



DEVELOPMENT STORMWATER
MANAGEMENT REPORT

105 WEST MAIN ST AND
LAWSON PROPERTIES

CBM Project No. 0070-00-001

Submitted to:

FREDERICK COUNTY
COMMUNITY DEVELOPMENT DIVISION

Client:

WEST MAIN STREET PROPERTIES
C/O JABEZ PROPERTIES LLC
2941 GREEN VALLEY ROAD
IJAMSVILLE, MD 21754

Prepared By:



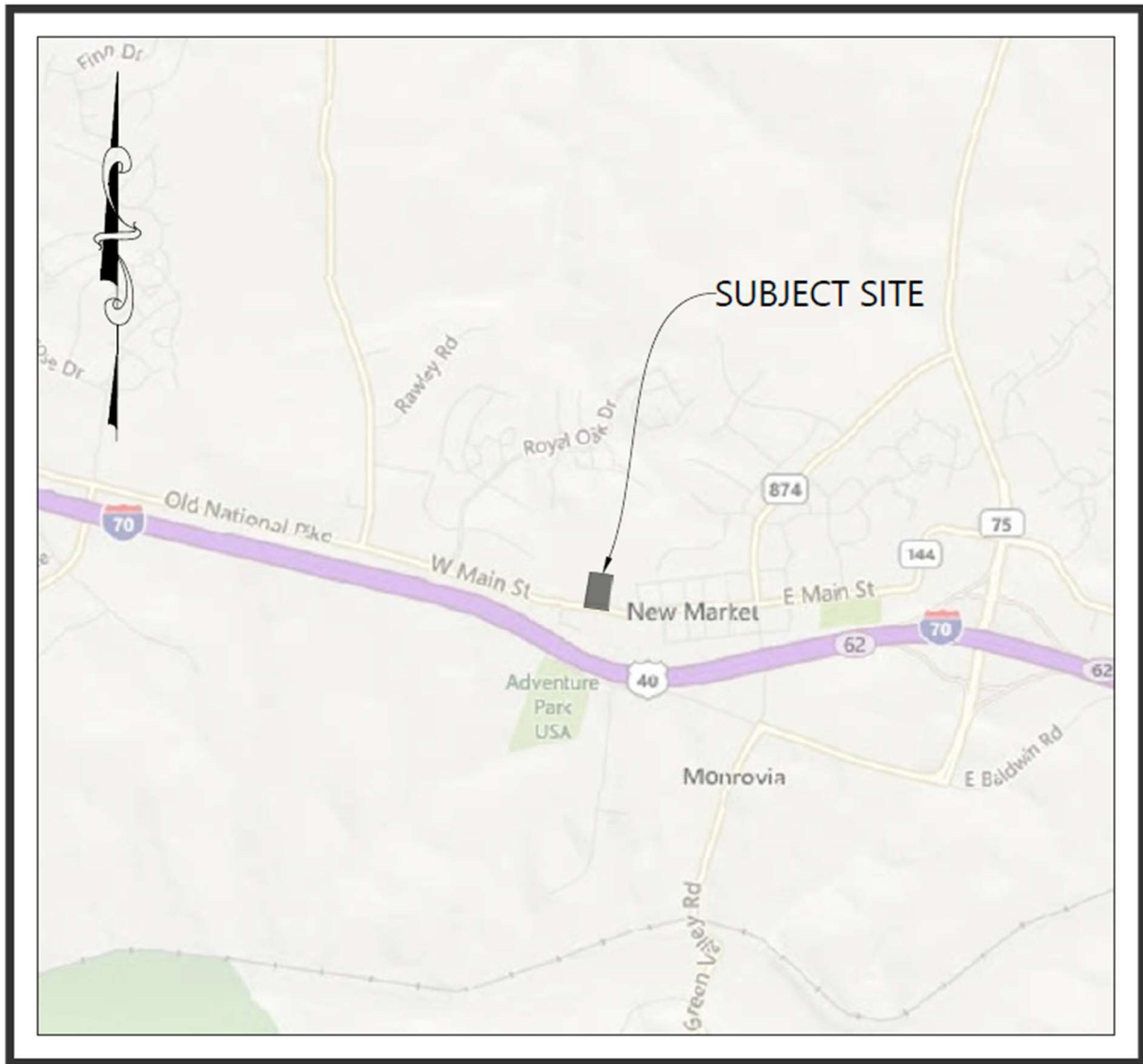
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MAY 26, 2021

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1. VICINITY MAP



VICINITY MAP

SCALE: 1" = 2,000'

Tax Map 801, Grid 00, Parcel 3880

Tax Map 801, Grid 09, Parcel 3887

2. INTRODUCTION

This project is known as “105 West Main Street & Lawson” and the proposed project is located along West Main Street in Town of New Market, adjacent to New Market Elementary and New Market Middle Schools and is currently zoned MRS. The purpose of this report is to present the final stormwater management Environmental Site Design (ESD) study conducted as per Maryland Stormwater Management Regulations and Guidelines.

3. EXISTING SITE INFORMATION

The site currently consists of two existing developed lots as described below:

- a. Lot 105 West Main Street, consist of Polymer Clay Express at the Arts commercial business and existing residential dwelling with typically residential landscaping, turf yard, access road and parking.
- b. Lot 113 West Main Street, consist of Lawson Outdoor Power Equipment repair facility with associated outdoor storage, access road, parking and residential mobile trailer park with associated residential landscaping and turf areas.

Existing Drainage:

The drainage runoff from the existing site discharges to an existing storm drainage system in two outfall locations (Outfalls #1 and #2) downstream of the property at West Main Street.

Watershed Stream Designation:

The site is located within the Lower Linganor Creek watershed.

Land Use:

The existing site areas consist primarily of residential and commercial developments. On-site area consists predominantly of the roadway, sidewalks and grassy areas. The existing topography of the site is moderately sloped and onward to West Main Street.

Hydrologic Soil Group:

There are two soil types located within the limits of development. There are no highly erodible soils within the project limits. As per the US Department of Agriculture, Soil Conservation Service, the project site is underlain predominantly by soils categorized in the soil hydrologic groups “B” as described in the table below.

<i>Soils Symbol</i>	<i>Soils Name</i>	<i>Hydrologic Soil Group</i>
<i>CeB</i>	<i>Catoctin-Spoolsville complex, 3-8% slopes</i>	<i>B</i>
<i>MvB</i>	<i>Myersville silt loam, 3-8% slopes</i>	<i>B</i>

100-year Flood Plain:

Per the FEMA FIRM map, 24021C0320D, dated 09/19/2007, the proposed project site is not within the 100-yr delineation.

Wetlands and Water of the US:

There is not a Wetland and Waters of the US present within the project site.

4. PROPOSED SITE INFORMATION

Proposed Development:

The proposed project involves development of 2.741 acres of the property. The project will include the demolition of the existing site features and the construction of residential lots, non-residential lots, parking lots, access drive, roadways, sidewalks, utilities, storm drainage system and stormwater management facilities.

Proposed Drainage Pattern:

The proposed development will maintain the existing drainage conditions as close as possible outfall to the existing storm drain system. The site grading, stormwater management facilities, and storm drain system will be designed in an effort to maintain the existing storm drainage systems at (Outfalls #1 and #2).

Downstream Point of Interest (POI):

A Point of Interest (POI-1) is selected in downstream of the site property boundary where drainage from the project site leaves the property at West Main Street, which covers all drainage areas related to the project site.

5. STORMWATER MANAGEMENT NARRATIVE

In accordance with Supplement No. 1 to the 2000 Maryland Department of the Environment Stormwater Management Design Manual and Chapter 1-15.2 of the Frederick's County code, the proposed project has been designed to implement Environmental Site Design (ESD) to the Maximum Extent Practicable (MEP). This has been accomplished through utilization of Environmental Site Design planning and design techniques. The ESD implementation includes the reduction of impervious surfaces and the use of non-structural and micro-scale stormwater management practices throughout the proposed development. Only after ESD implementation was exhausted, stormwater management facilities from Chapter 3 of the Maryland Department of the Environment 2000 Stormwater Management Design Manual were provided to meet the remainder of the stormwater management quality and quantity requirements for the proposed development.

Every effort has been made to protect natural resources, minimize impervious cover, cluster the proposed development, and reduce environmental disturbances, while achieving the

minimum required development density for the proposed project. Providing a cluster-type development enabled impervious surfaces to be minimized and increase the areas available for micro-scale facility treatment. The proposed layout utilizes road sections which provide minimum width drive aisles and provides roadside parking to serve multiple buildings. The number of required surface parking spaces has been minimized for the proposed development to reduce the overall amount of impervious surface on the site. Stormwater management non-structural and micro-scale practices have been located in an effort to maximize the amount of runoff treated immediately adjacent to each of these runoff sources through the implementation of modified road sections.

ESD Alternative selections:

- Proposed
- Not proposed
- * To be considered

Alternative Surfaces

- Green Roofs: The rooftop pitches proposed on this project exceed the maximum allowed and are not a practicable application for green roofs in this residential development, and are therefore not proposed for this project.
- Permeable Pavement: Permeable pavement is currently not allowed within the public right-of-way. This option has been considered in private alley's, but is currently not included in the proposed ESD selection.
- Reinforced Turf: Areas that comply with this criterion are not readily available within the properties boundary, and are therefore not proposed for this project.

Nonstructural Practices

- Disconnection of Rooftop Runoff: On lots where the disconnection distances and slopes can be achieved this option will be considered, but is currently not included in the proposed ESD selection.
- Disconnection of Non-Rooftop Runoff: On lots where the disconnection distances and slopes can be achieved this option will be considered, but is currently not included in the proposed ESD selection.
- Sheet flow to Conservation Area: The proposed Conservation Areas on this project are uphill of potential areas for sheet flow, and are therefore not proposed for this project.

Micro-Scale practices

- Rainwater Harvesting: With this type of residential development this option was not considered as viable, and is therefore not proposed for this project.
- Submerged Gravel Wetlands: This option has been considered as viable in large drainage areas. Additional research will be required to verify if a water source is available to maintain the vegetation, and are therefore not proposed for this project.
- Landscape Infiltration: With this type of residential development this option was not considered as viable, and is therefore not proposed for this project.
- Infiltration Berms: With this type of residential development this option was not considered as viable, and is therefore not proposed for this project
- Dry Wells: With this type of residential development this option was not considered as viable, and is therefore not proposed for this project
- Micro-Bio Retention: This ESD type is proposed in multiple locations on the site to treat drainage area of higher imperviousness. Storm drainage systems will be designed to ensure that the maximum drainage area limits are not exceeded. Underdrains and overflow inlets will be detailed in these facilities during the property development phase.
- Raingardens: With this type of residential development this option was not considered as viable, and is therefore not proposed for this project.
- Swales: This option has been considered as viable in the roadways project, and is therefore not proposed for this project.
- Enhanced Filters: Although not pursued in the conceptual design, enhanced filters have not been eliminated as a viable option. These may be applied as the during the property development phase.

In areas where ESD facilities are not feasible, due to available space and required easements and setbacks from utilities or sufficient in quantity, wet ponds will be provided. The wet pond facilities will be used for extended detention treatment of runoff from areas that exceed the maximum allowable drainage areas for micro-scale facilities. These facilities will be sized to provide adequate water quality and quantity treatment for the remaining contributing runoff and will be sized for additional capacity to adequately store and treat the runoff from the entire 1-year storm event (C_{pv}) within each study point.

6. METHODOLOGY

The regulations described by Supplement No. 1 of the 2000 Maryland Stormwater Management Design Manual Volume I and II, requires that all new development implement Environmental Site Design (ESD) practices to the Maximum Extent Practicable (MEP). The supplement requires that ESD practices be implemented through site design to maintain predevelopment runoff characteristics and protect natural resources during the developed conditions. If ESD is implemented to the MEP, and the entire ESD volume treatment has not been provided, the development shall address the remaining to meet all of the criteria for channel protection volume (Cpv), Overbank Flood Protection Volume (Qp10), and Extreme Flood Volume (Qf100).

7. ANALYSIS

A. Hydrology

The USDA, NRCS “Runoff Curve Number Method, Technical Release No. 55 (WinTR-55 Small Watershed Hydrology) are the main resources used to develop hydrologic computations for this project site.

B. Stormwater Management – Environmental Site Design (ESDv) Requirements

The concept of Environmental Site Design (ESD) to the Maximum Extent Possible (MEP) shall be utilized to meet the site’s stormwater management needs as determined by the methods described above from the Maryland Department of the Environment 2000 Stormwater Management manual, Chapter 5 and the Frederick County Stormwater management Ordinance, revised May 4th, 2010.

The goal of ESD to the MEP is to provide stormwater control to the point where the developed site runoff reflects conditions representative of “woods in good condition”. The Hydrologic Soil Group (HSG) for the entire site is a “B” soils and the equivalent runoff curve number associated to “**woods**” condition for the proposed development **RCN=55**.

Project Development Analysis:

This project has been analyzed using the New development criteria as follows:

Total Property Site Area 119,408 sf

Total existing Impervious Area within Property = 47,119 sf

Percent existing Impervious (I) = $(47,119 / 119,408) \times 100 = 39.5\% < 40\%$

Because of the existing impervious is less than 40%, therefore the project is subject to New development requirements.

Target Impervious Area and Impervious Area Required Treatment (IART):

The target impervious area for new development project is required treatment of all proposed impervious surface in developed conditions within the proposed LOD area.

The existing impervious area Off-Site of property within LOD will be treated in order to compensate the untreated proposed impervious area within the site LOD.

Total Proposed Conditions Impervious Area within On-Site Property = 77,231 sf
Total Proposed Impervious Area Off-Site Property = 5,961 sf

Total Target impervious Area within LOD = (Prop. Imp. On-Site) + (Prop. Imp. Off-Site)
= (77,231) + (5,961) = 83,192 sf

(IART) Impervious Area Required Treatment = (Total On-Site Prop. Imp.) = 77,231 sf

Target ESDv Required Treatment:

The Target ESDv treatment required was calculated by the total development impervious area of 83,192 sf within the proposed LOD area of 132,181 sf with a 62.9% Impervious area and hydrologic soil group of “B” soils.

Therefore, the calculations yielded a Target ESDv = 13,580 cf via Target PE=2.0” required to be treated for this site as a New Development project

C. Environmental Site Design (ESD)

The proposed ESD Micro-Bioretenion / Planter Box facilities being performed as part of this project and has been analyzed for New Development criteria within the proposed site LOD. Refer to **Appendix ‘B’** for the ESD Summary Table. Table below represent the Summary of the ESD Required vs. ESD Provided:

ESD Summary Table

REQUIRED TARGET (ESD)	
Target PE:	2.0” (New development)
Target ESD _v	13,580 cf
(IART)	77,231 sf
PROVIDED (ESD)	
PE	2.2”
ESD _v	15,066 cf (Excess ESD _v = 1,485 cf)
(IART)	77,231 sf

D. (ESD) Facilities

A total of twelve (12) ESD facilities including Micro-Bioretenion / Planter Box (M-6) which will treat a total drainage area of 119,795 sf (2.75 acres) via 77,231 sf (1.77 acres) of impervious areas. Table below represent the ESD Facilities Summary:

ESD Facilities Summary Table

ESD Facilities and Drainage Area Tabulations		Remarks	
ESD-1	DA= 15,565 sf Imp. Area= 12,250 sf	Micro-BioRetention (Planter Box)	As = 600 sf
ESD-2	DA= 14,000 sf Imp. Area= 7,444 sf	Micro-BioRetention	As = 615 sf
ESD-3	DA= 19,870 sf Imp. Area= 11,410 sf	Micro-BioRetention	As = 935 sf
ESD-4	DA= 17,145 sf Imp. Area= 11,280 sf	Micro-BioRetention	As = 900 sf
ESD-5	DA= 7,715 sf Imp. Area= 5,675 sf	Micro-BioRetention	As = 550 sf
ESD-6	DA= 8,110 sf Imp. Area= 7,020 sf	Micro-BioRetention (Planter Box)	As = 530 sf
ESD-7	DA= 5,270 sf Imp. Area= 4,250 sf	Micro-BioRetention (Planter Box)	As = 380 sf
ESD-8	DA= 5,980 sf Imp. Area= 3,298 sf	Micro-BioRetention (Planter Box)	As = 360 sf
ESD-9	DA= 5,600 sf Imp. Area= 3,360 sf	Micro-BioRetention (Planter Box)	As = 400 sf
ESD-10	DA= 6,370 sf Imp. Area= 3,670 sf	Micro-BioRetention (Planter Box)	As = 315 sf
ESD-11	DA= 9,540 sf Imp. Area= 4,755 sf	Micro-BioRetention (Planter Box)	As = 400 sf
ESD-12	DA= 4,630 sf Imp. Area= 2,819 sf	Micro-BioRetention (Planter Box)	As = 180 sf
TOTAL	Total ESD DA= 119,795 sf Total ESD Imp. Area= 77,231 sf	(2.75 acres) (1.77 acres)	

Downstream Impact Study at (POI-1):

To simplify study, assumed the entire existing site as “meadows” and based on TR-55 Hydrologic Soil Group with “B” soils in good conditions, RCN=69.

The stormwater management for the proposed development within the LOD has been analyzed using the ESD facilities. As a result, the analysis indicates the ESDv Provided would meet and Exceed the **Target ESDv** required for this new development project. Refer to **Appendix ‘B’** for the ESD Summary Table.

The goal of ESDv to the MEP is to provide stormwater control to the point where the developed site runoff reflects conditions representative of “woods in good condition” based on TR-55 Hydrologic Soil Group (HSG) “B” soils and the Equivalent Runoff Curve Number (RCN) associated to “woods” condition with Adjusted (Reduced) **RCN = 55**.

Site Drainage Hydrology Conditions

Existing Conditions “Meadows”	
DA	2.50 acres
RCN	69
Proposed (Adjusted RCN) “Woods”	
DA	2.75 acres
RCN	55

Table below summarizes the downstream runoff discharge flow rates at (POI-1)

(TR-55) Downstream Peak Flow Runoff Discharge Summary at (POI-1)

Pre-Developed Conditions “Meadows”				Post-Developed (ESDv) Conditions “Woods”			Remarks
DA= 2.50 ac. RCN= 69 Tc= 0.10 hr				DA= 2.75 ac. RCN= 55 Tc= 0.10 hr			
POI	Existing 2-Yr (cfs)	Existing 10-Yr (cfs)	Existing 100-Yr (cfs)	Proposed 2-Yr (cfs)	Proposed 10-Yr (cfs)	Proposed 100-Yr (cfs)	
(POI)	2.19	5.67	14.44	0.21	2.48	10.04	No Impacts

8. CONCLUSION

The site has been designed to address Chapter 1-15.2 of the Frederick County code and the appropriate MDE stormwater management requirements to meet the pollutant removal goal, maintain groundwater recharges, reduce channel erosion, and pass extreme floods using the appropriate stormwater BMP's per Supplement No. 1 to the 2000 Maryland Stormwater Design Manual.

Environmental Site Design (ESD) will be implemented to meet stormwater management requirements, to reflect the new development runoff conditions of the proposed site in order additional on-site detention will not be provided, and to ensure adequate outfall through the receiving systems.

As a result, the analysis indicates the ESDv Provided would Exceed the Target ESDv required for this new development project. Based on TR-55 Hydrologic Soil Group "B" soils, and the Equivalent Runoff Curve Number (RCN) associated to "woods" condition with Adjusted (Reduced) RCN = 55.

Downstream study at (POI), based on TR-55 hydrologic analysis for existing site Pre-developed conditions as "Meadow" via proposed Post-development ESDv conditions as "Woods" indicates no increase in runoff discharge from the proposed development to the downstream location at existing storm drain structure.

The goal of ESDv to the MEP is to provide stormwater control to the point where the developed site runoff reflects conditions to no adverse impact to the downstream conditions.

APPENDIX A: USDA HYDROLOGIC SOIL GROUP MAP

Custom Soil Resource Report
Soil Map (70-00-0 W Main St)



APPENDIX B: ENVIRONMENTAL SITE DESIGN DEVICE SUMMARY

CBM Consulting, LLC
 47 East South Street, Suite 302
 Frederick, MD 21701
 240-578-4010

Date: 5/20/2021
 Project Name: West Main Street
 Project No.: 0070-00-00
 By: JS
 Checked: xxx

ESD Summary Table

Overall Site Target

ESD Facility	Drainage Area sq. ft.	Imp. D.A. sq. ft.	% of Imp. Cover	A Soil	B Soil	C Soil	D Soil	Target PE (in.) Table 5.3	Provided P _E (in.)	Rv	Target ESDv cu. ft.	Provided ESDv cu. ft.	Excess ESDv cu. ft.	Reduced RCN	Type of Facility	Remarks
LOD	132,181	83,192	62.9%	0%	100%	0%	0%	2.0	2.2	0.62	13,580	15,066	1,485	55	See ESD Practices Below	Site Compliance
				2.2	2.0 in	2.0 in	1.8 in									
				(Individual Target P _E)				(Provided ESDv Below)								

Total Site Target Composite RCN for "Woods in Good Cond." = 55
 Total Site Reduced Composite RCN for "Woods in Good Cond." = 55

Phase 1 Individual Facility Summary

ESD Facility	Drainage Area sq. ft.	Imp. D.A. sq. ft.	% of Imp. Cover	A Soil	B Soil	C Soil	D Soil	Target PE (in.) Table 5.3	Provided P _E (in.)	Rv	Target ESDv cu. ft.	Provided ESDv cu. ft.	Excess ESDv cu. ft.	Reduced RCN	Type of Facility	Remarks
ESD #1	15,565	12,250	79%	0%	100%	0%	0%	2.2	1.7	0.76	2,164	1,639	0	69	Micro BioRet (Planter Box)	
ESD #2	14,000	7,444	53%	0%	100%	0%	0%	1.8	2.6	0.53	1,110	1,603	493	55	Micro BioRetention	
ESD #3	19,870	11,410	57%	0%	100%	0%	0%	2.0	2.6	0.57	1,877	2,440	563	55	Micro BioRetention	
ESD #4	17,145	11,280	66%	0%	100%	0%	0%	2.0	2.6	0.64	1,835	2,385	550	55	Micro BioRetention	
ESD #5	7,715	5,675	74%	0%	100%	0%	0%	2.2	2.6	0.71	1,007	1,190	183	55	Micro BioRetention	
ESD #6	8,110	7,020	87%	0%	100%	0%	0%	2.4	2.6	0.83	1,345	1,448	103	55	Micro BioRet (Planter Box)	
ESD #7	5,270	4,250	81%	0%	100%	0%	0%	2.2	2.5	0.78	750	848	99	55	Micro BioRet (Planter Box)	
ESD #8	5,980	3,298	55%	0%	100%	0%	0%	1.8	2.6	0.55	490	708	218	55	Micro BioRet (Planter Box)	
ESD #9	5,600	3,360	60%	0%	100%	0%	0%	2.0	2.6	0.59	551	716	165	55	Micro BioRet (Planter Box)	
ESD #10	6,370	3,670	58%	0%	100%	0%	0%	2.0	2.3	0.57	604	703	99	55	Micro BioRet (Planter Box)	
ESD #11	9,540	4,755	50%	0%	100%	0%	0%	1.8	2.3	0.50	713	893	179	55	Micro BioRet (Planter Box)	
ESD #12	4,630	2,819	61%	0%	100%	0%	0%	2.0	2.1	0.60	461	492	30	55	Micro BioRet (Planter Box)	
TOTALS	119,795 sqft	77,231 sqft										15,066 cu-ft				

Z:\Shared\0070-00-00 - 105113 W Main\Civil\On-Site\FINAL SWM Report and Comps\Final Comps_ESD Comps_W Main St_JASON

APPENDIX C: EXISTING TR-55

WinTR-55 Current Data Description

--- Identification Data ---

User: JS Date: 5/2/2021
 Project: W MAIN STREET Units: English
 SubTitle: Pre-Developed Conditions As 'MEADOWS' - DA at (POI) Areal Units: Acres
 State: Maryland
 County: Frederick NOAA_C
 Filename: C:\Users\Jason\Sheikhzadeh\Desktop\W Main Street_0070-00-00\TR55_Exit_W Main St_Frederick Co_NC

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
(POI)		Outlet	2.5	69	.1

Total area: 2.50 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.07	3.9	4.64	5.77	6.79	7.95	2.54

Storm Data Source: User-provided custom storm data
 Rainfall Distribution Type: NOAA_C
 Dimensionless Unit Hydrograph: <standard>

JS

W MAIN STREET
Pre-Developed Conditions As 'MEADOWS' - DA at (POI)
Frederick NOAA_C County, Maryland

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period			
	2-Yr (cfs)	10-Yr (cfs)	100-Yr (cfs)	1-Yr (cfs)

SUBAREAS (POI)	2.19	5.67	14.44	1.22
REACHES				
OUTLET	2.19	5.67	14.44	1.22

JS

W MAIN STREET
Pre-Developed Conditions As 'MEADOWS' - DA at (POI)
Frederick NOAA_C County, Maryland

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
(POI)	2.50	0.100	69	Outlet	
Total Area:		2.50 (ac)			

JS

W MAIN STREET
Pre-Developed Conditions As 'MEADOWS' - DA at (POI)
Frederick NOAA_C County, Maryland

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
(POI)	Legume/Rot. Meadow Contoured	(good) B	2.5	69
Total Area / Weighted Curve Number			2.5	69
			===	==

APPENDIX D: PROPOSED TR-55

WinTR-55 Current Data Description

--- Identification Data ---

User: JS Date: 5/2/2021
Project: W MAIN STREET Units: English
SubTitle: Post-Developed ESD Conditions As 'WOODS' - DA at (POI)
Areal Units: Acres
State: Maryland
County: Frederick NOAA_C
Filename: C:\Users\Jason Sheikhzadeh\Desktop\W Main Street_0070-00-00\TR55_Prop_W Main St_Frederick Co_NC

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
(POI)		Outlet	2.75	55	.1

Total area: 2.75 (ac)

--- Storm Data ---

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.07	3.9	4.64	5.77	6.79	7.95	2.54

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: NOAA_C
Dimensionless Unit Hydrograph: <standard>

JS

W MAIN STREET
Post-Developed ESD Conditions As 'WOODS' - DA at (POI)
Frederick NOAA_C County, Maryland

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period			
	2-Yr (cfs)	10-Yr (cfs)	100-Yr (cfs)	1-Yr (cfs)

SUBAREAS (POI)	0.21	2.48	10.04	.00
REACHES				
OUTLET	0.21	2.48	10.04	.00

JS

W MAIN STREET
Post-Developed ESD Conditions As 'WOODS' - DA at (POI)
Frederick NOAA_C County, Maryland

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
(POI)	2.75	0.100	55	Outlet	

Total Area:	2.75 (ac)				

JS

W MAIN STREET
Post-Developed ESD Conditions As 'WOODS' - DA at (POI)
Frederick NOAA_C County, Maryland

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
(POI)	Woods	(good) B	2.75	55
Total Area / Weighted Curve Number			2.75	55
			====	==