

**STORMWATER
MANAGEMENT PLAN
FOR
NUPRO INDUSTRIAL PROJECT DEVELOPMENT
LOCATED AT
LOT 21 & 21.2 on Map 168
OFF OF MERRIGAN WAY**

Aug. 22, 2022

SVE Project No.: G2073

PREPARED FOR:

NUPRO, LLC.

10 Sandy Lane

Deerfield, MA 01373

&

One Development & Construction, LLC.

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Westfield, MA 01085

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Date

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1.0 Introduction

This Stormwater Management Plan (SWMP) documents the drainage impacts associated with the redevelopment of Parcel 21 and 21.2 (Map 168) in South Deerfield, MA. The property is approximately 8.88 acres in size and is owned by NUPRO, LLC. (Parcel 21 – Deed Bk.: 8052, Pg.: 32; Parcel 21.2 – Deed Bk.: 8052, Pg.: 37). NUPRO, LLC., a protective polyurethane film producer, is in discussions with the Town to purchase the properties to relocate their operation to a larger facility. The property is a portion of the old Oxford Foods site. The site had been utilized by the Oxford Foods company as a pickling facility from the late 1800's until it closed in 2006 at which time the Town of Deerfield purchased the property. The town subdivided the existing pickling facility property into multiple lots with a proposed public road (Merrigan Way) for access. The Town sold the development property to New England Natural Bakers who then sold the property back to the Town after an unsuccessful development program. The Town then divided the property to create a non-building lot from the northern portion of the property (Parcel 21.2). The property is surrounded by residential properties along the west-northwestern and eastern side of the property. To the south is Merrigan Way along with Pilot Precision Products/The DuMont Company. Blacksmith/Sugarloaf Brook creates the northwestern property line.

The development properties are located within the Town's Expedited Permitting District (EPD).

The proposed development consists of the construction of an approximate 100,357 square foot building, which includes offices, manufacturing, maintenance, and storage warehouse to be constructed on Parcel 21. The development will also involve the construction of a parking area, loading dock apron, relocation of water mains and the construction of stormwater systems. A portion of an infiltration basin will be constructed on Parcel 21.2.

Refer to the vicinity map on page 5 for the specific location of the project.

2.0 Existing Conditions

2.1 Site Characteristics

The site had previously been used to house pickling vats, parking, a pickling, and packaging plant for the pickling facility while the property was used by Oxford Foods. Once the Town had taken control of the property, the existing pickling

facilities were deconstructed, and the property was used for the old Highway Garage. Once the new Highway Garage was constructed on the opposite side of Merrigan Way, the old Highway Garage was deconstructed as well. Currently the proposed development site consists of broken pavement, gravel, numerous underground utilities, and weeds. A small man-made detention basin is in the western edge of the open field and discharges to Blacksmith/Sugarloaf Brook. Blacksmith/Sugarloaf Brook runs southwest from the northern point of Parcel 21.2 along the northwestern property line. The brook then cuts through the western portion of Parcel 21 between the open field and the frontage on South Main Street.

Refer to page 6 for an aerial plan of the existing property.

2.2 Soil Characteristics

A review of the Natural Resources Conservation Services (NRCS) Web Soil Survey (WSS) classifies the majority of the site Agawam fine sandy loam and Udorthents-Urban land complex. Small portions of the site are classified as Windsor loamy sand and Ninigret fine sandy loam. Agawam fine sandy loam has a hydrologic classification of B. Udorthents-Urban land complex and Windsor loamy sand have hydrologic classifications of A. Ningret fine sandy loam has a hydrologic classification of C.

Refer to Appendix B for more information and page 7 for Soil Map

2.3 Floodplain

Review of the Flood Insurance Rate Map (FIRM) for South Deerfield in the Town of Deerfield, Massachusetts, Community Panel Number 250115 0006 B, effective date: July 2, 1980, indicates the subject property falls within zone 'C': area of minimum flood hazard. This property is not considered to be in a special flood hazard zone.

Refer to page 8 for a copy of the FIRM.

VICINITY MAP

Parcel 21 & 21.2

Deerfield, MA

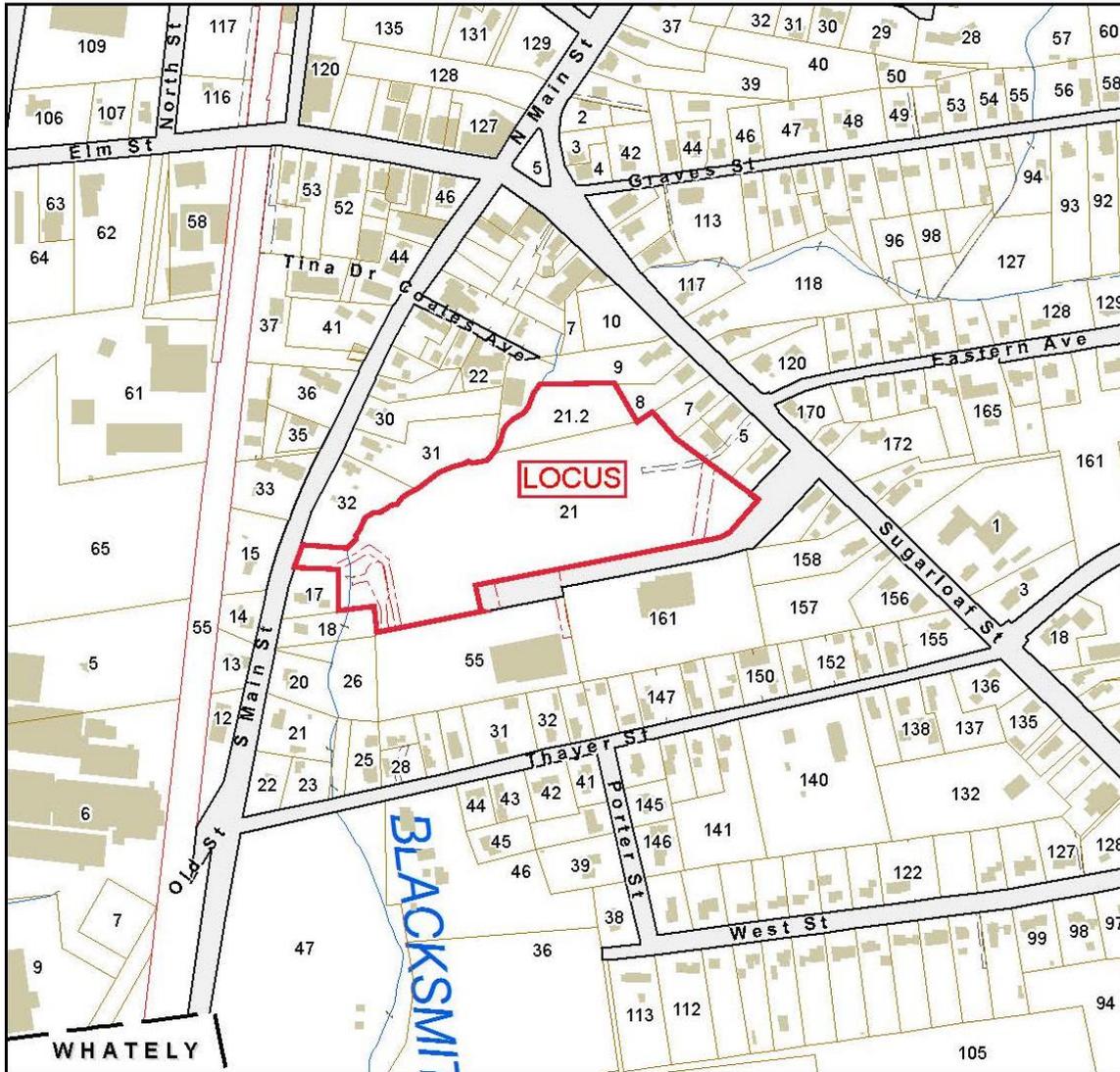


March 29, 2022

1 inch = 400 Feet

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| | | | |
|---------------|--------------|---------------|---------------|
| Large Scale | Public Road | Property Hook | Right of Ways |
| CAI Town Line | Railroad | Property TIC | |
| PWater | Right of Way | WaterLines | |
| Property Line | Utility | Buildings | |

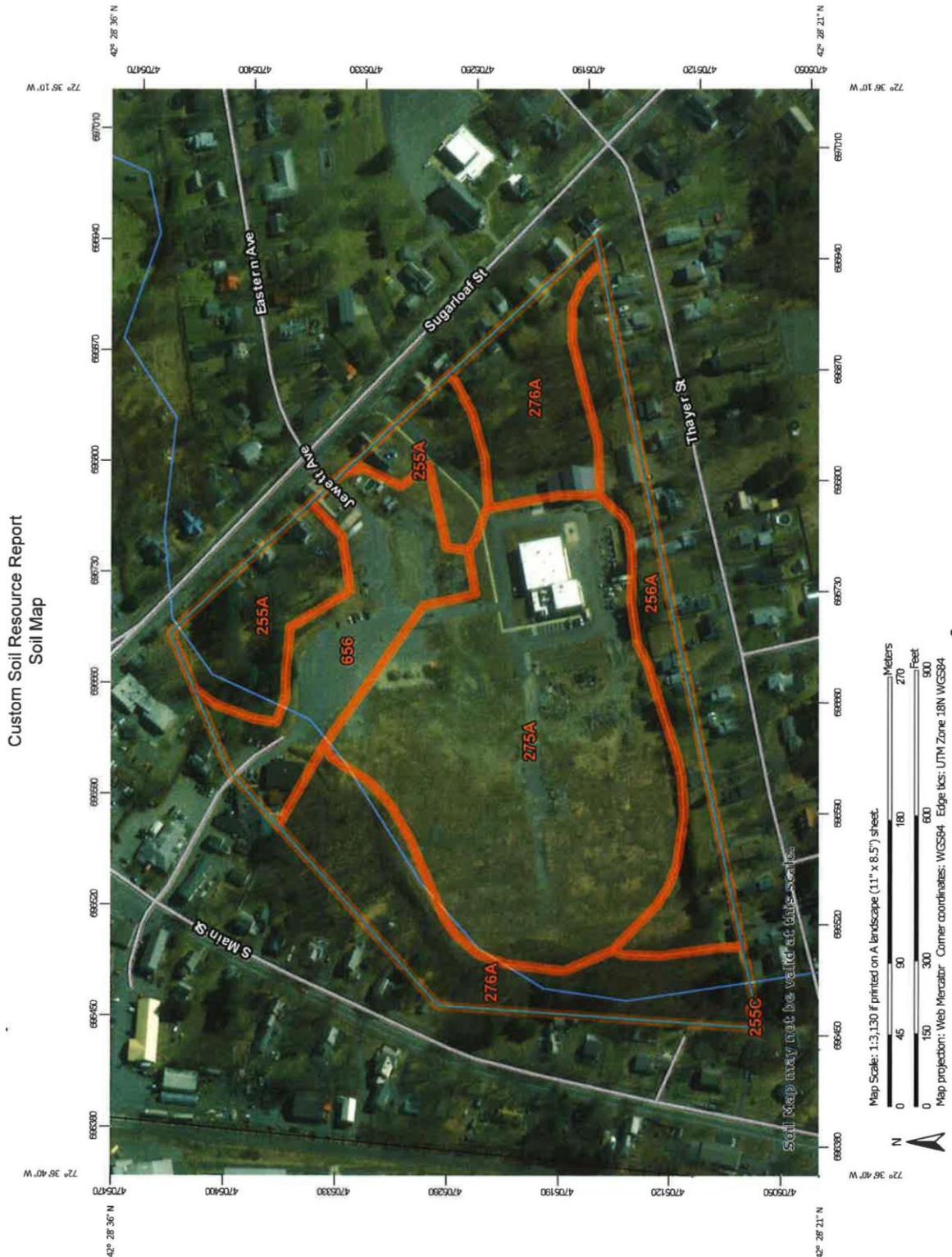
Data shown on this map is provided for planning and informational purposes only. The municipality and CAI Technologies are not responsible for any use for other purposes or misuse or misrepresentation of this map.

EXISTING AERIAL SITE MAP

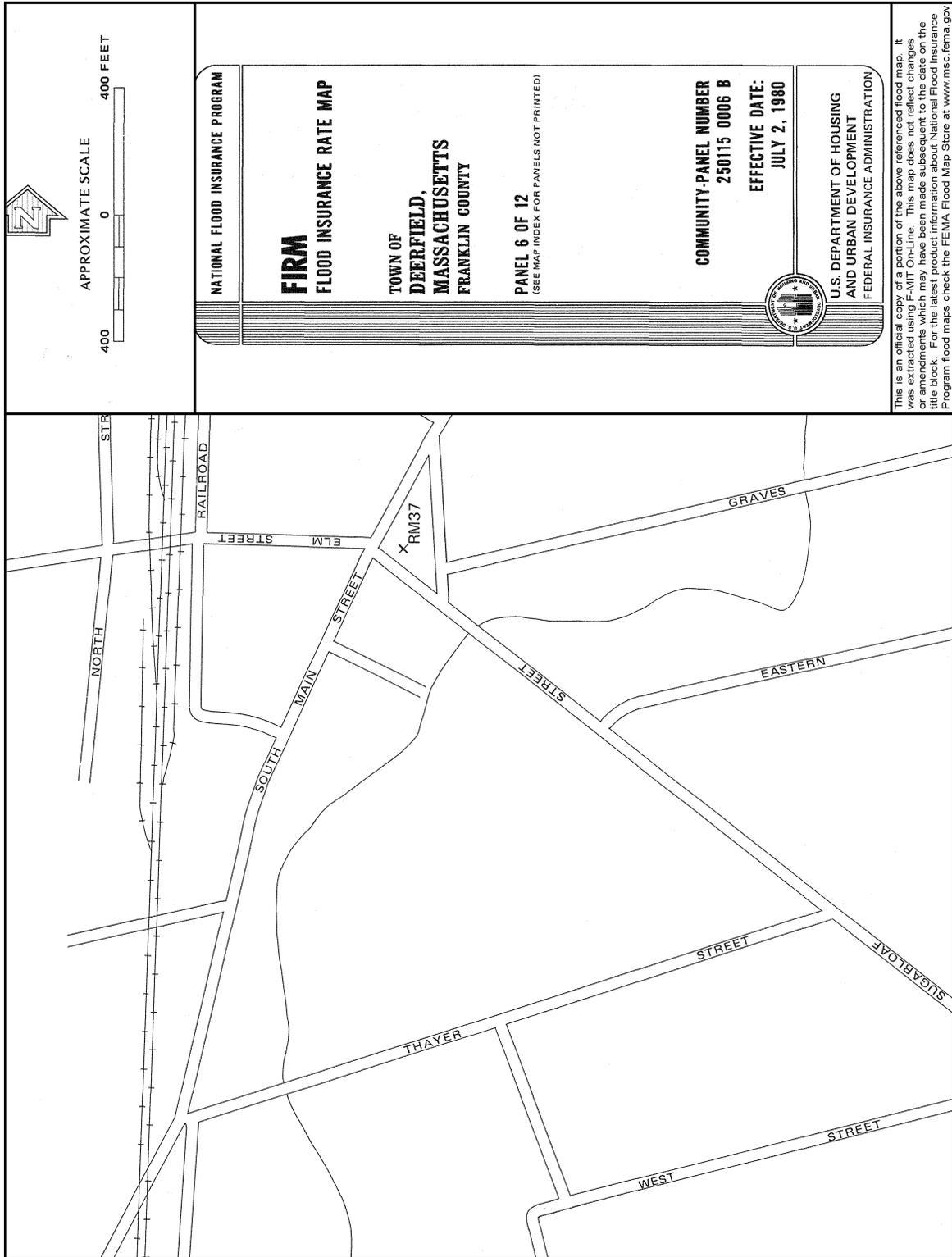


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| <p>SVE ©2016 SVE Associates 439 West River Road Brattleboro, VT 05302 T 413.774.6698 F 413.773.0875 www.sveassoc.com</p> <p>Engineering Planning Landscape Architecture Surveying</p> | <p>AERIAL MAP</p> <p>NUPRO INDUSTRIAL PROJECT DEVELOPMENT</p> <p>ONE DEVELOPMENT & CONSTRUCTION, LLC. 68 UNION STREET WESTFIELD, MA 01085</p> | <p>200 100 0</p> <p>GRAPHIC SCALE: 1" = 200'</p> <p>PROJ. #: G2073 DATE: 23-MAR-22 SHEET 1/1 DRAWN: MJS</p> |
|--|---|--|

SOIL MAP



FLOOD INSURANCE RATE MAP (FIRM)



2.3 Existing Hydrology

The Drainage area studied for this project is approximately 8.4 acres in size. Existing stormwater runoff flows to three areas. The stormwater which falls onto the western portion of the property collects in existing catch basins and is then discharged to the man-made detention basin located at the edge of the open field, or sheet flows to swales which direct the stormwater to the same man-made detention basin. The man-made detention basin then discharges the stormwater to a manhole before releasing the stormwater to Blacksmith/Sugarloaf Brook. Stormwater which falls onto the northern portion of the properties either sheet flows to Blacksmith/Sugarloaf Brook or is collected and routed to the brook via an underground drainage system. Stormwater which falls in the southeastern portion of the properties sheet flows onto Merrigan Way which collects into the municipal drainage system on the street.

Refer to Pocket #1 for the existing conditions hydrology exhibit to designate areas used for the analysis.

The table below summarizes the results of the existing runoff calculations for the property.

| | Existing Runoff Amounts & Discharge Locations | | |
|------------------|---|---------------------------------|---|
| Design Storm | Existing Area 1 (Out of Basin) | Existing Area 2 (Flow North) | Existing Area 3 (Flow to Merrigan Way) |
| Q ₂ | 0.06 cfs | 1.06 cfs | 0.36 cfs |
| Q ₁₀ | 1.02 cfs | 3.60 cfs | 1.59 cfs |
| Q ₂₅ | 2.57 cfs | 5.50 cfs | 2.60 cfs |
| Q ₁₀₀ | 4.24 cfs | 8.67 cfs | 4.36 cfs |

3.0 Developed Conditions

3.1 Design Objectives

The objective of this SWMP is to analyze the pre- and post-development stormwater runoff conditions and impacts to downstream properties associated with the proposed development. There will be approximately 75,575 square feet of new impervious area which will increase the amount of runoff generated from the property. To mitigate this, new infiltration/detention basins, with dry wells,

will be created to reduce the flow off site and promote groundwater recharge in accordance with Town and State Regulations.

The proposed drywells will be utilized to evenly distribute stormwater into the basins as well as allow infiltration during periods of ground frost. Stormwater which falls onto the proposed parking and loading dock apron will be collected by deep sump catch basins and routed through oil/water separators before being discharged to the infiltration/detention basins. Stormwater which falls onto the proposed building will be collected via downspouts and channeled in underground drainage piping to be discharged into the infiltration/detention basin. Clean stormwater will be allowed to sheet flow off site.

3.2 Developed Hydrology

The area studied for the post-developed conditions is the 8.4 acres studied for the existing conditions. Stormwater which falls on new impervious area will be directed to two proposed large shallow infiltration/detention basins. The first proposed infiltration/detention basin is located on the western side of the proposed building. The second infiltration/detention basin is located on the northern and eastern side of the proposed building. Stormwater which falls onto the loading dock apron will be collected in deep sump catch basins then will flow through an oil/water separator before discharging into a drywell located within the infiltration/detention basin on the western side. Stormwater which falls onto the southern half of the proposed building's roof will be collected in downspouts and directed to a drywell within the infiltration/detention basin via underground drainage pipes. Stormwater which falls onto the southern lawn and the extension of Merrigan Way will sheet flow to a small forebay before it enters the proposed infiltration/detention basin. The western basin has a proposed 10ft wide broad crested weir that will discharge to the existing infiltration/detention basin located at the western edge of the existing field. The depth of the proposed basin is based off the approved plans of the New England Bakers project.

Stormwater which falls onto the proposed employee and customer parking area will be collected in deep sump catch basins then will flow through an oil/water separator before discharging into a drywell located within the northern/eastern infiltration/detention basin. Stormwater which falls on the northern half and flat roof, in the southeastern corner, of the proposed building will be collected in downspouts and directed to a drywell within the northern infiltration/detention basin. The northern/eastern infiltration/detention basin has a 10ft wide broad crested weir that discharges overflow to Blacksmith/Sugarloaf Brook to the north.

The proposed drywells within the infiltration/detention basins will be utilized to infiltrate stormwater during periods of ground frost. The proposed drywells will be interconnected within each basin to allow an even distribution of infiltration. The depth of the proposed basin is based off the approved plans of the New England Bakers project.

Stormwater which falls outside of the proposed basin and impervious area in the western portion of the property will sheet flow to Blacksmith/Sugarloaf Brook or be captured by an existing swale which runs along the edge of the field that discharges to the existing infiltration/detention basin at the western edge of the existing field. Stormwater which doesn't fall onto the impervious area or within the proposed northern basin will sheet flow north/northwest to Blacksmith/Sugarloaf Brook. Stormwater which falls on the grass south of the building as well as in the southeastern corner of the property will sheet flow onto Merrigan Way and enter the municipal drainage system.

Refer to Appendix A for Hydrology Calculations.

Refer to Pocket #2 for Redeveloped Hydrology Maps.

3.3 Summary of Post Development Hydrology (CFS)

| Design Storm | Change in outflow from Existing Basin | | |
|------------------|--|--------------------------------------|-------------------------------------|
| | Existing Area 1 (Out of Existing Basin) | Developed (Out of Existing Basin) | Δ (Out of Existing Basin) |
| Q ₂ | 0.05 cfs | 0.06 cfs | 0.01 cfs |
| Q ₁₀ | 1.02 cfs | 0.38 cfs | -0.64 cfs |
| Q ₂₅ | 2.35 cfs | 0.60 cfs | -1.75 cfs |
| Q ₁₀₀ | 4.24 cfs | 1.34 cfs | -2.90 cfs |

| Design Storm | Change in outflow to North | | |
|------------------|---------------------------------|---------------------------|--------------------------|
| | Existing Area 2 (Flow North) | Developed (Flow North) | Δ (Flow North) |
| Q ₂ | 1.06 cfs | 0.93 cfs | -0.13 cfs |
| Q ₁₀ | 3.61 cfs | 1.57 cfs | -2.04 cfs |
| Q ₂₅ | 5.50 cfs | 2.13 cfs | -3.37 cfs |
| Q ₁₀₀ | 8.71 cfs | 4.49 cfs | -4.22 cfs |

| Design Storm | Change in flow to Merrigan Way | | |
|------------------|--|--|------------------------------------|
| | Existing Area 3 (Flow to Merrigan Way) | Developed (Flow to Merrigan Way) | Δ (Flow to Merrigan Way) |
| Q ₂ | 0.36 cfs | 0.26 cfs | -0.10 cfs |
| Q ₁₀ | 1.59 cfs | 0.65 cfs | -0.94 cfs |
| Q ₂₅ | 2.60 cfs | 0.93 cfs | -1.67 cfs |
| Q ₁₀₀ | 4.36 cfs | 1.42 cfs | -2.94 cfs |

From the hydrology calculations there are reductions of runoff from the pre- and post-development values. The runoff associated with the increased impervious area is retained and infiltrated within the two proposed basins.

4.0 Stormwater Management Standards

Standard No. 1 – There are no new stormwater conveyances (e.g. outfalls) discharging untreated stormwater directly to or cause erosion in wetlands or water of the Commonwealth. Onsite stormwater from impervious areas will be conveyed to the proposed infiltration basins. Emergency spillways will discharge stormwater to existing locations.

Standard No. 2 – There will be a reduction in stormwater runoff from the development site compared to existing conditions.

Standard No. 3 – The loss of annual recharge from the development will be mitigated using infiltration basins. The development will increase the amount of impervious area by approximately 75,575square feet.

Existing Impervious Area = 105,228 sf
 Developed Impervious Area = 180,803 sf
 Δ Impervious Area = +75,575 sf

The required recharge volume based on the increased impervious area and Hydrologic Soil Classification A (used for most extreme case) is as follows:

Required Recharge Volume (R_v) = F × Impervious Area
 F = Target Depth Factor = 0.60 inch (Hydrologic Soil Classification A used for most extreme case)

$$R_v = 0.60in \times \frac{1 ft}{12 in} \times 75,575 sf = 3,779 cf$$

Proposed Western Basin will provide 2,675 cf of stormwater volume during a 2-yr design storm.

Proposed Eastern/northern basin will provide 3,118 cf of stormwater volume during a 2-yr design storm.

Combined available stormwater amount to recharge during a 2-yr design storm is 5,793 cf.

Drawdown Time Calculation

Eastern/northern basin

$$T = \frac{Volume}{(k)(Bottom\ Area)}$$

$$T_{\substack{Eastern \\ Northern}} = \frac{3,118\ cf}{(1.02\ in/hr)(\frac{1\ ft}{12\ in})(12,626\ sf)} = 2.91\ hrs < 72\ hrs$$

$$T_{Western} = \frac{2,675\ cf}{(1.02\ in/hr)(\frac{1\ ft}{12\ in})(31,513\ sf)} = 1.00\ hrs < 72\ hrs$$

The proposed development site is located within a Zone II well protection area. Therefore, the design must remove at least 44% of the Total Suspended Solids (TSS) prior to reaching the infiltration area. The proposed design will remove the required percentage of TSS before reaching the infiltration from stormwater that falls onto traveled impervious area. The proposed drainage system will meet the removal requirements with the use of treatment trains made up of deep sump catch basins and oil/water separators.

Standard No. 4 – The proposed storm drain system will remove at a minimum 80% of TSS from the runoff of the development. Refer to the attached spreadsheets for particulars in Appendix C. These also show that 44% of TSS is expected to be removed from runoff prior to discharge to the proposed infiltration basins.

Water Quality Volume would equal 1-inch of runoff for the project increase impervious area.

$$75,575 \text{ sf} \times 1 \text{ in} \times \frac{1 \text{ ft}}{12 \text{ in}} = 6,298 \text{ cf}$$

Total stored runoff after a 2-yr storm is 5,793 cf in the two proposed basins. This is below the required Water Quality Volume by 505 cf.

Standard No. 5 – This Standard is not applicable. The function of the proposed property is not considered a land with higher potential pollutant loads.

Standard No. 6 – The property is located within a Zone II Wellhead Protection Area. Therefore, the treatment trains proposed with this development accommodates the 80% TSS Removal Requirement. It also accommodates the required 44% TSS removal prior to runoff discharging to the proposed infiltration basins.

Standard No. 7 – This Standard is met. The required standards were met to the maximum extent practicable.

Standard No. 8 – A plan to control construction related sediment is provided. Refer to project plans.

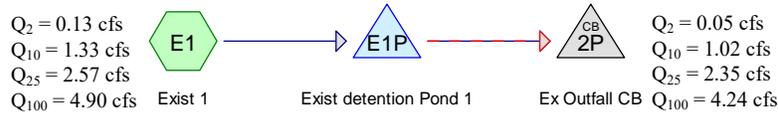
Standard No. 9 – A Long-Term Operation and Maintenance Plan is provided. See Appendix D.

Standard No. 10 – There are no known illicit discharges to the stormwater management system. Refer to Appendix E for Illicit Discharge Compliance Statement.

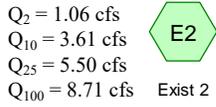
5.0 Conclusion

This SWMP has been prepared to document the stormwater impacts associated with the development of Lots 21 and 21.2 off Merrigan Way in South Deerfield, MA. Analysis was performed for the 2-, 10-, 25- and 100-yr design storms. Runoff from the proposed development will be treated, recharged, and attenuated to below existing conditions using low impact development practices and traditional storm drain conveyance systems. The analysis shows that using deep sump catch basins, oil/water separators and infiltration/detention basins, the proposed development does not adversely affect the existing downstream properties, natural habitats, or the public right-of-way and will improve the expected runoff conditions for the 2-, 10-, 25- and 100-yr design storms.

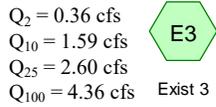
NUPRO INDUSTRIAL PROJECT PROJECT DEVELOPMENT HYDOLOGY CALCULATIONS



Change in Flow West out of Existing Detention Pond to Stream



| Design Storm | Exist (2P) | Redev (4P) | Change |
|--------------|------------|------------|-----------|
| Q_2 | 0.05 cfs | 0.06 cfs | +0.01 cfs |
| Q_{10} | 1.02 cfs | 0.38 cfs | -0.64 cfs |
| Q_{25} | 2.35 cfs | 0.60 cfs | -1.75 cfs |
| Q_{100} | 4.24 cfs | 1.34 cfs | -2.90 cfs |

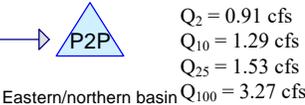
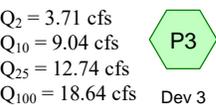
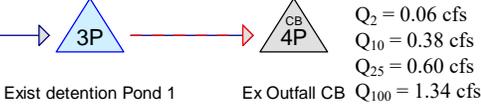
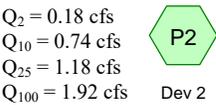
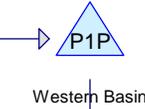
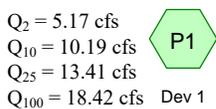


Change in Flow North to Stream

| Design Storm | Exist (E2) | Redev (P2P + P4) | Change |
|--------------|------------|------------------|-----------|
| Q_2 | 1.06 cfs | 0.93 cfs | -0.13 cfs |
| Q_{10} | 3.61 cfs | 1.57 cfs | -2.04 cfs |
| Q_{25} | 5.50 cfs | 2.13 cfs | -3.37 cfs |
| Q_{100} | 8.71 cfs | 4.49 cfs | -4.22 cfs |

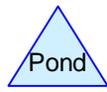
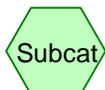
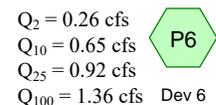
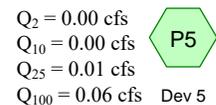
Change in Flow to Merrigan Way

| Design Storm | Exist (E3) | Redev (P5 + P6) | Change |
|--------------|------------|-----------------|-----------|
| Q_2 | 0.36 cfs | 0.26 cfs | -0.10 cfs |
| Q_{10} | 1.59 cfs | 0.65 cfs | -0.94 cfs |
| Q_{25} | 2.60 cfs | 0.93 cfs | -1.67 cfs |
| Q_{100} | 4.36 cfs | 1.42 cfs | -2.94 cfs |



Change in Total Flow off Property

| Design Storm | Exist | Redev | Change |
|--------------|-----------|----------|------------|
| Q_2 | 1.47 cfs | 1.25 cfs | -0.22 cfs |
| Q_{10} | 6.22 cfs | 2.60 cfs | -3.62 cfs |
| Q_{25} | 10.45 cfs | 3.66 cfs | -6.79 cfs |
| Q_{100} | 17.31 cfs | 7.25 cfs | -10.06 cfs |



Routing Diagram for G2073-Hydro Calcs

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Project Notes

Defined 7 rainfall events from MA-DEERFIELD_2021 IDF

G2073-Hydro Calcs

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Rainfall Events Listing (selected events)

| Event# | Event Name | Storm Type | Curve | Mode | Duration (hours) | B/B | Depth (inches) | AMC |
|--------|------------|----------------|-------|---------|------------------|-----|----------------|-----|
| 1 | 2-yr | Type III 24-hr | | Default | 24.00 | 1 | 3.00 | 2 |
| 2 | 10-yr | Type III 24-hr | | Default | 24.00 | 1 | 4.64 | 2 |
| 3 | 25-yr | Type III 24-hr | | Default | 24.00 | 1 | 5.66 | 2 |
| 4 | 100-yr | Type III 24-hr | | Default | 24.00 | 1 | 7.24 | 2 |

G2073-Hydro Calcs

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Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|-----------------|-----------|--|
| 1.741 | 39 | >75% Grass cover, Good, HSG A (P3, P4, P5) |
| 2.133 | 61 | >75% Grass cover, Good, HSG B (E3, P1, P2, P3, P4, P6) |
| 0.165 | 74 | >75% Grass cover, Good, HSG C (P1, P2, P4) |
| 1.186 | 30 | Brush, Good, HSG A (E1, E2, E3) |
| 4.523 | 48 | Brush, Good, HSG B (E1, E2, E3) |
| 0.054 | 65 | Brush, Good, HSG C (E2) |
| 2.335 | 98 | Paved parking, HSG A (E2, E3, P3) |
| 1.848 | 98 | Paved parking, HSG B (E1, E2, E3, P1, P2, P6) |
| 0.064 | 98 | Paved parking, HSG C (P1) |
| 1.488 | 98 | Roofs, HSG A (P3) |
| 0.826 | 98 | Roofs, HSG B (P1) |
| 0.005 | 98 | Unconnected pavement, HSG B (P4) |
| 0.254 | 30 | Woods, Good, HSG A (E2, P3, P4) |
| 0.061 | 55 | Woods, Good, HSG B (E2, P4) |
| 0.093 | 70 | Woods, Good, HSG C (E2, P2, P4) |
| 16.776 | 67 | TOTAL AREA |

G2073-Hydro Calcs

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Soil Listing (all nodes)

| Area (acres) | Soil Group | Subcatchment Numbers |
|-----------------|---------------|--------------------------------|
| 7.004 | HSG A | E1, E2, E3, P3, P4, P5 |
| 9.396 | HSG B | E1, E2, E3, P1, P2, P3, P4, P6 |
| 0.375 | HSG C | E2, P1, P2, P4 |
| 0.000 | HSG D | |
| 0.000 | Other | |
| 16.776 | | TOTAL AREA |

G2073-Hydro Calcs

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Ground Covers (all nodes)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchment Numbers |
|------------------|------------------|------------------|------------------|------------------|------------------|------------------------|----------------------------------|
| 1.741 | 2.133 | 0.165 | 0.000 | 0.000 | 4.039 | >75% Grass cover, Good | E3, P1, P2, P3, P4, P5, P6 |
| 1.186 | 4.523 | 0.054 | 0.000 | 0.000 | 5.763 | Brush, Good | E1, E2, E3 |
| 2.335 | 1.848 | 0.064 | 0.000 | 0.000 | 4.247 | Paved parking | E1, E2, E3, P1, P2, P3, P6 |
| 1.488 | 0.826 | 0.000 | 0.000 | 0.000 | 2.315 | Roofs | P1, P3 |
| 0.000 | 0.005 | 0.000 | 0.000 | 0.000 | 0.005 | Unconnected pavement | P4 |
| 0.254 | 0.061 | 0.093 | 0.000 | 0.000 | 0.408 | Woods, Good | E2, P2, P3, P4 |
| 7.004 | 9.396 | 0.375 | 0.000 | 0.000 | 16.776 | TOTAL AREA | |

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Pipe Listing (all nodes)

| Line# | Node Number | In-Invert (feet) | Out-Invert (feet) | Length (feet) | Slope (ft/ft) | n | Width (inches) | Diam/Height (inches) | Inside-Fill (inches) |
|-------|-------------|------------------|-------------------|---------------|---------------|-------|----------------|----------------------|----------------------|
| 1 | 2P | 193.19 | 191.39 | 35.2 | 0.0511 | 0.012 | 0.0 | 24.0 | 0.0 |
| 2 | 3P | 194.19 | 194.20 | 4.0 | -0.0025 | 0.013 | 0.0 | 6.0 | 0.0 |
| 3 | 4P | 193.19 | 191.39 | 35.2 | 0.0511 | 0.012 | 0.0 | 24.0 | 0.0 |
| 4 | E1P | 194.19 | 194.20 | 4.0 | -0.0025 | 0.013 | 0.0 | 6.0 | 0.0 |

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Time span=0.00-72.00 hrs, dt=0.03 hrs, 2401 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 E1: Exist 1 | Runoff Area=137,262 sf 14.51% Impervious Runoff Depth=0.17" Flow Length=576' Slope=0.0376 '/' Tc=21.2 min CN=54 Runoff=0.13 cfs 0.045 af |
| Subcatchment E2: Exist 2 | Runoff Area=113,301 sf 37.65% Impervious Runoff Depth=0.54" Flow Length=318' Slope=0.0302 '/' Tc=10.9 min CN=66 Runoff=1.06 cfs 0.118 af |
| Subcatchment E3: Exist 3 | Runoff Area=114,815 sf 37.15% Impervious Runoff Depth=0.37" Flow Length=427' Slope=0.0050 '/' Tc=38.4 min CN=61 Runoff=0.36 cfs 0.080 af |
| Subcatchment P1: Dev 1 | Runoff Area=132,144 sf 58.76% Impervious Runoff Depth=1.45" Flow Length=130' Slope=0.0100 '/' Tc=5.6 min CN=83 Runoff=5.17 cfs 0.366 af |
| Subcatchment P2: Dev 2 | Runoff Area=22,871 sf 0.75% Impervious Runoff Depth=0.43" Tc=5.0 min CN=63 Runoff=0.18 cfs 0.019 af |
| Subcatchment P3: Dev 3 | Runoff Area=169,487 sf 58.40% Impervious Runoff Depth=0.91" Flow Length=120' Slope=0.0100 '/' Tc=7.0 min CN=74 Runoff=3.71 cfs 0.294 af |
| Subcatchment P4: Dev 4 | Runoff Area=24,319 sf 0.89% Impervious Runoff Depth=0.13" Tc=5.0 min CN=52 Runoff=0.02 cfs 0.006 af |
| Subcatchment P5: Dev 5 | Runoff Area=4,653 sf 0.00% Impervious Runoff Depth=0.00" Tc=5.0 min CN=39 Runoff=0.00 cfs 0.000 af |
| Subcatchment P6: Dev 6 | Runoff Area=11,904 sf 31.81% Impervious Runoff Depth=0.86" Tc=5.0 min CN=73 Runoff=0.26 cfs 0.020 af |
| Pond 2P: Ex Outfall CB | Peak Elev=193.28' Inflow=0.05 cfs 0.013 af 24.0" Round Culvert n=0.012 L=35.2' S=0.0511 '/' Outflow=0.05 cfs 0.013 af |
| Pond 3P: Exist detention Pond 1 | Peak Elev=194.39' Storage=185 cf Inflow=0.18 cfs 0.019 af Primary=0.06 cfs 0.017 af Secondary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.017 af |
| Pond 4P: Ex Outfall CB | Peak Elev=193.29' Inflow=0.06 cfs 0.017 af 24.0" Round Culvert n=0.012 L=35.2' S=0.0511 '/' Outflow=0.06 cfs 0.017 af |
| Pond E1P: Exist detention Pond 1 | Peak Elev=194.37' Storage=173 cf Inflow=0.13 cfs 0.045 af Discarded=0.04 cfs 0.032 af Primary=0.05 cfs 0.013 af Secondary=0.00 cfs 0.000 af Outflow=0.09 cfs 0.045 af |
| Pond P1P: Western Basin | Peak Elev=197.58' Storage=2,675 cf Inflow=5.17 cfs 0.366 af Discarded=1.81 cfs 0.366 af Primary=0.00 cfs 0.000 af Outflow=1.81 cfs 0.366 af |
| Pond P2P: Eastern/northern basin | Peak Elev=199.22' Storage=3,118 cf Inflow=3.71 cfs 0.294 af Discarded=0.91 cfs 0.294 af Primary=0.00 cfs 0.000 af Outflow=0.91 cfs 0.294 af |

Total Runoff Area = 16.776 ac Runoff Volume = 0.948 af Average Runoff Depth = 0.68"
60.86% Pervious = 10.209 ac 39.14% Impervious = 6.566 ac

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Summary for Subcatchment E1: Exist 1

Runoff = 0.13 cfs @ 12.63 hrs, Volume= 0.045 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-yr Rainfall=3.00"

| Area (sf) | CN | Description |
|-----------|----|------------------------|
| 19,917 | 98 | Paved parking, HSG B |
| 109,301 | 48 | Brush, Good, HSG B |
| 8,044 | 30 | Brush, Good, HSG A |
| 137,262 | 54 | Weighted Average |
| 117,345 | | 85.49% Pervious Area |
| 19,917 | | 14.51% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|----------------|
| 21.2 | 576 | 0.0376 | 0.45 | | Lag/CN Method, |

Summary for Subcatchment E2: Exist 2

Runoff = 1.06 cfs @ 12.19 hrs, Volume= 0.118 af, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-yr Rainfall=3.00"

| Area (sf) | CN | Description |
|-----------|----|------------------------|
| 37,221 | 98 | Paved parking, HSG A |
| 5,437 | 98 | Paved parking, HSG B |
| 54,804 | 48 | Brush, Good, HSG B |
| 1,810 | 70 | Woods, Good, HSG C |
| 1,335 | 55 | Woods, Good, HSG B |
| 5,531 | 30 | Woods, Good, HSG A |
| 4,827 | 30 | Brush, Good, HSG A |
| 2,336 | 65 | Brush, Good, HSG C |
| 113,301 | 66 | Weighted Average |
| 70,643 | | 62.35% Pervious Area |
| 42,658 | | 37.65% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|----------------|
| 10.9 | 318 | 0.0302 | 0.49 | | Lag/CN Method, |

Summary for Subcatchment E3: Exist 3

Runoff = 0.36 cfs @ 12.71 hrs, Volume= 0.080 af, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-yr Rainfall=3.00"

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Type III 24-hr 2-yr Rainfall=3.00"

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| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 12,296 | 98 | Paved parking, HSG B |
| 30,356 | 98 | Paved parking, HSG A |
| 448 | 61 | >75% Grass cover, Good, HSG B |
| 32,937 | 48 | Brush, Good, HSG B |
| 38,778 | 30 | Brush, Good, HSG A |
| 114,815 | 61 | Weighted Average |
| 72,163 | | 62.85% Pervious Area |
| 42,652 | | 37.15% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|-----------------------|
| 38.4 | 427 | 0.0050 | 0.19 | | Lag/CN Method, |

Summary for Subcatchment P1: Dev 1

Runoff = 5.17 cfs @ 12.09 hrs, Volume= 0.366 af, Depth= 1.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-yr Rainfall=3.00"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 2,778 | 98 | Paved parking, HSG C |
| 248 | 74 | >75% Grass cover, Good, HSG C |
| 38,877 | 98 | Paved parking, HSG B |
| 35,992 | 98 | Roofs, HSG B |
| 54,249 | 61 | >75% Grass cover, Good, HSG B |
| 132,144 | 83 | Weighted Average |
| 54,497 | | 41.24% Pervious Area |
| 77,647 | | 58.76% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|-----------------------|
| 5.6 | 130 | 0.0100 | 0.38 | | Lag/CN Method, |

Summary for Subcatchment P2: Dev 2

Runoff = 0.18 cfs @ 12.11 hrs, Volume= 0.019 af, Depth= 0.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-yr Rainfall=3.00"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 3,247 | 74 | >75% Grass cover, Good, HSG C |
| 365 | 70 | Woods, Good, HSG C |
| 19,088 | 61 | >75% Grass cover, Good, HSG B |
| 171 | 98 | Paved parking, HSG B |
| 22,871 | 63 | Weighted Average |
| 22,700 | | 99.25% Pervious Area |
| 171 | | 0.75% Impervious Area |

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Type III 24-hr 2-yr Rainfall=3.00"

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| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0 | | | | | Direct Entry, |

Summary for Subcatchment P3: Dev 3

Runoff = 3.71 cfs @ 12.11 hrs, Volume= 0.294 af, Depth= 0.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-yr Rainfall=3.00"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 65,867 | 39 | >75% Grass cover, Good, HSG A |
| 28,661 | 98 | Paved parking, HSG A |
| 64,829 | 98 | Roofs, HSG A |
| 142 | 30 | Woods, Good, HSG A |
| 5,494 | 98 | Paved parking, HSG A |
| * 4,494 | 61 | >75% Grass cover, Good, HSG B |
| 169,487 | 74 | Weighted Average |
| 70,503 | | 41.60% Pervious Area |
| 98,984 | | 58.40% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|-----------------------|
| 7.0 | 120 | 0.0100 | 0.29 | | Lag/CN Method, |

Summary for Subcatchment P4: Dev 4

Runoff = 0.02 cfs @ 12.45 hrs, Volume= 0.006 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-yr Rainfall=3.00"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 1,856 | 70 | Woods, Good, HSG C |
| 3,703 | 74 | >75% Grass cover, Good, HSG C |
| 1,337 | 55 | Woods, Good, HSG B |
| 6,504 | 61 | >75% Grass cover, Good, HSG B |
| 217 | 98 | Unconnected pavement, HSG B |
| 5,388 | 30 | Woods, Good, HSG A |
| 5,314 | 39 | >75% Grass cover, Good, HSG A |
| 24,319 | 52 | Weighted Average |
| 24,102 | | 99.11% Pervious Area |
| 217 | | 0.89% Impervious Area |
| 217 | | 100.00% Unconnected |

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Type III 24-hr 2-yr Rainfall=3.00"

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| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0 | | | | | Direct Entry, |

Summary for Subcatchment P5: Dev 5

[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= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-yr Rainfall=3.00"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 4,653 | 39 | >75% Grass cover, Good, HSG A |
| 4,653 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0 | | | | | Direct Entry, |

Summary for Subcatchment P6: Dev 6

Runoff = 0.26 cfs @ 12.09 hrs, Volume= 0.020 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-yr Rainfall=3.00"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 3,787 | 98 | Paved parking, HSG B |
| 8,117 | 61 | >75% Grass cover, Good, HSG B |
| 11,904 | 73 | Weighted Average |
| 8,117 | | 68.19% Pervious Area |
| 3,787 | | 31.81% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0 | | | | | Direct Entry, |

Summary for Pond 2P: Ex Outfall CB

Inflow Area = 3.151 ac, 14.51% Impervious, Inflow Depth = 0.05" for 2-yr event

Inflow = 0.05 cfs @ 13.26 hrs, Volume= 0.013 af

Outflow = 0.05 cfs @ 13.26 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min

Primary = 0.05 cfs @ 13.26 hrs, Volume= 0.013 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs

Peak Elev= 193.28' @ 13.26 hrs

Flood Elev= 198.00'

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| Device | Routing | Invert | Outlet Devices |
|--------|---------|---------|--|
| #1 | Primary | 193.19' | 24.0" Round Culvert L= 35.2' Ke= 0.500 Inlet / Outlet Invert= 193.19' / 191.39' S= 0.0511 1/1' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf |

Primary OutFlow Max=0.05 cfs @ 13.26 hrs HW=193.28' (Free Discharge)↑**1=Culvert** (Inlet Controls 0.05 cfs @ 1.00 fps)**Summary for Pond 3P: Exist detention Pond 1**

| | |
|---------------|---|
| Inflow Area = | 3.559 ac, 50.20% Impervious, Inflow Depth = 0.06" for 2-yr event |
| Inflow = | 0.18 cfs @ 12.11 hrs, Volume= 0.019 af |
| Outflow = | 0.06 cfs @ 12.54 hrs, Volume= 0.017 af, Atten= 66%, Lag= 26.2 min |
| Primary = | 0.06 cfs @ 12.54 hrs, Volume= 0.017 af |
| Secondary = | 0.00 cfs @ 0.00 hrs, Volume= 0.000 af |

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs

Peak Elev= 194.39' @ 12.54 hrs Surf.Area= 663 sf Storage= 185 cf

Flood Elev= 198.00' Surf.Area= 2,726 sf Storage= 4,723 cf

Plug-Flow detention time= 115.5 min calculated for 0.017 af (91% of inflow)

Center-of-Mass det. time= 70.0 min (981.2 - 911.3)

| Volume | Invert | Avail.Storage | Storage Description |
|---------------------|----------------------|---------------------------|--|
| #1 | 194.00' | 4,723 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
| 194.00 | 295 | 0 | 0 |
| 195.00 | 1,246 | 771 | 771 |
| 196.00 | 1,966 | 1,606 | 2,377 |
| 197.00 | 2,726 | 2,346 | 4,723 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|---------|---|
| #1 | Secondary | 195.05' | 20.0" W x 3.0" H Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads |
| #2 | Primary | 194.20' | 6.0" Round Culvert L= 4.0' Ke= 0.500 Inlet / Outlet Invert= 194.19' / 194.20' S= -0.0025 1/1' Cc= 0.900 n= 0.013, Flow Area= 0.20 sf |

Primary OutFlow Max=0.06 cfs @ 12.54 hrs HW=194.39' (Free Discharge)↑**2=Culvert** (Barrel Controls 0.06 cfs @ 1.25 fps)**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=194.00' (Free Discharge)↑**1=Orifice/Grate** (Controls 0.00 cfs)

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Summary for Pond 4P: Ex Outfall CB

Inflow Area = 3.559 ac, 50.20% Impervious, Inflow Depth = 0.06" for 2-yr event
 Inflow = 0.06 cfs @ 12.54 hrs, Volume= 0.017 af
 Outflow = 0.06 cfs @ 12.54 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.06 cfs @ 12.54 hrs, Volume= 0.017 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
 Peak Elev= 193.29' @ 12.54 hrs
 Flood Elev= 198.00'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|---------|---|
| #1 | Primary | 193.19' | 24.0" Round Culvert L= 35.2' Ke= 0.500 Inlet / Outlet Invert= 193.19' / 191.39' S= 0.0511 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf |

Primary OutFlow Max=0.06 cfs @ 12.54 hrs HW=193.29' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.06 cfs @ 1.06 fps)

Summary for Pond E1P: Exist detention Pond 1

Inflow Area = 3.151 ac, 14.51% Impervious, Inflow Depth = 0.17" for 2-yr event
 Inflow = 0.13 cfs @ 12.63 hrs, Volume= 0.045 af
 Outflow = 0.09 cfs @ 13.26 hrs, Volume= 0.045 af, Atten= 35%, Lag= 37.7 min
 Discarded = 0.04 cfs @ 13.26 hrs, Volume= 0.032 af
 Primary = 0.05 cfs @ 13.26 hrs, Volume= 0.013 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
 Peak Elev= 194.37' @ 13.26 hrs Surf.Area= 645 sf Storage= 173 cf
 Flood Elev= 198.00' Surf.Area= 2,726 sf Storage= 4,723 cf

Plug-Flow detention time= 40.0 min calculated for 0.045 af (100% of inflow)
 Center-of-Mass det. time= 39.9 min (1,034.4 - 994.5)

| Volume | Invert | Avail.Storage | Storage Description |
|--------|---------|---------------|--|
| #1 | 194.00' | 4,723 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|------------------|-------------------|------------------------|------------------------|
| 194.00 | 295 | 0 | 0 |
| 195.00 | 1,246 | 771 | 771 |
| 196.00 | 1,966 | 1,606 | 2,377 |
| 197.00 | 2,726 | 2,346 | 4,723 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|---------|--|
| #1 | Secondary | 195.05' | 20.0" W x 3.0" H Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads |
| #2 | Primary | 194.20' | 6.0" Round Culvert L= 4.0' Ke= 0.500 Inlet / Outlet Invert= 194.19' / 194.20' S= -0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 0.20 sf |

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#3 Discarded 194.00' **2.400 in/hr Exfiltration over Surface area**
Conductivity to Groundwater Elevation = 190.00'

Discarded OutFlow Max=0.04 cfs @ 13.26 hrs HW=194.37' (Free Discharge)
↑**3=Exfiltration** (Controls 0.04 cfs)

Primary OutFlow Max=0.05 cfs @ 13.26 hrs HW=194.37' (Free Discharge)
↑**2=Culvert** (Barrel Controls 0.05 cfs @ 1.17 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=194.00' (Free Discharge)
↑**1=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P1P: Western Basin

Inflow Area = 3.034 ac, 58.76% Impervious, Inflow Depth = 1.45" for 2-yr event
Inflow = 5.17 cfs @ 12.09 hrs, Volume= 0.366 af
Outflow = 1.81 cfs @ 12.39 hrs, Volume= 0.366 af, Atten= 65%, Lag= 18.3 min
Discarded = 1.81 cfs @ 12.39 hrs, Volume= 0.366 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Peak Elev= 197.58' @ 12.39 hrs Surf.Area= 31,898 sf Storage= 2,675 cf
Flood Elev= 199.00' Surf.Area= 35,946 sf Storage= 51,213 cf

Plug-Flow detention time= 9.9 min calculated for 0.366 af (100% of inflow)
Center-of-Mass det. time= 9.9 min (845.5 - 835.7)

| Volume | Invert | Avail.Storage | Storage Description | | | |
|------------------|-------------------|---------------|--|------------------------|------------------|--|
| #1 | 197.50' | 51,213 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) | |
| 197.50 | 31,513 | 814.0 | 0 | 0 | 31,513 | |
| 198.00 | 33,827 | 1,050.0 | 16,332 | 16,332 | 66,523 | |
| 199.00 | 35,946 | 1,264.0 | 34,881 | 51,213 | 105,946 | |

| Device | Routing | Invert | Outlet Devices | | | | | | | | | |
|--------|-----------|---------|--|--|--|--|--|--|--|--|--|--|
| #1 | Primary | 198.00' | 10.0' long x 14.0' breadth Broad-Crested Rectangular Weir | | | | | | | | | |
| | | | Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 | | | | | | | | | |
| | | | Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63 | | | | | | | | | |
| #2 | Discarded | 197.50' | 2.400 in/hr Exfiltration over Surface area | | | | | | | | | |
| | | | Conductivity to Groundwater Elevation = 194.00' | | | | | | | | | |

Discarded OutFlow Max=1.81 cfs @ 12.39 hrs HW=197.58' (Free Discharge)
↑**2=Exfiltration** (Controls 1.81 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=197.50' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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Type III 24-hr 2-yr Rainfall=3.00"

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Summary for Pond P2P: Eastern/northern basin

Inflow Area = 3.891 ac, 58.40% Impervious, Inflow Depth = 0.91" for 2-yr event
 Inflow = 3.71 cfs @ 12.11 hrs, Volume= 0.294 af
 Outflow = 0.91 cfs @ 12.57 hrs, Volume= 0.294 af, Atten= 75%, Lag= 27.3 min
 Discarded = 0.91 cfs @ 12.57 hrs, Volume= 0.294 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
 Peak Elev= 199.22' @ 12.57 hrs Surf.Area= 15,679 sf Storage= 3,118 cf
 Flood Elev= 201.00' Surf.Area= 31,658 sf Storage= 48,626 cf

Plug-Flow detention time= 25.0 min calculated for 0.294 af (100% of inflow)
 Center-of-Mass det. time= 25.0 min (892.2 - 867.2)

| Volume | Invert | Avail.Storage | Storage Description |
|------------------|-------------------|------------------------|--|
| #1 | 199.00' | 48,626 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
| 199.00 | 12,626 | 0 | 0 |
| 200.00 | 26,484 | 19,555 | 19,555 |
| 201.00 | 31,658 | 29,071 | 48,626 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|---------|--|
| #1 | Primary | 200.00' | 10.0' long x 14.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63 |
| #2 | Discarded | 199.00' | 2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 194.00' |

Discarded OutFlow Max=0.91 cfs @ 12.57 hrs HW=199.22' (Free Discharge)
 ↑**2=Exfiltration** (Controls 0.91 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=199.00' (Free Discharge)
 ↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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Type III 24-hr 10-yr Rainfall=4.64"

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Time span=0.00-72.00 hrs, dt=0.03 hrs, 2401 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 E1: Exist 1 | Runoff Area=137,262 sf 14.51% Impervious Runoff Depth=0.75" Flow Length=576' Slope=0.0376 '/ Tc=21.2 min CN=54 Runoff=1.33 cfs 0.198 af |
| Subcatchment E2: Exist 2 | Runoff Area=113,301 sf 37.65% Impervious Runoff Depth=1.49" Flow Length=318' Slope=0.0302 '/ Tc=10.9 min CN=66 Runoff=3.61 cfs 0.322 af |
| Subcatchment E3: Exist 3 | Runoff Area=114,815 sf 37.15% Impervious Runoff Depth=1.16" Flow Length=427' Slope=0.0050 '/ Tc=38.4 min CN=61 Runoff=1.59 cfs 0.254 af |
| Subcatchment P1: Dev 1 | Runoff Area=132,144 sf 58.76% Impervious Runoff Depth=2.85" Flow Length=130' Slope=0.0100 '/ Tc=5.6 min CN=83 Runoff=10.19 cfs 0.721 af |
| Subcatchment P2: Dev 2 | Runoff Area=22,871 sf 0.75% Impervious Runoff Depth=1.29" Tc=5.0 min CN=63 Runoff=0.74 cfs 0.056 af |
| Subcatchment P3: Dev 3 | Runoff Area=169,487 sf 58.40% Impervious Runoff Depth=2.08" Flow Length=120' Slope=0.0100 '/ Tc=7.0 min CN=74 Runoff=9.04 cfs 0.675 af |
| Subcatchment P4: Dev 4 | Runoff Area=24,319 sf 0.89% Impervious Runoff Depth=0.65" Tc=5.0 min CN=52 Runoff=0.28 cfs 0.030 af |
| Subcatchment P5: Dev 5 | Runoff Area=4,653 sf 0.00% Impervious Runoff Depth=0.13" Tc=5.0 min CN=39 Runoff=0.00 cfs 0.001 af |
| Subcatchment P6: Dev 6 | Runoff Area=11,904 sf 31.81% Impervious Runoff Depth=2.00" Tc=5.0 min CN=73 Runoff=0.65 cfs 0.046 af |
| Pond 2P: Ex Outfall CB | Peak Elev=193.60' Inflow=1.02 cfs 0.149 af 24.0" Round Culvert n=0.012 L=35.2' S=0.0511 '/ Outflow=1.02 cfs 0.149 af |
| Pond 3P: Exist detention Pond 1 | Peak Elev=194.73' Storage=464 cf Inflow=0.74 cfs 0.056 af Primary=0.38 cfs 0.054 af Secondary=0.00 cfs 0.000 af Outflow=0.38 cfs 0.054 af |
| Pond 4P: Ex Outfall CB | Peak Elev=193.44' Inflow=0.38 cfs 0.054 af 24.0" Round Culvert n=0.012 L=35.2' S=0.0511 '/ Outflow=0.38 cfs 0.054 af |
| Pond E1P: Exist detention Pond 1 | Peak Elev=195.13' Storage=940 cf Inflow=1.33 cfs 0.198 af Discarded=0.09 cfs 0.048 af Primary=0.77 cfs 0.145 af Secondary=0.25 cfs 0.005 af Outflow=1.11 cfs 0.198 af |
| Pond P1P: Western Basin | Peak Elev=197.77' Storage=8,694 cf Inflow=10.19 cfs 0.721 af Discarded=1.96 cfs 0.721 af Primary=0.00 cfs 0.000 af Outflow=1.96 cfs 0.721 af |
| Pond P2P: Eastern/northern basin | Peak Elev=199.61' Storage=10,295 cf Inflow=9.04 cfs 0.675 af Discarded=1.29 cfs 0.675 af Primary=0.00 cfs 0.000 af Outflow=1.29 cfs 0.675 af |

Total Runoff Area = 16.776 ac Runoff Volume = 2.303 af Average Runoff Depth = 1.65"
60.86% Pervious = 10.209 ac 39.14% Impervious = 6.566 ac

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Type III 24-hr 10-yr Rainfall=4.64"

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Summary for Subcatchment E1: Exist 1

Runoff = 1.33 cfs @ 12.39 hrs, Volume= 0.198 af, Depth= 0.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr Rainfall=4.64"

| Area (sf) | CN | Description |
|-----------|----|------------------------|
| 19,917 | 98 | Paved parking, HSG B |
| 109,301 | 48 | Brush, Good, HSG B |
| 8,044 | 30 | Brush, Good, HSG A |
| 137,262 | 54 | Weighted Average |
| 117,345 | | 85.49% Pervious Area |
| 19,917 | | 14.51% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|----------------|
| 21.2 | 576 | 0.0376 | 0.45 | | Lag/CN Method, |

Summary for Subcatchment E2: Exist 2

Runoff = 3.61 cfs @ 12.16 hrs, Volume= 0.322 af, Depth= 1.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr Rainfall=4.64"

| Area (sf) | CN | Description |
|-----------|----|------------------------|
| 37,221 | 98 | Paved parking, HSG A |
| 5,437 | 98 | Paved parking, HSG B |
| 54,804 | 48 | Brush, Good, HSG B |
| 1,810 | 70 | Woods, Good, HSG C |
| 1,335 | 55 | Woods, Good, HSG B |
| 5,531 | 30 | Woods, Good, HSG A |
| 4,827 | 30 | Brush, Good, HSG A |
| 2,336 | 65 | Brush, Good, HSG C |
| 113,301 | 66 | Weighted Average |
| 70,643 | | 62.35% Pervious Area |
| 42,658 | | 37.65% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|----------------|
| 10.9 | 318 | 0.0302 | 0.49 | | Lag/CN Method, |

Summary for Subcatchment E3: Exist 3

Runoff = 1.59 cfs @ 12.60 hrs, Volume= 0.254 af, Depth= 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr Rainfall=4.64"

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Type III 24-hr 10-yr Rainfall=4.64"

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| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 12,296 | 98 | Paved parking, HSG B |
| 30,356 | 98 | Paved parking, HSG A |
| 448 | 61 | >75% Grass cover, Good, HSG B |
| 32,937 | 48 | Brush, Good, HSG B |
| 38,778 | 30 | Brush, Good, HSG A |
| 114,815 | 61 | Weighted Average |
| 72,163 | | 62.85% Pervious Area |
| 42,652 | | 37.15% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|-----------------------|
| 38.4 | 427 | 0.0050 | 0.19 | | Lag/CN Method, |

Summary for Subcatchment P1: Dev 1

Runoff = 10.19 cfs @ 12.08 hrs, Volume= 0.721 af, Depth= 2.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr Rainfall=4.64"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 2,778 | 98 | Paved parking, HSG C |
| 248 | 74 | >75% Grass cover, Good, HSG C |
| 38,877 | 98 | Paved parking, HSG B |
| 35,992 | 98 | Roofs, HSG B |
| 54,249 | 61 | >75% Grass cover, Good, HSG B |
| 132,144 | 83 | Weighted Average |
| 54,497 | | 41.24% Pervious Area |
| 77,647 | | 58.76% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|-----------------------|
| 5.6 | 130 | 0.0100 | 0.38 | | Lag/CN Method, |

Summary for Subcatchment P2: Dev 2

Runoff = 0.74 cfs @ 12.09 hrs, Volume= 0.056 af, Depth= 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr Rainfall=4.64"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 3,247 | 74 | >75% Grass cover, Good, HSG C |
| 365 | 70 | Woods, Good, HSG C |
| 19,088 | 61 | >75% Grass cover, Good, HSG B |
| 171 | 98 | Paved parking, HSG B |
| 22,871 | 63 | Weighted Average |
| 22,700 | | 99.25% Pervious Area |
| 171 | | 0.75% Impervious Area |

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Type III 24-hr 10-yr Rainfall=4.64"

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| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0 | | | | | Direct Entry, |

Summary for Subcatchment P3: Dev 3

Runoff = 9.04 cfs @ 12.10 hrs, Volume= 0.675 af, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr Rainfall=4.64"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 65,867 | 39 | >75% Grass cover, Good, HSG A |
| 28,661 | 98 | Paved parking, HSG A |
| 64,829 | 98 | Roofs, HSG A |
| 142 | 30 | Woods, Good, HSG A |
| 5,494 | 98 | Paved parking, HSG A |
| * 4,494 | 61 | >75% Grass cover, Good, HSG B |
| 169,487 | 74 | Weighted Average |
| 70,503 | | 41.60% Pervious Area |
| 98,984 | | 58.40% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|-----------------------|
| 7.0 | 120 | 0.0100 | 0.29 | | Lag/CN Method, |

Summary for Subcatchment P4: Dev 4

Runoff = 0.28 cfs @ 12.11 hrs, Volume= 0.030 af, Depth= 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr Rainfall=4.64"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 1,856 | 70 | Woods, Good, HSG C |
| 3,703 | 74 | >75% Grass cover, Good, HSG C |
| 1,337 | 55 | Woods, Good, HSG B |
| 6,504 | 61 | >75% Grass cover, Good, HSG B |
| 217 | 98 | Unconnected pavement, HSG B |
| 5,388 | 30 | Woods, Good, HSG A |
| 5,314 | 39 | >75% Grass cover, Good, HSG A |
| 24,319 | 52 | Weighted Average |
| 24,102 | | 99.11% Pervious Area |
| 217 | | 0.89% Impervious Area |
| 217 | | 100.00% Unconnected |

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Type III 24-hr 10-yr Rainfall=4.64"

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| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0 | | | | | Direct Entry, |

Summary for Subcatchment P5: Dev 5

Runoff = 0.00 cfs @ 14.52 hrs, Volume= 0.001 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr Rainfall=4.64"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 4,653 | 39 | >75% Grass cover, Good, HSG A |
| 4,653 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0 | | | | | Direct Entry, |

Summary for Subcatchment P6: Dev 6

Runoff = 0.65 cfs @ 12.08 hrs, Volume= 0.046 af, Depth= 2.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr Rainfall=4.64"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 3,787 | 98 | Paved parking, HSG B |
| 8,117 | 61 | >75% Grass cover, Good, HSG B |
| 11,904 | 73 | Weighted Average |
| 8,117 | | 68.19% Pervious Area |
| 3,787 | | 31.81% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0 | | | | | Direct Entry, |

Summary for Pond 2P: Ex Outfall CB

Inflow Area = 3.151 ac, 14.51% Impervious, Inflow Depth = 0.57" for 10-yr event
 Inflow = 1.02 cfs @ 12.58 hrs, Volume= 0.149 af
 Outflow = 1.02 cfs @ 12.58 hrs, Volume= 0.149 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.02 cfs @ 12.58 hrs, Volume= 0.149 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
 Peak Elev= 193.60' @ 12.58 hrs
 Flood Elev= 198.00'

| Device #1 | Routing Primary | Invert 193.19' | Outlet Devices 24.0" Round Culvert | L= 35.2' | Ke= 0.500 |
|--------------|--------------------|-------------------|--|----------|-----------|
|--------------|--------------------|-------------------|--|----------|-----------|

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Type III 24-hr 10-yr Rainfall=4.64"

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Inlet / Outlet Invert= 193.19' / 191.39' S= 0.0511 '/ Cc= 0.900
 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf

Primary OutFlow Max=1.02 cfs @ 12.58 hrs HW=193.60' (Free Discharge)

↑**1=Culvert** (Inlet Controls 1.02 cfs @ 2.18 fps)

Summary for Pond 3P: Exist detention Pond 1

Inflow Area = 3.559 ac, 50.20% Impervious, Inflow Depth = 0.19" for 10-yr event
 Inflow = 0.74 cfs @ 12.09 hrs, Volume= 0.056 af
 Outflow = 0.38 cfs @ 12.29 hrs, Volume= 0.054 af, Atten= 50%, Lag= 12.0 min
 Primary = 0.38 cfs @ 12.29 hrs, Volume= 0.054 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
 Peak Elev= 194.73' @ 12.29 hrs Surf.Area= 985 sf Storage= 464 cf
 Flood Elev= 198.00' Surf.Area= 2,726 sf Storage= 4,723 cf

Plug-Flow detention time= 53.1 min calculated for 0.054 af (97% of inflow)
 Center-of-Mass det. time= 35.4 min (906.1 - 870.7)

| Volume | Invert | Avail.Storage | Storage Description |
|--------|---------|---------------|--|
| #1 | 194.00' | 4,723 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 194.00 | 295 | 0 | 0 |
| 195.00 | 1,246 | 771 | 771 |
| 196.00 | 1,966 | 1,606 | 2,377 |
| 197.00 | 2,726 | 2,346 | 4,723 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|---------|---|
| #1 | Secondary | 195.05' | 20.0" W x 3.0" H Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads |
| #2 | Primary | 194.20' | 6.0" Round Culvert L= 4.0' Ke= 0.500 Inlet / Outlet Invert= 194.19' / 194.20' S= -0.0025 '/ Cc= 0.900 n= 0.013, Flow Area= 0.20 sf |

Primary OutFlow Max=0.38 cfs @ 12.29 hrs HW=194.73' (Free Discharge)

↑**2=Culvert** (Barrel Controls 0.38 cfs @ 2.22 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=194.00' (Free Discharge)

↑**1=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 4P: Ex Outfall CB

Inflow Area = 3.559 ac, 50.20% Impervious, Inflow Depth = 0.18" for 10-yr event
 Inflow = 0.38 cfs @ 12.29 hrs, Volume= 0.054 af
 Outflow = 0.38 cfs @ 12.29 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.38 cfs @ 12.29 hrs, Volume= 0.054 af

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Type III 24-hr 10-yr Rainfall=4.64"

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Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs

Peak Elev= 193.44' @ 12.29 hrs

Flood Elev= 198.00'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|---------|---|
| #1 | Primary | 193.19' | 24.0" Round Culvert L= 35.2' Ke= 0.500 Inlet / Outlet Invert= 193.19' / 191.39' S= 0.0511 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf |

Primary OutFlow Max=0.37 cfs @ 12.29 hrs HW=193.44' (Free Discharge)

↑**1=Culvert** (Inlet Controls 0.37 cfs @ 1.69 fps)

Summary for Pond E1P: Exist detention Pond 1

| | |
|---------------|---|
| Inflow Area = | 3.151 ac, 14.51% Impervious, Inflow Depth = 0.75" for 10-yr event |
| Inflow = | 1.33 cfs @ 12.39 hrs, Volume= 0.198 af |
| Outflow = | 1.11 cfs @ 12.58 hrs, Volume= 0.198 af, Atten= 16%, Lag= 11.6 min |
| Discarded = | 0.09 cfs @ 12.58 hrs, Volume= 0.048 af |
| Primary = | 0.77 cfs @ 12.58 hrs, Volume= 0.145 af |
| Secondary = | 0.25 cfs @ 12.58 hrs, Volume= 0.005 af |

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs

Peak Elev= 195.13' @ 12.58 hrs Surf.Area= 1,340 sf Storage= 940 cf

Flood Elev= 198.00' Surf.Area= 2,726 sf Storage= 4,723 cf

Plug-Flow detention time= 22.9 min calculated for 0.198 af (100% of inflow)

Center-of-Mass det. time= 22.9 min (941.6 - 918.7)

| Volume | Invert | Avail.Storage | Storage Description |
|------------------|-------------------|------------------------|--|
| #1 | 194.00' | 4,723 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
| 194.00 | 295 | 0 | 0 |
| 195.00 | 1,246 | 771 | 771 |
| 196.00 | 1,966 | 1,606 | 2,377 |
| 197.00 | 2,726 | 2,346 | 4,723 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|---------|--|
| #1 | Secondary | 195.05' | 20.0" W x 3.0" H Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads |
| #2 | Primary | 194.20' | 6.0" Round Culvert L= 4.0' Ke= 0.500 Inlet / Outlet Invert= 194.19' / 194.20' S= -0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 0.20 sf |
| #3 | Discarded | 194.00' | 2.400 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 190.00' |

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Discarded OutFlow Max=0.09 cfs @ 12.58 hrs HW=195.13' (Free Discharge)

↑**3=Exfiltration** (Controls 0.09 cfs)

Primary OutFlow Max=0.78 cfs @ 12.58 hrs HW=195.13' (Free Discharge)

↑**2=Culvert** (Barrel Controls 0.78 cfs @ 3.95 fps)

Secondary OutFlow Max=0.24 cfs @ 12.58 hrs HW=195.13' (Free Discharge)

↑**1=Orifice/Grate** (Orifice Controls 0.24 cfs @ 0.91 fps)

Summary for Pond P1P: Western Basin

Inflow Area = 3.034 ac, 58.76% Impervious, Inflow Depth = 2.85" for 10-yr event
Inflow = 10.19 cfs @ 12.08 hrs, Volume= 0.721 af
Outflow = 1.96 cfs @ 12.53 hrs, Volume= 0.721 af, Atten= 81%, Lag= 26.9 min
Discarded = 1.96 cfs @ 12.53 hrs, Volume= 0.721 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Peak Elev= 197.77' @ 12.53 hrs Surf.Area= 32,755 sf Storage= 8,694 cf
Flood Elev= 199.00' Surf.Area= 35,946 sf Storage= 51,213 cf

Plug-Flow detention time= 29.5 min calculated for 0.721 af (100% of inflow)
Center-of-Mass det. time= 29.5 min (845.7 - 816.1)

| Volume | Invert | Avail.Storage | Storage Description | | |
|------------------|-------------------|---------------|--|------------------------|------------------|
| #1 | 197.50' | 51,213 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) |
| 197.50 | 31,513 | 814.0 | 0 | 0 | 31,513 |
| 198.00 | 33,827 | 1,050.0 | 16,332 | 16,332 | 66,523 |
| 199.00 | 35,946 | 1,264.0 | 34,881 | 51,213 | 105,946 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|---------|--|
| #1 | Primary | 198.00' | 10.0' long x 14.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63 |
| #2 | Discarded | 197.50' | 2.400 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 194.00' |

Discarded OutFlow Max=1.96 cfs @ 12.53 hrs HW=197.77' (Free Discharge)

↑**2=Exfiltration** (Controls 1.96 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=197.50' (Free Discharge)

↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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Type III 24-hr 10-yr Rainfall=4.64"

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Summary for Pond P2P: Eastern/northern basin

Inflow Area = 3.891 ac, 58.40% Impervious, Inflow Depth = 2.08" for 10-yr event
 Inflow = 9.04 cfs @ 12.10 hrs, Volume= 0.675 af
 Outflow = 1.29 cfs @ 12.76 hrs, Volume= 0.675 af, Atten= 86%, Lag= 39.5 min
 Discarded = 1.29 cfs @ 12.76 hrs, Volume= 0.675 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
 Peak Elev= 199.61' @ 12.76 hrs Surf.Area= 21,089 sf Storage= 10,295 cf
 Flood Elev= 201.00' Surf.Area= 31,658 sf Storage= 48,626 cf

Plug-Flow detention time= 74.7 min calculated for 0.674 af (100% of inflow)
 Center-of-Mass det. time= 74.7 min (916.8 - 842.1)

| Volume | Invert | Avail.Storage | Storage Description |
|---------------------|----------------------|---------------------------|--|
| #1 | 199.00' | 48,626 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
| 199.00 | 12,626 | 0 | 0 |
| 200.00 | 26,484 | 19,555 | 19,555 |
| 201.00 | 31,658 | 29,071 | 48,626 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|---------|--|
| #1 | Primary | 200.00' | 10.0' long x 14.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63 |
| #2 | Discarded | 199.00' | 2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 194.00' |

Discarded OutFlow Max=1.29 cfs @ 12.76 hrs HW=199.61' (Free Discharge)
 ↑**2=Exfiltration** (Controls 1.29 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=199.00' (Free Discharge)
 ↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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Type III 24-hr 25-yr Rainfall=5.66"

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Time span=0.00-72.00 hrs, dt=0.03 hrs, 2401 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 E1: Exist 1 | Runoff Area=137,262 sf 14.51% Impervious Runoff Depth=1.25" Flow Length=576' Slope=0.0376 '/ Tc=21.2 min CN=54 Runoff=2.57 cfs 0.329 af |
| Subcatchment E2: Exist 2 | Runoff Area=113,301 sf 37.65% Impervious Runoff Depth=2.19" Flow Length=318' Slope=0.0302 '/ Tc=10.9 min CN=66 Runoff=5.50 cfs 0.475 af |
| Subcatchment E3: Exist 3 | Runoff Area=114,815 sf 37.15% Impervious Runoff Depth=1.78" Flow Length=427' Slope=0.0050 '/ Tc=38.4 min CN=61 Runoff=2.60 cfs 0.391 af |
| Subcatchment P1: Dev 1 | Runoff Area=132,144 sf 58.76% Impervious Runoff Depth=3.78" Flow Length=130' Slope=0.0100 '/ Tc=5.6 min CN=83 Runoff=13.41 cfs 0.955 af |
| Subcatchment P2: Dev 2 | Runoff Area=22,871 sf 0.75% Impervious Runoff Depth=1.94" Tc=5.0 min CN=63 Runoff=1.18 cfs 0.085 af |
| Subcatchment P3: Dev 3 | Runoff Area=169,487 sf 58.40% Impervious Runoff Depth=2.90" Flow Length=120' Slope=0.0100 '/ Tc=7.0 min CN=74 Runoff=12.71 cfs 0.941 af |
| Subcatchment P4: Dev 4 | Runoff Area=24,319 sf 0.89% Impervious Runoff Depth=1.12" Tc=5.0 min CN=52 Runoff=0.60 cfs 0.052 af |
| Subcatchment P5: Dev 5 | Runoff Area=4,653 sf 0.00% Impervious Runoff Depth=0.35" Tc=5.0 min CN=39 Runoff=0.01 cfs 0.003 af |
| Subcatchment P6: Dev 6 | Runoff Area=11,904 sf 31.81% Impervious Runoff Depth=2.81" Tc=5.0 min CN=73 Runoff=0.92 cfs 0.064 af |
| Pond 2P: Ex Outfall CB | Peak Elev=193.83' Inflow=2.35 cfs 0.274 af 24.0" Round Culvert n=0.012 L=35.2' S=0.0511 '/ Outflow=2.35 cfs 0.274 af |
| Pond 3P: Exist detention Pond 1 | Peak Elev=194.95' Storage=712 cf Inflow=1.18 cfs 0.085 af Primary=0.60 cfs 0.083 af Secondary=0.00 cfs 0.000 af Outflow=0.60 cfs 0.083 af |
| Pond 4P: Ex Outfall CB | Peak Elev=193.50' Inflow=0.60 cfs 0.083 af 24.0" Round Culvert n=0.012 L=35.2' S=0.0511 '/ Outflow=0.60 cfs 0.083 af |
| Pond E1P: Exist detention Pond 1 | Peak Elev=195.32' Storage=1,205 cf Inflow=2.57 cfs 0.329 af Discarded=0.10 cfs 0.055 af Primary=0.88 cfs 0.224 af Secondary=1.47 cfs 0.051 af Outflow=2.45 cfs 0.329 af |
| Pond P1P: Western Basin | Peak Elev=197.90' Storage=13,060 cf Inflow=13.41 cfs 0.955 af Discarded=2.06 cfs 0.955 af Primary=0.00 cfs 0.000 af Outflow=2.06 cfs 0.955 af |
| Pond P2P: Eastern/northern basin | Peak Elev=199.85' Storage=15,737 cf Inflow=12.71 cfs 0.941 af Discarded=1.53 cfs 0.941 af Primary=0.00 cfs 0.000 af Outflow=1.53 cfs 0.941 af |

Total Runoff Area = 16.776 ac Runoff Volume = 3.295 af Average Runoff Depth = 2.36"
60.86% Pervious = 10.209 ac 39.14% Impervious = 6.566 ac

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Type III 24-hr 25-yr Rainfall=5.66"

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Summary for Subcatchment E1: Exist 1

Runoff = 2.57 cfs @ 12.35 hrs, Volume= 0.329 af, Depth= 1.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-yr Rainfall=5.66"

| Area (sf) | CN | Description |
|-----------|----|------------------------|
| 19,917 | 98 | Paved parking, HSG B |
| 109,301 | 48 | Brush, Good, HSG B |
| 8,044 | 30 | Brush, Good, HSG A |
| 137,262 | 54 | Weighted Average |
| 117,345 | | 85.49% Pervious Area |
| 19,917 | | 14.51% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|----------------|
| 21.2 | 576 | 0.0376 | 0.45 | | Lag/CN Method, |

Summary for Subcatchment E2: Exist 2

Runoff = 5.50 cfs @ 12.16 hrs, Volume= 0.475 af, Depth= 2.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-yr Rainfall=5.66"

| Area (sf) | CN | Description |
|-----------|----|------------------------|
| 37,221 | 98 | Paved parking, HSG A |
| 5,437 | 98 | Paved parking, HSG B |
| 54,804 | 48 | Brush, Good, HSG B |
| 1,810 | 70 | Woods, Good, HSG C |
| 1,335 | 55 | Woods, Good, HSG B |
| 5,531 | 30 | Woods, Good, HSG A |
| 4,827 | 30 | Brush, Good, HSG A |
| 2,336 | 65 | Brush, Good, HSG C |
| 113,301 | 66 | Weighted Average |
| 70,643 | | 62.35% Pervious Area |
| 42,658 | | 37.65% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|----------------|
| 10.9 | 318 | 0.0302 | 0.49 | | Lag/CN Method, |

Summary for Subcatchment E3: Exist 3

Runoff = 2.60 cfs @ 12.58 hrs, Volume= 0.391 af, Depth= 1.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-yr Rainfall=5.66"

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Type III 24-hr 25-yr Rainfall=5.66"

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| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 12,296 | 98 | Paved parking, HSG B |
| 30,356 | 98 | Paved parking, HSG A |
| 448 | 61 | >75% Grass cover, Good, HSG B |
| 32,937 | 48 | Brush, Good, HSG B |
| 38,778 | 30 | Brush, Good, HSG A |
| 114,815 | 61 | Weighted Average |
| 72,163 | | 62.85% Pervious Area |
| 42,652 | | 37.15% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|-----------------------|
| 38.4 | 427 | 0.0050 | 0.19 | | Lag/CN Method, |

Summary for Subcatchment P1: Dev 1

Runoff = 13.41 cfs @ 12.08 hrs, Volume= 0.955 af, Depth= 3.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-yr Rainfall=5.66"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 2,778 | 98 | Paved parking, HSG C |
| 248 | 74 | >75% Grass cover, Good, HSG C |
| 38,877 | 98 | Paved parking, HSG B |
| 35,992 | 98 | Roofs, HSG B |
| 54,249 | 61 | >75% Grass cover, Good, HSG B |
| 132,144 | 83 | Weighted Average |
| 54,497 | | 41.24% Pervious Area |
| 77,647 | | 58.76% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|-----------------------|
| 5.6 | 130 | 0.0100 | 0.38 | | Lag/CN Method, |

Summary for Subcatchment P2: Dev 2

Runoff = 1.18 cfs @ 12.08 hrs, Volume= 0.085 af, Depth= 1.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-yr Rainfall=5.66"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 3,247 | 74 | >75% Grass cover, Good, HSG C |
| 365 | 70 | Woods, Good, HSG C |
| 19,088 | 61 | >75% Grass cover, Good, HSG B |
| 171 | 98 | Paved parking, HSG B |
| 22,871 | 63 | Weighted Average |
| 22,700 | | 99.25% Pervious Area |
| 171 | | 0.75% Impervious Area |

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Type III 24-hr 25-yr Rainfall=5.66"

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| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0 | | | | | Direct Entry, |

Summary for Subcatchment P3: Dev 3

Runoff = 12.71 cfs @ 12.10 hrs, Volume= 0.941 af, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-yr Rainfall=5.66"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 65,867 | 39 | >75% Grass cover, Good, HSG A |
| 28,661 | 98 | Paved parking, HSG A |
| 64,829 | 98 | Roofs, HSG A |
| 142 | 30 | Woods, Good, HSG A |
| 5,494 | 98 | Paved parking, HSG A |
| * 4,494 | 61 | >75% Grass cover, Good, HSG B |
| 169,487 | 74 | Weighted Average |
| 70,503 | | 41.60% Pervious Area |
| 98,984 | | 58.40% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|-----------------------|
| 7.0 | 120 | 0.0100 | 0.29 | | Lag/CN Method, |

Summary for Subcatchment P4: Dev 4

Runoff = 0.60 cfs @ 12.09 hrs, Volume= 0.052 af, Depth= 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-yr Rainfall=5.66"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 1,856 | 70 | Woods, Good, HSG C |
| 3,703 | 74 | >75% Grass cover, Good, HSG C |
| 1,337 | 55 | Woods, Good, HSG B |
| 6,504 | 61 | >75% Grass cover, Good, HSG B |
| 217 | 98 | Unconnected pavement, HSG B |
| 5,388 | 30 | Woods, Good, HSG A |
| 5,314 | 39 | >75% Grass cover, Good, HSG A |
| 24,319 | 52 | Weighted Average |
| 24,102 | | 99.11% Pervious Area |
| 217 | | 0.89% Impervious Area |
| 217 | | 100.00% Unconnected |

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Type III 24-hr 25-yr Rainfall=5.66"

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| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0 | | | | | Direct Entry, |

Summary for Subcatchment P5: Dev 5

Runoff = 0.01 cfs @ 12.36 hrs, Volume= 0.003 af, Depth= 0.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-yr Rainfall=5.66"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 4,653 | 39 | >75% Grass cover, Good, HSG A |
| 4,653 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0 | | | | | Direct Entry, |

Summary for Subcatchment P6: Dev 6

Runoff = 0.92 cfs @ 12.08 hrs, Volume= 0.064 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-yr Rainfall=5.66"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 3,787 | 98 | Paved parking, HSG B |
| 8,117 | 61 | >75% Grass cover, Good, HSG B |
| 11,904 | 73 | Weighted Average |
| 8,117 | | 68.19% Pervious Area |
| 3,787 | | 31.81% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0 | | | | | Direct Entry, |

Summary for Pond 2P: Ex Outfall CB

Inflow Area = 3.151 ac, 14.51% Impervious, Inflow Depth = 1.04" for 25-yr event
 Inflow = 2.35 cfs @ 12.43 hrs, Volume= 0.274 af
 Outflow = 2.35 cfs @ 12.43 hrs, Volume= 0.274 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.35 cfs @ 12.43 hrs, Volume= 0.274 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
 Peak Elev= 193.83' @ 12.43 hrs
 Flood Elev= 198.00'

| Device # | Routing | Invert | Outlet Devices |
|----------|---------|---------|---|
| #1 | Primary | 193.19' | 24.0" Round Culvert L= 35.2' Ke= 0.500 |

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Type III 24-hr 25-yr Rainfall=5.66"

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Inlet / Outlet Invert= 193.19' / 191.39' S= 0.0511 '/ Cc= 0.900
 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf

Primary OutFlow Max=2.34 cfs @ 12.43 hrs HW=193.83' (Free Discharge)

↑**1=Culvert** (Inlet Controls 2.34 cfs @ 2.72 fps)

Summary for Pond 3P: Exist detention Pond 1

Inflow Area = 3.559 ac, 50.20% Impervious, Inflow Depth = 0.29" for 25-yr event
 Inflow = 1.18 cfs @ 12.08 hrs, Volume= 0.085 af
 Outflow = 0.60 cfs @ 12.25 hrs, Volume= 0.083 af, Atten= 49%, Lag= 10.3 min
 Primary = 0.60 cfs @ 12.25 hrs, Volume= 0.083 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
 Peak Elev= 194.95' @ 12.25 hrs Surf.Area= 1,200 sf Storage= 712 cf
 Flood Elev= 198.00' Surf.Area= 2,726 sf Storage= 4,723 cf

Plug-Flow detention time= 41.6 min calculated for 0.083 af (98% of inflow)
 Center-of-Mass det. time= 29.9 min (887.6 - 857.6)

| Volume | Invert | Avail.Storage | Storage Description |
|--------|---------|---------------|--|
| #1 | 194.00' | 4,723 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 194.00 | 295 | 0 | 0 |
| 195.00 | 1,246 | 771 | 771 |
| 196.00 | 1,966 | 1,606 | 2,377 |
| 197.00 | 2,726 | 2,346 | 4,723 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|---------|---|
| #1 | Secondary | 195.05' | 20.0" W x 3.0" H Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads |
| #2 | Primary | 194.20' | 6.0" Round Culvert L= 4.0' Ke= 0.500 Inlet / Outlet Invert= 194.19' / 194.20' S= -0.0025 '/ Cc= 0.900 n= 0.013, Flow Area= 0.20 sf |

Primary OutFlow Max=0.60 cfs @ 12.25 hrs HW=194.95' (Free Discharge)

↑**2=Culvert** (Barrel Controls 0.60 cfs @ 3.05 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=194.00' (Free Discharge)

↑**1=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 4P: Ex Outfall CB

Inflow Area = 3.559 ac, 50.20% Impervious, Inflow Depth = 0.28" for 25-yr event
 Inflow = 0.60 cfs @ 12.25 hrs, Volume= 0.083 af
 Outflow = 0.60 cfs @ 12.25 hrs, Volume= 0.083 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.60 cfs @ 12.25 hrs, Volume= 0.083 af

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Type III 24-hr 25-yr Rainfall=5.66"

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Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs

Peak Elev= 193.50' @ 12.25 hrs

Flood Elev= 198.00'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|---------|--|
| #1 | Primary | 193.19' | 24.0" Round Culvert L= 35.2' Ke= 0.500 Inlet / Outlet Invert= 193.19' / 191.39' S= 0.0511 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf |

Primary OutFlow Max=0.59 cfs @ 12.25 hrs HW=193.50' (Free Discharge)

↑**1=Culvert** (Inlet Controls 0.59 cfs @ 1.90 fps)

Summary for Pond E1P: Exist detention Pond 1

| | |
|---------------|---|
| Inflow Area = | 3.151 ac, 14.51% Impervious, Inflow Depth = 1.25" for 25-yr event |
| Inflow = | 2.57 cfs @ 12.35 hrs, Volume= 0.329 af |
| Outflow = | 2.45 cfs @ 12.43 hrs, Volume= 0.329 af, Atten= 5%, Lag= 4.8 min |
| Discarded = | 0.10 cfs @ 12.43 hrs, Volume= 0.055 af |
| Primary = | 0.88 cfs @ 12.43 hrs, Volume= 0.224 af |
| Secondary = | 1.47 cfs @ 12.43 hrs, Volume= 0.051 af |

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs

Peak Elev= 195.32' @ 12.43 hrs Surf.Area= 1,476 sf Storage= 1,205 cf

Flood Elev= 198.00' Surf.Area= 2,726 sf Storage= 4,723 cf

Plug-Flow detention time= 18.1 min calculated for 0.329 af (100% of inflow)

Center-of-Mass det. time= 18.2 min (917.4 - 899.2)

| Volume | Invert | Avail.Storage | Storage Description |
|------------------|-------------------|------------------------|--|
| #1 | 194.00' | 4,723 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
| 194.00 | 295 | 0 | 0 |
| 195.00 | 1,246 | 771 | 771 |
| 196.00 | 1,966 | 1,606 | 2,377 |
| 197.00 | 2,726 | 2,346 | 4,723 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|---------|---|
| #1 | Secondary | 195.05' | 20.0" W x 3.0" H Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads |
| #2 | Primary | 194.20' | 6.0" Round Culvert L= 4.0' Ke= 0.500 Inlet / Outlet Invert= 194.19' / 194.20' S= -0.0025 '/ Cc= 0.900 n= 0.013, Flow Area= 0.20 sf |
| #3 | Discarded | 194.00' | 2.400 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 190.00' |

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Type III 24-hr 25-yr Rainfall=5.66"

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Discarded OutFlow Max=0.10 cfs @ 12.43 hrs HW=195.32' (Free Discharge)

↑**3=Exfiltration** (Controls 0.10 cfs)

Primary OutFlow Max=0.88 cfs @ 12.43 hrs HW=195.32' (Free Discharge)

↑**2=Culvert** (Inlet Controls 0.88 cfs @ 4.49 fps)

Secondary OutFlow Max=1.46 cfs @ 12.43 hrs HW=195.32' (Free Discharge)

↑**1=Orifice/Grate** (Orifice Controls 1.46 cfs @ 1.76 fps)

Summary for Pond P1P: Western Basin

Inflow Area = 3.034 ac, 58.76% Impervious, Inflow Depth = 3.78" for 25-yr event
Inflow = 13.41 cfs @ 12.08 hrs, Volume= 0.955 af
Outflow = 2.06 cfs @ 12.58 hrs, Volume= 0.955 af, Atten= 85%, Lag= 29.7 min
Discarded = 2.06 cfs @ 12.58 hrs, Volume= 0.955 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Peak Elev= 197.90' @ 12.58 hrs Surf.Area= 33,370 sf Storage= 13,060 cf
Flood Elev= 199.00' Surf.Area= 35,946 sf Storage= 51,213 cf

Plug-Flow detention time= 45.5 min calculated for 0.954 af (100% of inflow)
Center-of-Mass det. time= 45.5 min (853.6 - 808.1)

| Volume | Invert | Avail.Storage | Storage Description | | |
|------------------|-------------------|---------------|--|------------------------|------------------|
| #1 | 197.50' | 51,213 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) |
| 197.50 | 31,513 | 814.0 | 0 | 0 | 31,513 |
| 198.00 | 33,827 | 1,050.0 | 16,332 | 16,332 | 66,523 |
| 199.00 | 35,946 | 1,264.0 | 34,881 | 51,213 | 105,946 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|---------|--|
| #1 | Primary | 198.00' | 10.0' long x 14.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63 |
| #2 | Discarded | 197.50' | 2.400 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 194.00' |

Discarded OutFlow Max=2.06 cfs @ 12.58 hrs HW=197.90' (Free Discharge)

↑**2=Exfiltration** (Controls 2.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=197.50' (Free Discharge)

↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P2P: Eastern/northern basin

Inflow Area = 3.891 ac, 58.40% Impervious, Inflow Depth = 2.90" for 25-yr event
 Inflow = 12.71 cfs @ 12.10 hrs, Volume= 0.941 af
 Outflow = 1.53 cfs @ 12.89 hrs, Volume= 0.941 af, Atten= 88%, Lag= 47.5 min
 Discarded = 1.53 cfs @ 12.89 hrs, Volume= 0.941 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
 Peak Elev= 199.85' @ 12.89 hrs Surf.Area= 24,404 sf Storage= 15,737 cf
 Flood Elev= 201.00' Surf.Area= 31,658 sf Storage= 48,626 cf

Plug-Flow detention time= 102.7 min calculated for 0.940 af (100% of inflow)
 Center-of-Mass det. time= 102.7 min (935.1 - 832.4)

| Volume | Invert | Avail.Storage | Storage Description |
|------------------|-------------------|------------------------|--|
| #1 | 199.00' | 48,626 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
| 199.00 | 12,626 | 0 | 0 |
| 200.00 | 26,484 | 19,555 | 19,555 |
| 201.00 | 31,658 | 29,071 | 48,626 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|---------|--|
| #1 | Primary | 200.00' | 10.0' long x 14.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63 |
| #2 | Discarded | 199.00' | 2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 194.00' |

Discarded OutFlow Max=1.53 cfs @ 12.89 hrs HW=199.85' (Free Discharge)
 ↑**2=Exfiltration** (Controls 1.53 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=199.00' (Free Discharge)
 ↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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Type III 24-hr 100-yr Rainfall=7.24"

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Time span=0.00-72.00 hrs, dt=0.03 hrs, 2401 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 E1: Exist 1 | Runoff Area=137,262 sf 14.51% Impervious Runoff Depth=2.18" Flow Length=576' Slope=0.0376 '/ Tc=21.2 min CN=54 Runoff=4.90 cfs 0.573 af |
| Subcatchment E2: Exist 2 | Runoff Area=113,301 sf 37.65% Impervious Runoff Depth=3.39" Flow Length=318' Slope=0.0302 '/ Tc=10.9 min CN=66 Runoff=8.71 cfs 0.736 af |
| Subcatchment E3: Exist 3 | Runoff Area=114,815 sf 37.15% Impervious Runoff Depth=2.88" Flow Length=427' Slope=0.0050 '/ Tc=38.4 min CN=61 Runoff=4.36 cfs 0.632 af |
| Subcatchment P1: Dev 1 | Runoff Area=132,144 sf 58.76% Impervious Runoff Depth=5.25" Flow Length=130' Slope=0.0100 '/ Tc=5.6 min CN=83 Runoff=18.42 cfs 1.328 af |
| Subcatchment P2: Dev 2 | Runoff Area=22,871 sf 0.75% Impervious Runoff Depth=3.08" Tc=5.0 min CN=63 Runoff=1.92 cfs 0.135 af |
| Subcatchment P3: Dev 3 | Runoff Area=169,487 sf 58.40% Impervious Runoff Depth=4.25" Flow Length=120' Slope=0.0100 '/ Tc=7.0 min CN=74 Runoff=18.64 cfs 1.379 af |
| Subcatchment P4: Dev 4 | Runoff Area=24,319 sf 0.89% Impervious Runoff Depth=1.99" Tc=5.0 min CN=52 Runoff=1.22 cfs 0.093 af |
| Subcatchment P5: Dev 5 | Runoff Area=4,653 sf 0.00% Impervious Runoff Depth=0.86" Tc=5.0 min CN=39 Runoff=0.06 cfs 0.008 af |
| Subcatchment P6: Dev 6 | Runoff Area=11,904 sf 31.81% Impervious Runoff Depth=4.14" Tc=5.0 min CN=73 Runoff=1.36 cfs 0.094 af |
| Pond 2P: Ex Outfall CB | Peak Elev=194.07' Inflow=4.24 cfs 0.507 af 24.0" Round Culvert n=0.012 L=35.2' S=0.0511 '/ Outflow=4.24 cfs 0.507 af |
| Pond 3P: Exist detention Pond 1 | Peak Elev=195.18' Storage=1,011 cf Inflow=1.92 cfs 0.178 af Primary=0.81 cfs 0.156 af Secondary=0.53 cfs 0.021 af Outflow=1.34 cfs 0.176 af |
| Pond 4P: Ex Outfall CB | Peak Elev=193.66' Inflow=1.34 cfs 0.176 af 24.0" Round Culvert n=0.012 L=35.2' S=0.0511 '/ Outflow=1.34 cfs 0.176 af |
| Pond E1P: Exist detention Pond 1 | Peak Elev=195.79' Storage=1,980 cf Inflow=4.90 cfs 0.573 af Discarded=0.13 cfs 0.066 af Primary=1.09 cfs 0.343 af Secondary=3.14 cfs 0.164 af Outflow=4.36 cfs 0.573 af |
| Pond P1P: Western Basin | Peak Elev=198.10' Storage=19,587 cf Inflow=18.42 cfs 1.328 af Discarded=2.20 cfs 1.285 af Primary=0.79 cfs 0.043 af Outflow=2.99 cfs 1.328 af |
| Pond P2P: Eastern/northern basin | Peak Elev=200.15' Storage=23,519 cf Inflow=18.64 cfs 1.379 af Discarded=1.77 cfs 1.273 af Primary=1.50 cfs 0.106 af Outflow=3.27 cfs 1.379 af |

Total Runoff Area = 16.776 ac Runoff Volume = 4.977 af Average Runoff Depth = 3.56"
60.86% Pervious = 10.209 ac 39.14% Impervious = 6.566 ac

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Type III 24-hr 100-yr Rainfall=7.24"

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Summary for Subcatchment E1: Exist 1

Runoff = 4.90 cfs @ 12.32 hrs, Volume= 0.573 af, Depth= 2.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr Rainfall=7.24"

| Area (sf) | CN | Description |
|-----------|----|------------------------|
| 19,917 | 98 | Paved parking, HSG B |
| 109,301 | 48 | Brush, Good, HSG B |
| 8,044 | 30 | Brush, Good, HSG A |
| 137,262 | 54 | Weighted Average |
| 117,345 | | 85.49% Pervious Area |
| 19,917 | | 14.51% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|----------------|
| 21.2 | 576 | 0.0376 | 0.45 | | Lag/CN Method, |

Summary for Subcatchment E2: Exist 2

Runoff = 8.71 cfs @ 12.16 hrs, Volume= 0.736 af, Depth= 3.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr Rainfall=7.24"

| Area (sf) | CN | Description |
|-----------|----|------------------------|
| 37,221 | 98 | Paved parking, HSG A |
| 5,437 | 98 | Paved parking, HSG B |
| 54,804 | 48 | Brush, Good, HSG B |
| 1,810 | 70 | Woods, Good, HSG C |
| 1,335 | 55 | Woods, Good, HSG B |
| 5,531 | 30 | Woods, Good, HSG A |
| 4,827 | 30 | Brush, Good, HSG A |
| 2,336 | 65 | Brush, Good, HSG C |
| 113,301 | 66 | Weighted Average |
| 70,643 | | 62.35% Pervious Area |
| 42,658 | | 37.65% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|----------------|
| 10.9 | 318 | 0.0302 | 0.49 | | Lag/CN Method, |

Summary for Subcatchment E3: Exist 3

Runoff = 4.36 cfs @ 12.56 hrs, Volume= 0.632 af, Depth= 2.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr Rainfall=7.24"

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Type III 24-hr 100-yr Rainfall=7.24"

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| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 12,296 | 98 | Paved parking, HSG B |
| 30,356 | 98 | Paved parking, HSG A |
| 448 | 61 | >75% Grass cover, Good, HSG B |
| 32,937 | 48 | Brush, Good, HSG B |
| 38,778 | 30 | Brush, Good, HSG A |
| 114,815 | 61 | Weighted Average |
| 72,163 | | 62.85% Pervious Area |
| 42,652 | | 37.15% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|-----------------------|
| 38.4 | 427 | 0.0050 | 0.19 | | Lag/CN Method, |

Summary for Subcatchment P1: Dev 1

Runoff = 18.42 cfs @ 12.08 hrs, Volume= 1.328 af, Depth= 5.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr Rainfall=7.24"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 2,778 | 98 | Paved parking, HSG C |
| 248 | 74 | >75% Grass cover, Good, HSG C |
| 38,877 | 98 | Paved parking, HSG B |
| 35,992 | 98 | Roofs, HSG B |
| 54,249 | 61 | >75% Grass cover, Good, HSG B |
| 132,144 | 83 | Weighted Average |
| 54,497 | | 41.24% Pervious Area |
| 77,647 | | 58.76% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|-----------------------|
| 5.6 | 130 | 0.0100 | 0.38 | | Lag/CN Method, |

Summary for Subcatchment P2: Dev 2

Runoff = 1.92 cfs @ 12.08 hrs, Volume= 0.135 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr Rainfall=7.24"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 3,247 | 74 | >75% Grass cover, Good, HSG C |
| 365 | 70 | Woods, Good, HSG C |
| 19,088 | 61 | >75% Grass cover, Good, HSG B |
| 171 | 98 | Paved parking, HSG B |
| 22,871 | 63 | Weighted Average |
| 22,700 | | 99.25% Pervious Area |
| 171 | | 0.75% Impervious Area |

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Type III 24-hr 100-yr Rainfall=7.24"

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| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0 | | | | | Direct Entry, |

Summary for Subcatchment P3: Dev 3

Runoff = 18.64 cfs @ 12.10 hrs, Volume= 1.379 af, Depth= 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr Rainfall=7.24"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 65,867 | 39 | >75% Grass cover, Good, HSG A |
| 28,661 | 98 | Paved parking, HSG A |
| 64,829 | 98 | Roofs, HSG A |
| 142 | 30 | Woods, Good, HSG A |
| 5,494 | 98 | Paved parking, HSG A |
| * 4,494 | 61 | >75% Grass cover, Good, HSG B |
| 169,487 | 74 | Weighted Average |
| 70,503 | | 41.60% Pervious Area |
| 98,984 | | 58.40% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|-----------------------|
| 7.0 | 120 | 0.0100 | 0.29 | | Lag/CN Method, |

Summary for Subcatchment P4: Dev 4

Runoff = 1.22 cfs @ 12.09 hrs, Volume= 0.093 af, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr Rainfall=7.24"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 1,856 | 70 | Woods, Good, HSG C |
| 3,703 | 74 | >75% Grass cover, Good, HSG C |
| 1,337 | 55 | Woods, Good, HSG B |
| 6,504 | 61 | >75% Grass cover, Good, HSG B |
| 217 | 98 | Unconnected pavement, HSG B |
| 5,388 | 30 | Woods, Good, HSG A |
| 5,314 | 39 | >75% Grass cover, Good, HSG A |
| 24,319 | 52 | Weighted Average |
| 24,102 | | 99.11% Pervious Area |
| 217 | | 0.89% Impervious Area |
| 217 | | 100.00% Unconnected |

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Type III 24-hr 100-yr Rainfall=7.24"

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| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0 | | | | | Direct Entry, |

Summary for Subcatchment P5: Dev 5

Runoff = 0.06 cfs @ 12.12 hrs, Volume= 0.008 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr Rainfall=7.24"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 4,653 | 39 | >75% Grass cover, Good, HSG A |
| 4,653 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0 | | | | | Direct Entry, |

Summary for Subcatchment P6: Dev 6

Runoff = 1.36 cfs @ 12.08 hrs, Volume= 0.094 af, Depth= 4.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr Rainfall=7.24"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 3,787 | 98 | Paved parking, HSG B |
| 8,117 | 61 | >75% Grass cover, Good, HSG B |
| 11,904 | 73 | Weighted Average |
| 8,117 | | 68.19% Pervious Area |
| 3,787 | | 31.81% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0 | | | | | Direct Entry, |

Summary for Pond 2P: Ex Outfall CB

Inflow Area = 3.151 ac, 14.51% Impervious, Inflow Depth = 1.93" for 100-yr event
 Inflow = 4.24 cfs @ 12.44 hrs, Volume= 0.507 af
 Outflow = 4.24 cfs @ 12.44 hrs, Volume= 0.507 af, Atten= 0%, Lag= 0.0 min
 Primary = 4.24 cfs @ 12.44 hrs, Volume= 0.507 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
 Peak Elev= 194.07' @ 12.44 hrs
 Flood Elev= 198.00'

| Device #1 | Routing Primary | Invert 193.19' | Outlet Devices 24.0" Round Culvert | L= 35.2' | Ke= 0.500 |
|--------------|--------------------|-------------------|--|----------|-----------|
|--------------|--------------------|-------------------|--|----------|-----------|

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Type III 24-hr 100-yr Rainfall=7.24"

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Inlet / Outlet Invert= 193.19' / 191.39' S= 0.0511 '/ Cc= 0.900
n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf

Primary OutFlow Max=4.23 cfs @ 12.44 hrs HW=194.07' (Free Discharge)

↑**1=Culvert** (Inlet Controls 4.23 cfs @ 3.19 fps)

Summary for Pond 3P: Exist detention Pond 1

Inflow Area = 3.559 ac, 50.20% Impervious, Inflow Depth = 0.60" for 100-yr event
Inflow = 1.92 cfs @ 12.08 hrs, Volume= 0.178 af
Outflow = 1.34 cfs @ 12.16 hrs, Volume= 0.176 af, Atten= 31%, Lag= 5.0 min
Primary = 0.81 cfs @ 12.16 hrs, Volume= 0.156 af
Secondary = 0.53 cfs @ 12.16 hrs, Volume= 0.021 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Peak Elev= 195.18' @ 12.16 hrs Surf.Area= 1,378 sf Storage= 1,011 cf
Flood Elev= 198.00' Surf.Area= 2,726 sf Storage= 4,723 cf

Plug-Flow detention time= 27.8 min calculated for 0.176 af (99% of inflow)
Center-of-Mass det. time= 21.9 min (846.6 - 824.7)

| Volume | Invert | Avail.Storage | Storage Description |
|--------|---------|---------------|--|
| #1 | 194.00' | 4,723 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 194.00 | 295 | 0 | 0 |
| 195.00 | 1,246 | 771 | 771 |
| 196.00 | 1,966 | 1,606 | 2,377 |
| 197.00 | 2,726 | 2,346 | 4,723 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|---------|---|
| #1 | Secondary | 195.05' | 20.0" W x 3.0" H Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads |
| #2 | Primary | 194.20' | 6.0" Round Culvert L= 4.0' Ke= 0.500 Inlet / Outlet Invert= 194.19' / 194.20' S= -0.0025 '/ Cc= 0.900 n= 0.013, Flow Area= 0.20 sf |

Primary OutFlow Max=0.81 cfs @ 12.16 hrs HW=195.18' (Free Discharge)

↑**2=Culvert** (Inlet Controls 0.81 cfs @ 4.12 fps)

Secondary OutFlow Max=0.50 cfs @ 12.16 hrs HW=195.18' (Free Discharge)

↑**1=Orifice/Grate** (Orifice Controls 0.50 cfs @ 1.16 fps)

Summary for Pond 4P: Ex Outfall CB

Inflow Area = 3.559 ac, 50.20% Impervious, Inflow Depth = 0.59" for 100-yr event
Inflow = 1.34 cfs @ 12.16 hrs, Volume= 0.176 af
Outflow = 1.34 cfs @ 12.16 hrs, Volume= 0.176 af, Atten= 0%, Lag= 0.0 min
Primary = 1.34 cfs @ 12.16 hrs, Volume= 0.176 af

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Type III 24-hr 100-yr Rainfall=7.24"

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Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs

Peak Elev= 193.66' @ 12.16 hrs

Flood Elev= 198.00'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|---------|--|
| #1 | Primary | 193.19' | 24.0" Round Culvert L= 35.2' Ke= 0.500 Inlet / Outlet Invert= 193.19' / 191.39' S= 0.0511 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 3.14 sf |

Primary OutFlow Max=1.31 cfs @ 12.16 hrs HW=193.66' (Free Discharge)

↑**1=Culvert** (Inlet Controls 1.31 cfs @ 2.33 fps)

Summary for Pond E1P: Exist detention Pond 1

| | |
|---------------|--|
| Inflow Area = | 3.151 ac, 14.51% Impervious, Inflow Depth = 2.18" for 100-yr event |
| Inflow = | 4.90 cfs @ 12.32 hrs, Volume= 0.573 af |
| Outflow = | 4.36 cfs @ 12.44 hrs, Volume= 0.573 af, Atten= 11%, Lag= 7.2 min |
| Discarded = | 0.13 cfs @ 12.44 hrs, Volume= 0.066 af |
| Primary = | 1.09 cfs @ 12.44 hrs, Volume= 0.343 af |
| Secondary = | 3.14 cfs @ 12.44 hrs, Volume= 0.164 af |

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs

Peak Elev= 195.79' @ 12.44 hrs Surf.Area= 1,815 sf Storage= 1,980 cf

Flood Elev= 198.00' Surf.Area= 2,726 sf Storage= 4,723 cf

Plug-Flow detention time= 14.7 min calculated for 0.572 af (100% of inflow)

Center-of-Mass det. time= 14.8 min (895.4 - 880.7)

| Volume | Invert | Avail.Storage | Storage Description |
|------------------|-------------------|------------------------|--|
| #1 | 194.00' | 4,723 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
| 194.00 | 295 | 0 | 0 |
| 195.00 | 1,246 | 771 | 771 |
| 196.00 | 1,966 | 1,606 | 2,377 |
| 197.00 | 2,726 | 2,346 | 4,723 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|---------|---|
| #1 | Secondary | 195.05' | 20.0" W x 3.0" H Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads |
| #2 | Primary | 194.20' | 6.0" Round Culvert L= 4.0' Ke= 0.500 Inlet / Outlet Invert= 194.19' / 194.20' S= -0.0025 '/ Cc= 0.900 n= 0.013, Flow Area= 0.20 sf |
| #3 | Discarded | 194.00' | 2.400 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 190.00' |

G2073-Hydro Calcs

Prepared by HP Inc.

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Type III 24-hr 100-yr Rainfall=7.24"

Printed 8/22/2022

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Discarded OutFlow Max=0.13 cfs @ 12.44 hrs HW=195.79' (Free Discharge)

↑**3=Exfiltration** (Controls 0.13 cfs)

Primary OutFlow Max=1.09 cfs @ 12.44 hrs HW=195.79' (Free Discharge)

↑**2=Culvert** (Inlet Controls 1.09 cfs @ 5.57 fps)

Secondary OutFlow Max=3.14 cfs @ 12.44 hrs HW=195.79' (Free Discharge)

↑**1=Orifice/Grate** (Orifice Controls 3.14 cfs @ 3.77 fps)

Summary for Pond P1P: Western Basin

Inflow Area = 3.034 ac, 58.76% Impervious, Inflow Depth = 5.25" for 100-yr event
Inflow = 18.42 cfs @ 12.08 hrs, Volume= 1.328 af
Outflow = 2.99 cfs @ 12.56 hrs, Volume= 1.328 af, Atten= 84%, Lag= 28.6 min
Discarded = 2.20 cfs @ 12.56 hrs, Volume= 1.285 af
Primary = 0.79 cfs @ 12.56 hrs, Volume= 0.043 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Peak Elev= 198.10' @ 12.56 hrs Surf.Area= 34,028 sf Storage= 19,587 cf
Flood Elev= 199.00' Surf.Area= 35,946 sf Storage= 51,213 cf

Plug-Flow detention time= 63.8 min calculated for 1.328 af (100% of inflow)
Center-of-Mass det. time= 63.7 min (862.6 - 798.8)

| Volume | Invert | Avail.Storage | Storage Description | | |
|---------------------|----------------------|------------------|--|---------------------------|---------------------|
| #1 | 197.50' | 51,213 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) |
| 197.50 | 31,513 | 814.0 | 0 | 0 | 31,513 |
| 198.00 | 33,827 | 1,050.0 | 16,332 | 16,332 | 66,523 |
| 199.00 | 35,946 | 1,264.0 | 34,881 | 51,213 | 105,946 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|---------|--|
| #1 | Primary | 198.00' | 10.0' long x 14.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63 |
| #2 | Discarded | 197.50' | 2.400 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 194.00' |

Discarded OutFlow Max=2.20 cfs @ 12.56 hrs HW=198.10' (Free Discharge)

↑**2=Exfiltration** (Controls 2.20 cfs)

Primary OutFlow Max=0.78 cfs @ 12.56 hrs HW=198.10' (Free Discharge)

↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.78 cfs @ 0.82 fps)

G2073-Hydro Calcs

Prepared by HP Inc.

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Type III 24-hr 100-yr Rainfall=7.24"

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Summary for Pond P2P: Eastern/northern basin

Inflow Area = 3.891 ac, 58.40% Impervious, Inflow Depth = 4.25" for 100-yr event
 Inflow = 18.64 cfs @ 12.10 hrs, Volume= 1.379 af
 Outflow = 3.27 cfs @ 12.59 hrs, Volume= 1.379 af, Atten= 82%, Lag= 29.4 min
 Discarded = 1.77 cfs @ 12.59 hrs, Volume= 1.273 af
 Primary = 1.50 cfs @ 12.59 hrs, Volume= 0.106 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
 Peak Elev= 200.15' @ 12.59 hrs Surf.Area= 27,247 sf Storage= 23,519 cf
 Flood Elev= 201.00' Surf.Area= 31,658 sf Storage= 48,626 cf

Plug-Flow detention time= 119.7 min calculated for 1.379 af (100% of inflow)
 Center-of-Mass det. time= 119.7 min (941.1 - 821.4)

| Volume | Invert | Avail.Storage | Storage Description |
|---------------------|----------------------|---------------------------|--|
| #1 | 199.00' | 48,626 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
| 199.00 | 12,626 | 0 | 0 |
| 200.00 | 26,484 | 19,555 | 19,555 |
| 201.00 | 31,658 | 29,071 | 48,626 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|---------|--|
| #1 | Primary | 200.00' | 10.0' long x 14.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63 |
| #2 | Discarded | 199.00' | 2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 194.00' |

Discarded OutFlow Max=1.77 cfs @ 12.59 hrs HW=200.15' (Free Discharge)
 ↑**2=Exfiltration** (Controls 1.77 cfs)

Primary OutFlow Max=1.49 cfs @ 12.59 hrs HW=200.15' (Free Discharge)
 ↑**1=Broad-Crested Rectangular Weir** (Weir Controls 1.49 cfs @ 1.01 fps)



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Franklin County, Massachusetts



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

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scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

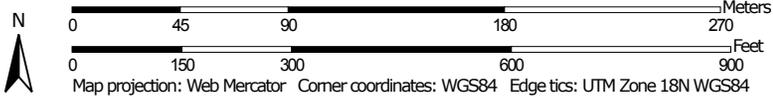
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Map Scale: 1:3,130 if printed on A landscape (11" x 8.5") sheet.



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features

Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

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

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: Franklin County, Massachusetts
 Survey Area Data: Version 12, Oct 6, 2017

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

Date(s) aerial images were photographed: Sep 29, 2013—Oct 16, 2016

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.

Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|------------------------------------|---|--------------|----------------|
| 255A | Windsor loamy sand, 0 to 3 percent slopes | 3.0 | 11.6% |
| 255C | Windsor loamy sand, 8 to 15 percent slopes | 0.0 | 0.0% |
| 256A | Deerfield loamy sand, 0 to 3 percent slopes | 2.8 | 10.9% |
| 275A | Agawam fine sandy loam, 0 to 3 percent slopes | 10.9 | 41.8% |
| 276A | Ninigret fine sandy loam, 0 to 3 percent slopes | 5.9 | 22.8% |
| 656 | Udorthents-Urban land complex | 3.3 | 12.8% |
| Totals for Area of Interest | | 26.0 | 100.0% |

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

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was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Franklin County, Massachusetts

255A—Windsor loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2svkg

Elevation: 0 to 990 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Windsor, loamy sand, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor, Loamy Sand

Setting

Landform: Deltas, dunes, outwash plains, outwash terraces

Landform position (three-dimensional): Riser, tread

Down-slope shape: Linear, convex

Across-slope shape: Linear, convex

Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

O - 0 to 1 inches: moderately decomposed plant material

A - 1 to 3 inches: loamy sand

Bw - 3 to 25 inches: loamy sand

C - 25 to 65 inches: sand

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Excessively drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water storage in profile: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2s

Hydrologic Soil Group: A

Hydric soil rating: No

Minor Components

Deerfield, loamy sand

Percent of map unit: 10 percent
Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hinckley, loamy sand

Percent of map unit: 5 percent
Landform: Deltas, eskers, kames, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

255C—Windsor loamy sand, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2svkq
Elevation: 0 to 1,260 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Windsor and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor

Setting

Landform: — error in exists on —
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, riser
Down-slope shape: Convex
Across-slope shape: Convex, linear
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material

Custom Soil Resource Report

Ap - 1 to 11 inches: loamy sand
Bw - 11 to 31 inches: loamy sand
C - 31 to 65 inches: sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Hinckley

Percent of map unit: 10 percent
Landform: Deltas, eskers, kames, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Deerfield

Percent of map unit: 5 percent
Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

256A—Deerfield loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9c6w
Elevation: 40 to 990 feet
Mean annual precipitation: 37 to 52 inches
Mean annual air temperature: 35 to 59 degrees F

Custom Soil Resource Report

Frost-free period: 127 to 182 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Deerfield and similar soils: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Deerfield

Setting

Landform: Deltas, outwash plains, terraces

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Tread, talf

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Stratified sandy glaciofluvial deposits

Typical profile

Ap - 0 to 9 inches: loamy sand

Bw1 - 9 to 15 inches: loamy sand

Bw2 - 15 to 19 inches: loamy sand

BC - 19 to 27 inches: sand

C - 27 to 65 inches: sand

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Moderately well drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (0.60 to 20.00 in/hr)

Depth to water table: About 13 to 17 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: A/D

Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 5 percent

Landform: Outwash plains, terraces

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread, rise

Down-slope shape: Convex

Across-slope shape: Convex

Hydric soil rating: No

Sudbury

Percent of map unit: 2 percent

Landform: Deltas, outwash plains, terraces

Custom Soil Resource Report

Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Walpole

Percent of map unit: 2 percent
Landform: Deltas, outwash plains, outwash terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 1 percent
Landform: Deltas, outwash plains, outwash terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

275A—Agawam fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tyqw
Elevation: 0 to 1,040 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Agawam and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Agawam

Setting

Landform: Kames, kame terraces, outwash plains, outwash terraces, moraines
Landform position (two-dimensional): Backslope, shoulder, footslope, summit
Landform position (three-dimensional): Side slope, crest, tread, riser, rise, dip
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from gneiss, granite, schist, and/or phyllite

Custom Soil Resource Report

Typical profile

Ap - 0 to 11 inches: fine sandy loam
Bw1 - 11 to 16 inches: fine sandy loam
Bw2 - 16 to 26 inches: fine sandy loam
2C1 - 26 to 39 inches: loamy fine sand
2C2 - 39 to 55 inches: loamy fine sand
2C3 - 55 to 65 inches: loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 15 to 35 inches to strongly contrasting textural stratification
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Ninigret

Percent of map unit: 5 percent
Landform: Terraces
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Windsor

Percent of map unit: 4 percent
Landform: Deltas, dunes, outwash plains, outwash terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Walpole

Percent of map unit: 3 percent
Landform: Deltas, depressions, depressions, outwash plains, outwash terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Hinckley

Percent of map unit: 3 percent
Landform: Deltas, eskers, kames, outwash plains

Custom Soil Resource Report

Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise

Down-slope shape: Convex

Across-slope shape: Convex, linear

Hydric soil rating: No

276A—Ninigret fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tyr6

Elevation: 0 to 1,250 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 250 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Ninigret and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ninigret

Setting

Landform: Depressions, kames, kame terraces, outwash plains, outwash terraces, drainageways, moraines

Landform position (two-dimensional): Backslope, shoulder, footslope, summit

Landform position (three-dimensional): Side slope, crest, tread, dip, rise

Down-slope shape: Concave, convex, linear

Across-slope shape: Concave, convex

Parent material: Coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from gneiss, granite, schist, and/or phyllite

Typical profile

Ap - 0 to 8 inches: fine sandy loam

Bw1 - 8 to 16 inches: fine sandy loam

Bw2 - 16 to 26 inches: fine sandy loam

2C - 26 to 65 inches: stratified loamy sand to loamy fine sand

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: 18 to 38 inches to strongly contrasting textural stratification

Natural drainage class: Moderately well drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)

Depth to water table: About 17 to 39 inches

Frequency of flooding: None

Custom Soil Resource Report

Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Deerfield

Percent of map unit: 5 percent
Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Agawam

Percent of map unit: 5 percent
Landform: Kames, kame terraces, outwash plains, outwash terraces, moraines
Landform position (two-dimensional): Backslope, shoulder, footslope, summit
Landform position (three-dimensional): Side slope, crest, tread, riser, rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Deltas, dunes, outwash plains, outwash terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

656—Udorthents-Urban land complex

Map Unit Setting

National map unit symbol: 9c8s
Elevation: 100 to 1,670 feet
Mean annual precipitation: 37 to 53 inches
Mean annual air temperature: 33 to 59 degrees F
Frost-free period: 127 to 182 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 50 percent
Urban land: 45 percent

Custom Soil Resource Report

Minor components: 5 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Talf

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Human reworked till and/or alluvium and/or glaciofluvial deposits

Typical profile

^A - 0 to 6 inches: fine sandy loam

^C1 - 6 to 23 inches: stratified loamy very fine sand to fine sandy loam

^C2 - 23 to 42 inches: stratified loamy very fine sand to fine sandy loam

^C3 - 42 to 46 inches: fine sand

^C4 - 46 to 65 inches: loamy fine sand

Properties and qualities

Slope: 0 to 15 percent

Percent of area covered with surface fragments: 0.0 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (0.60 to 20.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4s

Hydrologic Soil Group: A

Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 5 percent

Landform: Outwash plains, terraces

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread, rise

Down-slope shape: Convex

Across-slope shape: Convex

Hydric soil rating: No

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- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

Custom Soil Resource Report

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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: Eastern/Northern Basin

**TSS Removal
Calculation Worksheet**

| B BMP ¹ | C TSS Removal Rate ¹ | D Starting TSS Load* | E Amount Removed (C*D) | F Remaining Load (D-E) |
|----------------------------------|---------------------------------------|----------------------------|------------------------------|------------------------------|
| Deep Sump and Hooded Catch Basin | 0.25 | 1.00 | 0.25 | 0.75 |
| Oil Grit Separator | 0.25 | 0.75 | 0.19 | 0.56 |
| Infiltration Basin | 0.80 | 0.56 | 0.45 | 0.11 |
| | 0.00 | 0.11 | 0.00 | 0.11 |
| | 0.00 | 0.11 | 0.00 | 0.11 |

Total TSS Removal =

89%

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

Project: G2073
 Prepared By: Mark Stadnicki
 Date: 3/28/2022

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

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:

**TSS Removal
Calculation Worksheet**

| B | C | D | E | F |
|----------------------------------|-------------------------------|--------------------|----------------------|----------------------|
| BMP ¹ | TSS Removal Rate ¹ | Starting TSS Load* | Amount Removed (C*D) | Remaining Load (D-E) |
| Deep Sump and Hooded Catch Basin | 0.25 | 1.00 | 0.25 | 0.75 |
| Oil Grit Separator | 0.25 | 0.75 | 0.19 | 0.56 |
| Infiltration Basin | 0.80 | 0.56 | 0.45 | 0.11 |
| | 0.00 | 0.11 | 0.00 | 0.11 |
| | 0.00 | 0.11 | 0.00 | 0.11 |

Total TSS Removal =

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

Project:
 Prepared By:
 Date:

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

**STORMWATER
MANAGEMENT PLAN**
Long-Term Operations & Maintenance Plan
FOR
NUPRO INDUSTRIAL PROJECT DEVELOPMENT
LOCATED AT
LOT 21 & 21.2 on Map 168
OFF OF **MERRIGAN WAY**
DEERFIELD, MA

Aug. 22, 2022

SVE Project No.: G2073

PREPARED FOR:

NUPRO, LLC.

10 SANDY LANE

DEERFIELD, MA 01373

&

ONE DEVELOPMENT & CONSTRUCTION, LLC.

68 UNION STREET

WESTFIELD, MA 01085

PREPARED BY:

SVE ASSOCIATES

439 WEST RIVER ROAD

BRATTLEBORO, VT 05301

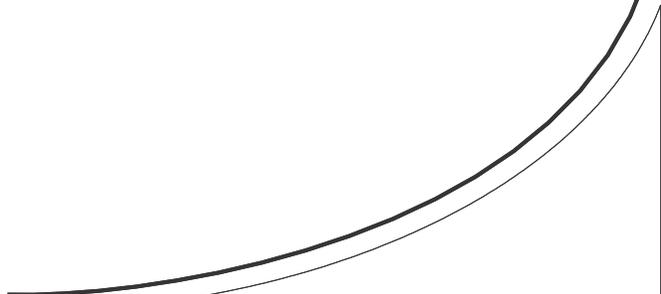
SVE

Engineering
Planning
Landscape Architecture
Surveying

SVE Associates
P.O. Box 1818
439 West River Road
Brattleboro, VT 05302

Tel: 802.257.0561

www.sveassoc.com



Maintenance Activities-

Operation and Maintenance of the stormwater facilities located within the property are the responsibility of the property owner.

1. Infiltration Basin

Inspect regularly for sediment build-up structural damage and standing water. Never store snow in infiltration areas. Inspect and remove any vegetation growth on outfalls and overflows.

Activity

Frequency

Preventative Maintenance
Inspect to ensure proper function

Twice a year
After ever major storm during first 3 months of operation, and twice a year thereafter and when there are discharges through the high outlet orifice

Mow the buffer area, side slopes, basin bottom if grassed floor; rake if stone bottom; Remove trash and debris; Remove grass clippings and accumulated organic matter
Inspect and clean pretreatment devices

Twice a year

Every other month (minimum) recommended and at least twice a year and after every major storm event.

2. Rip Rap

Activity

Frequency

Inspect the rip rap for sediment buildup and the vegetation for signs of erosion, bare spots and overall health

Every six months during the first year. Annually thereafter

Remove sediment from the toe of slope or level spreader and reseed bare spots
Regularly mow the grass around rip rap

As needed

As needed

3. Drywell

Activity

Frequency

Inspect Drywells

After every major storm in the first few months. Thereafter four times a year

Clean out collected sediment

Whenever the depth of sediment deposits is greater than or equal to 2 feet

4. Oil/Water Separator

Activity

Frequency

Inspect oil/water separator

In accordance with manufacturers requirements, but no less than twice a year following installation, and no less than once a year thereafter

Remove sediment and other trapped pollutants

In accordance with manufacturer requirements

5. Deep Sump Catch Basins

Activity

Frequency

Inspect Deep Sump Catch Basins

Four times a year

Clean Catch Basins

Four times a year or whenever the depth of sediment deposits is greater than or equal to one half the depth from the bottom of the sump to the lowest pipe in the basin

Estimated Annual Maintenance

| | |
|-------------------------------------|----------------|
| 2 Infiltration Basins @ \$2,500/ea | \$5,000 |
| 2 Rip Rap @ \$250/ea | \$500 |
| 8 Drywells @ \$500/ea | \$4,000 |
| 2 Oil/Water Separator @ \$1500/ea | \$3,000 |
| 5 Deep Sump Catch Basins @ \$500/ea | <u>\$2,500</u> |

Total: \$15,000

Storm Water Best Management Practices (BMP's) Inspection Report

Project Name: NUPRO Industrial Project Development

Date of Inspection: _____

Inspector's Name: _____

| BMP | BMP Operating Properly | | Remarks |
|---------------------------|--------------------------|--------------------------|---------|
| | Yes | No | |
| | | | |
| 1. Infiltration Basin | <input type="checkbox"/> | <input type="checkbox"/> | |
| | | | |
| 2. Rip Rap | <input type="checkbox"/> | <input type="checkbox"/> | |
| | | | |
| 3. Drywell | <input type="checkbox"/> | <input type="checkbox"/> | |
| | | | |
| 4. Oil/Water Separator | <input type="checkbox"/> | <input type="checkbox"/> | |
| | | | |
| 5. Deep Sump Catch Basins | <input type="checkbox"/> | <input type="checkbox"/> | |

Inspector Signature: _____ Date: _____

Illicit Discharge Compliance Statement

I, _____, of the NUPRO LLC. verify that we are unaware of any illicit discharges existing on the property and that we will implement the pollution prevention plan measures to prevent illicit discharges to the storm water management system, including wastewater discharges and discharges of storm water contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil or grease.

Jeff Ethier

Date



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.

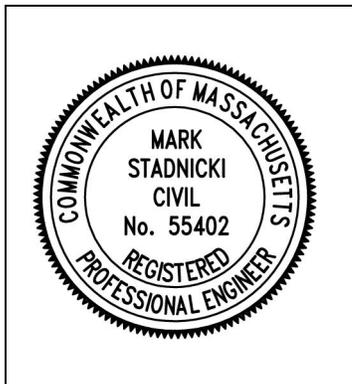
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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




Signature and Date

8-22-22

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): Deep Sump Catch Basins, Oil/water Separators & infiltration/detention basins

Standard 1: No New Untreated Discharges

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



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- Soil Analysis provided.
- Required Recharge Volume calculation provided.
- Required Recharge volume reduced through use of the LID site Design Credits.
- Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - Static
 - Simple Dynamic
 - Dynamic 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 propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

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

- The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- The NPDES Multi-Sector General Permit does **not** cover the land use.
- LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- All exposure has been eliminated.
- All exposure has **not** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- Critical areas and BMPs are identified in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

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

- The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
- Limited Project
 - Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
 - Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
 - Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
 - Bike Path and/or Foot Path
 - Redevelopment Project
 - Redevelopment portion of mix of new and redevelopment.
- Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

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

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

- Narrative;
 - Construction Period Operation and Maintenance Plan;
 - Names of Persons or Entity Responsible for Plan Compliance;
 - Construction Period Pollution Prevention Measures;
 - Erosion and Sedimentation Control Plan Drawings;
 - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
 - Vegetation Planning;
 - Site Development Plan;
 - Construction Sequencing Plan;
 - Sequencing of Erosion and Sedimentation Controls;
 - Operation and Maintenance of Erosion and Sedimentation Controls;
 - Inspection Schedule;
 - Maintenance Schedule;
 - Inspection and Maintenance Log Form.
- A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

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

- The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- The project is **not** covered by a NPDES Construction General Permit.
- The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

- The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
 - Name of the stormwater management system owners;
 - Party responsible for operation and maintenance;
 - Schedule for implementation of routine and non-routine maintenance tasks;
 - Plan showing the location of all stormwater BMPs maintenance access areas;
 - Description and delineation of public safety features;
 - Estimated operation and maintenance budget; and
 - Operation and Maintenance Log Form.
- The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
 - A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
 - A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

- The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- An Illicit Discharge Compliance Statement is attached;
- NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.



MARK STADNICKI
R.C.E. NUMBER: 55402

DATE
FOR PERMITTING

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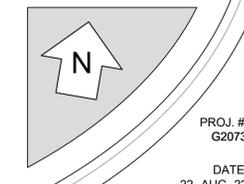
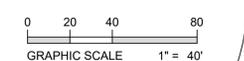
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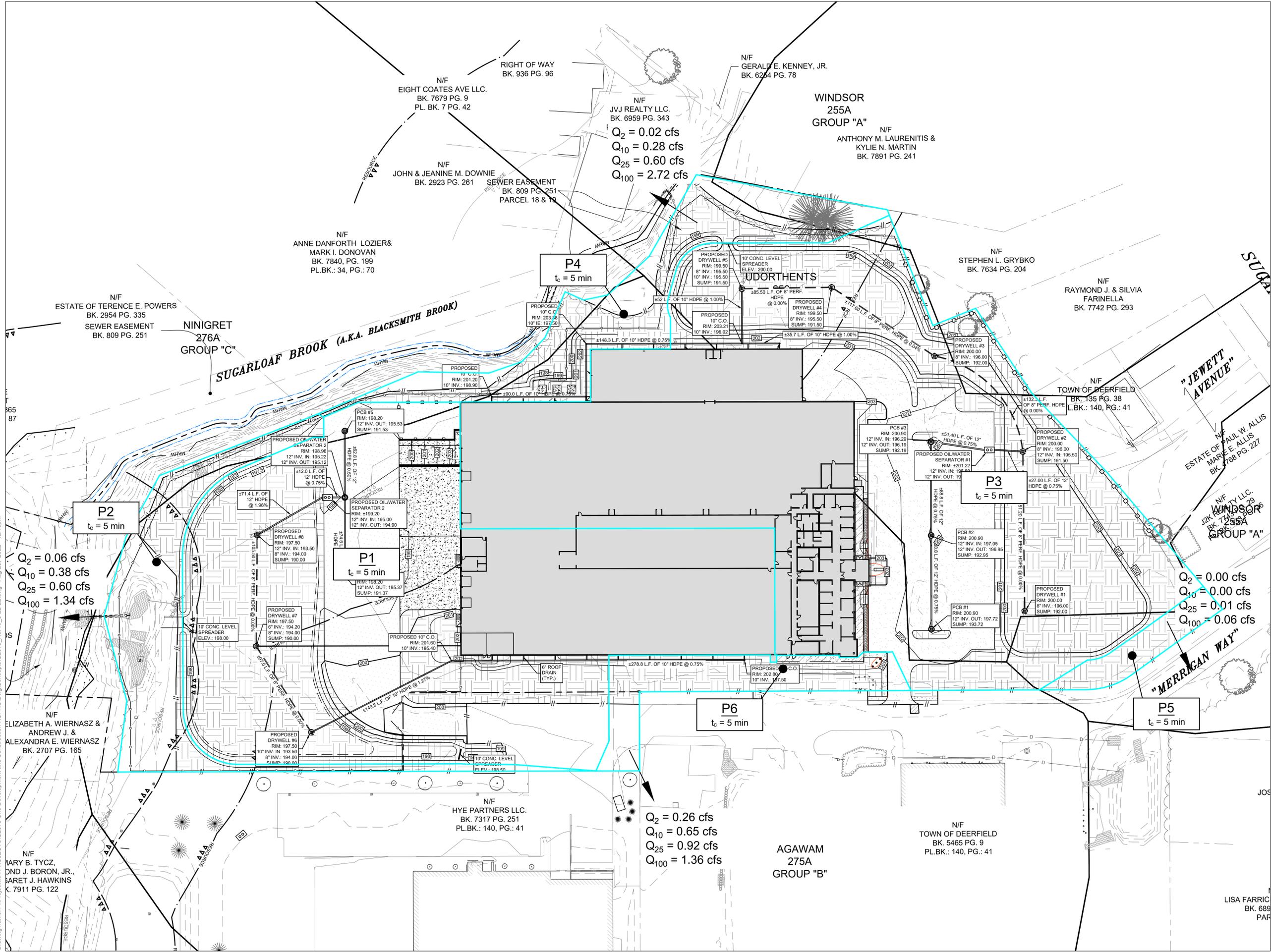
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