



ENGINEERING,
INC.

ENGINEERS
SURVEYORS

STORMWATER REPORT

For

“Damien’s Food Pantry”

242 Marion Road
Wareham, MA

Prepared for

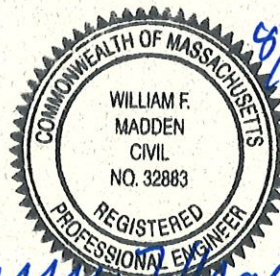
The Family Pantry – Damien’s Place Corp.

P.O. Box 730
East Wareham, MA 02538

Prepared by

G.A.F. Engineering, Inc.

266 Main Street
Wareham, MA 02571



August 4, 2022

G.A.F. Job No.: 22-9838

266 MAIN ST.
WAREHAM, MA 02571

TEL 508.295.6600
FAX 508.295.6634

Table of Contents

- Drainage Narrative.....
- Summary Table.....
- Checklist for Stormwater Report.....
- Compliance with Stormwater Management Standards.....
- Pre-Development Runoff Calculations.....
- Post-Development Runoff Calculations.....
- TSS Calculation Sheet.....
- Water Quality Volume Calculations.....
- Recharge Volume Calculations.....
- Sediment Forebay Sizing Calculations.....
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan.....
- Long Term Operation and Maintenance Plan.....
- Groundwater Mounding Calculations.....
- Soil Map.....
- Watershed Maps.....

DRAINAGE NARRATIVE

General Description

This project consists of the construction of a 50'x 100' building with associated parking lot, access drives, utilities, and stormwater management system. The grading for the site directs runoff to two low points at the edge of pavement where paved waterways discharge to sediment forebays for pretreatment. The forebays have crushed stone check dams which dissipate the flow into infiltration basins. Infiltration Basin #1 is located on the north side of the building. Infiltration Basin #2 is located south of the building and the Swift's Beach Road access drive.

Existing Conditions

The project site is a 2.48 acre parcel of wooded land bordered by Brown Street, Marion Road (Route 6), and Swift's Beach Road. There is a cellular communication tower on the abutting lot to the south. The topography is such that surface runoff flows from north to south toward the tower lot and Brown Street.

Soils on the property as mapped by the USDA Natural Resources Conservation Service consist of Windsor loamy sand (255B), 3 to 8 percent slopes, and Deerfield loamy fine sand (256B), 0 to 3 percent slopes. Both of these soils have a Hydrologic Soil Group rating A. This was utilized in the runoff calculations for determination of runoff curve numbers for each cover type.

Four test pits were excavated to confirm soil types and depth to seasonal high groundwater. The locations and description for each is indicated on the plans. Soil mottling observed in the test pits indicate that seasonal high groundwater is uniform approximately four feet below existing grade.

All storm event runoff volumes were input using the values listed in NOAA Atlas 14, Volume 10, Version 3.

The design point for comparison of pre-development and post-development runoff rates and volumes is the southerly property line and Brown Street. Sub-catchment 1S is the existing 2.48 acre wooded lot.

Proposed Conditions

Site grading for the parking lot and access drives have been designed to prevent runoff from entering the adjacent streets. The stormwater management system consists of two infiltration basins equipped with sediment forebays. The runoff enters the forebays at

low points on the edge of pavement where paved waterways are specified. Roof runoff is piped to each of the basins eliminating the need for a separate infiltration system.

The portion of the project and parking lot adjacent to Marion Road are designated Sub-catchment 1S. Stormwater is directed to Forebay 1 and Infiltration Basin 1. The basin has been sized to store and infiltrate all storm events up to and including the 100 year storm. A Rawls rate of 2.41 inches an hour was input for the exfiltration rate based on a Hydrologic Soil Group rating A for loamy sand.

The access drive and southerly portion of the development have been designated Sub-catchment 2S. Grading directs runoff to the paved waterway and sediment forebay adjacent to Infiltration Basin 2 which is located between Swift's Beach Road and the cellular tower lot. This basin also contains all of the runoff from all storm events with no discharge.

The bottom of each basin is set two feet above seasonal high groundwater as required.

Sub-catchment 3S is the remaining portion of the property which does not enter the drainage system and is 100% pervious. There is a proposed vegetable garden at the corner of Brown Street and Marion Road within this area.

Sub-catchment 3S is the "unmitigated" area used for comparison with pre-development Sub-catchment 1S. The summary table included with this report confirms the reduction in peak flow rates and volumes for all storm events.

In summary, the development of the project in accordance with the design will provide protection to downgradient properties in compliance with the Massachusetts Stormwater Handbook and the applicable Town of Wareham rules and regulations.

Drainage Summary

**Table 1 – Pre-Development vs. Post-Development to South Abutter
(1S/3S)**

| Storm Event | Pre | | Post | | Pre vs. Post changes | |
|-------------|----------------------|-----------------|----------------------|-----------------|----------------------|-----------------|
| | Peak Discharge (cfs) | Volume (ac-ft.) | Peak Discharge (cfs) | Volume (ac-ft.) | Peak Discharge (cfs) | Volume (ac-ft.) |
| 2 yr | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 yr | 0 | 0.001 | 0 | 0.001 | 0 | 0 |
| 25 yr | 0.02 | 0.016 | 0.01 | 0.007 | -0.01 | -0.009 |
| 100 yr | 0.13 | 0.068 | 0.07 | 0.024 | -0.06 | -0.044 |



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 8²
- 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.



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.

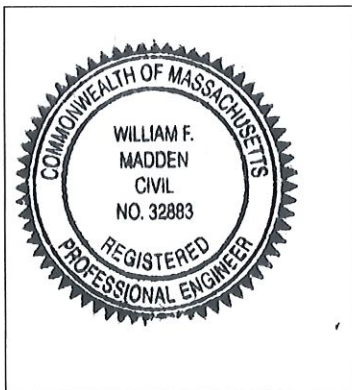
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



William F. Madden 8/6/07

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 Field¹
- 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 proprietary 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.

COMPLIANCE WITH THE STORMWATER MANAGEMENT STANDARDS

The Stormwater Management Standards

1. No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.
 - *This project does not include any new stormwater conveyances or outfalls.*
2. Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.
 - *The drainage calculations confirm that this standard has been met.*
3. Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.
 - *Recharge volume calculations are included in the report and confirm that this standard is met.*
4. Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:
 - a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;
 - b. Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and
 - c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.
 - *This project has specified infiltration basins with sediment forebays. A TSS Calculation Sheet is included in the report to document compliance.*

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

- *This project is not considered a land use with higher potential pollutant load.*

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

- *This project is not located within a Zone II of a public water supply and there are no critical areas downstream from the property.*

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

- *This project is considered new development.*

8. A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.
 - *Construction period erosion and sedimentation control measures are included on the design plans and in this report.*
9. A post-construction operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.
 - *The post-construction operation and maintenance plan has been listed on the design plans and in this report.*
10. All illicit discharges to the stormwater management system are prohibited.
 - *An illicit discharge statement is included in this report.*

Date:

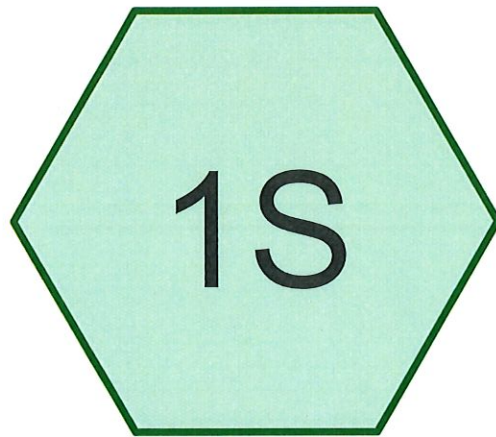
8/3/2022

To whom it may concern:

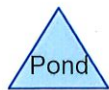
I hereby certify that no illicit discharge connections presently exist nor will any be permitted in the future at the property located at 242 Marion Road, Wareham, Mass., the future home of Damien's Food Pantry.



The Family Pantry – Damien's Place, Corp.



To South Abutter



9838PRE

Prepared by GAF Engineering, Inc

HydroCAD® 10.20-2d s/n 02319 © 2021 HydroCAD Software Solutions LLC

Printed 8/3/2022

Page 2

Project Notes

Rainfall events imported from "9838POST.hcp"

Rainfall Events Listing

| Event# | Event Name | Storm Type | Curve | Mode | Duration (hours) | B/B | Depth (inches) | AMC |
|--------|----------------|----------------|-------|---------|------------------|-----|----------------|-----|
| 1 | 2 Year Storm | Type III 24-hr | | Default | 24.00 | 1 | 3.44 | 2 |
| 2 | 10 Year Storm | Type III 24-hr | | Default | 24.00 | 1 | 5.05 | 2 |
| 3 | 25 Year Storm | Type III 24-hr | | Default | 24.00 | 1 | 6.05 | 2 |
| 4 | 100 Year Storm | Type III 24-hr | | Default | 24.00 | 1 | 7.60 | 2 |

9838PRE

Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|-----------------|-----------|---------------------------------------|
| 2.480 | 30 | Woods, Good, HSG A (1S) |
| 2.480 | 30 | TOTAL AREA |

Soil Listing (all nodes)

| Area (acres) | Soil Group | Subcatchment Numbers |
|-----------------|---------------|-------------------------|
| 2.480 | HSG A | 1S |
| 0.000 | HSG B | |
| 0.000 | HSG C | |
| 0.000 | HSG D | |
| 0.000 | Other | |
| 2.480 | | TOTAL AREA |

Ground Covers (all nodes)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchment Numbers |
|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|-------------------------|
| 2.480 | 0.000 | 0.000 | 0.000 | 0.000 | 2.480 | Woods, Good | 1S |
| 2.480 | 0.000 | 0.000 | 0.000 | 0.000 | 2.480 | TOTAL AREA | |

9838PRE

Type III 24-hr 2 Year Storm Rainfall=3.44"

Prepared by GAF Engineering, Inc

Printed 8/3/2022

HydroCAD® 10.20-2d s/n 02319 © 2021 HydroCAD Software Solutions LLC

Page 7

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

Subcatchment 1S: To South Abutter

Runoff Area=108,040 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=340' Tc=21.1 min CN=30 Runoff=0.00 cfs 0.000 af

Total Runoff Area = 2.480 ac Runoff Volume = 0.000 af Average Runoff Depth = 0.00"
100.00% Pervious = 2.480 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: To South Abutter

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.44"

| Area (sf) | CN | Description |
|-----------|----|-----------------------|
| 108,040 | 30 | Woods, Good, HSG A |
| 108,040 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 17.2 | 50 | 0.0080 | 0.05 | | Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44" |
| 3.9 | 290 | 0.0060 | 1.25 | | Shallow Concentrated Flow, Unpaved Kv= 16.1 fps |
| 21.1 | 340 | Total | | | |

9838PRE

Type III 24-hr 10 Year Storm Rainfall=5.05"

Prepared by GAF Engineering, Inc

Printed 8/3/2022

HydroCAD® 10.20-2d s/n 02319 © 2021 HydroCAD Software Solutions LLC

Page 9

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

Subcatchment 1S: To South Abutter

Runoff Area=108,040 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=340' Tc=21.1 min CN=30 Runoff=0.00 cfs 0.001 af

Total Runoff Area = 2.480 ac Runoff Volume = 0.001 af Average Runoff Depth = 0.01"
100.00% Pervious = 2.480 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: To South Abutter

Runoff = 0.00 cfs @ 23.84 hrs, Volume= 0.001 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=5.05"

| Area (sf) | CN | Description |
|-----------|----|-----------------------|
| 108,040 | 30 | Woods, Good, HSG A |
| 108,040 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 17.2 | 50 | 0.0080 | 0.05 | | Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44" |
| 3.9 | 290 | 0.0060 | 1.25 | | Shallow Concentrated Flow, Unpaved Kv= 16.1 fps |
| 21.1 | 340 | Total | | | |

9838PRE

Type III 24-hr 25 Year Storm Rainfall=6.05"

Prepared by GAF Engineering, Inc

Printed 8/3/2022

HydroCAD® 10.20-2d s/n 02319 © 2021 HydroCAD Software Solutions LLC

Page 11

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

Subcatchment 1S: To South Abutter

Runoff Area=108,040 sf 0.00% Impervious Runoff Depth=0.08"
Flow Length=340' Tc=21.1 min CN=30 Runoff=0.02 cfs 0.016 af

Total Runoff Area = 2.480 ac Runoff Volume = 0.016 af Average Runoff Depth = 0.08"
100.00% Pervious = 2.480 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: To South Abutter

Runoff = 0.02 cfs @ 15.68 hrs, Volume= 0.016 af, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 Year Storm Rainfall=6.05"

| Area (sf) | CN | Description |
|-----------|----|-----------------------|
| 108,040 | 30 | Woods, Good, HSG A |
| 108,040 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 17.2 | 50 | 0.0080 | 0.05 | | Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44" |
| 3.9 | 290 | 0.0060 | 1.25 | | Shallow Concentrated Flow, Unpaved Kv= 16.1 fps |
| 21.1 | 340 | Total | | | |

9838PRE

Type III 24-hr 100 Year Storm Rainfall=7.60"

Prepared by GAF Engineering, Inc

Printed 8/3/2022

HydroCAD® 10.20-2d s/n 02319 © 2021 HydroCAD Software Solutions LLC

Page 13

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To South Abutter

Runoff Area=108,040 sf 0.00% Impervious Runoff Depth=0.33"
Flow Length=340' Tc=21.1 min CN=30 Runoff=0.13 cfs 0.068 af

Total Runoff Area = 2.480 ac Runoff Volume = 0.068 af Average Runoff Depth = 0.33"
100.00% Pervious = 2.480 ac 0.00% Impervious = 0.000 ac

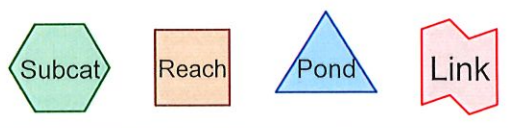
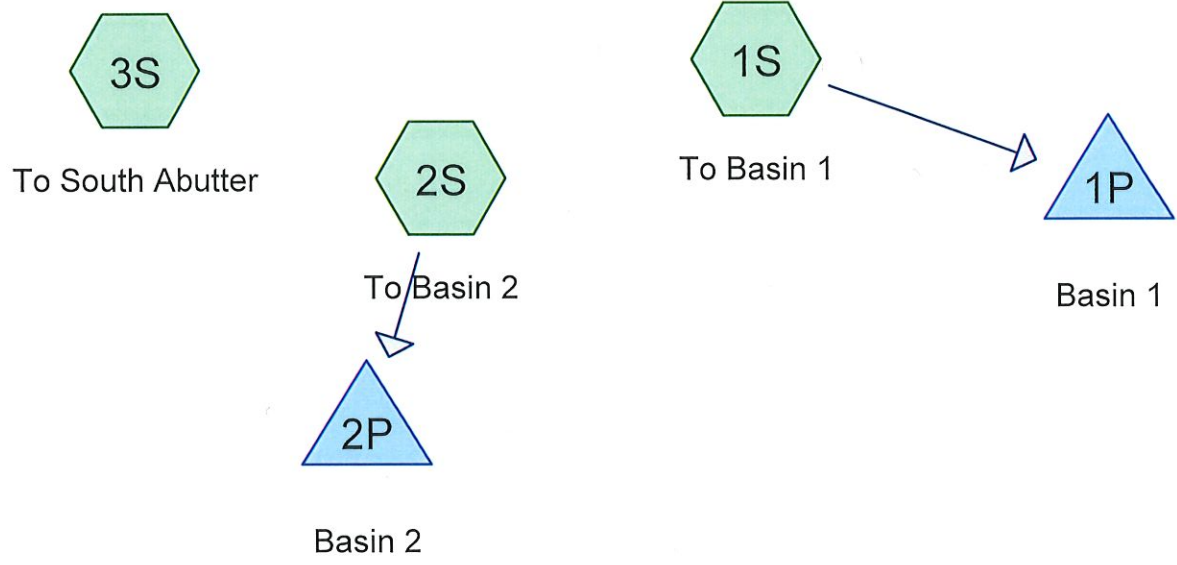
Summary for Subcatchment 1S: To South Abutter

Runoff = 0.13 cfs @ 12.73 hrs, Volume= 0.068 af, Depth= 0.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=7.60"

| Area (sf) | CN | Description |
|-----------|----|-----------------------|
| 108,040 | 30 | Woods, Good, HSG A |
| 108,040 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 17.2 | 50 | 0.0080 | 0.05 | | Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44" |
| 3.9 | 290 | 0.0060 | 1.25 | | Shallow Concentrated Flow, Unpaved Kv= 16.1 fps |
| 21.1 | 340 | Total | | | |



9838POST

Prepared by GAF Engineering, Inc
HydroCAD® 10.20-2d s/n 02319 © 2021 HydroCAD Software Solutions LLC

Printed 8/3/2022

Page 16

Rainfall Events Listing

| Event# | Event Name | Storm Type | Curve | Mode | Duration (hours) | B/B | Depth (inches) | AMC |
|--------|----------------|----------------|-------|---------|------------------|-----|----------------|-----|
| 1 | 2 Year Storm | Type III 24-hr | | Default | 24.00 | 1 | 3.44 | 2 |
| 2 | 10 Year Storm | Type III 24-hr | | Default | 24.00 | 1 | 5.05 | 2 |
| 3 | 25 Year Storm | Type III 24-hr | | Default | 24.00 | 1 | 6.05 | 2 |
| 4 | 100 Year Storm | Type III 24-hr | | Default | 24.00 | 1 | 7.60 | 2 |

Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|-----------------|-----------|--|
| 0.729 | 39 | >75% Grass cover, Good, HSG A (1S, 2S, 3S) |
| 0.321 | 98 | Parking Lot, Walks, Roof Area (1S) |
| 0.546 | 98 | Pavement, Walks, Pads, Roof (2S) |
| 0.281 | 30 | Raised Bed Garden (3S) |
| 0.602 | 30 | Woods, Good, HSG A (1S, 2S, 3S) |
| 2.480 | 56 | TOTAL AREA |

9838POST

Soil Listing (all nodes)

| Area (acres) | Soil Group | Subcatchment Numbers |
|-----------------|---------------|-------------------------|
| 1.331 | HSG A | 1S, 2S, 3S |
| 0.000 | HSG B | |
| 0.000 | HSG C | |
| 0.000 | HSG D | |
| 1.149 | Other | 1S, 2S, 3S |
| 2.480 | | TOTAL AREA |

9838POST

Prepared by GAF Engineering, Inc

Printed 8/3/2022

HydroCAD® 10.20-2d s/n 02319 © 2021 HydroCAD Software Solutions LLC

Page 19

Ground Covers (all nodes)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchmen Numbers |
|------------------|------------------|------------------|------------------|------------------|------------------|-------------------------------|------------------------|
| 0.729 | 0.000 | 0.000 | 0.000 | 0.000 | 0.729 | >75% Grass cover, Good | 1S, 2S, 3S |
| 0.000 | 0.000 | 0.000 | 0.000 | 0.321 | 0.321 | Parking Lot, Walks, Roof Area | 1S |
| 0.000 | 0.000 | 0.000 | 0.000 | 0.546 | 0.546 | Pavement, Walks, Pads, Roof | 2S |
| 0.000 | 0.000 | 0.000 | 0.000 | 0.281 | 0.281 | Raised Bed Garden | 3S |
| 0.602 | 0.000 | 0.000 | 0.000 | 0.000 | 0.602 | Woods, Good | 1S, 2S, 3S |
| 1.331 | 0.000 | 0.000 | 0.000 | 1.149 | 2.480 | TOTAL AREA | |

9838POST

Type III 24-hr 2 Year Storm Rainfall=3.44"

Prepared by GAF Engineering, Inc

Printed 8/3/2022

HydroCAD® 10.20-2d s/n 02319 © 2021 HydroCAD Software Solutions LLC

Page 20

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

| | |
|--|---|
| Subcatchment 1S: To Basin 1 | Runoff Area=30,520 sf 45.87% Impervious Runoff Depth=0.67" Flow Length=70' Tc=17.3 min CN=64 Runoff=0.31 cfs 0.039 af |
| Subcatchment 2S: To Basin 2 | Runoff Area=45,450 sf 52.37% Impervious Runoff Depth=0.92" Flow Length=135' Tc=16.8 min CN=69 Runoff=0.73 cfs 0.080 af |
| Subcatchment 3S: To South Abutter | Runoff Area=32,070 sf 0.00% Impervious Runoff Depth=0.00" Flow Length=180' Tc=12.3 min CN=31 Runoff=0.00 cfs 0.000 af |
| Pond 1P: Basin 1 | Peak Elev=16.12' Storage=279 cf Inflow=0.31 cfs 0.039 af Outflow=0.13 cfs 0.039 af |
| Pond 2P: Basin 2 | Peak Elev=15.35' Storage=372 cf Inflow=0.73 cfs 0.080 af Outflow=0.42 cfs 0.080 af |

Total Runoff Area = 2.480 ac Runoff Volume = 0.119 af Average Runoff Depth = 0.58"
65.01% Pervious = 1.612 ac 34.99% Impervious = 0.868 ac

Summary for Subcatchment 1S: To Basin 1

Runoff = 0.31 cfs @ 12.29 hrs, Volume= 0.039 af, Depth= 0.67"
 Routed to Pond 1P : Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.44"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| * 14,000 | 98 | Parking Lot, Walks, Roof Area |
| 9,470 | 39 | >75% Grass cover, Good, HSG A |
| 7,050 | 30 | Woods, Good, HSG A |
| 30,520 | 64 | Weighted Average |
| 16,520 | | 54.13% Pervious Area |
| 14,000 | | 45.87% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 17.2 | 50 | 0.0080 | 0.05 | | Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44" |
| 0.1 | 20 | 0.1300 | 5.80 | | Shallow Concentrated Flow, Unpaved Kv= 16.1 fps |
| 17.3 | 70 | Total | | | |

Summary for Subcatchment 2S: To Basin 2

Runoff = 0.73 cfs @ 12.26 hrs, Volume= 0.080 af, Depth= 0.92"
 Routed to Pond 2P : Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.44"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| * 23,800 | 98 | Pavement, Walks, Pads, Roof |
| 18,350 | 39 | >75% Grass cover, Good, HSG A |
| 3,300 | 30 | Woods, Good, HSG A |
| 45,450 | 69 | Weighted Average |
| 21,650 | | 47.63% Pervious Area |
| 23,800 | | 52.37% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 15.7 | 50 | 0.0100 | 0.05 | | Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44" |
| 0.6 | 30 | 0.0030 | 0.88 | | Shallow Concentrated Flow, Unpaved Kv= 16.1 fps |
| 0.5 | 55 | 0.0070 | 1.70 | | Shallow Concentrated Flow, Paved Kv= 20.3 fps |
| 16.8 | 135 | Total | | | |

Summary for Subcatchment 3S: To South Abutter

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.44"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 3,950 | 39 | >75% Grass cover, Good, HSG A |
| * 12,250 | 30 | Raised Bed Garden |
| 15,870 | 30 | Woods, Good, HSG A |
| 32,070 | 31 | Weighted Average |
| 32,070 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|---|
| 10.4 | 50 | 0.0100 | 0.08 | | Sheet Flow, Grass: Dense n= 0.240 P2= 3.44" |
| 1.9 | 130 | 0.0050 | 1.14 | | Shallow Concentrated Flow, Unpaved Kv= 16.1 fps |
| 12.3 | 180 | Total | | | |

Summary for Pond 1P: Basin 1

Inflow Area = 0.701 ac, 45.87% Impervious, Inflow Depth = 0.67" for 2 Year Storm event
 Inflow = 0.31 cfs @ 12.29 hrs, Volume= 0.039 af
 Outflow = 0.13 cfs @ 12.74 hrs, Volume= 0.039 af, Atten= 58%, Lag= 27.4 min
 Discarded = 0.13 cfs @ 12.74 hrs, Volume= 0.039 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 16.12' @ 12.74 hrs Surf.Area= 2,368 sf Storage= 279 cf

Plug-Flow detention time= 14.3 min calculated for 0.039 af (100% of inflow)
 Center-of-Mass det. time= 14.3 min (917.4 - 903.1)

| Volume | Invert | Avail.Storage | Storage Description |
|--------|--------|---------------|--|
| #1 | 16.00' | 5,878 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 16.00 | 2,292 | 0 | 0 |
| 17.00 | 2,927 | 2,610 | 2,610 |
| 17.50 | 3,265 | 1,548 | 4,158 |
| 18.00 | 3,618 | 1,721 | 5,878 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|--------|---|
| #1 | Discarded | 16.00' | 2.410 in/hr Exfiltration over Surface area |

Discarded OutFlow Max=0.13 cfs @ 12.74 hrs HW=16.12' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.13 cfs)

Summary for Pond 2P: Basin 2

Inflow Area = 1.043 ac, 52.37% Impervious, Inflow Depth = 0.92" for 2 Year Storm event
 Inflow = 0.73 cfs @ 12.26 hrs, Volume= 0.080 af
 Outflow = 0.42 cfs @ 12.57 hrs, Volume= 0.080 af, Atten= 42%, Lag= 18.7 min
 Discarded = 0.42 cfs @ 12.57 hrs, Volume= 0.080 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 15.35' @ 12.57 hrs Surf.Area= 7,539 sf Storage= 372 cf

Plug-Flow detention time= 6.2 min calculated for 0.080 af (100% of inflow)
 Center-of-Mass det. time= 6.2 min (890.1 - 883.9)

| Volume | Invert | Avail.Storage | Storage Description |
|--------|--------|---------------|--|
| #1 | 15.30' | 10,043 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 15.30 | 7,460 | 0 | 0 |
| 16.00 | 8,573 | 5,612 | 5,612 |
| 16.50 | 9,151 | 4,431 | 10,043 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|--------|---|
| #1 | Discarded | 15.30' | 2.410 in/hr Exfiltration over Surface area |

Discarded OutFlow Max=0.42 cfs @ 12.57 hrs HW=15.35' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.42 cfs)

9838POST

Type III 24-hr 10 Year Storm Rainfall=5.05"

Prepared by GAF Engineering, Inc

Printed 8/3/2022

HydroCAD® 10.20-2d s/n 02319 © 2021 HydroCAD Software Solutions LLC

Page 26

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

| | |
|--|---|
| Subcatchment 1S: To Basin 1 | Runoff Area=30,520 sf 45.87% Impervious Runoff Depth=1.61" Flow Length=70' Tc=17.3 min CN=64 Runoff=0.89 cfs 0.094 af |
| Subcatchment 2S: To Basin 2 | Runoff Area=45,450 sf 52.37% Impervious Runoff Depth=1.99" Flow Length=135' Tc=16.8 min CN=69 Runoff=1.72 cfs 0.173 af |
| Subcatchment 3S: To South Abutter | Runoff Area=32,070 sf 0.00% Impervious Runoff Depth=0.02" Flow Length=180' Tc=12.3 min CN=31 Runoff=0.00 cfs 0.001 af |
| Pond 1P: Basin 1 | Peak Elev=16.56' Storage=1,394 cf Inflow=0.89 cfs 0.094 af Outflow=0.15 cfs 0.094 af |
| Pond 2P: Basin 2 | Peak Elev=15.56' Storage=1,994 cf Inflow=1.72 cfs 0.173 af Outflow=0.44 cfs 0.173 af |

Total Runoff Area = 2.480 ac Runoff Volume = 0.269 af Average Runoff Depth = 1.30"
65.01% Pervious = 1.612 ac 34.99% Impervious = 0.868 ac

Summary for Subcatchment 1S: To Basin 1

Runoff = 0.89 cfs @ 12.25 hrs, Volume= 0.094 af, Depth= 1.61"
 Routed to Pond 1P : Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=5.05"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| * 14,000 | 98 | Parking Lot, Walks, Roof Area |
| 9,470 | 39 | >75% Grass cover, Good, HSG A |
| 7,050 | 30 | Woods, Good, HSG A |
| 30,520 | 64 | Weighted Average |
| 16,520 | | 54.13% Pervious Area |
| 14,000 | | 45.87% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 17.2 | 50 | 0.0080 | 0.05 | | Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44" |
| 0.1 | 20 | 0.1300 | 5.80 | | Shallow Concentrated Flow, Unpaved Kv= 16.1 fps |
| 17.3 | 70 | Total | | | |

Summary for Subcatchment 2S: To Basin 2

Runoff = 1.72 cfs @ 12.24 hrs, Volume= 0.173 af, Depth= 1.99"
 Routed to Pond 2P : Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=5.05"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| * 23,800 | 98 | Pavement, Walks, Pads, Roof |
| 18,350 | 39 | >75% Grass cover, Good, HSG A |
| 3,300 | 30 | Woods, Good, HSG A |
| 45,450 | 69 | Weighted Average |
| 21,650 | | 47.63% Pervious Area |
| 23,800 | | 52.37% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 15.7 | 50 | 0.0100 | 0.05 | | Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44" |
| 0.6 | 30 | 0.0030 | 0.88 | | Shallow Concentrated Flow, Unpaved Kv= 16.1 fps |
| 0.5 | 55 | 0.0070 | 1.70 | | Shallow Concentrated Flow, Paved Kv= 20.3 fps |
| 16.8 | 135 | Total | | | |

Summary for Subcatchment 3S: To South Abutter

Runoff = 0.00 cfs @ 22.18 hrs, Volume= 0.001 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=5.05"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 3,950 | 39 | >75% Grass cover, Good, HSG A |
| * 12,250 | 30 | Raised Bed Garden |
| 15,870 | 30 | Woods, Good, HSG A |
| 32,070 | 31 | Weighted Average |
| 32,070 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|---|
| 10.4 | 50 | 0.0100 | 0.08 | | Sheet Flow, Grass: Dense n= 0.240 P2= 3.44" |
| 1.9 | 130 | 0.0050 | 1.14 | | Shallow Concentrated Flow, Unpaved Kv= 16.1 fps |
| 12.3 | 180 | Total | | | |

Summary for Pond 1P: Basin 1

Inflow Area = 0.701 ac, 45.87% Impervious, Inflow Depth = 1.61" for 10 Year Storm event
 Inflow = 0.89 cfs @ 12.25 hrs, Volume= 0.094 af
 Outflow = 0.15 cfs @ 13.26 hrs, Volume= 0.094 af, Atten= 83%, Lag= 60.3 min
 Discarded = 0.15 cfs @ 13.26 hrs, Volume= 0.094 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 16.56' @ 13.26 hrs Surf.Area= 2,650 sf Storage= 1,394 cf

Plug-Flow detention time= 87.2 min calculated for 0.094 af (100% of inflow)
 Center-of-Mass det. time= 87.1 min (960.6 - 873.5)

| Volume | Invert | Avail.Storage | Storage Description |
|--------|--------|---------------|--|
| #1 | 16.00' | 5,878 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 16.00 | 2,292 | 0 | 0 |
| 17.00 | 2,927 | 2,610 | 2,610 |
| 17.50 | 3,265 | 1,548 | 4,158 |
| 18.00 | 3,618 | 1,721 | 5,878 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|--------|---|
| #1 | Discarded | 16.00' | 2.410 in/hr Exfiltration over Surface area |

Discarded OutFlow Max=0.15 cfs @ 13.26 hrs HW=16.56' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.15 cfs)

Summary for Pond 2P: Basin 2

Inflow Area = 1.043 ac, 52.37% Impervious, Inflow Depth = 1.99" for 10 Year Storm event
 Inflow = 1.72 cfs @ 12.24 hrs, Volume= 0.173 af
 Outflow = 0.44 cfs @ 12.81 hrs, Volume= 0.173 af, Atten= 74%, Lag= 34.6 min
 Discarded = 0.44 cfs @ 12.81 hrs, Volume= 0.173 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 15.56' @ 12.81 hrs Surf.Area= 7,874 sf Storage= 1,994 cf

Plug-Flow detention time= 31.7 min calculated for 0.173 af (100% of inflow)
 Center-of-Mass det. time= 31.7 min (891.4 - 859.7)

| Volume | Invert | Avail.Storage | Storage Description |
|--------|--------|---------------|---|
| #1 | 15.30' | 10,043 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|------------------|-------------------|------------------------|------------------------|
| 15.30 | 7,460 | 0 | 0 |
| 16.00 | 8,573 | 5,612 | 5,612 |
| 16.50 | 9,151 | 4,431 | 10,043 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|--------|--|
| #1 | Discarded | 15.30' | 2.410 in/hr Exfiltration over Surface area |

Discarded OutFlow Max=0.44 cfs @ 12.81 hrs HW=15.56' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.44 cfs)

9838POST

Type III 24-hr 25 Year Storm Rainfall=6.05"

Prepared by GAF Engineering, Inc

Printed 8/3/2022

HydroCAD® 10.20-2d s/n 02319 © 2021 HydroCAD Software Solutions LLC

Page 32

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

| | |
|---|---|
| Subcatchment 1S: To Basin 1 | Runoff Area=30,520 sf 45.87% Impervious Runoff Depth=2.30" Flow Length=70' Tc=17.3 min CN=64 Runoff=1.31 cfs 0.134 af |
| Subcatchment 2S: To Basin 2 | Runoff Area=45,450 sf 52.37% Impervious Runoff Depth=2.75" Flow Length=135' Tc=16.8 min CN=69 Runoff=2.41 cfs 0.239 af |
| Subcatchment 3S: To South Abutter | Runoff Area=32,070 sf 0.00% Impervious Runoff Depth=0.11" Flow Length=180' Tc=12.3 min CN=31 Runoff=0.01 cfs 0.007 af |
| Pond 1P: Basin 1 | Peak Elev=16.91' Storage=2,353 cf Inflow=1.31 cfs 0.134 af Outflow=0.16 cfs 0.134 af |
| Pond 2P: Basin 2 | Peak Elev=15.73' Storage=3,342 cf Inflow=2.41 cfs 0.239 af Outflow=0.45 cfs 0.239 af |
| Total Runoff Area = 2.480 ac Runoff Volume = 0.380 af Average Runoff Depth = 1.84" 65.01% Pervious = 1.612 ac 34.99% Impervious = 0.868 ac | |

Summary for Subcatchment 1S: To Basin 1

Runoff = 1.31 cfs @ 12.25 hrs, Volume= 0.134 af, Depth= 2.30"
 Routed to Pond 1P : Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 Year Storm Rainfall=6.05"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| * 14,000 | 98 | Parking Lot, Walks, Roof Area |
| 9,470 | 39 | >75% Grass cover, Good, HSG A |
| 7,050 | 30 | Woods, Good, HSG A |
| 30,520 | 64 | Weighted Average |
| 16,520 | | 54.13% Pervious Area |
| 14,000 | | 45.87% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 17.2 | 50 | 0.0080 | 0.05 | | Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44" |
| 0.1 | 20 | 0.1300 | 5.80 | | Shallow Concentrated Flow, Unpaved Kv= 16.1 fps |
| 17.3 | 70 | Total | | | |

Summary for Subcatchment 2S: To Basin 2

Runoff = 2.41 cfs @ 12.23 hrs, Volume= 0.239 af, Depth= 2.75"
 Routed to Pond 2P : Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 Year Storm Rainfall=6.05"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| * 23,800 | 98 | Pavement, Walks, Pads, Roof |
| 18,350 | 39 | >75% Grass cover, Good, HSG A |
| 3,300 | 30 | Woods, Good, HSG A |
| 45,450 | 69 | Weighted Average |
| 21,650 | | 47.63% Pervious Area |
| 23,800 | | 52.37% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 15.7 | 50 | 0.0100 | 0.05 | | Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44" |
| 0.6 | 30 | 0.0030 | 0.88 | | Shallow Concentrated Flow, Unpaved Kv= 16.1 fps |
| 0.5 | 55 | 0.0070 | 1.70 | | Shallow Concentrated Flow, Paved Kv= 20.3 fps |
| 16.8 | 135 | Total | | | |

Summary for Subcatchment 3S: To South Abutter

Runoff = 0.01 cfs @ 15.18 hrs, Volume= 0.007 af, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 Year Storm Rainfall=6.05"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 3,950 | 39 | >75% Grass cover, Good, HSG A |
| * 12,250 | 30 | Raised Bed Garden |
| 15,870 | 30 | Woods, Good, HSG A |
| 32,070 | 31 | Weighted Average |
| 32,070 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|---|
| 10.4 | 50 | 0.0100 | 0.08 | | Sheet Flow, Grass: Dense n= 0.240 P2= 3.44" |
| 1.9 | 130 | 0.0050 | 1.14 | | Shallow Concentrated Flow, Unpaved Kv= 16.1 fps |
| 12.3 | 180 | Total | | | |

Summary for Pond 1P: Basin 1

Inflow Area = 0.701 ac, 45.87% Impervious, Inflow Depth = 2.30" for 25 Year Storm event
 Inflow = 1.31 cfs @ 12.25 hrs, Volume= 0.134 af
 Outflow = 0.16 cfs @ 13.83 hrs, Volume= 0.134 af, Atten= 88%, Lag= 95.2 min
 Discarded = 0.16 cfs @ 13.83 hrs, Volume= 0.134 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 16.91' @ 13.83 hrs Surf.Area= 2,871 sf Storage= 2,353 cf

Plug-Flow detention time= 149.4 min calculated for 0.134 af (100% of inflow)
 Center-of-Mass det. time= 149.4 min (1,012.0 - 862.6)

| Volume | Invert | Avail.Storage | Storage Description |
|--------|--------|---------------|--|
| #1 | 16.00' | 5,878 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 16.00 | 2,292 | 0 | 0 |
| 17.00 | 2,927 | 2,610 | 2,610 |
| 17.50 | 3,265 | 1,548 | 4,158 |
| 18.00 | 3,618 | 1,721 | 5,878 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|--------|---|
| #1 | Discarded | 16.00' | 2.410 in/hr Exfiltration over Surface area |

Discarded OutFlow Max=0.16 cfs @ 13.83 hrs HW=16.91' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Summary for Pond 2P: Basin 2

Inflow Area = 1.043 ac, 52.37% Impervious, Inflow Depth = 2.75" for 25 Year Storm event
 Inflow = 2.41 cfs @ 12.23 hrs, Volume= 0.239 af
 Outflow = 0.45 cfs @ 12.97 hrs, Volume= 0.239 af, Atten= 81%, Lag= 44.3 min
 Discarded = 0.45 cfs @ 12.97 hrs, Volume= 0.239 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 15.73' @ 12.97 hrs Surf.Area= 8,141 sf Storage= 3,342 cf

Plug-Flow detention time= 58.2 min calculated for 0.239 af (100% of inflow)
 Center-of-Mass det. time= 58.2 min (908.4 - 850.2)

| Volume | Invert | Avail.Storage | Storage Description |
|---------------------|----------------------|---------------------------|--|
| #1 | 15.30' | 10,043 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
| 15.30 | 7,460 | 0 | 0 |
| 16.00 | 8,573 | 5,612 | 5,612 |
| 16.50 | 9,151 | 4,431 | 10,043 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|--------|---|
| #1 | Discarded | 15.30' | 2.410 in/hr Exfiltration over Surface area |

Discarded OutFlow Max=0.45 cfs @ 12.97 hrs HW=15.73' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.45 cfs)

9838POST

Type III 24-hr 100 Year Storm Rainfall=7.60"

Prepared by GAF Engineering, Inc

Printed 8/3/2022

HydroCAD® 10.20-2d s/n 02319 © 2021 HydroCAD Software Solutions LLC

Page 38

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

Subcatchment 1S: To Basin 1

Runoff Area=30,520 sf 45.87% Impervious Runoff Depth=3.46"
Flow Length=70' Tc=17.3 min CN=64 Runoff=2.02 cfs 0.202 af

Subcatchment 2S: To Basin 2

Runoff Area=45,450 sf 52.37% Impervious Runoff Depth=4.01"
Flow Length=135' Tc=16.8 min CN=69 Runoff=3.55 cfs 0.349 af

Subcatchment 3S: To South Abutter

Runoff Area=32,070 sf 0.00% Impervious Runoff Depth=0.39"
Flow Length=180' Tc=12.3 min CN=31 Runoff=0.07 cfs 0.024 af

Pond 1P: Basin 1

Peak Elev=17.49' Storage=4,124 cf Inflow=2.02 cfs 0.202 af
Outflow=0.18 cfs 0.202 af

Pond 2P: Basin 2

Peak Elev=16.02' Storage=5,765 cf Inflow=3.55 cfs 0.349 af
Outflow=0.48 cfs 0.349 af

Total Runoff Area = 2.480 ac Runoff Volume = 0.575 af Average Runoff Depth = 2.78"
65.01% Pervious = 1.612 ac 34.99% Impervious = 0.868 ac

Summary for Subcatchment 1S: To Basin 1

Runoff = 2.02 cfs @ 12.24 hrs, Volume= 0.202 af, Depth= 3.46"
 Routed to Pond 1P : Basin 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=7.60"

| | Area (sf) | CN | Description |
|---|-----------|----|-------------------------------|
| * | 14,000 | 98 | Parking Lot, Walks, Roof Area |
| | 9,470 | 39 | >75% Grass cover, Good, HSG A |
| | 7,050 | 30 | Woods, Good, HSG A |
| | 30,520 | 64 | Weighted Average |
| | 16,520 | | 54.13% Pervious Area |
| | 14,000 | | 45.87% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 17.2 | 50 | 0.0080 | 0.05 | | Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44" |
| 0.1 | 20 | 0.1300 | 5.80 | | Shallow Concentrated Flow, Unpaved Kv= 16.1 fps |
| 17.3 | 70 | Total | | | |

Summary for Subcatchment 2S: To Basin 2

Runoff = 3.55 cfs @ 12.23 hrs, Volume= 0.349 af, Depth= 4.01"
 Routed to Pond 2P : Basin 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=7.60"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 23,800 | 98 | Pavement, Walks, Pads, Roof |
| 18,350 | 39 | >75% Grass cover, Good, HSG A |
| 3,300 | 30 | Woods, Good, HSG A |
| 45,450 | 69 | Weighted Average |
| 21,650 | | 47.63% Pervious Area |
| 23,800 | | 52.37% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 15.7 | 50 | 0.0100 | 0.05 | | Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.44" |
| 0.6 | 30 | 0.0030 | 0.88 | | Shallow Concentrated Flow, Unpaved Kv= 16.1 fps |
| 0.5 | 55 | 0.0070 | 1.70 | | Shallow Concentrated Flow, Paved Kv= 20.3 fps |
| 16.8 | 135 | Total | | | |

Summary for Subcatchment 3S: To South Abutter

Runoff = 0.07 cfs @ 12.52 hrs, Volume= 0.024 af, Depth= 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=7.60"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 3,950 | 39 | >75% Grass cover, Good, HSG A |
| * 12,250 | 30 | Raised Bed Garden |
| 15,870 | 30 | Woods, Good, HSG A |
| 32,070 | 31 | Weighted Average |
| 32,070 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|---|
| 10.4 | 50 | 0.0100 | 0.08 | | Sheet Flow, Grass: Dense n= 0.240 P2= 3.44" |
| 1.9 | 130 | 0.0050 | 1.14 | | Shallow Concentrated Flow, Unpaved Kv= 16.1 fps |
| 12.3 | 180 | Total | | | |

Summary for Pond 1P: Basin 1

Inflow Area = 0.701 ac, 45.87% Impervious, Inflow Depth = 3.46" for 100 Year Storm event
 Inflow = 2.02 cfs @ 12.24 hrs, Volume= 0.202 af
 Outflow = 0.18 cfs @ 14.48 hrs, Volume= 0.202 af, Atten= 91%, Lag= 134.2 min
 Discarded = 0.18 cfs @ 14.48 hrs, Volume= 0.202 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 17.49' @ 14.48 hrs Surf.Area= 3,258 sf Storage= 4,124 cf

Plug-Flow detention time= 247.4 min calculated for 0.202 af (100% of inflow)
 Center-of-Mass det. time= 247.4 min (1,097.9 - 850.5)

| Volume | Invert | Avail.Storage | Storage Description |
|--------|--------|---------------|--|
| #1 | 16.00' | 5,878 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 16.00 | 2,292 | 0 | 0 |
| 17.00 | 2,927 | 2,610 | 2,610 |
| 17.50 | 3,265 | 1,548 | 4,158 |
| 18.00 | 3,618 | 1,721 | 5,878 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|--------|---|
| #1 | Discarded | 16.00' | 2.410 in/hr Exfiltration over Surface area |

Discarded OutFlow Max=0.18 cfs @ 14.48 hrs HW=17.49' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.18 cfs)

Summary for Pond 2P: Basin 2

Inflow Area = 1.043 ac, 52.37% Impervious, Inflow Depth = 4.01" for 100 Year Storm event
 Inflow = 3.55 cfs @ 12.23 hrs, Volume= 0.349 af
 Outflow = 0.48 cfs @ 13.23 hrs, Volume= 0.349 af, Atten= 87%, Lag= 59.7 min
 Discarded = 0.48 cfs @ 13.23 hrs, Volume= 0.349 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 16.02' @ 13.23 hrs Surf.Area= 8,594 sf Storage= 5,765 cf

Plug-Flow detention time= 106.5 min calculated for 0.349 af (100% of inflow)
 Center-of-Mass det. time= 106.5 min (945.7 - 839.3)

| Volume | Invert | Avail.Storage | Storage Description |
|---------------------|----------------------|---------------------------|--|
| #1 | 15.30' | 10,043 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
| 15.30 | 7,460 | 0 | 0 |
| 16.00 | 8,573 | 5,612 | 5,612 |
| 16.50 | 9,151 | 4,431 | 10,043 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|--------|---|
| #1 | Discarded | 15.30' | 2.410 in/hr Exfiltration over Surface area |

Discarded OutFlow Max=0.48 cfs @ 13.23 hrs HW=16.02' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.48 cfs)

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: 242 Marion Road, Wareham, Mass.

| B | C | D | E | F |
|--------------------|-------------------------------|--------------------|----------------------|----------------------|
| BMP ¹ | TSS Removal Rate ¹ | Starting TSS Load* | Amount Removed (C*D) | Remaining Load (D-E) |
| Infiltration Basin | 0.80 | 1.00 | 0.80 | 0.20 |
| | 0.00 | 0.20 | 0.00 | 0.20 |
| | 0.00 | 0.20 | 0.00 | 0.20 |
| | 0.00 | 0.20 | 0.00 | 0.20 |
| | 0.00 | 0.20 | 0.00 | 0.20 |

Separate Form Needs to be Completed for Each Outlet or BMP Train

Total TSS Removal =

80%

| | |
|--------------|--------------------------|
| Project: | Damien's Food Pantry |
| Prepared By: | G.A.F. Engineering, Inc. |
| Date: | 4-Aug-22 |

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
 1. From MassDEP Stormwater Handbook Vol. 1

Water Quality Volume Calculation

Required Water Quality Depth = 0.50 inch volume from impervious surfaces.

Impervious Area to Infiltration Basin 1 = 14,000 sf

WQV = 14,000 sf x 0.50 in x 1 ft/12 in = 583.3 cf

Volume Available in Basin 1 = 5,878 cf (HydroCAD)

5,878 cf > 583.3 cf OK

Impervious Area to Infiltration Basin 2 = 23,800 sf

WQV = 23,800 sf x 0.50 in x 1 ft/12 in = 991.7 cf

Volume Available in Basin 2 = 10,043 cf (HydroCAD)

10,043 cf > 991.7 OK

Required Recharge Volume Calculation

Infiltration Basins

Total Impervious Area to Infiltration Basin 1 = 14,000 sf

Required Recharge Depth = 0.6 inches (HSG A Soil)

Required Recharge Volume = 14,000 sf x 0.6"/12 = 700 cf

Available Storage = 5,878 cf (HydroCAD)

5,878 cf > 700 cf - OK

Recharge System Drawdown time (72 hours maximum for 100 year storm volume)

Time = $\frac{\text{Storage Volume}}{\text{(Rawls Rate) (Bottom Area)}}$

Time = $\frac{4,124 \text{ cf}}{(2.41 \text{ inches/hour}) (1\text{ft}/12\text{inches}) (2,292 \text{ sf})}$

= 8.96 hours < 72 hours - OK

Total Impervious Area to Infiltration Basin 2 = 23,800 sf

Required Recharge Volume = 23,800 sf x 0.6"/12 = 1,190 cf

Available Storage = 10,043 cf

10,043 cf > 1,190 cf - OK

Recharge System Drawdown time

Time = $\frac{5,765 \text{ cf}}{(2.41 \text{ inches/hour}) (1\text{ft}/12\text{inches}) (7,460 \text{ sf})}$

= 3.85 hours < 72 hours - OK

Sediment Forebay Sizing Calculations

Minimum Required Volume for pretreatment is 0.10 inch per impervious acre (Handbook)

Impervious Area to Forebay #1 = 14,000 sf

Required Forebay Volume = $14,000 \text{ sf} \times 0.10''/12 = 116.7 \text{ cf}$

Total Storage in Forebay below outlet = 329 cf (HydroCAD)

329 cf > 116.7 cf - OK

Impervious Area to Forebay #2 = 23,800 sf

Required Forebay Volume = $23,800 \text{ sf} \times 0.10''/12 = 198 \text{ cf}$

Total Storage in Forebay below outlet = 568 cf (HydroCAD)

568 cf > 198 cf - OK

9838FOREBAYS

Prepared by GAF Engineering, Inc
HydroCAD® 10.20-2d s/n 02319 © 2021 HydroCAD Software Solutions LLC

Rainfall file not specified
Printed 8/3/2022

Summary for Pond 1P: Forebay 1

[43] Hint: Has no inflow (Outflow=Zero)

| Volume | Invert | Avail.Storage | Storage Description |
|--------|--------|---------------|--|
| #1 | 16.00' | 329 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 16.00 | 107 | 0 | 0 |
| 17.00 | 251 | 179 | 179 |
| 17.50 | 349 | 150 | 329 |

9838FOREBAYS

Prepared by GAF Engineering, Inc
HydroCAD® 10.20-2d s/n 02319 © 2021 HydroCAD Software Solutions LLC

Rainfall file not specified
Printed 8/3/2022

Summary for Pond 2P: Forebay 2

[43] Hint: Has no inflow (Outflow=Zero)

| Volume | Invert | Avail.Storage | Storage Description |
|---------------------|----------------------|---------------------------|--|
| #1 | 15.30' | 568 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
| 15.30 | 278 | 0 | 0 |
| 16.00 | 513 | 277 | 277 |
| 16.50 | 652 | 291 | 568 |

Construction Period Pollution Prevention and

Erosion & Sedimentation Control Plan

Narrative: This project consists of the construction of a 50' x 100' building with associated parking lot, access drives, utilities, landscaping, and stormwater management system. The stormwater management system includes paved waterways, sediment forebays, and drainage basins.

Responsible Parties: The site contractor and owner.

Construction Period Operation / Maintenance Plan:

- Provide sufficient refuse containers and empty as needed.
- Inspect erosion controls daily. Repair or replace as needed.
- Police the area for safety hazards and trash on a daily basis.
- Store materials away from drainage and resource areas.
- Provide or receive only the materials which can be installed promptly.
- Inspect vehicles for leaks and repair or replace when necessary.
- Provide dust control with watering.
- Maintain truck runoff pads.
- Provide a contact person for complaints and notification of problems.

Construction Sequence:

- Install erosion controls per the plans.
- Install silt sacks and outlet hoods in existing catch basins.
- Clear trees, remove stumps, and grub within the limits of work.
- Rough grade the drainage areas, parking lot, and building pad.
- Install underground utilities and building foundation.
- Install gravel base material. Rough grade the drainage basins.
- Finish grade and stabilize drainage areas.
- Install roof drain conveyance pipes.
- Install gravel base material and base course of pavement.
- Install top course of pavement.
- Install landscaping.
- Loam and seed disturbed areas.
- Maintain erosion controls until all areas are stabilized with vegetation.

Maintenance Schedule:

- Erosion controls are to be inspected daily and repaired or replaced as needed.
- Trash is to be picked up daily.
- Water shall be used for dust control as needed.
- Silt sacks shall be emptied or replaced when full.
- Vehicles shall be inspected daily for any leaks and repaired or replaced as needed.

Long Term Operation and Maintenance Plan

Responsible Party: The Family Pantry – Damien’s Place Corp.
242 Marion Road
Wareham, MA 02751

The property owner is responsible for the inspection, operation and maintenance of the Stormwater Management System. The director of the facility will be provided with copies of the approved site design and as-built plans to make them aware of the locations of system components. A copy of this Operation and Maintenance (O & M) Plan should also be provided.

System Description: The drainage system consists of a number of Best Management Practices, BMPs, which collect, treat, and infiltrate stormwater runoff from all storm events up to and including the 100 year storm event. Runoff flows to low points on the edge of pavement and enters a paved waterway which discharges to a sediment forebay. The sediment forebay removes silt and sand as the runoff flows through and over a crushed stone check dam into an infiltration basin. The infiltration basin stores and infiltrates the runoff providing final treatment of the runoff prior to reaching groundwater.

Parking Lot Sweeping: Parking lot sweeping is an effective non-structural source control that will remove sediment from paved surfaces. Sweeping should be done with a high efficiency vacuum sweeper or regenerative air sweeper. Sweeping should be done twice per year. Once removed from paved surfaces, the sweepings must be handled and disposed of properly in one of the ways approved by MassDEP. (See Policy #BAW-18-001: Reuse and Disposal of Street Sweepings)

Sediment Forebays: Sediment forebays are excavated pits with crushed stone check dams, bermed areas designed to slow incoming stormwater runoff and facilitate the gravity separation of suspended solids. Sediment forebays shall be inspected monthly and cleaned out at least four times per year. Inspect stone check dams and reset rip rap as necessary. When mowing grasses, set the mower blades no lower than three inches. Mow when the height approaches six inches. Check for signs of rilling and gullying and repair as needed. After removing sediment, replace any vegetation damaged during the cleanout by reseeding or installing sod. 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 Basins: The basin should be inspected monthly for bare spots and re-seeded if necessary. Any debris, trash, or sediment should be removed. Mowing of the basin will be infrequent, once or twice a year, primarily to prevent the growth of undesirable weeds, trees, and shrubs. Check the emergency outlet spillway for erosion and reset the stone and concrete curb if

necessary. Remove any sediment which has entered the basin. Dispose of any sediment in accordance with local, state, and federal guidelines and regulations.

Operation and Maintenance Budget: The estimated annual cost for inspection, mowing, and sediment removal associated with the maintenance of the Stormwater Management System is \$1500.

Reference: For full details on drainage system Construction, Operation and Maintenance refer to the current edition of the Massachusetts Stormwater Handbook.

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

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0)), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.

Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. **The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed** otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

| Input Values | Conversion Table |
|--------------|------------------|
| R | inch/hour |
| Sy | feet/day |
| K | ft/d |
| x | hours |
| y | days |
| t | ft/d |
| hi(0) | ft/d |

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

Recharge (infiltration) rate (feet/day)

Specific yield, Sy (dimensionless, between 0 and 1)

Horizontal hydraulic conductivity, Kh (feet/day)*

1/2 length of basin (x direction, in feet)

1/2 width of basin (y direction, in feet)

duration of infiltration period (days)

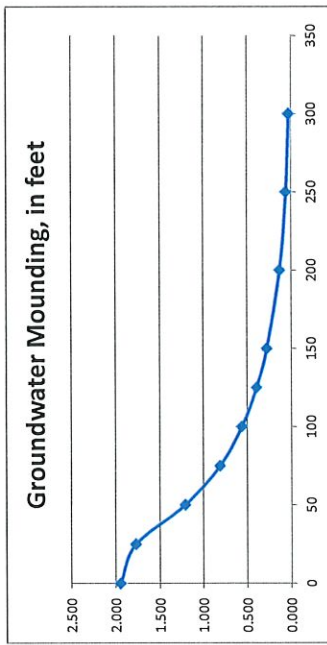
initial thickness of saturated zone (feet)

maximum thickness of saturated zone (beneath center of basin at end of infiltration period)

maximum groundwater mounding (beneath center of basin at end of infiltration period)

Re-Calculate Now

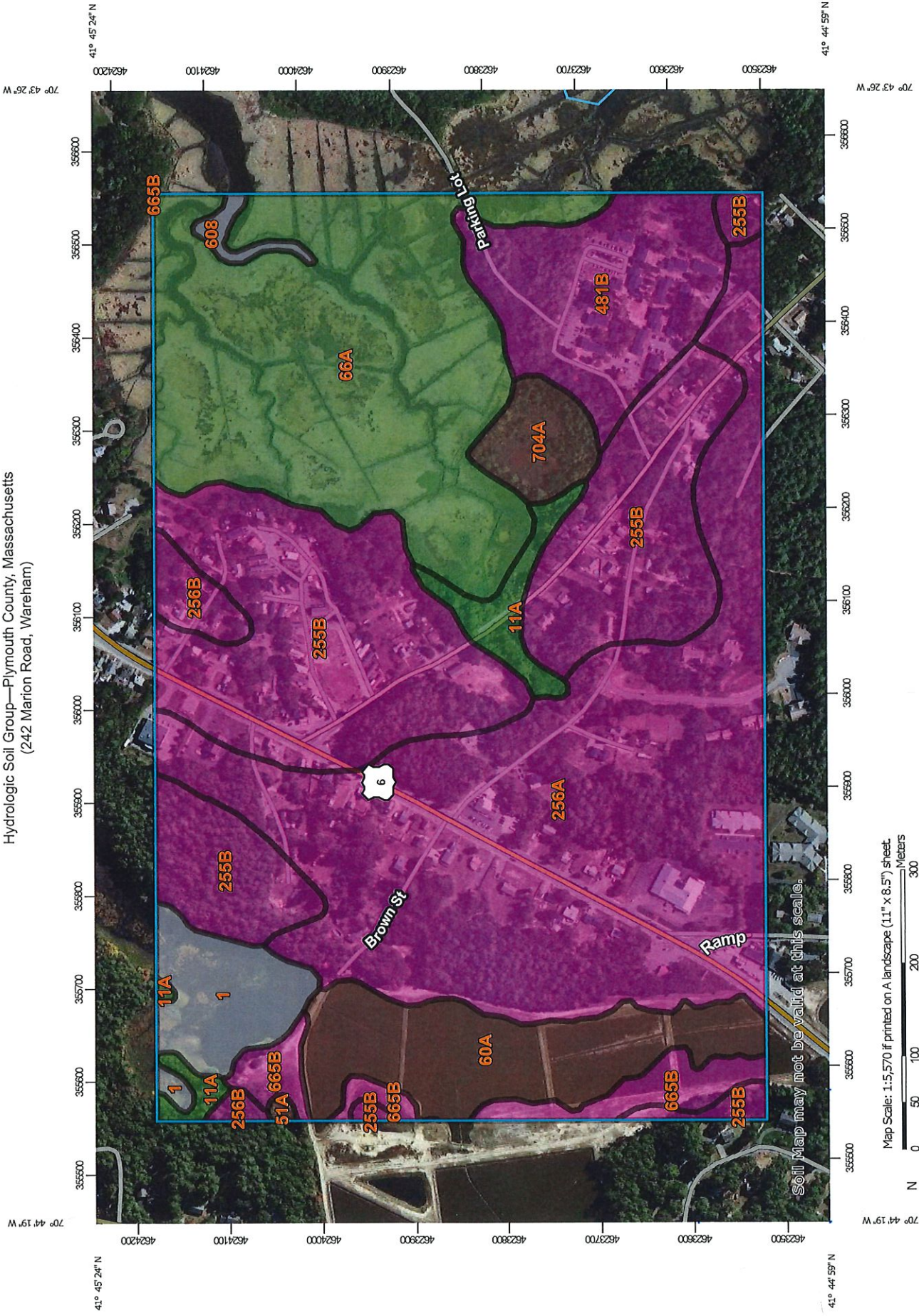
| Ground-water Mounding, in feet | Distance from center of basin Mounding, in feet |
|--------------------------------|---|
| 1.954 | 0 |
| 1.775 | 25 |
| 1.217 | 50 |
| 0.815 | 75 |
| 0.566 | 100 |
| 0.388 | 125 |
| 0.275 | 150 |
| 0.185 | 200 |
| 0.064 | 250 |
| 0.033 | 300 |



Disclaimer

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

Hydrologic Soil Group—Plymouth County, Massachusetts
(242 Marion Road, Wareham)




































Soil Map may not be valid at this scale.

Map Scale: 1:5,570 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84



MAP LEGEND

| | |
|---|--|
|  Area of Interest (AOI) |  C |
|  Area of Interest (AOI) |  C/D |
| Soils |  D |
| Soil Rating Polygons |  Not rated or not available |
|  A | Water Features |
|  A/D |  Streams and Canals |
|  B | Transportation |
|  B/D |  Rails |
|  C |  Interstate Highways |
|  C/D |  US Routes |
|  D |  Major Roads |
|  Not rated or not available |  Local Roads |
| Soil Rating Lines | Background |
|  A |  Aerial Photography |
|  A/D | |
|  B | |
|  B/D | |
|  C | |
|  C/D | |
|  D | |
|  Not rated or not available | |
| Soil Rating Points | |
|  A | |
|  A/D | |
|  B | |
|  B/D | |

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Plymouth County, Massachusetts

Survey Area Data: Version 14, Sep 2, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 25, 2020—Oct 9, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

| Map unit symbol | Map unit name | Rating | Acres in AOI | Percent of AOI |
|------------------------------------|--|--------|--------------|----------------|
| 1 | Water | | 5.3 | 3.3% |
| 11A | Rainberry coarse sand, 0 to 3 percent slopes | A/D | 3.3 | 2.0% |
| 51A | Swansea muck, 0 to 1 percent slopes | B/D | 0.2 | 0.1% |
| 60A | Swansea coarse sand, 0 to 2 percent slopes | B/D | 11.1 | 6.8% |
| 66A | Ipswich - Pawcatuck - Matunuck complex, 0 to 2 percent slopes, very frequently flooded | A/D | 32.8 | 20.2% |
| 255B | Windsor loamy sand, 3 to 8 percent slopes | A | 38.2 | 23.5% |
| 256A | Deerfield loamy fine sand, 0 to 3 percent slopes | A | 49.5 | 30.4% |
| 256B | Deerfield loamy fine sand, 3 to 8 percent slopes | A | 2.1 | 1.3% |
| 481B | Plymouth - Carver complex, 3 to 8 percent slopes, bouldery | A | 11.9 | 7.3% |
| 608 | Water, ocean | | 0.7 | 0.4% |
| 665B | Udipsamments, 0 to 8 percent slopes | A | 4.4 | 2.7% |
| 704A | Freetown and Swansea coarse sands, 0 to 3 percent slopes, sanded surface and inactive | B/D | 3.1 | 1.9% |
| Totals for Area of Interest | | | 162.7 | 100.0% |

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

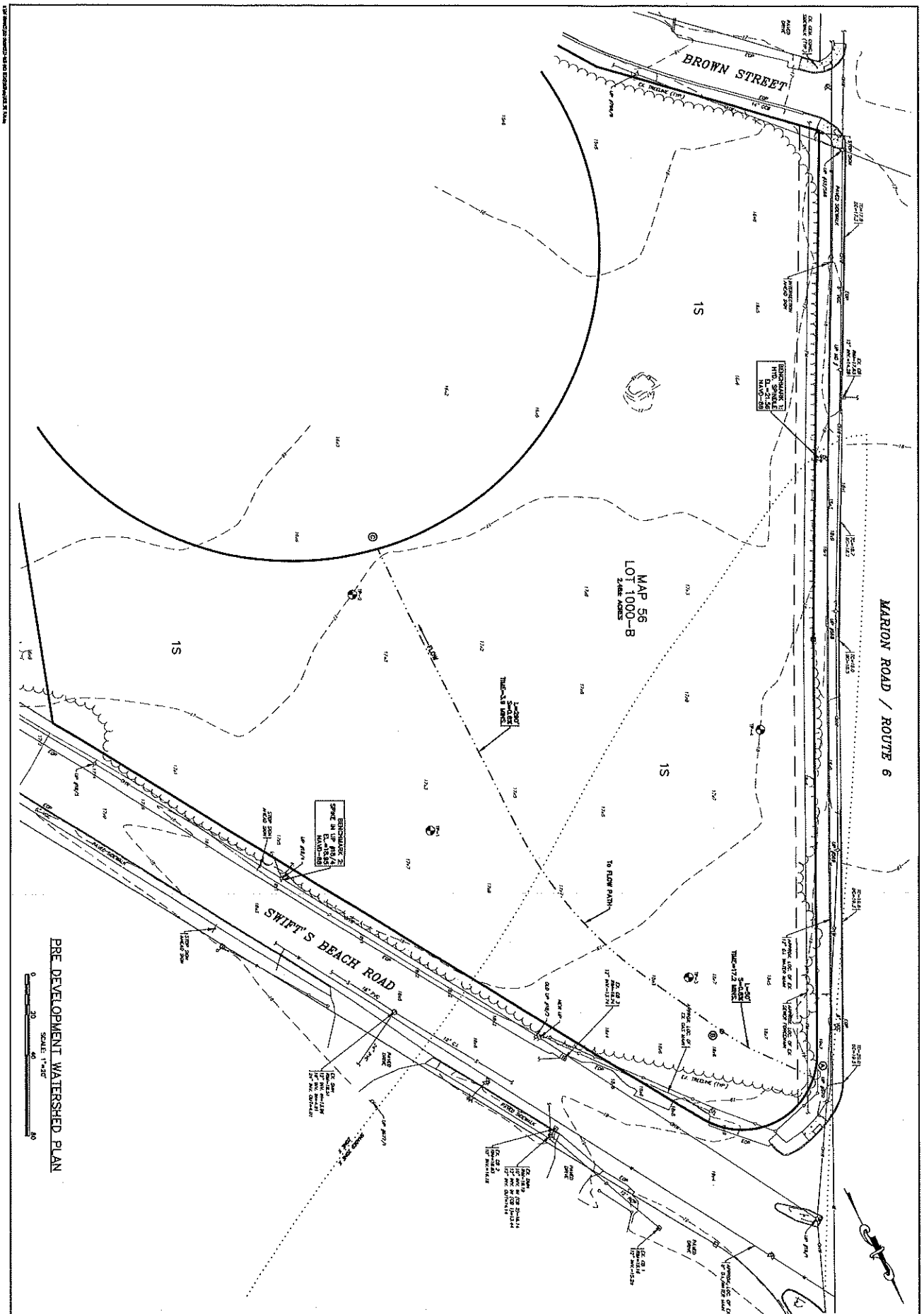
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



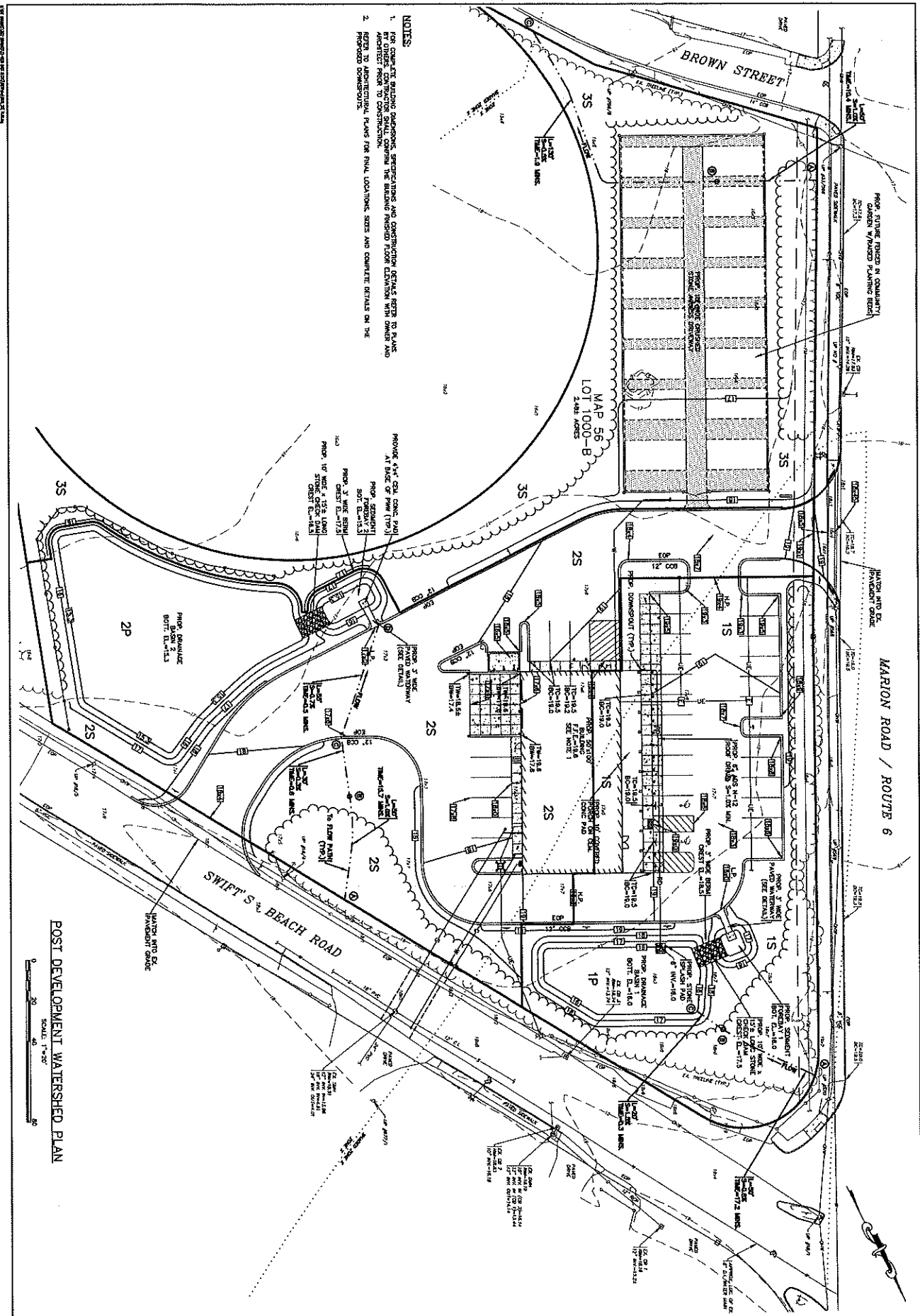
PRE DEVELOPMENT WATERSHED PLAN
 242 MARION ROAD
 WAREHAM, MA
 PREPARED FOR:
DAMIEN'S FOOD PANTRY
 P.O. BOX 730
 WAREHAM, MA

G.A.F. ENGINEERING, INC.
 PROFESSIONAL ENGINEERS & LAND SURVEYORS
 256 LAJON STREET - WAREHAM, MA 02571
 TEL: (508) 295-8600 FAX: (508) 295-6834
 E-MAIL: info@gafengr.com

COPYRIGHT © 2022 BY G.A.F. ENGINEERING, INC. ALL RIGHTS RESERVED. THIS DOCUMENT IS THE PROPERTY OF G.A.F. ENGINEERING, INC. AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE EXPRESS WRITTEN PERMISSION OF G.A.F. ENGINEERING, INC. THE DESIGNER OF ANY REGULATORY AGENCY SHALL BE SOLELY RESPONSIBLE FOR THE PERFORMANCE OF ANY OTHER REGULATORY AGENCY'S REQUIREMENTS AND NOTIFICATION SHALL BE THE SOLE RESPONSIBILITY OF THE CLIENT. THE DESIGNER OF ANY REGULATORY AGENCY SHALL BE SOLELY RESPONSIBLE FOR THE PERFORMANCE OF ANY OTHER REGULATORY AGENCY'S REQUIREMENTS AND NOTIFICATION SHALL BE THE SOLE RESPONSIBILITY OF THE CLIENT.

APPROVED BY: _____
 DATE: AUGUST 4, 2022
 DRAWN BY: J.M.P.
 CHECKED BY: R.B.R.
 JOB NO.: 22-8828
 SCALE: 1" = 20'

| REV. | DATE | BY | APP'D | DESCRIPTION |
|------|------|----|-------|-------------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |



- NOTES**
- FOR COMPLETE MATERIAL SPECIFICATIONS, DIMENSIONS AND CONSTRUCTION DETAILS REFER TO PLANS AND SPECIFICATIONS FOR THE PROJECT. THE DRAWING PROVIDES FLOOR ELEVATIONS WITH OWNER AND ARCHITECT FROM TO CONSTRUCTION.
 - REFER TO ARCHITECTURAL PLANS FOR FINAL LOCATIONS, SIZES AND COMPLETE DETAILS ON THE PROPOSED DEMONSTRATION.

| DWG. NO. 22-0838 2 OF 2 | POST DEVELOPMENT WATERSHED PLAN 242 MARION ROAD WAREHAM, MA PREPARED FOR: DAMIEN'S FOOD PANTRY P.O. BOX 730 WAREHAM, MA | G.A.F. ENGINEERING, INC. PROFESSIONAL ENGINEERS & LAND SURVEYORS 268 MAIN STREET - WAREHAM, MA 02571 TEL: (508) 298-6600 FAX: (508) 298-6634 E-MAIL: info@gafeng.com | APPROVED BY: _____ APPROVED BY: _____ | DATE: AUGUST 4, 2022 DRAWN BY: JJP CHECKED BY: RJR JOB NO.: 22-0838 SCALE: 1" = 20' | <table border="1"> <thead> <tr> <th>REV.</th> <th>DATE</th> <th>BY</th> <th>APP'D</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> | REV. | DATE | BY | APP'D | DESCRIPTION | | | | | |
|--|---|---|--|---|--|------|------|----|-------|-------------|--|--|--|--|--|
| | REV. | DATE | BY | APP'D | DESCRIPTION | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| <small> REPRESENTS BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION SYSTEM, WITHOUT THE EXPRESS WRITTEN CONSENT OF G.A.F. ENGINEERING, INC. THE DESIGN OR ANY LIABILITY THEREON SHALL REMAIN THE SOLE RESPONSIBILITY OF THE ENGINEER. THE DESIGNER'S LIABILITY IS LIMITED TO THE DESIGN AND CONSTRUCTION OF THE PROJECT WITHOUT THE EXPRESS WRITTEN CONSENT OF G.A.F. ENGINEERING, INC. THE DESIGNER IS NOT RESPONSIBLE FOR THE DESIGN OR CONSTRUCTION OF ANY OTHER WORK NOT SHOWN ON THIS DRAWING. </small> | | | | | | | | | | | | | | | |