
DRAINAGE REPORT
Cusson Automotive
753 John Fitch Boulevard
South Windsor, CT

May 19, 2023

Prepared for:

Cusson Enterprises, LLC
29 Mascolo Road
South Windsor, CT 06074

Project No. 2023-014

Prepared by:

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I. INTRODUCTION

A. Project Description

Cusson Enterprises, LLC is proposing a development at 735 John Fitch Boulevard in South Windsor. The development will include the construction of a 18,000 s.f. automotive repair shop. Future The development will result in approximately 2.1 acres of new impervious area. Catch basins and piping will collect and convey stormwater from the building and parking lot to a stormwater infiltration basin to provide treatment, ground water recharge, and peak flow attenuation in accordance with the Connecticut Stormwater Quality Manual. The basin has been sized with two areas of possible future development in consideration. The areas each consist of approximately 0.75 acres and have been considered as impervious area in design of the stormwater infiltration basin.

B. Existing Conditions

The project site consists of an existing 9.92-acre parcel at 735 John Fitch Boulevard. The parcel is located on the western side of John Fitch Boulevard 400 feet south of the intersection with Mascolo Road. Currently, the parcel is undeveloped woods and brush. Runoff from the parcel ultimately flows into a wetland at the southwest corner of the parcel. Majority of the site slopes westerly down towards a berm along the western property line. The berm directs runoff south to where it opens to a steep slope down towards the wetland. The wetland includes a ravine with a stream along the southern property line.

Based on a review of the USDA Soil Survey of Connecticut, the soil in the area to be developed consists of Windsor loamy sand (see Soils Map in Appendix 1). The USDA Soil Survey defines groups of soils into Hydrologic Soil Groups (HSG) according to their runoff-producing characteristics. Soils are assigned to four groups (A, B, C, and D Groups). In group A, are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They typically are deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a hardpan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other nearly impervious material. The classification of Windsor loamy sand is HSG A.

II. STORMWATER RUNOFF ANALYSIS

A. Methodology

Peak runoff flow rates were determined for pre- and post-development conditions using Applied Microcomputer System's HydroCAD™ Stormwater Modeling System. This computer software employs the SCS Technical Release 55 and 20 (TR-55 & TR-20) methodology. The potential stormwater impacts downstream were evaluated for the 2-yr, 10-yr, 25-yr, and 100-yr; 24-hour storm events. The rainfall for these storm events was taken from NOAA Atlas 14 provided in Appendix 2. Based on the present drainage patterns, runoff from the site flows into a wetland

that wraps around the southwest corner of the parcel. As a result, the wetland was selected as the design point.

B. Pre-Development Hydrology

The pre-development site was modeled as a two subcatchments. Subcatchment E1 includes the approximately 8.3 acres on-site. Subcatchment E2 includes the approximately 2.5 acres of off-site area that sheet flows onto the subject parcel. The pre-development drainage area map is provided in Appendix 3. The pre-development runoff characteristics of the contributing area is provided on the HydroCAD data sheets in Appendix 4. The pre-development discharge rates from the site during the design storms are summarized in Table 1.

C. Post-Development Hydrology

The proposed project will result in approximately 2.1 acres of new impervious area and an additional 1.5 acres of possible future development impervious area. In order to mitigate the increase in runoff resulting from the increase in impervious area, the development will include a series of catch basins and piping to collect runoff and convey it to a new stormwater infiltration basin at the southwest corner of the parcel. The stormwater infiltration basin has been designed in accordance with the CT Storm Water Quality Manual to provide treatment, groundwater recharge, and peak flow attenuation. Based on the USDA Soil Survey, expected soil conditions are to be sandy. Therefore, a Rawls Rate of 8.27 inches/hour was selected for the design infiltration rate of the infiltration basin.

The infiltration basin will be 5 feet deep with a bottom elevation at 53.0. The basin will be equipped with an outlet structure. The structure's primary outlet will be a 12" orifice set at the elevation 55.0. The storage capacity below the primary outlet was sized to exceed the water quality volume. For an emergency spillway, the structure will have a frame and grate set at elevation 57.0. Additionally, the basin will be equipped with a sediment forebay and stone filter berm to provide treatment. The sediment forebay is sized in accordance with the water quality volume. WQV calculations are provided in Appendix 5.

The same design point for the pre-development analysis was used for the post development analysis. The post development site was divided into 11 subcatchments.

Subcatchments S1-S5 include the areas collected by the catch basins around the proposed parking lot that will be diverted to the stormwater infiltration basin. Subcatchments S6 and S7 include the roof runoff from the proposed building that will be directed to the basin. Subcatchment S8 includes the area to the east that is a possible future development. The development is expected to include catch basin and pipes that will tie into the proposed system at catch basin CB3. Subcatchment S9 includes the off-site area that will sheet flow onto our site and will be collected by catch basin CB3. Subcatchment S10 includes the area that will sheet flow directly into the proposed stormwater infiltration basin. Subcatchment S11 includes the area that will continue to flow directly to the design point.

The post development drainage area map is provided in Appendix 3. The post development runoff characteristics of the subcatchments are provided on the HydroCAD data sheets in Appendix 4. As shown in Table 1, the post-development peak rates of runoff from the site to the design points will be maintained or reduced in comparison to the pre-development rates.

**TABLE 1 – COMPARISON OF PRE- & POST-DEVELOPMENT
DISCHARGE RATES (CFS) TO THE DESIGN POINT**

	2-year	10-year	25-year	100-year
Pre-Development	1.20	3.01	4.26	6.63
Post Development	0.00	1.15	3.43	5.36

D. Pipe Sizing

The piping proposed at the site consists of smooth bore corrugated high density polyethylene pipe with smooth interior walls (CPEP-S). The roughness coefficient used for this pipe type is 0.012. The analysis provided in Appendix 4 indicates headwater elevation in the structure at each pipe inlet for the design storms and compares it to the flood elevation, which corresponds to the top of frame of the structure. The calculations indicate that all proposed pipes will have sufficient capacity to convey the 10-year storm event while maintaining at least 12 inches of freeboard below the top of the structures.

E. Summary of Results

The proposed design and analysis indicates that the proposed development will not result in negative impacts downstream of the site.

Appendix 1:
SOILS INFORMATION



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 State of Connecticut



May 18, 2023

Custom Soil Resource Report Soil Map



Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
36B	Windsor loamy sand, 3 to 8 percent slopes	6.9	54.2%
36C	Windsor loamy sand, 8 to 15 percent slopes	0.0	0.4%
306	Udorthents-Urban land complex	3.9	30.5%
701A	Ninigret fine sandy loam, 0 to 3 percent slopes	1.9	14.9%
Totals for Area of Interest		12.7	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 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

State of Connecticut

36B—Windsor loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2svkf

Elevation: 0 to 1,210 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: Dunes, outwash plains, deltas, outwash terraces

Landform position (three-dimensional): Tread, riser

Down-slope shape: Convex, linear

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

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: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

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

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2s

Hydrologic Soil Group: A

Ecological site: F144AY022MA - Dry Outwash

Hydric soil rating: No

Minor Components

Hinckley, loamy sand

Percent of map unit: 10 percent

Landform: Deltas, kames, eskers, outwash plains

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

Landform position (three-dimensional): Head slope, nose slope, crest, side slope, rise

Down-slope shape: Convex

Across-slope shape: Convex, linear

Hydric soil rating: No

Deerfield, loamy sand

Percent of map unit: 5 percent

Landform: Deltas, terraces, outwash plains

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Tread, talf

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

36C—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: Farmland of statewide importance

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
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
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Hinckley

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

Deerfield

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

306—Udorthents-Urban land complex

Map Unit Setting

National map unit symbol: 9lmg
Elevation: 0 to 2,000 feet
Mean annual precipitation: 43 to 56 inches

Custom Soil Resource Report

Mean annual air temperature: 45 to 55 degrees F

Frost-free period: 120 to 185 days

Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 50 percent

Urban land: 35 percent

Minor components: 15 percent

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

Description of Udorthents

Setting

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Drift

Typical profile

A - 0 to 5 inches: loam

C1 - 5 to 21 inches: gravelly loam

C2 - 21 to 80 inches: very gravelly sandy loam

Properties and qualities

Slope: 0 to 25 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 1.98 in/hr)

Depth to water table: About 54 to 72 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: B

Hydric soil rating: No

Description of Urban Land

Typical profile

H - 0 to 6 inches: material

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: D

Hydric soil rating: Unranked

Minor Components

Unnamed, undisturbed soils

Percent of map unit: 8 percent

Hydric soil rating: No

Udorthents, wet substratum

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

Rock outcrop

Percent of map unit: 2 percent
Hydric soil rating: No

701A—Ninigret fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2y07d
Elevation: 0 to 1,260 feet
Mean annual precipitation: 43 to 54 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 140 to 185 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: Kame terraces, outwash plains, moraines, kames, outwash terraces
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Convex, linear
Across-slope shape: Convex, concave
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
Drainage class: Moderately well drained
Runoff class: Very low

Custom Soil Resource Report

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

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: C

Ecological site: F144AY026CT - Moist Silty Outwash

Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 5 percent

Landform: Outwash plains, outwash terraces, eskers, kames, moraines

Landform position (two-dimensional): Summit, shoulder

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

Down-slope shape: Convex

Across-slope shape: Convex

Hydric soil rating: No

Agawam

Percent of map unit: 5 percent

Landform: Kame terraces, outwash plains, outwash terraces, moraines, kames

Landform position (two-dimensional): Summit, shoulder

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

Down-slope shape: Convex

Across-slope shape: Convex

Hydric soil rating: No

Tisbury

Percent of map unit: 3 percent

Landform: Outwash terraces, valley trains, deltas, outwash plains

Landform position (three-dimensional): Tread

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: No

Raypol

Percent of map unit: 2 percent

Landform: Drainageways, depressions

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Appendix 2:
RAINFALL DATA



NOAA Atlas 14, Volume 10, Version 3
Location name: South Windsor, Connecticut, USA*
Latitude: 41.8243°, Longitude: -72.6093°
Elevation: m/ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerals](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.336 (0.262-0.432)	0.408 (0.317-0.524)	0.524 (0.406-0.676)	0.621 (0.478-0.806)	0.753 (0.562-1.02)	0.853 (0.624-1.19)	0.958 (0.680-1.38)	1.08 (0.724-1.59)	1.25 (0.807-1.91)	1.38 (0.876-2.16)
10-min	0.477 (0.371-0.612)	0.577 (0.449-0.742)	0.742 (0.575-0.956)	0.879 (0.677-1.14)	1.07 (0.796-1.45)	1.21 (0.884-1.68)	1.36 (0.964-1.96)	1.52 (1.03-2.25)	1.76 (1.14-2.70)	1.96 (1.24-3.06)
15-min	0.561 (0.436-0.720)	0.679 (0.528-0.873)	0.873 (0.676-1.13)	1.03 (0.796-1.34)	1.25 (0.936-1.70)	1.42 (1.04-1.97)	1.60 (1.13-2.30)	1.79 (1.21-2.65)	2.08 (1.35-3.18)	2.31 (1.46-3.60)
30-min	0.751 (0.585-0.964)	0.913 (0.710-1.17)	1.18 (0.912-1.52)	1.40 (1.08-1.81)	1.70 (1.27-2.31)	1.93 (1.41-2.67)	2.17 (1.54-3.12)	2.43 (1.64-3.59)	2.82 (1.82-4.31)	3.13 (1.98-4.89)
60-min	0.942 (0.733-1.21)	1.15 (0.892-1.47)	1.48 (1.15-1.91)	1.76 (1.36-2.28)	2.14 (1.60-2.91)	2.43 (1.78-3.38)	2.73 (1.94-3.94)	3.07 (2.07-4.54)	3.56 (2.30-5.44)	3.95 (2.50-6.18)
2-hr	1.22 (0.955-1.56)	1.48 (1.16-1.89)	1.90 (1.48-2.43)	2.25 (1.74-2.90)	2.73 (2.05-3.69)	3.08 (2.27-4.27)	3.46 (2.49-5.00)	3.91 (2.64-5.74)	4.58 (2.98-6.97)	5.15 (3.27-7.99)
3-hr	1.41 (1.11-1.79)	1.70 (1.33-2.17)	2.18 (1.71-2.79)	2.58 (2.01-3.32)	3.13 (2.36-4.23)	3.54 (2.62-4.89)	3.98 (2.87-5.74)	4.51 (3.05-6.59)	5.31 (3.46-8.05)	5.99 (3.81-9.27)
6-hr	1.76 (1.39-2.23)	2.14 (1.69-2.70)	2.75 (2.16-3.49)	3.26 (2.55-4.16)	3.96 (3.01-5.33)	4.48 (3.34-6.17)	5.04 (3.67-7.26)	5.74 (3.90-8.35)	6.81 (4.45-10.3)	7.74 (4.93-11.9)
12-hr	2.14 (1.70-2.69)	2.63 (2.09-3.30)	3.42 (2.70-4.31)	4.07 (3.20-5.17)	4.98 (3.80-6.66)	5.64 (4.23-7.74)	6.37 (4.66-9.13)	7.27 (4.96-10.5)	8.68 (5.68-13.0)	9.90 (6.34-15.1)
24-hr	2.50 (2.00-3.12)	3.11 (2.48-3.88)	4.10 (3.26-5.14)	4.93 (3.90-6.22)	6.06 (4.66-8.08)	6.90 (5.21-9.43)	7.82 (5.77-11.2)	8.99 (6.15-12.9)	10.9 (7.13-16.2)	12.5 (8.03-19.0)
2-day	2.81 (2.26-3.49)	3.55 (2.85-4.41)	4.76 (3.81-5.93)	5.76 (4.58-7.23)	7.14 (5.53-9.50)	8.15 (6.20-11.1)	9.27 (6.92-13.3)	10.8 (7.38-15.4)	13.2 (8.71-19.6)	15.4 (9.93-23.2)
3-day	3.06 (2.47-3.79)	3.87 (3.12-4.80)	5.20 (4.18-6.46)	6.30 (5.03-7.88)	7.82 (6.08-10.4)	8.92 (6.82-12.2)	10.2 (7.62-14.6)	11.8 (8.12-16.8)	14.6 (9.62-21.5)	17.1 (11.0-25.6)
4-day	3.29 (2.66-4.05)	4.15 (3.35-5.13)	5.57 (4.48-6.90)	6.74 (5.39-8.40)	8.36 (6.51-11.0)	9.53 (7.30-13.0)	10.8 (8.15-15.5)	12.6 (8.69-17.9)	15.6 (10.3-22.9)	18.2 (11.8-27.2)
7-day	3.90 (3.17-4.78)	4.87 (3.95-5.98)	6.46 (5.22-7.96)	7.78 (6.25-9.64)	9.59 (7.50-12.6)	10.9 (8.38-14.7)	12.4 (9.32-17.6)	14.4 (9.91-20.3)	17.6 (11.6-25.7)	20.4 (13.2-30.4)
10-day	4.51 (3.68-5.52)	5.54 (4.51-6.79)	7.22 (5.86-8.87)	8.62 (6.95-10.6)	10.5 (8.25-13.8)	11.9 (9.17-16.0)	13.5 (10.1-19.0)	15.5 (10.7-21.8)	18.8 (12.5-27.3)	21.7 (14.1-32.1)
20-day	6.50 (5.33-7.90)	7.59 (6.22-9.23)	9.36 (7.64-11.4)	10.8 (8.79-13.3)	12.9 (10.1-16.6)	14.4 (11.0-18.9)	16.0 (11.9-22.0)	18.0 (12.5-25.0)	21.0 (14.0-30.3)	23.6 (15.3-34.7)
30-day	8.21 (6.76-9.94)	9.32 (7.66-11.3)	11.1 (9.12-13.5)	12.6 (10.3-15.5)	14.7 (11.6-18.8)	16.3 (12.5-21.2)	17.9 (13.3-24.3)	19.8 (13.8-27.4)	22.5 (15.1-32.3)	24.7 (16.1-36.3)
45-day	10.4 (8.56-12.5)	11.5 (9.50-13.9)	13.4 (11.0-16.2)	14.9 (12.2-18.2)	17.1 (13.4-21.6)	18.7 (14.4-24.2)	20.4 (15.0-27.2)	22.1 (15.5-30.5)	24.4 (16.4-34.9)	26.2 (17.1-38.3)
60-day	12.2 (10.1-14.7)	13.4 (11.1-16.1)	15.3 (12.6-18.5)	16.9 (13.9-20.6)	19.1 (15.1-24.1)	20.9 (16.0-26.8)	22.6 (16.6-29.8)	24.2 (17.0-33.2)	26.2 (17.6-37.3)	27.6 (18.1-40.2)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).
 Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
 Please refer to NOAA Atlas 14 document for more information.

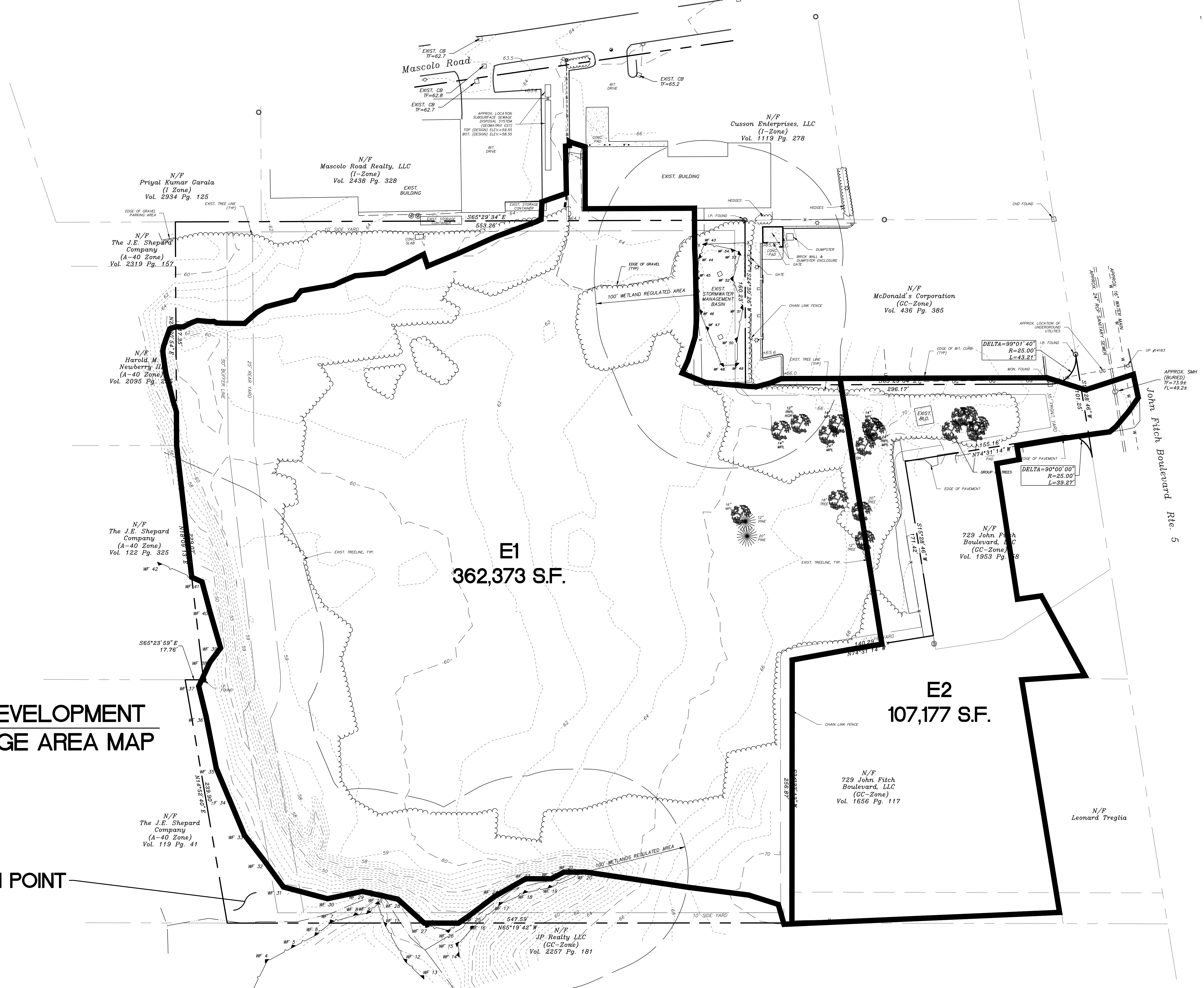
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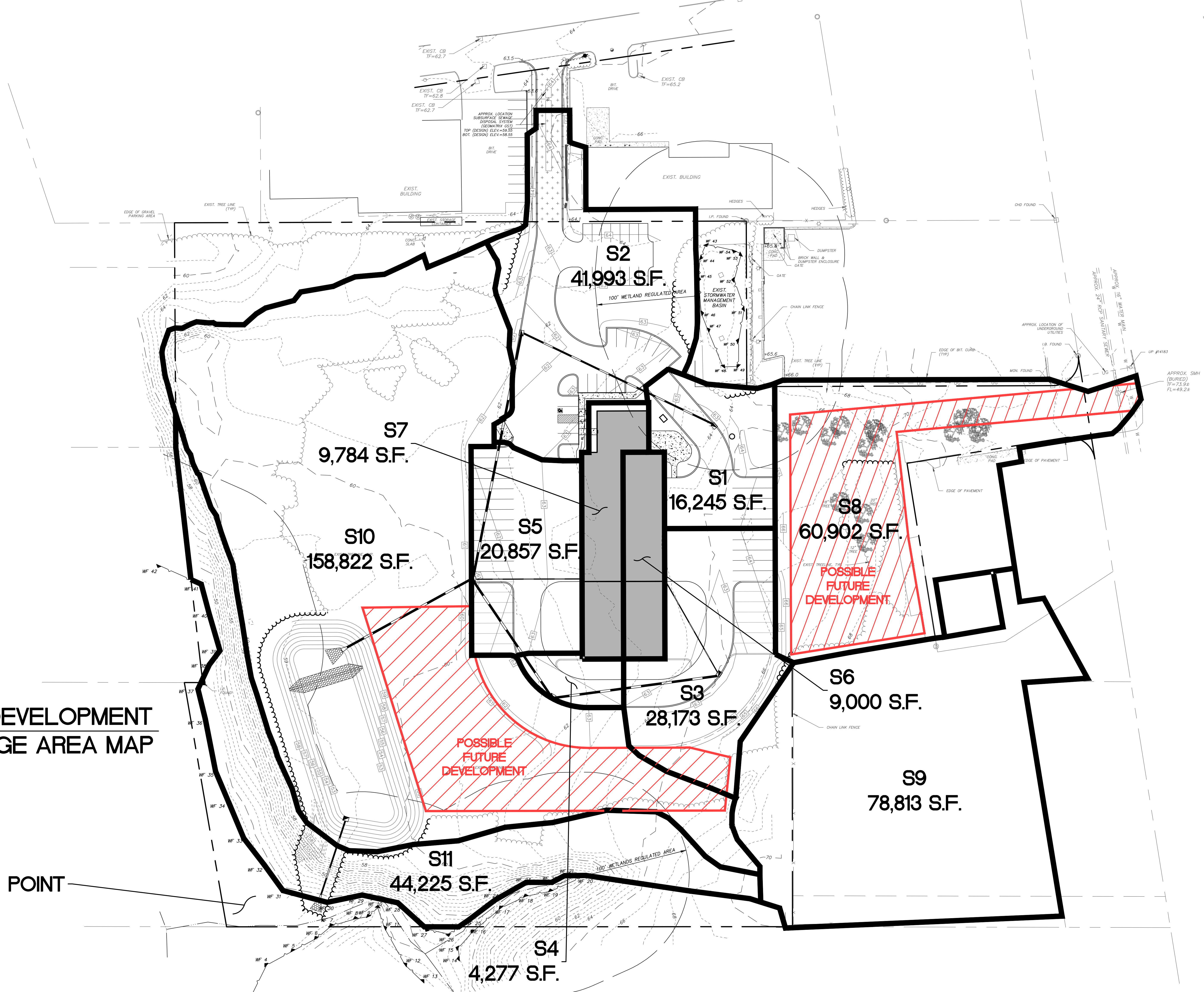
PF graphical

Appendix 3:
DRAINAGE AREA MAPS

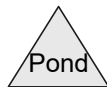
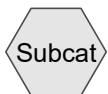
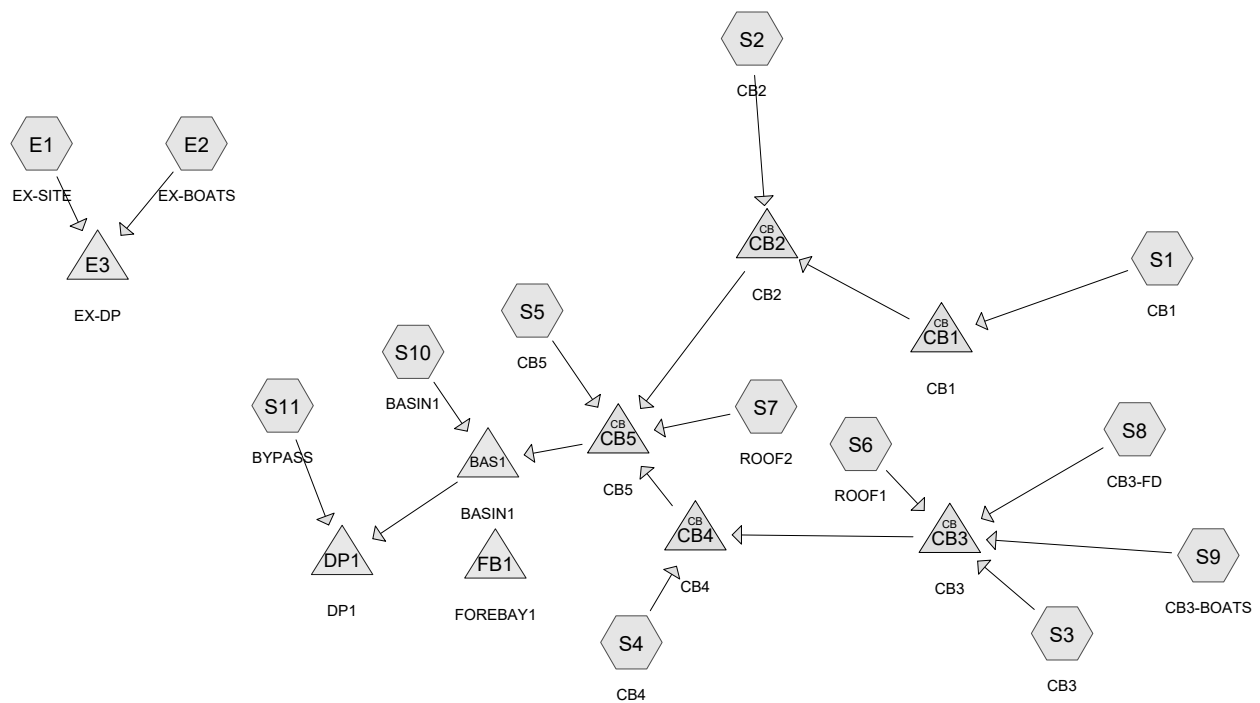
PRE-DEVELOPMENT
DRAINAGE AREA MAP

DESIGN POINT



[illegible]

Appendix 4:
HYDROCAD ANALYSES



Routing Diagram for 2023-014 Cusson Automotive - 29 Mascolo Rd
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Summary for Subcatchment E1: EX-SITE

Runoff = 0.02 cfs @ 22.18 hrs, Volume= 0.015 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.93"

Area (sf)	CN	Description
123	98	Paved parking, HSG A
9,074	96	Gravel surface, HSG A
0	68	<50% Grass cover, Poor, HSG A
2,372	39	>75% Grass cover, Good, HSG A
350,804	30	Woods, Good, HSG A
362,373	32	Weighted Average
362,250		99.97% Pervious Area
123		0.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.3	100	0.0183	0.07		Sheet Flow, W Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	64	0.0183	0.68		Shallow Concentrated Flow, W Woodland Kv= 5.0 fps
29.3	825	0.0088	0.47		Shallow Concentrated Flow, W Woodland Kv= 5.0 fps
0.9	95	0.1373	1.85		Shallow Concentrated Flow, W Woodland Kv= 5.0 fps
54.1	1,084	Total			

Summary for Subcatchment E2: EX-BOATS

Runoff = 3.01 cfs @ 12.64 hrs, Volume= 0.473 af, Depth= 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.93"

Area (sf)	CN	Description
36,173	98	Paved parking, HSG A
18,308	96	Gravel surface, HSG A
24,475	68	<50% Grass cover, Poor, HSG A
13,602	39	>75% Grass cover, Good, HSG A
14,619	30	Woods, Good, HSG A
107,177	74	Weighted Average
71,004		66.25% Pervious Area
36,173		33.75% Impervious Area

2023-014 Cusson Automotive - 29 Mascolo Rd

Type III 24-hr 10-year Rainfall=4.93"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	100	0.0160	0.16		Sheet Flow, G Grass: Short n= 0.150 P2= 3.20"
2.2	120	0.0167	0.90		Shallow Concentrated Flow, G Short Grass Pasture Kv= 7.0 fps
3.3	182	0.0341	0.92		Shallow Concentrated Flow, W Woodland Kv= 5.0 fps
29.3	825	0.0088	0.47		Shallow Concentrated Flow, W Woodland Kv= 5.0 fps
0.9	95	0.1373	1.85		Shallow Concentrated Flow, W Woodland Kv= 5.0 fps
46.4	1,322	Total			

Summary for Subcatchment S1: CB1

Runoff = 1.00 cfs @ 12.08 hrs, Volume= 0.069 af, Depth= 2.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.93"

Area (sf)	CN	Description
4,177	39	>75% Grass cover, Good, HSG A
2,233	30	Woods, Good, HSG A
9,835	98	Paved parking, HSG A
16,245	73	Weighted Average
6,410		39.46% Pervious Area
9,835		60.54% Impervious Area

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

Summary for Subcatchment S10: BASIN1

Runoff = 0.67 cfs @ 12.69 hrs, Volume= 0.156 af, Depth= 0.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.93"

Area (sf)	CN	Description
29,110	39	>75% Grass cover, Good, HSG A
48,838	30	Woods, Good, HSG A
44,452	30	Brush, Good, HSG A
6,219	96	Gravel surface, HSG A
* 30,203	98	Future Development, HSG A
158,822	47	Weighted Average
128,619		80.98% Pervious Area
30,203		19.02% Impervious Area

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Type III 24-hr 10-year Rainfall=4.93"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.9	100	0.0153	0.07		Sheet Flow, W
					Woods: Light underbrush n= 0.400 P2= 3.20"
9.6	358	0.0153	0.62		Shallow Concentrated Flow, W
					Woodland Kv= 5.0 fps
33.5	458	Total			

Summary for Subcatchment S11: BYPASS

Runoff = 0.00 cfs @ 22.85 hrs, Volume= 0.001 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.93"

Area (sf)	CN	Description
3,093	39	>75% Grass cover, Good, HSG A
40,349	30	Woods, Good, HSG A
783	30	Brush, Good, HSG A
44,225	31	Weighted Average
44,225		100.00% Pervious Area

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

Summary for Subcatchment S2: CB2

Runoff = 2.49 cfs @ 12.08 hrs, Volume= 0.172 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.93"

Area (sf)	CN	Description
15,170	39	>75% Grass cover, Good, HSG A
2,679	30	Woods, Good, HSG A
23,392	98	Paved parking, HSG A
681	96	Gravel surface, HSG A
71	30	Brush, Good, HSG A
41,993	72	Weighted Average
18,601		44.30% Pervious Area
23,392		55.70% Impervious Area

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

Summary for Subcatchment S3: CB3

Runoff = 2.89 cfs @ 12.07 hrs, Volume= 0.205 af, Depth= 3.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.93"

Area (sf)	CN	Description
3,339	39	>75% Grass cover, Good, HSG A
438	30	Woods, Good, HSG A
16,056	98	Paved parking, HSG A
* 2,321	98	Future Development, HSG A
6,019	96	Gravel surface, HSG A
28,173	90	Weighted Average
9,796		34.77% Pervious Area
18,377		65.23% Impervious Area

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

Summary for Subcatchment S4: CB4

Runoff = 0.36 cfs @ 12.07 hrs, Volume= 0.025 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.93"

Area (sf)	CN	Description
1,184	39	>75% Grass cover, Good, HSG A
3,093	98	Paved parking, HSG A
4,277	82	Weighted Average
1,184		27.68% Pervious Area
3,093		72.32% Impervious Area

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

Summary for Subcatchment S5: CB5

Runoff = 2.39 cfs @ 12.07 hrs, Volume= 0.187 af, Depth> 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.93"

2023-014 Cusson Automotive - 29 Mascolo Rd

Type III 24-hr 10-year Rainfall=4.93"

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Area (sf)	CN	Description
51	39	>75% Grass cover, Good, HSG A
20,806	98	Paved parking, HSG A
20,857	98	Weighted Average
51		0.24% Pervious Area
20,806		99.76% Impervious Area

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

Summary for Subcatchment S6: ROOF1

Runoff = 1.03 cfs @ 12.07 hrs, Volume= 0.081 af, Depth> 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.93"

Area (sf)	CN	Description
9,000	98	Roofs, HSG A
9,000		100.00% Impervious Area

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

Summary for Subcatchment S7: ROOF2

Runoff = 1.12 cfs @ 12.07 hrs, Volume= 0.088 af, Depth> 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.93"

Area (sf)	CN	Description
9,784	98	Roofs, HSG A
9,784		100.00% Impervious Area

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

Summary for Subcatchment S8: CB3-FD

Runoff = 4.81 cfs @ 12.07 hrs, Volume= 0.330 af, Depth= 2.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.93"

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Type III 24-hr 10-year Rainfall=4.93"

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Area (sf)	CN	Description
13,646	39	>75% Grass cover, Good, HSG A
3,843	30	Woods, Good, HSG A
11,472	98	Paved parking, HSG A
* 31,941	98	Future Development, HSG A
60,902	80	Weighted Average
17,489		28.72% Pervious Area
43,413		71.28% Impervious Area

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

Summary for Subcatchment S9: CB3-BOATS

Runoff = 5.83 cfs @ 12.08 hrs, Volume= 0.400 af, Depth= 2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.93"

Area (sf)	CN	Description
1,311	39	>75% Grass cover, Good, HSG A
11,204	30	Woods, Good, HSG A
23,515	98	Paved parking, HSG A
18,308	96	Gravel surface, HSG A
24,475	68	<50% Grass cover, Poor, HSG A
78,813	78	Weighted Average
55,298		70.16% Pervious Area
23,515		29.84% Impervious Area

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

Summary for Pond BAS1: BASIN1

[86] Warning: Oscillations may require smaller dt (severity=851)

Inflow Area = 9.845 ac, 44.63% Impervious, Inflow Depth = 2.09" for 10-year event
 Inflow = 21.79 cfs @ 12.10 hrs, Volume= 1.713 af
 Outflow = 3.58 cfs @ 12.65 hrs, Volume= 2.573 af, Atten= 84%, Lag= 33.0 min
 Discarded = 2.43 cfs @ 12.65 hrs, Volume= 2.499 af
 Primary = 1.15 cfs @ 12.65 hrs, Volume= 0.073 af

Routing by Sim-Route method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 55.23' @ 12.65 hrs Surf.Area= 12,716 sf Storage= 23,693 cf
 Flood Elev= 58.00' Surf.Area= 18,506 sf Storage= 66,738 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 12.6 min (832.9 - 820.3)

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Type III 24-hr 10-year Rainfall=4.93"

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Volume	Invert	Avail.Storage	Storage Description
#1	53.00'	66,738 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
53.00	8,592	0	0
54.00	10,373	9,483	9,483
55.00	12,256	11,315	20,797
56.00	14,238	13,247	34,044
57.00	16,322	15,280	49,324
58.00	18,506	17,414	66,738

Device	Routing	Invert	Outlet Devices
#1	Discarded	53.00'	8.270 in/hr Exfiltration over Surface area
#2	Primary	50.00'	15.0" Round Culvert L= 81.0' Ke= 0.500 Inlet / Outlet Invert= 50.00' / 44.00' S= 0.0741 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#3	Device 2	57.50'	2.0" x 2.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Device 2	55.00'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=2.43 cfs @ 12.65 hrs HW=55.23' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 2.43 cfs)**Primary OutFlow** Max=1.15 cfs @ 12.65 hrs HW=55.23' TW=0.00' (Dynamic Tailwater)↑**2=Culvert** (Passes 1.15 cfs of 12.68 cfs potential flow)↑**3=Orifice/Grate** (Controls 0.00 cfs)↑**4=Orifice/Grate** (Weir Controls 1.15 cfs @ 1.57 fps)**Summary for Pond CB1: CB1**

Inflow Area = 0.373 ac, 60.54% Impervious, Inflow Depth = 2.23" for 10-year event
 Inflow = 1.00 cfs @ 12.08 hrs, Volume= 0.069 af
 Outflow = 1.00 cfs @ 12.09 hrs, Volume= 0.069 af, Atten= 0%, Lag= 0.6 min
 Primary = 1.00 cfs @ 12.09 hrs, Volume= 0.069 af

Routing by Sim-Route method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 59.82' @ 12.11 hrs

Flood Elev= 62.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	58.90'	15.0" Round Culvert L= 206.0' Ke= 0.500 Inlet / Outlet Invert= 58.90' / 57.80' S= 0.0053 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.62 cfs @ 12.09 hrs HW=59.63' TW=59.50' (Dynamic Tailwater)↑**1=Culvert** (Outlet Controls 0.62 cfs @ 1.20 fps)

Summary for Pond CB2: CB2

[80] Warning: Exceeded Pond CB1 by 0.01' @ 12.10 hrs (0.19 cfs 0.000 af)

Inflow Area = 1.337 ac, 57.05% Impervious, Inflow Depth = 2.17" for 10-year event
 Inflow = 3.48 cfs @ 12.08 hrs, Volume= 0.241 af
 Outflow = 3.48 cfs @ 12.09 hrs, Volume= 0.241 af, Atten= 0%, Lag= 0.6 min
 Primary = 3.48 cfs @ 12.09 hrs, Volume= 0.241 af

Routing by Sim-Route method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 59.67' @ 12.11 hrs

Flood Elev= 61.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	57.80'	15.0" Round Culvert L= 240.0' Ke= 0.500 Inlet / Outlet Invert= 57.80' / 56.60' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=3.24 cfs @ 12.09 hrs HW=59.57' TW=58.89' (Dynamic Tailwater)

↑**1=Culvert** (Outlet Controls 3.24 cfs @ 2.64 fps)

Summary for Pond CB3: CB3

Inflow Area = 4.061 ac, 53.31% Impervious, Inflow Depth = 3.00" for 10-year event
 Inflow = 14.57 cfs @ 12.07 hrs, Volume= 1.016 af
 Outflow = 14.57 cfs @ 12.08 hrs, Volume= 1.016 af, Atten= 0%, Lag= 0.6 min
 Primary = 14.57 cfs @ 12.08 hrs, Volume= 1.016 af

Routing by Sim-Route method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 60.87' @ 12.11 hrs

Flood Elev= 62.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	57.75'	24.0" Round Culvert L= 160.0' Ke= 0.500 Inlet / Outlet Invert= 57.75' / 56.95' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=12.56 cfs @ 12.08 hrs HW=60.45' TW=59.66' (Dynamic Tailwater)

↑**1=Culvert** (Outlet Controls 12.56 cfs @ 4.00 fps)

Summary for Pond CB4: CB4

Inflow Area = 4.159 ac, 53.76% Impervious, Inflow Depth = 3.00" for 10-year event
 Inflow = 14.92 cfs @ 12.08 hrs, Volume= 1.041 af
 Outflow = 14.92 cfs @ 12.09 hrs, Volume= 1.041 af, Atten= 0%, Lag= 0.6 min
 Primary = 14.92 cfs @ 12.09 hrs, Volume= 1.041 af

Routing by Sim-Route method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 59.92' @ 12.10 hrs

Flood Elev= 62.20'

2023-014 Cusson Automotive - 29 Mascolo Rd

Type III 24-hr 10-year Rainfall=4.93"

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Device	Routing	Invert	Outlet Devices
#1	Primary	56.95'	24.0" Round Culvert L= 136.0' Ke= 0.500 Inlet / Outlet Invert= 56.95' / 55.85' S= 0.0081 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=14.29 cfs @ 12.09 hrs HW=59.85' TW=58.90' (Dynamic Tailwater)↑**1=Culvert** (Outlet Controls 14.29 cfs @ 4.55 fps)**Summary for Pond CB5: CB5**

Inflow Area = 6.199 ac, 59.70% Impervious, Inflow Depth > 3.01" for 10-year event
 Inflow = 21.78 cfs @ 12.09 hrs, Volume= 1.557 af
 Outflow = 21.78 cfs @ 12.10 hrs, Volume= 1.557 af, Atten= 0%, Lag= 0.6 min
 Primary = 21.78 cfs @ 12.10 hrs, Volume= 1.557 af

Routing by Sim-Route method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 58.92' @ 12.10 hrs

Flood Elev= 60.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	55.85'	24.0" Round Culvert L= 143.0' Ke= 0.500 Inlet / Outlet Invert= 55.85' / 53.00' S= 0.0199 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=21.78 cfs @ 12.10 hrs HW=58.92' TW=54.11' (Dynamic Tailwater)↑**1=Culvert** (Inlet Controls 21.78 cfs @ 6.93 fps)**Summary for Pond DP1: DP1**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 10.861 ac, 40.46% Impervious, Inflow Depth = 0.08" for 10-year event
 Inflow = 1.15 cfs @ 12.65 hrs, Volume= 0.074 af
 Primary = 1.15 cfs @ 12.66 hrs, Volume= 0.074 af, Atten= 0%, Lag= 0.6 min

Routing by Sim-Route method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond E3: EX-DP

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 10.779 ac, 7.73% Impervious, Inflow Depth = 0.54" for 10-year event
 Inflow = 3.01 cfs @ 12.64 hrs, Volume= 0.488 af
 Primary = 3.01 cfs @ 12.65 hrs, Volume= 0.488 af, Atten= 0%, Lag= 0.6 min

Routing by Sim-Route method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond FB1: FOREBAY1

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

Volume	Invert	Avail.Storage	Storage Description
#1	53.00'	5,691 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
53.00	1,091	0	0
54.00	1,583	1,337	1,337
55.00	2,156	1,870	3,207
56.00	2,812	2,484	5,691

Device	Routing	Invert	Outlet Devices
#1	Discarded	53.00'	8.270 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.00 cfs @ 1.00 hrs HW=0.00' (Free Discharge)↑**1=Exfiltration** (Controls 0.00 cfs)

2023-014 Cusson Automotive - 29 Mascolo Rd

Type III 24-hr 2-year Rainfall=3.11"

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Time span=1.00-72.00 hrs, dt=0.01 hrs, 7101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

SubcatchmentE1: EX-SITE

Runoff Area=362,373 sf 0.03% Impervious Runoff Depth=0.00"
Flow Length=1,084' Tc=54.1 min CN=32 Runoff=0.00 cfs 0.000 af

SubcatchmentE2: EX-BOATS

Runoff Area=107,177 sf 33.75% Impervious Runoff Depth=0.98"
Flow Length=1,322' Tc=46.4 min CN=74 Runoff=1.20 cfs 0.201 af

SubcatchmentS1: CB1

Runoff Area=16,245 sf 60.54% Impervious Runoff Depth=0.93"
Tc=5.0 min CN=73 Runoff=0.39 cfs 0.029 af

SubcatchmentS10: BASIN1

Runoff Area=158,822 sf 19.02% Impervious Runoff Depth=0.06"
Flow Length=458' Slope=0.0153 '/' Tc=33.5 min CN=47 Runoff=0.03 cfs 0.018 af

SubcatchmentS11: BYPASS

Runoff Area=44,225 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=31 Runoff=0.00 cfs 0.000 af

SubcatchmentS2: CB2

Runoff Area=41,993 sf 55.70% Impervious Runoff Depth=0.87"
Tc=5.0 min CN=72 Runoff=0.94 cfs 0.070 af

SubcatchmentS3: CB3

Runoff Area=28,173 sf 65.23% Impervious Runoff Depth=2.09"
Tc=5.0 min CN=90 Runoff=1.62 cfs 0.112 af

SubcatchmentS4: CB4

Runoff Area=4,277 sf 72.32% Impervious Runoff Depth=1.47"
Tc=5.0 min CN=82 Runoff=0.17 cfs 0.012 af

SubcatchmentS5: CB5

Runoff Area=20,857 sf 99.76% Impervious Runoff Depth=2.88"
Tc=5.0 min CN=98 Runoff=1.50 cfs 0.115 af

SubcatchmentS6: ROOF1

Runoff Area=9,000 sf 100.00% Impervious Runoff Depth=2.88"
Tc=5.0 min CN=98 Runoff=0.65 cfs 0.050 af

SubcatchmentS7: ROOF2

Runoff Area=9,784 sf 100.00% Impervious Runoff Depth=2.88"
Tc=5.0 min CN=98 Runoff=0.70 cfs 0.054 af

SubcatchmentS8: CB3-FD

Runoff Area=60,902 sf 71.28% Impervious Runoff Depth=1.33"
Tc=5.0 min CN=80 Runoff=2.24 cfs 0.155 af

SubcatchmentS9: CB3-BOATS

Runoff Area=78,813 sf 29.84% Impervious Runoff Depth=1.21"
Tc=5.0 min CN=78 Runoff=2.59 cfs 0.182 af

Pond BAS1: BASIN1

Peak Elev=53.95' Storage=8,915 cf Inflow=10.69 cfs 0.797 af
Discarded=1.97 cfs 1.957 af Primary=0.00 cfs 0.000 af Outflow=1.97 cfs 1.957 af

Pond CB1: CB1

Peak Elev=59.25' Inflow=0.39 cfs 0.029 af
15.0" Round Culvert n=0.012 L=206.0' S=0.0053 '/' Outflow=0.39 cfs 0.029 af

Pond CB2: CB2

Peak Elev=58.44' Inflow=1.33 cfs 0.099 af
15.0" Round Culvert n=0.012 L=240.0' S=0.0050 '/' Outflow=1.33 cfs 0.099 af

2023-014 Cusson Automotive - 29 Mascolo Rd*Type III 24-hr 2-year Rainfall=3.11"*

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Pond CB3: CB3

Peak Elev=59.15' Inflow=7.10 cfs 0.499 af
24.0" Round Culvert n=0.012 L=160.0' S=0.0050 '/' Outflow=7.10 cfs 0.499 af

Pond CB4: CB4

Peak Elev=58.30' Inflow=7.27 cfs 0.511 af
24.0" Round Culvert n=0.012 L=136.0' S=0.0081 '/' Outflow=7.27 cfs 0.511 af

Pond CB5: CB5

Peak Elev=57.36' Inflow=10.69 cfs 0.779 af
24.0" Round Culvert n=0.012 L=143.0' S=0.0199 '/' Outflow=10.69 cfs 0.779 af

Pond DP1: DP1

Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond E3: EX-DP

Inflow=1.20 cfs 0.201 af
Primary=1.20 cfs 0.201 af

Pond FB1: FOREBAY1

Peak Elev=0.00' Storage=0 cf
Discarded=0.00 cfs 0.000 af

Total Runoff Area = 21.640 ac Runoff Volume = 0.998 af Average Runoff Depth = 0.55"
75.84% Pervious = 16.412 ac 24.16% Impervious = 5.228 ac

2023-014 Cusson Automotive - 29 Mascolo Rd

Type III 24-hr 10-year Rainfall=4.93"

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Time span=1.00-72.00 hrs, dt=0.01 hrs, 7101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

SubcatchmentE1: EX-SITE

Runoff Area=362,373 sf 0.03% Impervious Runoff Depth=0.02"
Flow Length=1,084' Tc=54.1 min CN=32 Runoff=0.02 cfs 0.015 af

SubcatchmentE2: EX-BOATS

Runoff Area=107,177 sf 33.75% Impervious Runoff Depth=2.31"
Flow Length=1,322' Tc=46.4 min CN=74 Runoff=3.01 cfs 0.473 af

SubcatchmentS1: CB1

Runoff Area=16,245 sf 60.54% Impervious Runoff Depth=2.23"
Tc=5.0 min CN=73 Runoff=1.00 cfs 0.069 af

SubcatchmentS10: BASIN1

Runoff Area=158,822 sf 19.02% Impervious Runoff Depth=0.51"
Flow Length=458' Slope=0.0153 '/' Tc=33.5 min CN=47 Runoff=0.67 cfs 0.156 af

SubcatchmentS11: BYPASS

Runoff Area=44,225 sf 0.00% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=31 Runoff=0.00 cfs 0.001 af

SubcatchmentS2: CB2

Runoff Area=41,993 sf 55.70% Impervious Runoff Depth=2.14"
Tc=5.0 min CN=72 Runoff=2.49 cfs 0.172 af

SubcatchmentS3: CB3

Runoff Area=28,173 sf 65.23% Impervious Runoff Depth=3.81"
Tc=5.0 min CN=90 Runoff=2.89 cfs 0.205 af

SubcatchmentS4: CB4

Runoff Area=4,277 sf 72.32% Impervious Runoff Depth=3.02"
Tc=5.0 min CN=82 Runoff=0.36 cfs 0.025 af

SubcatchmentS5: CB5

Runoff Area=20,857 sf 99.76% Impervious Runoff Depth>4.69"
Tc=5.0 min CN=98 Runoff=2.39 cfs 0.187 af

SubcatchmentS6: ROOF1

Runoff Area=9,000 sf 100.00% Impervious Runoff Depth>4.69"
Tc=5.0 min CN=98 Runoff=1.03 cfs 0.081 af

SubcatchmentS7: ROOF2

Runoff Area=9,784 sf 100.00% Impervious Runoff Depth>4.69"
Tc=5.0 min CN=98 Runoff=1.12 cfs 0.088 af

SubcatchmentS8: CB3-FD

Runoff Area=60,902 sf 71.28% Impervious Runoff Depth=2.83"
Tc=5.0 min CN=80 Runoff=4.81 cfs 0.330 af

SubcatchmentS9: CB3-BOATS

Runoff Area=78,813 sf 29.84% Impervious Runoff Depth=2.65"
Tc=5.0 min CN=78 Runoff=5.83 cfs 0.400 af

Pond BAS1: BASIN1

Peak Elev=55.23' Storage=23,693 cf Inflow=21.79 cfs 1.713 af
Discarded=2.43 cfs 2.499 af Primary=1.15 cfs 0.073 af Outflow=3.58 cfs 2.573 af

Pond CB1: CB1

Peak Elev=59.82' Inflow=1.00 cfs 0.069 af
15.0" Round Culvert n=0.012 L=206.0' S=0.0053 '/' Outflow=1.00 cfs 0.069 af

Pond CB2: CB2

Peak Elev=59.67' Inflow=3.48 cfs 0.241 af
15.0" Round Culvert n=0.012 L=240.0' S=0.0050 '/' Outflow=3.48 cfs 0.241 af

2023-014 Cusson Automotive - 29 Mascolo Rd*Type III 24-hr 10-year Rainfall=4.93"*

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Pond CB3: CB3

Peak Elev=60.87' Inflow=14.57 cfs 1.016 af
24.0" Round Culvert n=0.012 L=160.0' S=0.0050 '/' Outflow=14.57 cfs 1.016 af

Pond CB4: CB4

Peak Elev=59.92' Inflow=14.92 cfs 1.041 af
24.0" Round Culvert n=0.012 L=136.0' S=0.0081 '/' Outflow=14.92 cfs 1.041 af

Pond CB5: CB5

Peak Elev=58.92' Inflow=21.78 cfs 1.557 af
24.0" Round Culvert n=0.012 L=143.0' S=0.0199 '/' Outflow=21.78 cfs 1.557 af

Pond DP1: DP1

Inflow=1.15 cfs 0.074 af
Primary=1.15 cfs 0.074 af

Pond E3: EX-DP

Inflow=3.01 cfs 0.488 af
Primary=3.01 cfs 0.488 af

Pond FB1: FOREBAY1

Peak Elev=0.00' Storage=0 cf
Discarded=0.00 cfs 0.000 af

Total Runoff Area = 21.640 ac Runoff Volume = 2.202 af Average Runoff Depth = 1.22"
75.84% Pervious = 16.412 ac 24.16% Impervious = 5.228 ac

Time span=1.00-72.00 hrs, dt=0.01 hrs, 7101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

SubcatchmentE1: EX-SITE	Runoff Area=362,373 sf 0.03% Impervious Runoff Depth=0.14" Flow Length=1,084' Tc=54.1 min CN=32 Runoff=0.16 cfs 0.098 af
SubcatchmentE2: EX-BOATS	Runoff Area=107,177 sf 33.75% Impervious Runoff Depth=3.24" Flow Length=1,322' Tc=46.4 min CN=74 Runoff=4.26 cfs 0.663 af
SubcatchmentS1: CB1	Runoff Area=16,245 sf 60.54% Impervious Runoff Depth=3.14" Tc=5.0 min CN=73 Runoff=1.42 cfs 0.098 af
SubcatchmentS10: BASIN1	Runoff Area=158,822 sf 19.02% Impervious Runoff Depth=0.96" Flow Length=458' Slope=0.0153 '/' Tc=33.5 min CN=47 Runoff=1.62 cfs 0.292 af
SubcatchmentS11: BYPASS	Runoff Area=44,225 sf 0.00% Impervious Runoff Depth=0.11" Tc=5.0 min CN=31 Runoff=0.01 cfs 0.009 af
SubcatchmentS2: CB2	Runoff Area=41,993 sf 55.70% Impervious Runoff Depth=3.04" Tc=5.0 min CN=72 Runoff=3.56 cfs 0.244 af
SubcatchmentS3: CB3	Runoff Area=28,173 sf 65.23% Impervious Runoff Depth=4.90" Tc=5.0 min CN=90 Runoff=3.67 cfs 0.264 af
SubcatchmentS4: CB4	Runoff Area=4,277 sf 72.32% Impervious Runoff Depth=4.04" Tc=5.0 min CN=82 Runoff=0.48 cfs 0.033 af
SubcatchmentS5: CB5	Runoff Area=20,857 sf 99.76% Impervious Runoff Depth>5.82" Tc=5.0 min CN=98 Runoff=2.95 cfs 0.232 af
SubcatchmentS6: ROOF1	Runoff Area=9,000 sf 100.00% Impervious Runoff Depth>5.82" Tc=5.0 min CN=98 Runoff=1.27 cfs 0.100 af
SubcatchmentS7: ROOF2	Runoff Area=9,784 sf 100.00% Impervious Runoff Depth>5.82" Tc=5.0 min CN=98 Runoff=1.38 cfs 0.109 af
SubcatchmentS8: CB3-FD	Runoff Area=60,902 sf 71.28% Impervious Runoff Depth=3.84" Tc=5.0 min CN=80 Runoff=6.49 cfs 0.447 af
SubcatchmentS9: CB3-BOATS	Runoff Area=78,813 sf 29.84% Impervious Runoff Depth=3.63" Tc=5.0 min CN=78 Runoff=7.98 cfs 0.548 af
Pond BAS1: BASIN1	Peak Elev=55.82' Storage=31,545 cf Inflow=29.11 cfs 2.367 af Discarded=2.66 cfs 2.701 af Primary=3.43 cfs 0.400 af Outflow=6.09 cfs 3.101 af
Pond CB1: CB1	Peak Elev=62.16' Inflow=1.42 cfs 0.098 af 15.0" Round Culvert n=0.012 L=206.0' S=0.0053 '/' Outflow=1.42 cfs 0.098 af
Pond CB2: CB2	Peak Elev=62.05' Inflow=4.97 cfs 0.342 af 15.0" Round Culvert n=0.012 L=240.0' S=0.0050 '/' Outflow=4.97 cfs 0.342 af

2023-014 Cusson Automotive - 29 Mascolo Rd*Type III 24-hr 25-year Rainfall=6.06"*

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Pond CB3: CB3

Peak Elev=63.98' Inflow=19.41 cfs 1.359 af
24.0" Round Culvert n=0.012 L=160.0' S=0.0050 '/' Outflow=19.41 cfs 1.359 af

Pond CB4: CB4

Peak Elev=62.31' Inflow=19.88 cfs 1.392 af
24.0" Round Culvert n=0.012 L=136.0' S=0.0081 '/' Outflow=19.88 cfs 1.392 af

Pond CB5: CB5

Peak Elev=60.53' Inflow=29.02 cfs 2.075 af
24.0" Round Culvert n=0.012 L=143.0' S=0.0199 '/' Outflow=29.02 cfs 2.075 af

Pond DP1: DP1

Inflow=3.43 cfs 0.409 af
Primary=3.43 cfs 0.409 af

Pond E3: EX-DP

Inflow=4.26 cfs 0.762 af
Primary=4.26 cfs 0.762 af

Pond FB1: FOREBAY1

Peak Elev=0.00' Storage=0 cf
Discarded=0.00 cfs 0.000 af

Total Runoff Area = 21.640 ac Runoff Volume = 3.138 af Average Runoff Depth = 1.74"
75.84% Pervious = 16.412 ac 24.16% Impervious = 5.228 ac

Time span=1.00-72.00 hrs, dt=0.01 hrs, 7101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

SubcatchmentE1: EX-SITE	Runoff Area=362,373 sf 0.03% Impervious Runoff Depth=0.51" Flow Length=1,084' Tc=54.1 min CN=32 Runoff=0.85 cfs 0.356 af
SubcatchmentE2: EX-BOATS	Runoff Area=107,177 sf 33.75% Impervious Runoff Depth=4.77" Flow Length=1,322' Tc=46.4 min CN=74 Runoff=6.28 cfs 0.977 af
SubcatchmentS1: CB1	Runoff Area=16,245 sf 60.54% Impervious Runoff Depth=4.65" Tc=5.0 min CN=73 Runoff=2.11 cfs 0.145 af
SubcatchmentS10: BASIN1	Runoff Area=158,822 sf 19.02% Impervious Runoff Depth=1.84" Flow Length=458' Slope=0.0153 '/' Tc=33.5 min CN=47 Runoff=3.68 cfs 0.559 af
SubcatchmentS11: BYPASS	Runoff Area=44,225 sf 0.00% Impervious Runoff Depth=0.44" Tc=5.0 min CN=31 Runoff=0.14 cfs 0.037 af
SubcatchmentS2: CB2	Runoff Area=41,993 sf 55.70% Impervious Runoff Depth=4.54" Tc=5.0 min CN=72 Runoff=5.32 cfs 0.364 af
SubcatchmentS3: CB3	Runoff Area=28,173 sf 65.23% Impervious Runoff Depth=6.63" Tc=5.0 min CN=90 Runoff=4.88 cfs 0.357 af
SubcatchmentS4: CB4	Runoff Area=4,277 sf 72.32% Impervious Runoff Depth=5.69" Tc=5.0 min CN=82 Runoff=0.66 cfs 0.047 af
SubcatchmentS5: CB5	Runoff Area=20,857 sf 99.76% Impervious Runoff Depth>7.58" Tc=5.0 min CN=98 Runoff=3.81 cfs 0.302 af
SubcatchmentS6: ROOF1	Runoff Area=9,000 sf 100.00% Impervious Runoff Depth>7.58" Tc=5.0 min CN=98 Runoff=1.64 cfs 0.130 af
SubcatchmentS7: ROOF2	Runoff Area=9,784 sf 100.00% Impervious Runoff Depth>7.58" Tc=5.0 min CN=98 Runoff=1.79 cfs 0.142 af
SubcatchmentS8: CB3-FD	Runoff Area=60,902 sf 71.28% Impervious Runoff Depth=5.46" Tc=5.0 min CN=80 Runoff=9.13 cfs 0.636 af
SubcatchmentS9: CB3-BOATS	Runoff Area=78,813 sf 29.84% Impervious Runoff Depth=5.22" Tc=5.0 min CN=78 Runoff=11.38 cfs 0.788 af
Pond BAS1: BASIN1	Peak Elev=56.95' Storage=48,510 cf Inflow=41.14 cfs 3.470 af Discarded=3.10 cfs 3.041 af Primary=5.28 cfs 1.022 af Outflow=8.39 cfs 4.063 af
Pond CB1: CB1	Peak Elev=67.61' Inflow=2.11 cfs 0.145 af 15.0" Round Culvert n=0.012 L=206.0' S=0.0053 '/' Outflow=2.11 cfs 0.145 af
Pond CB2: CB2	Peak Elev=67.39' Inflow=7.41 cfs 0.509 af 15.0" Round Culvert n=0.012 L=240.0' S=0.0050 '/' Outflow=7.41 cfs 0.509 af

2023-014 Cusson Automotive - 29 Mascolo Rd*Type III 24-hr 100-year Rainfall=7.82"*

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Pond CB3: CB3

Peak Elev=70.71' Inflow=27.03 cfs 1.911 af
24.0" Round Culvert n=0.012 L=160.0' S=0.0050 '/' Outflow=27.03 cfs 1.911 af

Pond CB4: CB4

Peak Elev=67.46' Inflow=27.69 cfs 1.958 af
24.0" Round Culvert n=0.012 L=136.0' S=0.0081 '/' Outflow=27.69 cfs 1.958 af

Pond CB5: CB5

Peak Elev=64.02' Inflow=40.50 cfs 2.911 af
24.0" Round Culvert n=0.012 L=143.0' S=0.0199 '/' Outflow=40.50 cfs 2.911 af

Pond DP1: DP1

Inflow=5.36 cfs 1.060 af
Primary=5.36 cfs 1.060 af

Pond E3: EX-DP

Inflow=6.63 cfs 1.333 af
Primary=6.63 cfs 1.333 af

Pond FB1: FOREBAY1

Peak Elev=0.00' Storage=0 cf
Discarded=0.00 cfs 0.000 af

Total Runoff Area = 21.640 ac Runoff Volume = 4.840 af Average Runoff Depth = 2.68"
75.84% Pervious = 16.412 ac 24.16% Impervious = 5.228 ac

Appendix 5:
MISCELLANEOUS CALCULATIONS



Water Quality Volume (WQV) Calculations

$$WQV = (1'')RA/12$$

$$R = 0.05 + 0.009I$$

I = percent impervious coverage
R = volumetric runoff coefficient
A = contributing area (s.f.)

$$A = 428,954 \text{ s.f.}$$

$$I = \frac{222,644 \text{ s.f. impervious}}{428,954 \text{ s.f. total}} = 51.9\%$$

$$R = 0.05 + 0.009(51.9) = 0.517$$

$$WQV = (1'')(0.517)(428,954)/12 = 18,486 \text{ c.f.}$$

$$\text{Fore bay} = 25\% (WQV) = 0.25(18,486) = 4,621 \text{ c.f.}$$

WQV Check:

$$\text{Storage below outlet} = 20,797 \text{ c.f.} > 18,486 \text{ c.f.} \checkmark$$

$$\text{Fore bay volume} = 5,691 \text{ c.f.} > 4,621 \text{ c.f.} \checkmark$$