually and after major rainfall	-Check for displacement of stone and repair as needed	
Level Spreader	Annually, in Spring	-Check for displacement of stone and repair as needed	

APPENDIX B

CONSTRUCTION PERIOD POLLUTION PREVENTION & EROSION/SEDIMENTATION CONTROL PLAN

ETHAN CIRCLE, SOUTH HADLEY, MA

CONSTRUCTION PERIOD POLLUTION PREVENTION & EROSION/SEDIMENTATION CONTROL PLAN ETHAN CIRCLE SUBDIVISION SOUTH HADLEY, MA.

CONTENTS:

CONSTRUCTION PERIOD POLLUTION PREVENTION & EROSION & SEDIMENTATION CONTROL PLAN ETHAN CIRCLE SUBDIVISION, SOUTH HADLEY, MA.

1. INTRODUCTION:

This document and the referenced plans and reports are intended to provide guidance to the responsible party on site for protection of water quality in adjacent receiving water during construction of the project, and to be integrated with required Storm Water Pollution Prevention Plan (SWPPP) in compliance with the NPDES General Permit for Storm Water Discharge from Construction Sites, issued by US EPA. A full SWPPP will be filed with the South Hadley Conservation Commission before construction begins.

2. PROJECT OPERATOR AND RESPONSIBILITIES:

2.1 OPERATOR: The responsible "operator" for this project is that party that has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications. The operator for this project shall be designated on the USEPA eNOI "Notice of Intent", to be submitted to the USEPA. Land disturbance on the site may begin 14 days acknowledgment of receipt on the EPA wet site, http://www.epa.gov/npdes/stormwater/cgpnoisearch.

The Operator for the road way and utility construction, stormwater management construction and rough grading on lots will be determined prior to construction, and designated in the SWPPP.

Owner/operators of individual lots, not under control of the "operator" for the overall subdivision construction, are responsible for Submittal of their own "Notice of Intent", for preparation and execution of their own SWPPP for any work not covered by the final SWPPP, and for compliance with relevant portions of the SWPPP.

2.2 OPERATOR'S RESPONSIBILITIES:
The Operator shall install, maintain, and replace as necessary all measures for erosion control, sediment control, wetland protection, and water quality protection, throughout the site as is outlined in this document and shown on the drawings and in accordance with local, state, and federal wetlands and environmental regulations and permits. The Operator shall execute all work in such a manner as to prevent alteration or degradation of wetlands or buffer zones beyond designated work limit lines, including taking temporary or emergency measures as necessary.

The Operator shall assume all responsibility for compliance with the following permits and related regulations:

1. Orders of Conditions issued under the Mass. Wetlands Protection Act, including referenced Notice of Intent for the project.
2. Water Quality Certification requirements of the Mass. DEP. under Section 401 of the Clean Water Act. (Not expected to be applicable)
3. U.S. Army Corps of Engineers Programmatic General Permit under Section 404 of the Clean Water Act. (Not expected to be applicable)
4. NPDES General Permit for Storm Water Discharge from Construction Sites, issued by US EPA.

3. DESCRIPTION OF SITE AND ACTIVITIES:

3.1 PROJECT DESCRIPTION: The Ethan Circle Subdivision is an 8 lot single family residential subdivision (including 2 existing homes) located on approximately 3.624 acres. The undeveloped land consists predominantly of soils derived from glacial outwash, with a forest cover. Slopes on the site range from gentle to moderate. The site includes a small area of wetland which will not be disturbed.

The work includes the construction of approximately 380 linear feet of roadway, private sanitary pressure sewer, public water supply, a stormwater management system, other utilities, and the construction of 6 new single family homes and related site work on the lots. A 50 ft wide naturally vegetated buffer is maintained between all land disturbance and any wetlands or waters.

3.2 AREAS:

Total site area:	3.624± Acres
Total Land Disturbance:	2.685± Acres.
Total Impervious Area:	0.822± Acres

3.4 PLANS and DOCUMENTS: (to be available on-site during construction):

Plans will include Topography and Grading with Plan/Profile sheet, and Construction Details and Erosion/Sediment Control Details and specifications. Documents will include the "Notice of Intent" (under Mass. Wetlands Protection Act), with exhibits (including Stormwater Management Plan), and any "Order of Conditions" (Mass. Wetlands Protection Act).

3.5 POTENTIAL SOURCES OF STORMWATER POLLUTION DURING CONSTRUCTION

1. Exposed soils during site work and grading - temporarily susceptible to erosion and source of sediment until re-stabilized by construction or permanent vegetation.
2. Construction vehicle and equipment fueling and maintenance
3. Sanitary waste from construction crews
4. Concrete truck wash-water
5. Building site waste and trash
6. Sediment tracked onto pavement by vehicles
7. Fertilizer for lawn establishment
8. Paints, glues, cleaning solvents, and other construction related chemicals

4.0 STORMWATER MANAGEMENT CONTROLS:

4.1 PHASING OF WORK AREAS:

Due to the small size of the site (3.6 AC) and extent of grading required, the potential for phasing of disturbance within this subdivision phase is limited. Therefore the work will be in two basic phases as follows:

- Stormwater basin, roadway, drainage, and utilities, and rough grading of lots, with seeding of lots for interim vegetative cover and permanent seeding of treebelt and detention basin slopes.
- House construction on individual lots with finish grading and permanent vegetative cover.

4.2 GENERAL SEQUENCE OF WORK:

- Stakeout and review of clearing limits and perimeter sediment barrier locations.
- Clearing of work areas without stripping or grubbing.
  Installation of perimeter sediment barriers along perimeter work limit.
- Construction of detention basin to temporary bottom elevation 94.0, installation of outlet structure with skimmer, permanent seeding of cut slopes and embankment, and temporary seeding of basin bottom.
- Grubbing and stripping of ROW and grubbing of lots as needed, including loaming and seeding of disturbed areas on lots.
- Construction of roadway, drainage, and utilities, with temporary erosion controls and maintenance of erosion control measures, as site conditions require. Rough grading of entire site within work limits, including loaming and temporary seeding of rough-graded lots.
- Stabilization of areas disturbed for road construction and drainage.
- Clean-out of sediment accumulation in detention basins and removal temporary skimmer.
- Site development of individual lots, with erosion/sediment controls for each lot.

4.3 EROSION AND SEDIMENT CONTROL MEASURES:

Preconstruction notifications and meetings: No land disturbance associated with this project shall occur until 14 days after receipt of USEPA eNOI has been confirmed by the USEPA. No work shall be performed within 100 feet of any wetland area until any notification and pre-construction meeting requirements of the Order of Conditions under the Mass. Wetlands Protection Act have been completed. These requirements shall be the responsibility of the Operator to arrange, attend, and document.

Perimeter Sediment Barrier and Work Limit: Before installation of the sediment barriers, the location shall be staked in the field for review and approval by the engineer or their representative. To facilitate sediment barrier installation, woody vegetation may then be removed and any required trench may be cut by machine, provided other ground cover is left intact.

No excavation, grading, filling, or removal of vegetative ground cover shall be performed within 100 feet of any wetland or stream until perimeter sediment barriers have been installed as shown on plans and have been inspected by the engineer or their representative.

Perimeter sediment barriers located adjacent to wetland areas shall serve as the limit of work for this project. No construction, equipment traffic, stockpiles, removal of vegetation, or other alteration shall be permitted on the wetland side of the sediment barrier/work limit without the approval of the engineer or their representative and the municipal Conservation Commission,

Silt fence: The bottom of the fence shall be trenched into the ground a minimum of 4" and back-filled with compacted soil. Where trenching is not feasible, silt fence skirt shall be covered with compacted soil or washed stone. The top of the fabric shall be stretched as tightly as is practical, with intermediate stakes added to correct excessive sags. Stakes shall be driven at least 12" into the ground. Splices between sections shall be made by rolling end stakes together one complete turn and driving into the ground together.

Straw bales: Bales may be used as temporary and moveable control measures, temporary check dams, or as reinforcement for silt fence in areas of concentrated runoff or high fills. Bales shall be tightly butted and staked 12" into the ground, with joints stuffed with straw.

Filter Sock ("Filtrexx" or equivalent): In areas of expected sheet flow, filter sock may be placed directly on the ground without trenching or stakes. In areas of expected concentrated flow, filter sock shall be staked as required to prevent movement or floatation, and mulch or washed stone shall be placed along the up-slope face to filter underflow. Area for filter sock installation may be machine or hand prepared to provide best bonding of sock with soil.

Stone Construction Entrance: A "Stone construction entrance" or "tracking mat" shall be installed and maintained at any points where construction traffic from an unpaved construction road or site access enters onto the paved public way or a paved portion of the project roadway.

Stockpiles: There shall be a sediment barrier between any soil stockpile any wetland, waterway, swale, gutter, or drain inlet. The base of the stockpile shall be kept at least 10 feet from the barrier. Temporary

piles of trench spoil may be closer to the sediment barrier but shall not rest against the barrier. Soil expected to remain stockpiled for over 30 days shall be shaped to stable slopes and seeded or mulched for temporary cover. No stockpile shall be placed within a swale, drainage-way, or other path of concentrated surface runoff.

Temporary runoff controls: As site grading progresses, temporary erosion control measures shall be installed, maintained, and removed as necessary to control erosive accumulations of runoff or sediment discharge until final grade and cover are established. Temporary control measures may include sediment barriers, check dams, diversions, sediment basins, open-top culverts, and stone-lined swales.

Stocking additional materials: A stock of additional erosion control materials shall be maintained available on the site for emergency repairs and temporary measures. Stock shall be replenished when decreased to 50% of the numbers below. Stock shall include:

Straw-bales -	15 (Covered to be kept dry)
Oak stakes -	30
Silt fence -	100 linear feet.
Washed stone -	2 cubic yards, 3/4" to 1 ½" diameter
Filter fabric -	25± linear feet of 12 ft. Wide roll, or equivalent.

Trench protection: Open trenches shall be protected from accumulation of surface water or groundwater that could result in erosion of the trench and discharge of sediment. Where feasible, spoil shall be stockpiled on the up-slope side of the trench to prevent entrance of surface runoff. Backfill shall be crowned to allow for settlement and to avoid concentration of runoff on top of the trench.

Storm drain protection: The storm drain system shall be put into operation as soon as possible in order to control runoff within a non-erodible system. The storm drain system shall be protected against inflow of sediment. Open storm drain structures shall be protected by sediment barriers, filtrex filter socks, stone filter berms, or filter fabric inserts ("tea-bags", "silt-sacks" or equivalents). These measures shall be maintained until the tributary area is stabilized by pavement and vegetative cover. If CB grates are set above the base course of pavement, temporary asphalt berms or other measures may be required to direct runoff into the CB's.

Roadside slopes: Cut and fill slopes for roadway construction shall be finish graded, loamed, seeded, and mulched as soon as possible during road construction. This stabilization shall not await finish grading of roadway, tree-belts, or lots. Where necessary, temporary runoff controls will be provided to permit establishment of permanent vegetative cover.

Erosion control netting, mulch mats or Turf Reinforcement Mats shall be used on steep slopes or in swales if required to protect seeding until establishment. Materials shall be installed per manufacturers' recommendations and anchored by burial of edges, staples, or stakes, as applicable.

Site Stabilization - Temporary: Where a portion of the site will not be subject to construction activity for over 14 days, measures shall be taken to provide temporary stabilization of that inactive portion of the site, within 14 days of the cessation of construction activity. Stabilization measures may include seeding for temporary cover, mulching, or other measures to protect exposed soil from erosion and prevent

sediment movement.

Site Stabilization - Permanent: Within 14 days of completion of loaming and finish grading on any portion of the site, that area shall be seeded or planted for permanent cover in accordance with USDA NRCS guidelines or equivalent, season permitting.

Roadway Sweeping: The entrance to the site and affected portions of the public roadway or paved project roadway shall be swept as needed to control sediment runoff into storm drains or waterways and to control blowing dust.

4.4 WORK ON INDIVIDUAL LOTS:

Site work on individual lots shall be controlled so as to prevent sediment discharge to the roadway, wetlands, or abutting lots. Typical measures may include:

1. Sediment barrier along down-slope edge of graded areas.
2. Stone construction entrance on driveway cut.
3. Check dams across swales carrying concentrated runoff.
4. Temporary diversions to carry runoff around open construction site.
5. Stone-lined swales to carry concentrated runoff.

- Immediate temporary re-vegetation of slopes, prior to finish grading of yard and lawn.
- Curtain drainage or stone blanket to control seepage from cut slopes.
- Temporary piping of down-spout discharges across graded areas until lawn establishment.
- Water-bars or open-topped culverts on unpaved driveways to divert runoff to vegetated areas.

4.5 CONSTRUCTION PHASE HOUSE-KEEPING MEASURES:

- All vehicles on site will be monitored for leaks and receive regular preventive maintenance.
- Petroleum products will be stored in tightly sealed containers which are clearly labeled.
- Asphalt substances will be applied according to manufacturer's recommendations.
- Sanitary waste will be collected from portable units a minimum of weekly to avoid overfilling.
- A covered dumpster or appropriate trash container will be used for all waste materials.
- Concrete trucks will not be allowed to wash out chutes within 100 feet of any water way or wetland. Discharge of surplus concrete or drum wash is not permitted on site.
- Vehicle maintenance and fueling will not be allowed within 100 feet of any waterway or wetland.
- Fertilizer for lawn establishment and stabilization seeding will be applied in accordance with manufacturers instructions and will be incorporated into the soil or as part of a hydro seeding mulch or "Terraseeding" mix.
- Paints, Glues, cleaning solvents, and other construction related chemicals will be used in accordance with manufacturer's instructions. Residue and empty containers will be disposed of in closed containers for appropriate final off-site disposal.

4.6 POST-CONSTRUCTION STORMWATER MANAGEMENT:

See accompanying "Stormwater Management Report" for stormwater management design calculations, TSS removal calculations, Groundwater Recharge calculations, and post-construction

maintenance program. See Appendix B for Operation and Maintenance procedures.

5.0 INSPECTION AND MAINTENANCE PROCEDURES:

All cleared and/or graded areas of the site that have not been permanently stabilized shall be inspected by the Operator or their designated representative at least once every 7 days during construction, or at least once every 14 days and within 24 hours after any storm event of 0.25 inches or more. The inspections are intended to verify that erosion and sediment control measures are properly functioning, to identify any repairs or maintenance needed, and to identify actual or potential sources of sediment discharge and recommend corrective action. Inspections may be monthly if the ground is covered with snow and/or ice or is temporarily stabilized. Measures shall be kept in functioning condition until tributary areas are stabilized. Sediment will be removed from sediment barriers, check dams, swales, and sediment basins when it reaches 6" depth or half the depth of the structure, whichever is less. The inspector shall complete and sign an inspection report, including date, conditions noted, and corrective actions taken. Corrective actions or maintenance or maintenance on existing controls must be performed on the same day or next day after discovery that corrective action is required.

Inspections shall be performed by qualified personnel, knowledgeable in construction practices for erosion and sediment control. Inspectors shall be designated by the Operator or Site Contractor. Completed inspection reports will be maintained on-site until stabilization of the project area. All records will then be kept by the Operator for a minimum of 3 years.

STORMWATER MANAGEMENT - CONSTRUCTION PHASE MAINTENANCE

SYSTEM COMPONENT	RECOMMENDED MAINTENANCE BY SITE CONTRACTOR
SEDIMENT BARRIERS Silt Fence, Straw Bale, or Filtrex Sock	-Add stakes or re-staple sagging silt fence -Replace decomposed bales or deteriorated fabric -Remove sediments when 6" deep against the barrier -Any sediment remaining after barrier is no longer required should be removed or dressed to conform to existing grade, prepared and seeded. - Remove barrier as soon as tributary area is permanently stabilized.
Storm Drain Inlet Protection	- inspect to assure runoff is not by-passing inlet and creating erosion downstream. - Inspect for integrity - Remove sediment as needed or when at ½ design depth - Remove protection as soon as tributary area is permanently stabilized.
Mulching	-Check rill erosion and apply additional mulch if needed -Inspect nets or mats for dislocation or failure -Repair washouts and reinstall nets or mats -Inspect until grass is established
Detention Basin as Sediment basin	-Remove sediment when it is 6" deep in bottom of basin. -Clean or replace temporary outlet filters if ponding persists -Check for erosion of embankment, outlet blockage or other operational problems
Stone Construction Entrance (Tracking Mat)	- Check for clogging of stone surface and sediment accumulation - Remove clogged surface and renew, or wash to sediment trap.
Straw bale/silt fence sediment traps	-Remove sediment as needed when depth is 6" -Replace rotten and destroyed bales or deteriorated fence
Stone/fabric sediment filter	-Inspect for excessive clogging and prolonged ponding behind filter. -Remove sediment as needed when depth is 6" -Replace fabric and stone cover
Check Dams (stone, hay-bales, filtrex)	- Inspect for underflow or bypass. Low point should be approx center, 6" below ends. - Reshape or reinforce. Add stone upstream to control underflow
Water-bars	- Reshape as necessary to assure continued operation. - Inspect outlet for erosion and provide stone protection if needed
Open-Top Culverts	-Clean as necessary to assure continued operation -Inspect outlet for erosion and provide stone protection if needed

INSPECTION AND MAINTENANCE REPORT FORM

To be completed every 7 days or every 14 days and within 24 hours of a rainfall of 0.25" or more, or more frequently if weather conditions or site activities require. A copy of this report shall be kept on site with the SWPPP.

Inspector:_____ Title: _____ Date:_____

Qualifications:_____

Date of last storm: _____ Amount of last storm (inches): _____

Weather during inspection: _____

Location: _____

Items inspected: ___ Sediment barrier ___ Drain inlet protection ___ Mulch ___ Vegetative cover

____ Tracking mat ___ Detention/sediment basin ___ Check dams Other_____

Findings: ____ No sediment discharge (project is in compliance with SWPPP)

____ No action required ____ Maintenance required ____ Additional measures needed

____ Sediment discharge (describe)_____

_____

Signature of Inspector: _____

Corrective action/maintenance required:_____

_____

_____

_____

by whom:_____ by date:_____ Completed(initials) : _____ Date: _____

Sketch (if needed)

APPENDIX C

WATER QUALITY MANAGEMENT & RECHARGE CALCULATIONS

ETHAN CIRCLE SUBDIVISION

SOUTH HADLEY, MA

APPENDIX C

RECHARGE AND WATER QUALITY TREATMENT CALCULATIONS **ETHAN CIRCLE SUBDIVISION**

VOLUME FOR GROUNDWATER RECHARGE:

HYDROLOGIC SOIL GROUP					A	B	C	D	
DEPTH TO INFILTRATE (INCHES)					0.60	0.35	0.25	0.1	
AREA:	NEW IMPERVIOUS (SQ.FT.)								TOTAL
	ROOF	DRIVE	ROAD	WALK					
Wo	5942	2800	1877	804	11423				
Ag	5048	3450	5007	688		14193			
Am		800	6036				6836		
	10990	7050	12920	1492					
TOTAL IMPERV AREA FOR:					11423	14193	6836	0	32452 SQ.FT.
INFILTRATION (ACRES.)									
% OF TOTAL IMPERVIOUS:					35.2%	43.7%	21.1%	0.0%	
TOTAL RECHARGE REQUIRED:					571	414	142	0	**1127 CUBIC FEET**

DRAIN TIME CALCULATION MAIN INFILTRATION BASIN

4614	SF INFILTRATION AREA	
0.3	FT DEPTH	AT ELEV 93.8
1	IN PER HOUR EXFILTRATION RATE	
0.083333	FT PER HOUR EXFILTRATION RATE	
3.6	**HOURS DRAIN TIME**	

DRAIN TIME CALCULATION RAIN GARDENS

420	SF INFILTRATION AREA	
0.5	FT DEPTH	AT ELEV
1	IN PER HOUR EXFILTRATION RATE	
0.083333	FT PER HOUR EXFILTRATION RATE	
6	**HOURS DRAIN TIME**	

VOLUME FOR TREATMENT

32452	SQ.FT. TOTAL NEW IMPERVIOUS	
2040	SQ. FT. - DEDUCT NEW IMPERVIOUS NOT TRIBUTARY TO WETLAND	
30412	SQ. FT. NEW IMPERVIOUS FOR TREATMENT	
0.5	INCH TREATMENT VOLUME	
1267	**CU FT.**	**REQUIRED**
1456	**CU FT.**	**PROVIDED AT ELEV 93.8**

FOREBAY VOLUME:

REQUIRED VOLUME: 0.1 IN. RUNOFF FROM 30412 SF. IMPERV = **253 CU. FT. REQUIRED**

DESIGN VOLUME FOR FOREBAY AT ENTRANCE TO DETENTION BASIN

BELOW ELEV.	AREA INTERVAL (SQ.FT.)	(FT.)	*AVG. AREA	ADDED VOL. CF	CUM VOL CF	* USING CONIC FORMULA
93.5	239	93.50	0	0	0	
94.5	364	1.00	299	299	**299**	**CU. FT. PROVIDED**

TSS REMOVAL CALCULATIONS

A BMP	B TSS REMOVAL RATE	C STARTING LOAD	D REMOVED A x C	E REMAINING LOAD (C-D)	COMBINED REMOVAL
DEEP SUMP CB'S	25.00%	100.00%	0.250	75.0%	25.00%
INFILTRATION BASIN	80.00%	75.00%	0.600	15.0%	85.00%

APPENDIX D

WORKSHEET FOR Tc & AREA CALCULATIONS

ETHAN CIRCLE SUBDIVISION

SOUTH HADLEY, MA

APPENDIX D

TIME OF CONCENTRATION AND DRAINAGE AREA WORKSHEET **ETHAN CIRCLE, SO. HADLEY, MA**

12/24/13

AREA ID: E1A TO NORTHWESTERN PL, HSGA

SHEET FLOW: (TR55, REV. 6/86, EQ.3-3)

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"		24 HR. PRECIP. (INCHES)	TIME(MIN)
109.1	106	100	3.10%	0.4	WOODS	3.1	18.3

SHALLOW CONCENTRATED FLOW

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"	HYD. RAD.	DESCRIPTION	Kv	VEL(FPS)	TIME(MIN)
106	104	50	4.00%	0.1	0.1	WOODS NO DEFINED SWALE	3	0.6	1.4
104	102	80	2.50%	0.08	0.15	LAWN, SLIGHT SWALE	5	0.8	1.7

TOTAL TIME OF CONCENTRATION: E1A **MINUTES 21.4**

WOODS	HSGA	12903

AREA ID: E1B TO NORTHWESTERN PL, HSGB

SHEET FLOW: (TR55, REV. 6/86, EQ.3-3)

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"		24 HR. PRECIP. (INCHES)	TIME(MIN)
108.1	104	80	5.12%	0.4	WOODS	3.1	12.5

SHALLOW CONCENTRATED FLOW

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"	HYD. RAD.	DESCRIPTION	Kv	VEL(FPS)	TIME(MIN)
104	102.5	65	2.31%	0.1	0.15	WOODS, SLIGHT SWALE	4	0.6	1.8
102.5	102	55	0.91%	0.08	0.15	LAWN, SLIGHT SWALE	5	0.5	1.8

TOTAL TIME OF CONCENTRATION: E1B **MINUTES 16.1**

ROOFS UNCON	HSGB	603
DRIVE UNCON	HSGB	478
LAWN	HSGB	14026
WOODS	HSGB	16429
TOTAL AREA:		31536

AREA ID: E2A CENTRAL AREA, HSGA TO SOUTHEASTERN PL

SHEET FLOW: (TR55, REV. 6/86, EQ.3-3)

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"		24 HR. PRECIP. (INCHES)	TIME(MIN)
109.1	101	100	8.10%	0.4	WOODS	3.1	12.5

SHALLOW CONCENTRATED FLOW

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"	HYD. RAD.	DESCRIPTION	Kv	VEL(FPS)	TIME(MIN)
101	96	60	8.33%	0.1	0.15	WOODS, SLIGHT SWALE	4	1.2	0.8

TOTAL TIME OF CONCENTRATION: MINUTES 13.3

WOODS	HSGA	24255

AREA ID: E2B CENTRAL AREA, HSGB TO SOUTHEASTERN PL

SHEET FLOW: (TR55, REV. 6/86, EQ.3-3)

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"		24 HR. PRECIP. (INCHES)	TIME(MIN)
108.1	107	75	1.47%	0.4	WOODS	3.1	19.6

SHALLOW CONCENTRATED FLOW

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"	HYD. RAD.	DESCRIPTION	Kv	VEL(FPS)	TIME(MIN)
107	104	115	2.61%	0.1	0.15	LAWN & WOODS, SLIGHT SWALE	4	0.6	3.2
104	96	80	10.00%	0.1	0.15	WOODS, SLIGHT SWALE	4	1.3	1.0

TOTAL TIME OF CONCENTRATION: MINUTES 23.8

ROOFS UNCON	HSGB	2000
LAWN	HSGB	13290
WOODS	HSGB	16481
	TOT. B	31771

AREA ID: E2C CENTRAL AREA, HSGC TO SOUTHEASTERN PL

SHEET FLOW: (TR55, REV. 6/86, EQ.3-3)

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"		24 HR. PRECIP. (INCHES)	TIME(MIN)
103.5	94.5	100	9.00%	0.4	WOODS	3.1	12.0

SHALLOW CONCENTRATED FLOW

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"	HYD. RAD.	DESCRIPTION	Kv	VEL(FPS)	TIME(MIN)
94.5	88	90	7.22%	0.1	0.1	WOODS NO DEFINED SWALE	3	0.8	1.9

TOTAL TIME OF CONCENTRATION: **MINUTES** **13.9**

WOODS	HSGC	25334

TOTAL AREA E2'S 81360

WOODED SWALE SOUTHEAST TO PL

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"
96	88	175	4.57%	0.1

AREA ID: E3 TO NORTHEASTERN PL

SHEET FLOW: (TR55, REV. 6/86, EQ.3-3)

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"		24 HR. PRECIP. (INCHES)	TIME(MIN)
108	101	75	9.33%	0.4	WOODS	3.1	9.4

TOTAL TIME OF CONCENTRATION: **E3** **MINUTES** **9.4**

WOODS	HSGA	12089

AREA ID: E4 TO HADLEY STREET

SHEET FLOW: (TR55, REV. 6/86, EQ.3-3)

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"		24 HR. PRECIP. (INCHES)	TIME(MIN)
108.1	105.5	75	3.47%	0.24	LAWN	3.1	9.2

TOTAL TIME OF CONCENTRATION: **E4** **MINUTES** **9.2**

DRIVES CON	HSGB	1427
ROOFS UNCON	HSGB	1173
LAWN	HSGB	10171
TOTAL AREA:		12771

AREA ID: E5

SHEET FLOW: (TR55, REV. 6/86, EQ.3-3)

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"		24 HR. PRECIP. (INCHES)	TIME(MIN)
103	93	66	15.15%	0.4	WOODS	3.1	7.0

SHALLOW CONCENTRATED FLOW

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"	HYD. RAD.	DESCRIPTION	Kv	VEL(FPS)	TIME(MIN)
93	90	80	3.75%	0.1	0.1	WOODS NO DEFINED SWALE	3	0.6	2.2

TOTAL TIME OF CONCENTRATION: **E5** **MINUTES** **9.2**

WOODS	HSGC	7274
WOODS	HSGD	6234
TOTAL AREA:		13508

AREA ID:P1A TO RAINGARDEN #2 HSGA

SHEET FLOW: (TR55, REV. 6/86, EQ.3-3)

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"		24 HR. PRECIP. (INCHES)	TIME(MIN)
107.8	105.5	100	2.30%	0.24	LAWN	3.1	**13.7**

GRASS	HSGA	8171	
ROOFS-UNCON	HSGA	990	Lot 3,rear roof.
TOTAL AREA:	HSGA	9161	

SLIGHT SWALE IN LAWN FROM RG2 TO RG1

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"
105	102	30	10.00%	0.08

AREA ID:P1B TO NORTHWESTERN PL HSGB

SHEET FLOW: (TR55, REV. 6/86, EQ.3-3)

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"		24 HR. PRECIP. (INCHES)	TIME(MIN)
106	102	115	3.48%	0.24	LAWN	3.1	**13.0**

ROOFS-UNCON	HSGB	1653	Lot 1 part, & lot 2 rear
GRASS	HSGB	17610	
TOTAL AREA:	HSGB	19263	

-

AREA ID:P2A TO CB1&2 - DMH1

SHEET FLOW: (TR55, REV. 6/86, EQ.3-3)

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"		24 HR. PRECIP. (INCHES)	TIME(MIN)
107.3	104.5	40	7.00%	0.24	LAWN	3.1	4.2

SHALLOW CONCENTRATED FLOW

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"	HYD. RAD.	DESCRIPTION	Kv	VEL(FPS)	TIME(MIN)
104.5	102.7	120	1.50%	0.012	0.2	GUTTER	42	5.1	0.4

TOTAL TIME OF CONCENTRATION: P2A MINUTES 4.6

ROOFS CON	HSGB	1796	Lot 1 part, Lot 2 front, Lot 7 part
ROOFS CON	HSGA	990	Lot 3, front
DRIVES CON	HSGB	2400	Lots 1,2,7
DRIVES CON	HSGA	900	Lot 3
ROAD	HSGB	5007	
ROAD	HSGA	360	
ROAD	HSGC	510	
WALK	HSGB	688	
WALK	HSGA	280	
LAWN	HSGA	3715	
LAWN	HSGB	9018	
TOTAL AREA:		25664	

AREA ID:P2B TO CB3

SHEET FLOW: (TR55, REV. 6/86, EQ.3-3)

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"		24 HR. PRECIP. (INCHES)	TIME(MIN)
108.1	107	70	1.57%	0.24	LAWN	3.1	12.0

SHALLOW CONCENTRATED FLOW

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"	HYD. RAD.	DESCRIPTION	Kv	VEL(FPS)	TIME(MIN)
107	101.5	140	3.93%	0.1	0.15	SLIGHT SWALE IN LAWN	4	0.8	2.9
101.5	100.26	94	1.32%	0.012	0.2	GUTTER	42	4.8	0.3

TOTAL TIME OF CONCENTRATION: P2B MINUTES 15.3

ROOFS CON	HSGA	1600	Lot 4 front, lot 5 part of front
ROOFS CON	HSGB	1365	Lots 6,7, part of fronts
ROOFS UNCON	HSGA	1050	Lot4,rear
ROOFS UNCON	HSGB	1811	Lots 7 & 8, rear roofs.
DRIVES CON	HSBA	1900	Lots 4,5
DRIVES CON	HSGC	800	Lot 6
DRIVES UNCON	HSGA	300	Lot 4, part
ROAD	HSGC	5526	

ROAD	HSGA	1517
WALK	HSGA	524
LAWN	HSGA	10549
LAWN	HSGB	21163
LAWN	HSGC	1765
TOTAL AREA:		49870

AREA ID:P2C OVERLAND TO DETENTION BASIN

SHEET FLOW: (TR55, REV. 6/86, EQ.3-3)

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"		24 HR. PRECIP. (INCHES)	TIME(MIN)
103.5	99.5	40	10.00%	0.24	LAWN	3.1	3.7

SHALLOW CONCENTRATED FLOW

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"	HYD. RAD.	DESCRIPTION	Kv	VEL(FPS)	TIME(MIN)
99.5	96	60	5.83%	0.12	0.15	SLIGHT SWALE IN LAWN	4	1.0	1.0

TOTAL TIME OF CONCENTRATION:			**P2C**					**MINUTES**	**4.7**

ROOFS CON	HSGA	1312
DTN BSN	HSGB	4614
GRASS	HSGA	12250
TOTAL AREA:		18176

AREA ID:P2D DIRECT TO SOUTHEASTERN PL

SHEET FLOW: (TR55, REV. 6/86, EQ.3-3)

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"		24 HR. PRECIP. (INCHES)	TIME(MIN)
99	92	100	7.00%	0.4	WOODS	3.1	13.2

SHALLOW CONCENTRATED FLOW

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"	HYD. RAD.	DESCRIPTION	Kv	VEL(FPS)	TIME(MIN)
92	89	35	8.57%	0.1	0.1	WOODS NO DEFINED SWALE	3	0.9	0.7
89	88	20	5.00%	0.1	0.15	WOODLAND SWALE	4	0.9	0.4

TOTAL TIME OF CONCENTRATION:			**P2D**					**MINUTES**	**14.2**

GRASS	HSGA	1409
WOODS	HSGA	1200
WOODS	HSGC	5715
GRASS	HSGC	2489
TOTAL AREA:		10813

AREA ID:P3 TO NORTHEASTERN PL

SHEET FLOW: (TR55, REV. 6/86, EQ.3-3)

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"		24 HR. PRECIP. (INCHES)	TIME(MIN)
103	99	30	13.33%	0.24	LAWN	3.1	2.6

SHALLOW CONCENTRATED FLOW

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"	HYD. RAD.	DESCRIPTION	Kv	VEL(FPS)	TIME(MIN)
NA	NA	MA	NA						---
TOTAL TIME OF CONCENTRATION:			**P3**					**MINUTES**	**2.6**

GRASS, MEADOW	HSGA	3081

AREA ID:P4 TO HADLEY STREET

SHEET FLOW: (TR55, REV. 6/86, EQ.3-3)

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"		24 HR. PRECIP. (INCHES)	TIME(MIN)
108.1	105.5	75	3.47%	0.24	LAWN	3.1	9.2

TOTAL TIME OF CONCENTRATION:			**P4**				**MINUTES**	**9.2**

DRIVES CON	HSGB	607
ROOFS UNCON	HSGB	890
LAWN	HSGB	7674
TOTAL AREA:		9171

AREA ID:P5

SHEET FLOW: (TR55, REV. 6/86, EQ.3-3)

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"		24 HR. PRECIP. (INCHES)	TIME(MIN)
108.5	108	60	0.83%	0.24	LAWN	3.1	13.7

SHALLOW CONCENTRATED FLOW

ELEV.	TO ELEV.	DIST.(FT)	SLOPE	"n"	HYD. RAD.	DESCRIPTION	Kv	VEL(FPS)	TIME(MIN)
108	101	50	14.00%	0.08	0.15	LAWN, SLIGHT SWALE	5	1.9	0.4
101	93	60	13.33%	0.1	0.1	WOODS NO DEFINED SWALE	3	1.1	0.9
93	90	80	3.75%	0.1	0.1	WOODS NO DEFINED SWALE	3	0.6	2.2

TOTAL TIME OF CONCENTRATION: P5 MINUTES 17.3

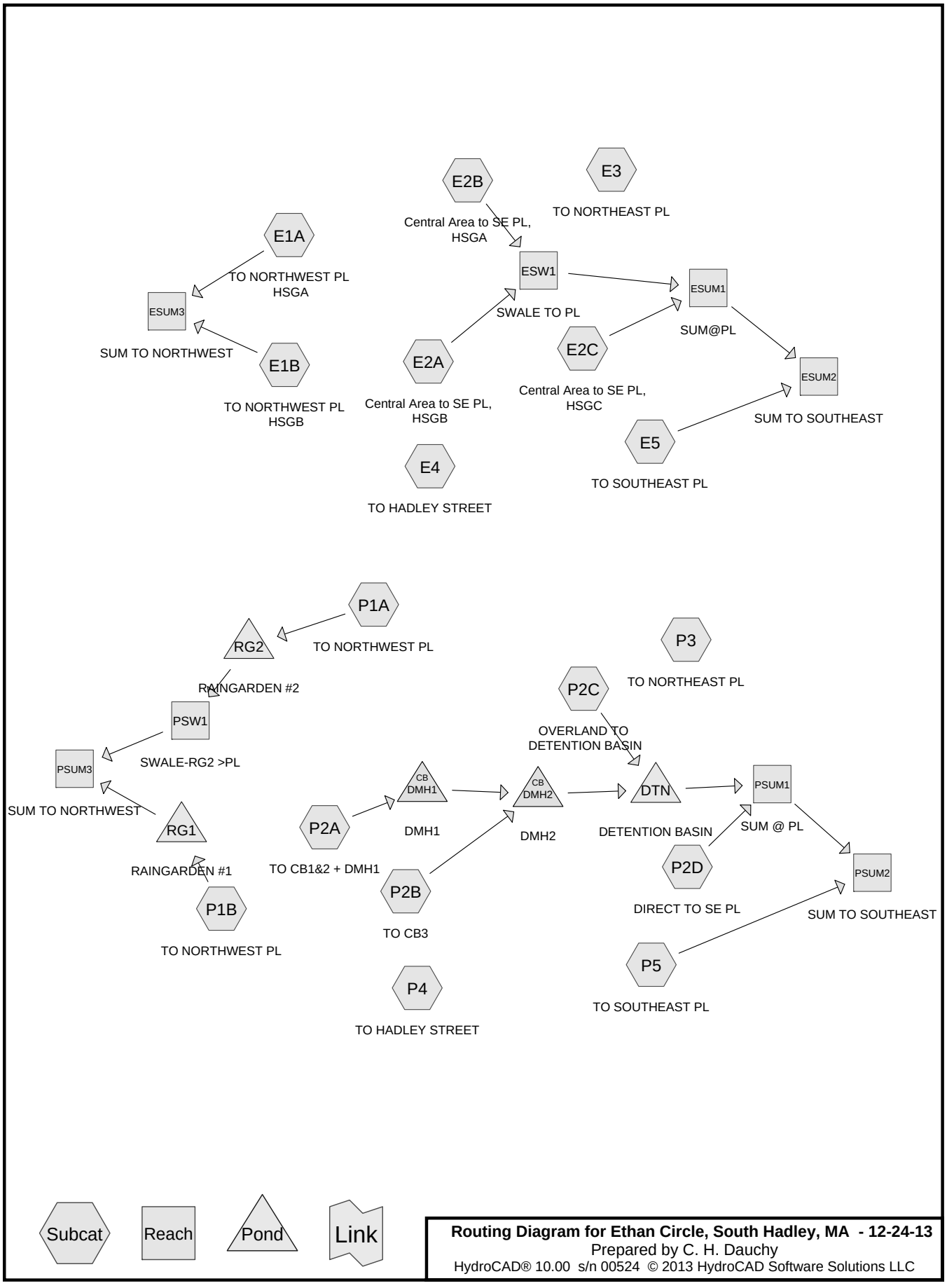
WOODS	HSGC	6521
LAWN	HSGC	964
LAWN	HSGB	4109
ROOFS UNCON		1050
WOODS	HSGD	6234
TOTAL AREA:		18878

APPENDIX E

WATERSHED MODEL AND ROUTING CALCULATIONS

ETHAN CIRCLE SUBDIVISION

SOUTH HADLEY, MA



Routing Diagram for Ethan Circle, South Hadley, MA - 12-24-13
Prepared by C. H. Dauchy

Time span=0.00-72.00 hrs, dt=0.02 hrs, 3601 points x 3
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E1A: TO NORTHWEST PL Runoff Area=12,903 sf 0.00% Impervious Runoff Depth=0.00"
Tc=21.4 min CN=30/0 Runoff=0.00 cfs 0 cf

Subcatchment E1B: TO NORTHWEST PL Runoff Area=31,536 sf 3.43% Impervious Runoff Depth=0.36"
Tc=16.1 min CN=58/98 Runoff=0.11 cfs 944 cf

Subcatchment E2A: Central Area to SE PL, Runoff Area=31,771 sf 6.30% Impervious Runoff Depth=0.43"
Tc=23.8 min CN=58/98 Runoff=0.13 cfs 1,141 cf

Subcatchment E2B: Central Area to SE PL, Runoff Area=24,255 sf 0.00% Impervious Runoff Depth=0.00"
Tc=13.3 min CN=30/0 Runoff=0.00 cfs 0 cf

Subcatchment E2C: Central Area to SE PL, Runoff Area=25,334 sf 0.00% Impervious Runoff Depth=0.71"
Tc=13.9 min CN=70/0 Runoff=0.33 cfs 1,508 cf

Subcatchment E3: TO NORTHEAST PL Runoff Area=12,089 sf 0.00% Impervious Runoff Depth=0.00"
Tc=9.4 min CN=30/0 Runoff=0.00 cfs 0 cf

Subcatchment E4: TO HADLEY STREET Runoff Area=12,771 sf 20.36% Impervious Runoff Depth=0.85"
Tc=9.2 min CN=61/98 Runoff=0.20 cfs 909 cf

Subcatchment E5: TO SOUTHEAST PL Runoff Area=13,508 sf 0.00% Impervious Runoff Depth=0.86"
Tc=9.2 min CN=73/0 Runoff=0.26 cfs 965 cf

Subcatchment P1A: TO NORTHWEST PL Runoff Area=9,161 sf 10.81% Impervious Runoff Depth=0.30"
Tc=18.1 min CN=39/98 Runoff=0.05 cfs 228 cf

Subcatchment P1B: TO NORTHWEST PL Runoff Area=19,263 sf 8.58% Impervious Runoff Depth=0.57"
Tc=13.0 min CN=61/98 Runoff=0.16 cfs 917 cf

Subcatchment P2A: TO CB1&2 + DMH1 Runoff Area=25,664 sf 50.39% Impervious Runoff Depth=1.49"
Tc=4.6 min CN=55/98 Runoff=0.90 cfs 3,190 cf

Subcatchment P2B: TO CB3 Runoff Area=49,870 sf 32.87% Impervious Runoff Depth=1.04"
Tc=15.3 min CN=55/98 Runoff=0.83 cfs 4,325 cf

Subcatchment P2C: OVERLAND TO Runoff Area=18,176 sf 7.22% Impervious Runoff Depth=0.38"
Tc=4.7 min CN=55/98 Runoff=0.09 cfs 576 cf

Subcatchment P2D: DIRECT TO SE PL Runoff Area=10,813 sf 0.00% Impervious Runoff Depth=0.40"
Tc=14.2 min CN=62/0 Runoff=0.05 cfs 359 cf

Subcatchment P3: TO NORTHEAST PL Runoff Area=3,081 sf 0.00% Impervious Runoff Depth=0.00"
Tc=2.6 min CN=30/0 Runoff=0.00 cfs 0 cf

Subcatchment P4: TO HADLEY STREET Runoff Area=9,171 sf 16.32% Impervious Runoff Depth=0.76"
Tc=9.2 min CN=61/98 Runoff=0.12 cfs 579 cf

Subcatchment P5: TO SOUTHEAST PL Runoff Area=18,878 sf 5.56% Impervious Runoff Depth=0.87"
Tc=17.3 min CN=71/98 Runoff=0.28 cfs 1,372 cf

Reach ESUM1: SUM@PL Inflow=0.39 cfs 2,649 cf
Outflow=0.39 cfs 2,649 cf

Reach ESUM2: SUM TO SOUTHEAST Inflow=0.60 cfs 3,614 cf
Outflow=0.60 cfs 3,614 cf

Reach ESUM3: SUM TO NORTHWEST Inflow=0.11 cfs 944 cf
Outflow=0.11 cfs 944 cf

Reach ESW1: SWALE TO PL Avg. Flow Depth=0.06' Max Vel=0.39 fps Inflow=0.13 cfs 1,141 cf
n=0.100 L=175.0' S=0.0457 '/' Capacity=48.40 cfs Outflow=0.13 cfs 1,141 cf

Reach PSUM1: SUM @ PL Inflow=0.24 cfs 1,844 cf
Outflow=0.24 cfs 1,844 cf

Reach PSUM2: SUM TO SOUTHEAST Inflow=0.42 cfs 3,216 cf
Outflow=0.42 cfs 3,216 cf

Reach PSUM3: SUM TO NORTHWEST Inflow=0.10 cfs 303 cf
Outflow=0.10 cfs 303 cf

Reach PSW1: SWALE-RG2 >PL Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0 cf
n=0.080 L=30.0' S=0.0967 '/' Capacity=13.85 cfs Outflow=0.00 cfs 0 cf

Pond DMH1: DMH1 Peak Elev=98.65' Inflow=0.90 cfs 3,190 cf
12.0" Round Culvert n=0.012 L=90.3' S=0.0239 '/' Outflow=0.90 cfs 3,190 cf

Pond DMH2: DMH2 Peak Elev=96.55' Inflow=1.47 cfs 7,515 cf
12.0" Round Culvert n=0.012 L=58.1' S=0.0241 '/' Outflow=1.47 cfs 7,515 cf

Pond DTN: DETENTION BASIN Peak Elev=94.04' Storage=2,709 cf Inflow=1.56 cfs 8,091 cf
Discarded=0.13 cfs 6,607 cf Primary=0.21 cfs 1,486 cf Outflow=0.34 cfs 8,093 cf

Pond RG1: RAINGARDEN #1 Peak Elev=102.12' Storage=263 cf Inflow=0.16 cfs 917 cf
Discarded=0.01 cfs 613 cf Primary=0.10 cfs 303 cf Outflow=0.11 cfs 916 cf

Pond RG2: RAINGARDEN #2 Peak Elev=104.78' Storage=132 cf Inflow=0.05 cfs 228 cf
Discarded=0.00 cfs 227 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 227 cf

Time span=0.00-72.00 hrs, dt=0.02 hrs, 3601 points x 3
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E1A: TO NORTHWEST PL Runoff Area=12,903 sf 0.00% Impervious Runoff Depth=0.00"
Tc=21.4 min CN=30/0 Runoff=0.00 cfs 0 cf

Subcatchment E1B: TO NORTHWEST PL Runoff Area=31,536 sf 3.43% Impervious Runoff Depth=1.02"
Tc=16.1 min CN=58/98 Runoff=0.51 cfs 2,680 cf

Subcatchment E2A: Central Area to SE PL, Runoff Area=31,771 sf 6.30% Impervious Runoff Depth=1.12"
Tc=23.8 min CN=58/98 Runoff=0.49 cfs 2,955 cf

Subcatchment E2B: Central Area to SE PL, Runoff Area=24,255 sf 0.00% Impervious Runoff Depth=0.00"
Tc=13.3 min CN=30/0 Runoff=0.00 cfs 0 cf

Subcatchment E2C: Central Area to SE PL, Runoff Area=25,334 sf 0.00% Impervious Runoff Depth=1.67"
Tc=13.9 min CN=70/0 Runoff=0.86 cfs 3,534 cf

Subcatchment E3: TO NORTHEAST PL Runoff Area=12,089 sf 0.00% Impervious Runoff Depth=0.00"
Tc=9.4 min CN=30/0 Runoff=0.00 cfs 0 cf

Subcatchment E4: TO HADLEY STREET Runoff Area=12,771 sf 20.36% Impervious Runoff Depth=1.73"
Tc=9.2 min CN=61/98 Runoff=0.46 cfs 1,839 cf

Subcatchment E5: TO SOUTHEAST PL Runoff Area=13,508 sf 0.00% Impervious Runoff Depth=1.90"
Tc=9.2 min CN=73/0 Runoff=0.61 cfs 2,134 cf

Subcatchment P1A: TO NORTHWEST PL Runoff Area=9,161 sf 10.81% Impervious Runoff Depth=0.56"
Tc=18.1 min CN=39/98 Runoff=0.07 cfs 427 cf

Subcatchment P1B: TO NORTHWEST PL Runoff Area=19,263 sf 8.58% Impervious Runoff Depth=1.35"
Tc=13.0 min CN=61/98 Runoff=0.48 cfs 2,171 cf

Subcatchment P2A: TO CB1&2 + DMH1 Runoff Area=25,664 sf 50.39% Impervious Runoff Depth=2.52"
Tc=4.6 min CN=55/98 Runoff=1.55 cfs 5,383 cf

Subcatchment P2B: TO CB3 Runoff Area=49,870 sf 32.87% Impervious Runoff Depth=1.90"
Tc=15.3 min CN=55/98 Runoff=1.58 cfs 7,896 cf

Subcatchment P2C: OVERLAND TO Runoff Area=18,176 sf 7.22% Impervious Runoff Depth=1.00"
Tc=4.7 min CN=55/98 Runoff=0.39 cfs 1,510 cf

Subcatchment P2D: DIRECT TO SE PL Runoff Area=10,813 sf 0.00% Impervious Runoff Depth=1.14"
Tc=14.2 min CN=62/0 Runoff=0.22 cfs 1,027 cf

Subcatchment P3: TO NORTHEAST PL Runoff Area=3,081 sf 0.00% Impervious Runoff Depth=0.00"
Tc=2.6 min CN=30/0 Runoff=0.00 cfs 0 cf

Subcatchment P4: TO HADLEY STREET Runoff Area=9,171 sf 16.32% Impervious Runoff Depth=1.60"
Tc=9.2 min CN=61/98 Runoff=0.31 cfs 1,222 cf

Subcatchment P5: TO SOUTHEAST PL Runoff Area=18,878 sf 5.56% Impervious Runoff Depth=1.89"
Tc=17.3 min CN=71/98 Runoff=0.66 cfs 2,968 cf

Reach ESUM1: SUM@PL Inflow=1.11 cfs 6,489 cf
Outflow=1.11 cfs 6,489 cf

Reach ESUM2: SUM TO SOUTHEAST Inflow=1.59 cfs 8,623 cf
Outflow=1.59 cfs 8,623 cf

Reach ESUM3: SUM TO NORTHWEST Inflow=0.51 cfs 2,680 cf
Outflow=0.51 cfs 2,680 cf

Reach ESW1: SWALE TO PL Avg. Flow Depth=0.12' Max Vel=0.58 fps Inflow=0.49 cfs 2,955 cf
n=0.100 L=175.0' S=0.0457 '/' Capacity=48.40 cfs Outflow=0.47 cfs 2,955 cf

Reach PSUM1: SUM @ PL Inflow=0.86 cfs 7,310 cf
Outflow=0.86 cfs 7,310 cf

Reach PSUM2: SUM TO SOUTHEAST Inflow=1.50 cfs 10,278 cf
Outflow=1.50 cfs 10,278 cf

Reach PSUM3: SUM TO NORTHWEST Inflow=0.47 cfs 1,484 cf
Outflow=0.47 cfs 1,484 cf

Reach PSW1: SWALE-RG2 >PL Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0 cf
n=0.080 L=30.0' S=0.0967 '/' Capacity=13.85 cfs Outflow=0.00 cfs 0 cf

Pond DMH1: DMH1 Peak Elev=98.83' Inflow=1.55 cfs 5,383 cf
12.0" Round Culvert n=0.012 L=90.3' S=0.0239 '/' Outflow=1.55 cfs 5,383 cf

Pond DMH2: DMH2 Peak Elev=96.85' Inflow=2.55 cfs 13,279 cf
12.0" Round Culvert n=0.012 L=58.1' S=0.0241 '/' Outflow=2.55 cfs 13,279 cf

Pond DTN: DETENTION BASIN Peak Elev=94.39' Storage=4,768 cf Inflow=2.93 cfs 14,788 cf
Discarded=0.14 cfs 8,506 cf Primary=0.73 cfs 6,283 cf Outflow=0.87 cfs 14,789 cf

Pond RG1: RAINGARDEN #1 Peak Elev=102.17' Storage=290 cf Inflow=0.48 cfs 2,171 cf
Discarded=0.01 cfs 686 cf Primary=0.47 cfs 1,484 cf Outflow=0.48 cfs 2,170 cf

Pond RG2: RAINGARDEN #2 Peak Elev=104.93' Storage=210 cf Inflow=0.07 cfs 427 cf
Discarded=0.01 cfs 425 cf Primary=0.00 cfs 0 cf Outflow=0.01 cfs 425 cf

Summary for Subcatchment E1A: TO NORTHWEST PL HSGA

Runoff = 0.00 cfs @ 15.24 hrs, Volume= 129 cf, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100YR STORM Rainfall=6.40"

Area (sf)	CN	Description
12,903	30	Woods, Good, HSG A
12,903	30	100.00% Pervious Area

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

Summary for Subcatchment E1B: TO NORTHWEST PL HSGB

Runoff = 1.24 cfs @ 12.24 hrs, Volume= 5,659 cf, Depth= 2.15"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100YR STORM Rainfall=6.40"

Area (sf)	CN	Description
16,429	55	Woods, Good, HSG B
14,026	61	>75% Grass cover, Good, HSG B
603	98	Unconnected roofs, HSG B
478	98	Unconnected pavement, HSG B
31,536	59	Weighted Average
30,455	58	96.57% Pervious Area
1,081	98	3.43% Impervious Area

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

Summary for Subcatchment E2A: Central Area to SE PL, HSGB

Runoff = 1.12 cfs @ 12.35 hrs, Volume= 6,016 cf, Depth= 2.27"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100YR STORM Rainfall=6.40"

Area (sf)	CN	Description
2,000	98	Unconnected roofs, HSG B
13,290	61	>75% Grass cover, Good, HSG B
16,481	55	Woods, Good, HSG B
31,771	60	Weighted Average
29,771	58	93.70% Pervious Area
2,000	98	6.30% Impervious Area

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

Summary for Subcatchment E2B: Central Area to SE PL, HSGA

Runoff = 0.01 cfs @ 15.12 hrs, Volume= 242 cf, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100YR STORM Rainfall=6.40"

Area (sf)	CN	Description
24,255	30	Woods, Good, HSG A
24,255	30	100.00% Pervious Area

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

Summary for Subcatchment E2C: Central Area to SE PL, HSGC

Runoff = 1.65 cfs @ 12.19 hrs, Volume= 6,599 cf, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100YR STORM Rainfall=6.40"

Area (sf)	CN	Description
25,334	70	Woods, Good, HSG C
25,334	70	100.00% Pervious Area

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

Summary for Subcatchment E3: TO NORTHEAST PL

Runoff = 0.00 cfs @ 15.07 hrs, Volume= 121 cf, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100YR STORM Rainfall=6.40"

Area (sf)	CN	Description
12,089	30	Woods, Good, HSG A
12,089	30	100.00% Pervious Area

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

Summary for Subcatchment E4: TO HADLEY STREET

Runoff = 0.87 cfs @ 12.13 hrs, Volume= 3,266 cf, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100YR STORM Rainfall=6.40"

	Area (sf)	CN	Description
	10,171	61	>75% Grass cover, Good, HSG B
*	1,427	98	Driveway, HSG B
	1,173	98	Unconnected roofs, HSG B
	12,771	69	Weighted Average
	10,171	61	79.64% Pervious Area
	2,600	98	20.36% Impervious Area

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

Summary for Subcatchment E5: TO SOUTHEAST PL

Runoff = 1.11 cfs @ 12.13 hrs, Volume= 3,854 cf, Depth= 3.42"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100YR STORM Rainfall=6.40"

	Area (sf)	CN	Description
	7,274	70	Woods, Good, HSG C
*	6,234	77	Woods, Good, HSG D (WETLAND)
	13,508	73	Weighted Average
	13,508	73	100.00% Pervious Area

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

Summary for Subcatchment P1A: TO NORTHWEST PL

Runoff = 0.12 cfs @ 12.29 hrs, Volume= 894 cf, Depth= 1.17"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100YR STORM Rainfall=6.40"

Area (sf)	CN	Description
8,171	39	>75% Grass cover, Good, HSG A
990	98	Unconnected roofs, HSG A
9,161	45	Weighted Average
8,171	39	89.19% Pervious Area
990	98	10.81% Impervious Area

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

Summary for Subcatchment P1B: TO NORTHWEST PL

Runoff = 1.02 cfs @ 12.19 hrs, Volume= 4,191 cf, Depth= 2.61"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100YR STORM Rainfall=6.40"

Area (sf)	CN	Description
17,610	61	>75% Grass cover, Good, HSG B
603	98	Unconnected roofs, HSG B
1,050	98	Unconnected roofs, HSG B
19,263	64	Weighted Average
17,610	61	91.42% Pervious Area
1,653	98	8.58% Impervious Area

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

Summary for Subcatchment P2A: TO CB1&2 + DMH1

Runoff = 2.52 cfs @ 12.07 hrs, Volume= 8,499 cf, Depth= 3.97"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100YR STORM Rainfall=6.40"

	Area (sf)	CN	Description
	1,796	98	Roofs, HSG B
	990	98	Roofs, HSG A
*	2,400	98	Driveways, HSG B
*	900	98	Driveways, HSG A
	5,007	98	Paved roads w/curbs & sewers, HSG B
	360	98	Paved roads w/curbs & sewers, HSG A
	510	98	Paved roads w/curbs & sewers, HSG C
*	688	98	Walk, HSG B
*	280	98	Walk, HSG A
	3,715	39	>75% Grass cover, Good, HSG A
	9,018	61	>75% Grass cover, Good, HSG B
	25,664	76	Weighted Average
	12,733	55	49.61% Pervious Area
	12,931	98	50.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6					**Direct Entry, See Separate Calculations**

Summary for Subcatchment P2B: TO CB3

Runoff = 2.84 cfs @ 12.21 hrs, Volume= 13,307 cf, Depth= 3.20"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100YR STORM Rainfall=6.40"

	Area (sf)	CN	Description
	1,600	98	Roofs, HSG A
	1,365	98	Roofs, HSG B
	1,050	98	Unconnected roofs, HSG A
	1,811	98	Unconnected roofs, HSG B
*	1,900	98	Driveways, HSG A
*	800	98	Driveways, HSG C
	300	98	Unconnected pavement, HSG A
	5,526	98	Paved roads w/curbs & sewers, HSG C
	1,517	98	Paved roads w/curbs & sewers, HSG A
*	524	98	Walk, HSG A
	10,549	39	>75% Grass cover, Good, HSG A
	21,163	61	>75% Grass cover, Good, HSG B
	1,765	74	>75% Grass cover, Good, HSG C
	49,870	69	Weighted Average
	33,477	55	67.13% Pervious Area
	16,393	98	32.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3					**Direct Entry, See Separate calculations**

Summary for Subcatchment P2C: OVERLAND TO DETENTION BASIN

Runoff = 0.95 cfs @ 12.08 hrs, Volume= 3,137 cf, Depth= 2.07"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100YR STORM Rainfall=6.40"

Area (sf)	CN	Description
1,312	98	Roofs, HSG A
4,835	74	>75% Grass cover, Good, HSG C
4,614	61	>75% Grass cover, Good, HSG B
7,415	39	>75% Grass cover, Good, HSG A
18,176	58	Weighted Average
16,864	55	92.78% Pervious Area
1,312	98	7.22% Impervious Area

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

Summary for Subcatchment P2D: DIRECT TO SE PL

Runoff = 0.51 cfs @ 12.21 hrs, Volume= 2,134 cf, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100YR STORM Rainfall=6.40"

Area (sf)	CN	Description
1,409	39	>75% Grass cover, Good, HSG A
1,200	30	Woods, Good, HSG A
5,715	70	Woods, Good, HSG C
2,489	74	>75% Grass cover, Good, HSG C
10,813	62	Weighted Average
10,813	62	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2					**Direct Entry, See separate calculations**

Summary for Subcatchment P3: TO NORTHEAST PL

Runoff = 0.00 cfs @ 14.96 hrs, Volume= 31 cf, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100YR STORM Rainfall=6.40"

Area (sf)	CN	Description
3,081	30	Meadow, non-grazed, HSG A
3,081	30	100.00% Pervious Area

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

Summary for Subcatchment P4: TO HADLEY STREET

Runoff = 0.60 cfs @ 12.13 hrs, Volume= 2,225 cf, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100YR STORM Rainfall=6.40"

	Area (sf)	CN	Description
	7,674	61	>75% Grass cover, Good, HSG B
	890	98	Unconnected roofs, HSG B
*	607	98	Driveways, HSG B
	9,171	67	Weighted Average
	7,674	61	83.68% Pervious Area
	1,497	98	16.32% Impervious Area

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

Summary for Subcatchment P5: TO SOUTHEAST PL

Runoff = 1.21 cfs @ 12.24 hrs, Volume= 5,329 cf, Depth= 3.39"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100YR STORM Rainfall=6.40"

Area (sf)	CN	Description
6,521	70	Woods, Good, HSG C
964	74	>75% Grass cover, Good, HSG C
4,109	61	>75% Grass cover, Good, HSG B
1,050	98	Unconnected roofs, HSG B
6,234	77	Woods, Good, HSG D
18,878	72	Weighted Average
17,828	71	94.44% Pervious Area
1,050	98	5.56% Impervious Area

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

Summary for Reach ESUM1: SUM@PL

Inflow Area = 81,360 sf, 2.46% Impervious, Inflow Depth = 1.90" for 100YR STORM event
Inflow = 2.37 cfs @ 12.25 hrs, Volume= 12,857 cf
Outflow = 2.37 cfs @ 12.25 hrs, Volume= 12,857 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs / 3

Summary for Reach ESUM2: SUM TO SOUTHEAST

Inflow Area = 94,868 sf, 2.11% Impervious, Inflow Depth = 2.11" for 100YR STORM event
Inflow = 3.23 cfs @ 12.19 hrs, Volume= 16,711 cf
Outflow = 3.23 cfs @ 12.19 hrs, Volume= 16,711 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs / 3

Summary for Reach ESUM3: SUM TO NORTHWEST

Inflow Area = 44,439 sf, 2.43% Impervious, Inflow Depth = 1.56" for 100YR STORM event
Inflow = 1.24 cfs @ 12.24 hrs, Volume= 5,788 cf
Outflow = 1.24 cfs @ 12.24 hrs, Volume= 5,788 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs / 3

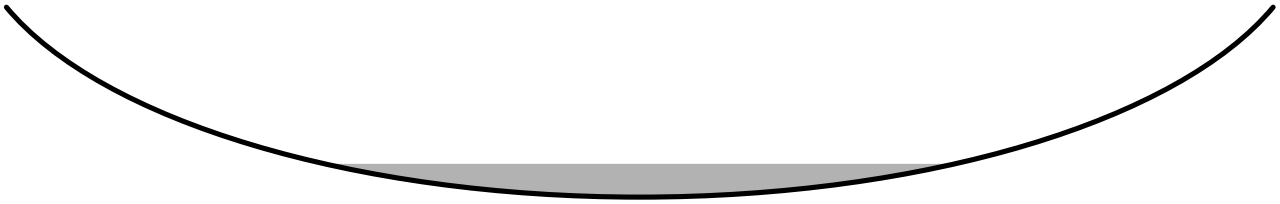
Summary for Reach ESW1: SWALE TO PL

Inflow Area = 56,026 sf, 3.57% Impervious, Inflow Depth = 1.34" for 100YR STORM event
Inflow = 1.12 cfs @ 12.35 hrs, Volume= 6,258 cf
Outflow = 1.10 cfs @ 12.40 hrs, Volume= 6,258 cf, Atten= 2%, Lag= 3.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs / 3
Max. Velocity= 0.76 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 0.25 fps, Avg. Travel Time= 11.9 min

Peak Storage= 254 cf @ 12.40 hrs
Average Depth at Peak Storage= 0.17'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 48.40 cfs

30.00' x 1.00' deep Parabolic Channel, n= 0.100
Length= 175.0' Slope= 0.0457 '/'
Inlet Invert= 96.00', Outlet Invert= 88.00'



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Summary for Reach PSUM1: SUM @ PL

Inflow Area = 104,523 sf, 29.31% Impervious, Inflow Depth = 1.94" for 100YR STORM event
Inflow = 1.59 cfs @ 12.56 hrs, Volume= 16,870 cf
Outflow = 1.59 cfs @ 12.56 hrs, Volume= 16,870 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs / 3

Summary for Reach PSUM2: SUM TO SOUTHEAST

Inflow Area = 123,401 sf, 25.68% Impervious, Inflow Depth = 2.16" for 100YR STORM event
Inflow = 2.61 cfs @ 12.24 hrs, Volume= 22,199 cf
Outflow = 2.61 cfs @ 12.24 hrs, Volume= 22,199 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs / 3

Summary for Reach PSUM3: SUM TO NORTHWEST

Inflow Area = 28,424 sf, 9.30% Impervious, Inflow Depth = 1.58" for 100YR STORM event
Inflow = 1.00 cfs @ 12.20 hrs, Volume= 3,741 cf
Outflow = 1.00 cfs @ 12.20 hrs, Volume= 3,741 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs / 3

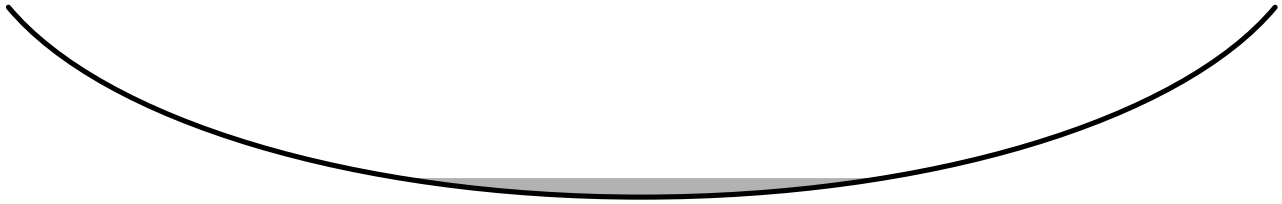
Summary for Reach PSW1: SWALE-RG2 >PL

Inflow Area = 9,161 sf, 10.81% Impervious, Inflow Depth = 0.36" for 100YR STORM event
Inflow = 0.09 cfs @ 12.49 hrs, Volume= 275 cf
Outflow = 0.09 cfs @ 12.50 hrs, Volume= 275 cf, Atten= 0%, Lag= 0.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs / 3
Max. Velocity= 0.59 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.28 fps, Avg. Travel Time= 1.8 min

Peak Storage= 5 cf @ 12.50 hrs
Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 0.50' Flow Area= 5.0 sf, Capacity= 13.85 cfs

15.00' x 0.50' deep Parabolic Channel, n= 0.080
Length= 30.0' Slope= 0.0967 '/'
Inlet Invert= 104.90', Outlet Invert= 102.00'



‡

Summary for Pond DMH1: DMH1

Inflow Area = 25,664 sf, 50.39% Impervious, Inflow Depth = 3.97" for 100YR STORM event
Inflow = 2.52 cfs @ 12.07 hrs, Volume= 8,499 cf
Outflow = 2.52 cfs @ 12.07 hrs, Volume= 8,499 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.52 cfs @ 12.07 hrs, Volume= 8,499 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs / 3
Peak Elev= 99.10' @ 12.07 hrs
Flood Elev= 102.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	98.16'	**12.0" Round Culvert** L= 90.3' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 98.16' / 96.00' S= 0.0239 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=2.50 cfs @ 12.07 hrs HW=99.09' TW=97.62' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 2.50 cfs @ 3.28 fps)

Summary for Pond DMH2: DMH2

Inflow Area = 75,534 sf, 38.82% Impervious, Inflow Depth = 3.46" for 100YR STORM event
Inflow = 4.35 cfs @ 12.10 hrs, Volume= 21,807 cf
Outflow = 4.35 cfs @ 12.10 hrs, Volume= 21,807 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.35 cfs @ 12.10 hrs, Volume= 21,807 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs / 3
Peak Elev= 97.72' @ 12.10 hrs
Flood Elev= 100.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	95.90'	**12.0" Round Culvert** L= 58.1' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.90' / 94.50' S= 0.0241 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=4.35 cfs @ 12.10 hrs HW=97.72' TW=94.40' (Dynamic Tailwater)
1=Culvert (Inlet Controls 4.35 cfs @ 5.53 fps)

Summary for Pond DTN: DETENTION BASIN

Inflow Area = 93,710 sf, 32.69% Impervious, Inflow Depth = 3.19" for 100YR STORM event
Inflow = 5.27 cfs @ 12.09 hrs, Volume= 24,944 cf
Outflow = 1.55 cfs @ 12.61 hrs, Volume= 24,947 cf, Atten= 71%, Lag= 31.2 min
Discarded = 0.17 cfs @ 12.61 hrs, Volume= 10,211 cf
Primary = 1.38 cfs @ 12.61 hrs, Volume= 14,735 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs / 3
Peak Elev= 95.00' @ 12.61 hrs Surf.Area= 7,168 sf Storage= 8,814 cf
Flood Elev= 95.10' Surf.Area= 7,337 sf Storage= 9,513 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 112.7 min (908.3 - 795.5)

Volume	Invert	Avail.Storage	Storage Description
#1	93.50'	16,853 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.50	4,614	390.0	0	0	4,614
94.00	5,435	409.0	2,509	2,509	5,838
95.00	7,162	438.0	6,279	8,788	7,838
96.00	9,002	465.0	8,064	16,853	9,831

Device	Routing	Invert	Outlet Devices
#1	Discarded	93.50'	**1.000 in/hr Exfiltration over Surface area**
#2	Primary	93.80'	**10.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 93.80' / 93.00' S= 0.0267 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf

#3	Device 2	93.80'	**6.0" Horiz. Orifice/Grate** C= 0.600
#4	Device 2	94.90'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.17 cfs @ 12.61 hrs HW=95.00' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=1.38 cfs @ 12.61 hrs HW=95.00' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Passes 1.38 cfs of 2.33 cfs potential flow)
  ├**3=Orifice/Grate** (Orifice Controls 1.04 cfs @ 5.28 fps)
  └**4=Orifice/Grate** (Weir Controls 0.34 cfs @ 1.05 fps)

Summary for Pond RG1: RAINGARDEN #1

Inflow Area = 19,263 sf, 8.58% Impervious, Inflow Depth = 2.61" for 100YR STORM event
Inflow = 1.02 cfs @ 12.19 hrs, Volume= 4,191 cf
Outflow = 1.01 cfs @ 12.20 hrs, Volume= 4,190 cf, Atten= 1%, Lag= 0.9 min
Discarded = 0.01 cfs @ 12.20 hrs, Volume= 725 cf
Primary = 1.00 cfs @ 12.20 hrs, Volume= 3,466 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs / 3
Peak Elev= 102.22' @ 12.20 hrs Surf.Area= 613 sf Storage= 317 cf

Plug-Flow detention time= 79.2 min calculated for 4,189 cf (100% of inflow)
Center-of-Mass det. time= 79.7 min (919.8 - 840.1)

Volume	Invert	Avail.Storage	Storage Description
#1	101.60'	577 cf	**6.00'W x 70.00'L x 1.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.60'	**2.400 in/hr Exfiltration over Horizontal area above 101.60'** Conductivity to Groundwater Elevation = 1.70' Excluded Horizontal area = 420 sf Phase-In= 0.01'
#2	Primary	102.10'	**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

Discarded OutFlow Max=0.01 cfs @ 12.20 hrs HW=102.22' (Free Discharge)
└**1=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=1.00 cfs @ 12.20 hrs HW=102.22' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 1.00 cfs @ 0.86 fps)

Summary for Pond RG2: RAINGARDEN #2

Inflow Area = 9,161 sf, 10.81% Impervious, Inflow Depth = 1.17" for 100YR STORM event
Inflow = 0.12 cfs @ 12.29 hrs, Volume= 894 cf
Outflow = 0.10 cfs @ 12.49 hrs, Volume= 892 cf, Atten= 18%, Lag= 12.1 min
Discarded = 0.01 cfs @ 12.49 hrs, Volume= 617 cf
Primary = 0.09 cfs @ 12.49 hrs, Volume= 275 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs / 3
Peak Elev= 105.02' @ 12.49 hrs Surf.Area= 584 sf Storage= 262 cf

Plug-Flow detention time= 315.5 min calculated for 892 cf (100% of inflow)
Center-of-Mass det. time= 314.9 min (1,157.5 - 842.6)

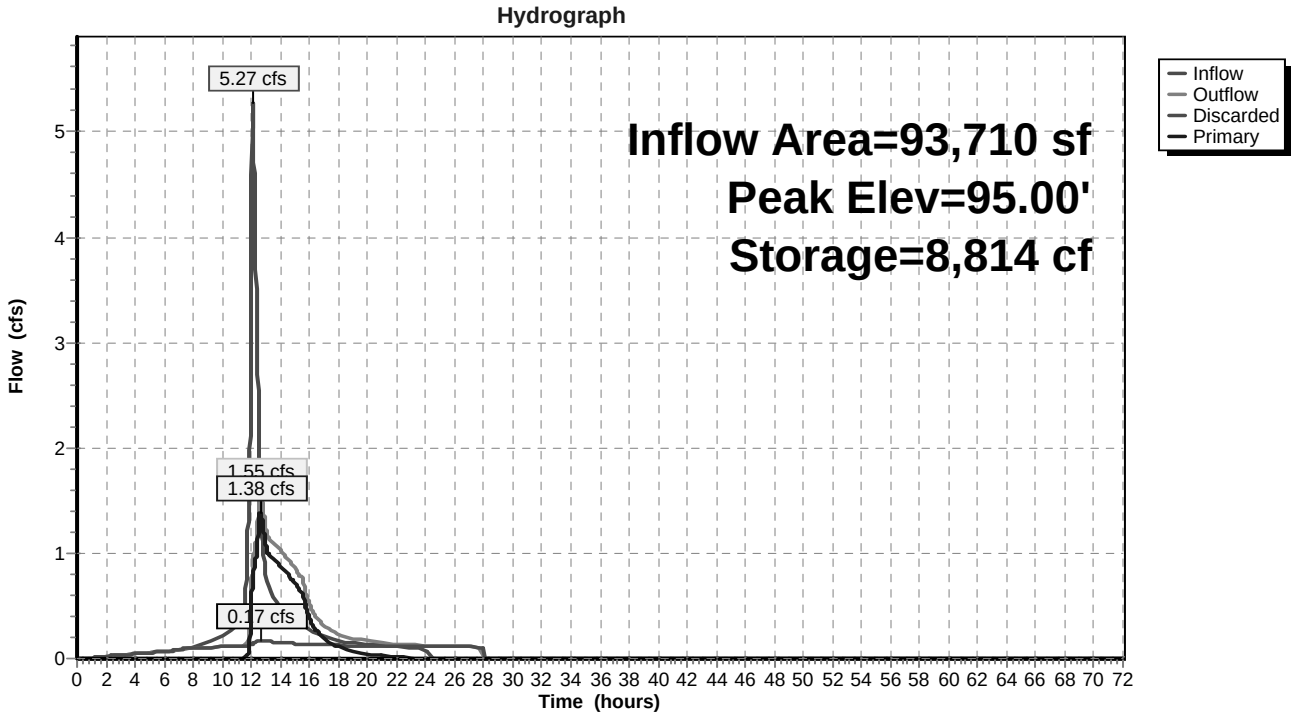
Volume	Invert	Avail.Storage	Storage Description
#1	104.50'	577 cf	**6.00'W x 70.00'L x 1.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Discarded	104.50'	**2.400 in/hr Exfiltration over Horizontal area above 104.50'** Conductivity to Groundwater Elevation = 2.00' Excluded Horizontal area = 420 sf Phase-In= 0.02'
#2	Primary	105.00'	**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

Discarded OutFlow Max=0.01 cfs @ 12.49 hrs HW=105.02' (Free Discharge)
└**1=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=0.09 cfs @ 12.49 hrs HW=105.02' TW=104.95' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 0.09 cfs @ 0.39 fps)

Pond DTN: DETENTION BASIN



APPENDIX F

SOILS LOGS & SUMMARY

ETHAN CIRCLE SUBDIVISION

SOUTH HADLEY, MA

FORM 11: Soil Evaluation Form NO:_____

Commonwealth of Massachusetts
Town of SOUTH HADLEY

Soil Suitability Assessment: On-Site Sewage Disposal

Performed By: SHAWN KIMBERLEY Date: 11/9/12
Witnessed By: _____

Location Address of: RT 47
Lot #:
Owner's Name: ETHAN BAGG
Address of:

New Construction ☐ Repair ☐ Telephone:

Number of bedrooms:

Office Review

Published Soil Survey Available? No ☐ Yes ☒
Year Published _____ Publication Scale _____ Soil Map Unit _____
Drainage Class _____ Soil Limitations _____

Surficial Geologic Report Available? No ☐ Yes ☐
Year Published _____ Publication Scale _____
Geologic Material (map unit) _____
Landform _____

Flood Insurance Rate Map:
Above 500 year flood boundary? No ☐ Yes ☒
Within 500 year flood boundary? No ☒ Yes ☐
Within 100 year flood boundary? No ☒ Yes ☐

Wetland Area:
National Wetland Inventory Map (map unit) _____
Wetlands Conservancy Program Map (map unit) _____

Current Water Resource Conditions (USGS): month _____
Range: Above Normal ☐ Normal ☒ Below Normal ☐

Other Reference Reviewed:

Determination: Seasonal High Water Table

Methods Used:

☐ Depth observed standing in observation hole _____ inches
☐ Depth weeping from side of observation hole _____ inches
☐ Depth to soil mottles _____ inches
☐ Ground water adjustment _____ feet

Index Well No. _____ Reading Date _____ Index Well Level _____
Adjustment factor _____ Adjusted ground water _____

Depth of Naturally Occurring Pervious Material

Does at least four feet of naturally occurring pervious materials exist in all areas observed throughout the area proposed for this soil absorption system? yes

If not, what is the depth of naturally occurring pervious material?
_____

Certification

I certify that on 6/97 *(date) I have passed the soil evaluator examination approved by the Department of Environmental Protection and that the above analysis was performed by me consistent with the required training, expertise, and experience described in 310 CMR 15.017.*

Signature _____

Date _____

On-Site Review

Deep Hole Number 2012-01 Date: 11/19/12 Time 1:30
Weather CLEAR
Land Use WOODLAND Slope (%) 4%
Surface Stone FEW
Vegetation:
MIXED

Landform:

Position on Landscape (sketch on back)
Distances from:

Open Water Body 50+ feet — Drainageway _____ feet
Possible Wet Areas 50+ feet — Property Line 50 feet
Drinking Water Well _____ feet — Other _____

DEEP OBSERVATION HOLE LOG

depth from surface (inches)	soil horizon	soil texture (USDA)	soil color (Munsel)	soil mottling	other (structure, stones, boulders) consistency, % gravel
0-13	A	LOAMY SAND	10YR 4/4	-	CRUMB
13-20	B	LOAMY SAND	10YR 5/6	-	SI.GR.
20-64	C1	FINE SAND	2.5Y 5/4	7.5YR 4/6 @ 54"	SI.GR.
64-72	C2	VERY FINE SAND	5Y 4/2	SAME	FIRM
-					
-					
-					
-					
-					

Parent Material (geologic)
Depth to Bedrock >72
Depth to Groundwater:

Standing Water in the Hole NONE
Weeping from Pit Face NONE
Estimated Seasonal High Water 54"

Comments:

On-Site Review

Deep Hole Number 02 Date: Time
Weather
Land Use Slope (%)
Surface Stone
Vegetation:

Landform:

Position on Landscape (sketch on back)
Distances from:

Open Water Body feet — Drainageway _____ feet
Possible Wet Areas _____ feet — Property Line _____ feet
Drinking Water Well _____ feet — Other _____

DEEP OBSERVATION HOLE LOG

depth from surface (inches)	soil horizon	soil texture (USDA)	soil color (Munsel)	soil mottling	other (structure, stones, boulders) consistency, % gravel
0-12	A	LOAMY SAND	10YR 4/4	-	CRUMB
12-24	B	LOAMY SAND	10YR 5/6	-	SI.GR.
24-60	C1	FINE SAND	2.5Y 5/4	7.5YR 4/6 @ 48"	SI.GR.
60-70	C2	VERY FINE SAND	5Y 4/2	SAME	FIRM
-					
-					
-					
-					
-					

Parent Material (geologic)
Depth to Bedrock >70"
Depth to Groundwater:

Standing Water in the Hole NONE
Weeping from Pit Face NONE
Estimated Seasonal High Water 48"

Comments:

On-Site Review

Deep Hole Number 2012-03 Date: 11/9/12 Time 2:00
Weather
Land Use Slope (%)
Surface Stone
Vegetation:

Landform:

Position on Landscape (sketch on back)
Distances from:

Open Water Body feet Drainageway feet
Possible Wet Areas feet Property Line feet
Drinking Water Well feet Other

DEEP OBSERVATION HOLE LOG

depth from surface (inches)	soil horizon	soil texture (USDA)	soil color (Munsel)	soil mottling	other (structure, stones, boulders) consistency, % gravel
0-15	A	LOAMY SAND	10YR 3/4	-	CRUMB
15-20	B	LOAMY SAND	10YR 4/4	-	SI.GR.
20-36	C1	FINE SAND	2.5Y 5/4	-	SI.GR.
36-43	Ab	LOAMY SAND	10YR 3/2	7.5YR 4/6	MS,FR
43-63	C2	SANDY LOAM	5Y 4/2	SAME	FIRM
63-68	C3	FINE SANDY LOAM	5Y 4/2	SAME	FIRM
-					
-					
-					

Parent Material (geologic)
Depth to Bedrock >68"
Depth to Groundwater:

Standing Water in the Hole NONE
Weeping from Pit Face NONE
Estimated Seasonal High Water 36"

Comments:

On-Site Review

Deep Hole Number -04 Date: 11/9/12 Time 2:30
Weather
Land Use Slope (%)
Surface Stone
Vegetation:

Landform:

Position on Landscape (sketch on back)
Distances from:

Open Water Body feet Drainageway feet
Possible Wet Areas feet Property Line feet
Drinking Water Well feet Other

DEEP OBSERVATION HOLE LOG

depth from surface (inches)	soil horizon	soil texture (USDA)	soil color (Munsel)	soil mottling	other (structure, stones, boulders) consistency, % gravel
0-8	A	SANDY LOAM	10YR 3/4	-	CRUMB
8-16	B	SANDY LOAM	10YR 4/4	7.5YR 4/6 @ 15"	FIRM
16-42	C	SILT LOAM	5Y 4/3	SAME	COMPACT
-					
-					
-					
-					
-					
-					

Parent Material (geologic)
Depth to Bedrock >42"
Depth to Groundwater:

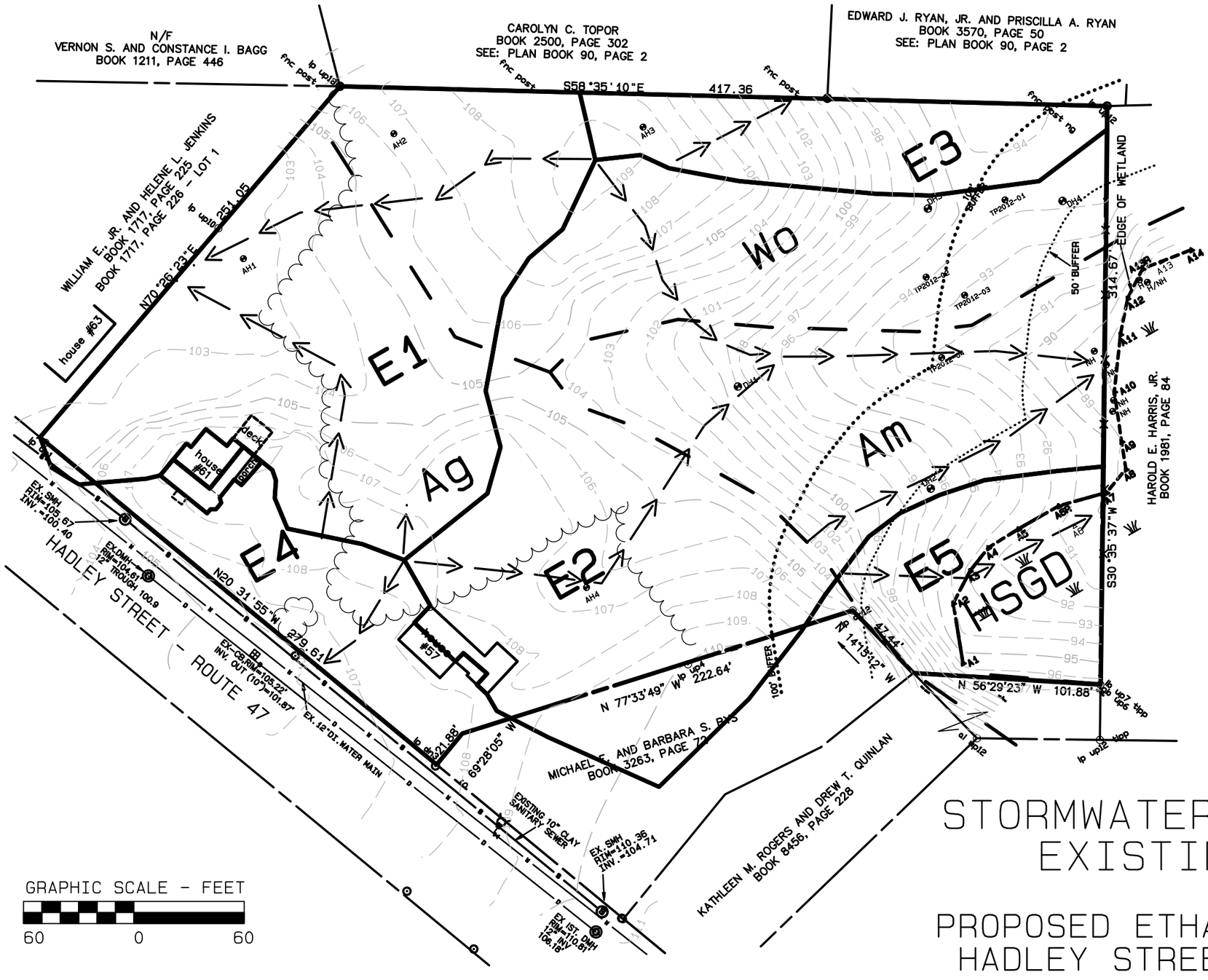
Standing Water in the Hole NONE
Weeping from Pit Face NONE
Estimated Seasonal High Water 15"

Comments:

ESTIMATED GROUNDWATER ELEVATIONS
ETHAN CIRCLE SUBDIVISION, SOUTH HADLEY, MA

HOLE ID	DOMINANT TEXTURES	GROUND ELEV.	DEPTH TO ESHWT	ESHWT ELEV.
2012-01	LS, FS	94.27	4.5	89.77
2012-2	LS, FS	94.1	4	90.1
2012-3	LS, FS	92.87	3	89.87
2012-4	SL, SIL	91.76	1.25	90.51
AH1	LS	102.45	2.5	99.95
AH2	LS, FS	106.5	3.5	103
AH3	FS	108.76	6	102.76
AH4	SL, SIL	106.4	3	103.4

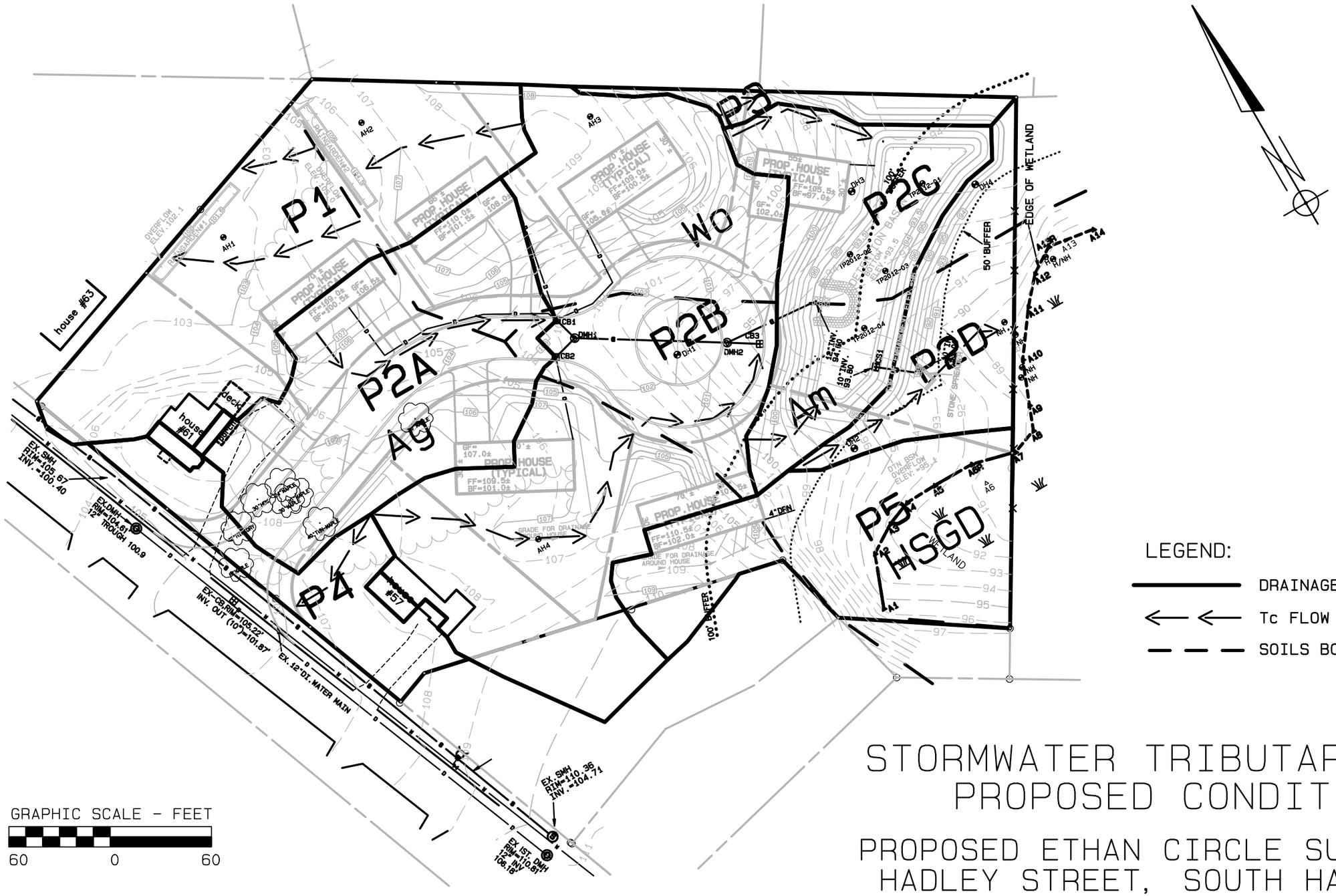
HAND AUGER HOLE WERE DONE 11/9/12 BY C. H. DAUCHY TO DETERMINE FEASIBILITY OF RAIN GARDENS.



STORMWATER TRIBUTARY AREAS EXISTING CONDITIONS

PROPOSED ETHAN CIRCLE SUBDIVISION
HADLEY STREET, SOUTH HADLEY, MA

12/24/13



LEGEND:

- DRAINAGE DIVIDE
- Tc FLOW PATH
- SOILS BOUNDARY (APPROX)

GRAPHIC SCALE - FEET

60 0 60

STORMWATER TRIBUTARY AREAS PROPOSED CONDITIONS

PROPOSED ETHAN CIRCLE SUBDIVISION HADLEY STREET, SOUTH HADLEY, MA

12/24/13