



Drainage Narrative

EASTON CROSSING

SPORT HILL ROAD, SILVER HILL ROAD, CEDAR HILL ROAD, AND WESTPORT ROAD

EASTON, CONNECTICUT

September 8, 2016

MMI #2683-01-29

The Easton Crossing project consists of a 48-lot subdivision to be located on a ± 124.7 -acre property bounded by Sport Hill Road (CT Route 59), Silver Hill Road, Cedar Hill Road, and Westport Road (CT Route 136) in the town of Easton, Connecticut. Approximately 110.5 acres of the overall property will be developed while the remaining ± 14.2 acres will remain a separate parcel. The revised site plan application for the proposed affordable housing development will have nine affordable homes and 11 affordable duplex buildings.

The original 48-lot proposed subdivision plan submitted on August 4, 2014 included a 2,000-square-foot building footprint on each lot and impervious roadways and driveways that totaled ± 7.89 acres of proposed impervious coverage. The original plan was revised on October 30, 2014 to include an assumed larger building footprint and additional impervious surfaces, which then reflected an increase of approximately 1,500 square feet of impervious area on each lot. The stormwater management computations were updated considering the new impervious area, and the total proposed impervious coverage was increased to ± 9.52 acres on the site overall.

The revised site plan submitted along with this drainage narrative reduces the proposed building footprint back to the original 2,000 square feet (40 feet by 50 feet) and utilizes permeable pavers as part of the stormwater management plan. The pavers will further reduce the effective impervious coverage on site and provide an opportunity to treat stormwater runoff. The pavers will be installed on the proposed driveways serving the duplex buildings to be constructed on Lots 1 through 7, 10, and 39 through 48. The revised proposed impervious area on the site overall is approximately 7.43 acres.

To confirm that the revised 2016 design plans will generate less stormwater runoff than the previous 2014 site applications, the runoff Curve Number (CN) for each proposed watershed area was recalculated including the updated impervious surface areas. The CN value is a numerical representation of the runoff characteristics of the land based on the watershed's soil and cover conditions. The CN, watershed area, time of concentration, and regional rainfall data are variable parameters used in hydrologic modeling for determining the amount of surface stormwater runoff. Due to minimal site changes (i.e., the reduction in impervious area) from the 2016 plans, the CN value is the only parameter with a potential to change. The watershed areas and time of concentrations remained unchanged from the October 2014 Hydrologic Analysis.

The proposed design modifications will result in a decrease of approximately 2.1 acres of on-site proposed impervious coverage when compared to the previously submitted design plans dated October 30, 2014. Furthermore, the revised design plans have less impervious coverage than the original design plans submitted on August 4, 2014. This is reflected on the revised CN computations,

which demonstrated that the revised CN values are equal to or less than the CN values from the previous 2014 design plans.

Therefore, no changes to the previously designed stormwater management plan will be required as part of the revised 2016 site plan, which reflects a smaller building footprint and less impervious coverage than the October 30, 2014 plans. The revised site plans will continue to meet the stormwater management design goals. Attached to and included in this application are the Engineering Report dated August 4, 2014 and the Engineering Report Addendum dated October 31, 2014.

Attachments

2683-01-29-s816-rpt

Impervious Coverage and Runoff Curve Number (CN) Comparison Summary

Watershed Label	Total Impervious Area per Watershed (acres)			CN Value		
	August 2014	October 2014	September 2016	August 2014	October 2014	September 2016
10	2.14	2.17	2.14	67	67	67
11	0.56	0.59	0.56	71	72	71
12	19.93	19.93	19.93	66	66	66
13	10.39	10.39	10.39	67	67	67
14	1.30	1.40	1.32	72	72	72
15	1.97	2.45	1.98	61	63	61
20	1.11	1.11	1.05	73	73	73
21	1.25	1.56	1.08	66	66	65
22	1.57	1.81	1.38	64	64	63
23	0.98	1.22	0.98	73	74	73
24	0.13	0.16	0.14	64	65	64
30	6.23	6.11	5.94	66	66	66
31	n/a *	0.29	0.21	n/a *	71	68
40	0	0	0	58	58	58

Watershed Label	Proposed Impervious Coverage (acres)		
	August 2014	October 2014	September 2016
10	0.15	0.18	0.15
11	0.09	0.12	0.09
12	0	0	0
13	0	0	0
14	1.00	1.10	1.02
15	1.97	2.45	1.98
20	0.06	0.06	0
21	1.25	1.56	1.08
22	1.57	1.81	1.38
23	0.98	1.22	0.98
24	0.05	0.08	0.06
30	0.77	0.65	0.48
31	n/a *	0.29	0.21
40	0	0	0
Total	7.89	9.52	7.43
% Site Area (124.70 acres)	6.3%	7.6%	6.0%

* WS 31 was not part of the August 2014 Stormwater Management Plan

Worksheet 2: Runoff curve number and runoff

Project: Easton Crossing (2683-01)
 Location: Easton, CT
 Circle one: Present Developed

By: FAB
 Checked: _____
 Watershed: WS 10 - Proposed Conditions

Date: Rev 9/8/2016
 Date: _____

** Adjusted for roofdrain leaders connected to infiltration galleries capable of storing 1.0" of runoff. See attached calculations.*

1.) Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value ^{1.}			Area Acres Sq. Ft. %	Product of CN x Area
		Table 2-2	Figure 2-3	Figure 2-4		
A	WOODS (GOOD)	30			2.72	81.50
A	OPEN SPACE / LAWN AREA (GOOD)	39			1.43	55.92
B	WOODS (GOOD)	55			4.55	250.06
B	OPEN SPACE / LAWN AREA (GOOD)	61			3.08	188.02
B	ROW CROPS (SR+CR) - GOOD	75			0.41	30.95
B	GRAVEL	85			0.01	1.05
C	OPEN SPACE / LAWN AREA (GOOD)	74			1.05	77.99
D	WOODS (GOOD)	77			5.86	451.31
D	OPEN SPACE / LAWN AREA (GOOD)	80			0.40	32.20
N/A	EXISTING BUILDING	98			0.23	22.78
N/A	EXISTING PAVED / IMPERVIOUS	98			1.76	172.54
W	WATER	98			2.29	224.53
N/A	PROPOSED PAVED / IMPERVIOUS	98			0.10	9.31
N/A	PROPOSED IMPERVIOUS (BUILDING) *	90			0.05	4.13
		Totals =			23.95	1602.30

^{1.} Use only one CN value source per line.

(0.03742 sq mi)

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{1602.30}{23.95} \quad \text{Use CN} = \boxed{67}$$

Worksheet 2: Runoff curve number and runoff

Project: Easton Crossing (2683-01)
 Location: Easton, CT
 Circle one: Present Developed

By: FAB
 Checked: _____
 Watershed: WS 11 - Proposed Conditions

Date: Rev 9/8/2016

Date: _____

** Adjusted for roofdrain leaders connected to infiltration galleries capable of storing 1.0" of runoff. See attached calculations.*

1.) Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value ^{1.}			Area Acres Sq. Ft. %	Product of CN x Area
		Table 2-2	Figure 2-3	Figure 2-4		
B	WOODS (GOOD)	55			1.78	98.04
B	OPEN SPACE / LAWN AREA (GOOD)	61			2.41	147.02
B	PASTURE, GRASSLAND	61			0.95	57.83
B	FALLOW - BARE SOIL	83			1.89	156.47
C	WOODS (GOOD)	70			0.80	55.86
C	OPEN SPACE / LAWN AREA (GOOD)	74			0.47	34.42
C	PASTURE, GRASSLAND	74			0.01	0.69
C	FALLOW - BARE SOIL	88			0.90	79.53
D	WOODS (GOOD)	77			1.51	116.64
D	OPEN SPACE / LAWN AREA (GOOD)	80			0.06	4.98
D	FALLOW - BARE SOIL	90			0.25	22.91
N/A	EXISTING BUILDING	98			0.09	8.73
N/A	EXISTING PAVED / IMPERVIOUS	98			0.38	37.14
N/A	PROPOSED PAVED / IMPERVIOUS	98			0.04	3.44
N/A	PROPOSED IMPERVIOUS (BUILDING) *	90			0.05	4.13
Totals =					11.58	827.85

^{1.} Use only one CN value source per line.

(0.01810 sq mi)

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{827.85}{11.58} \quad \text{Use CN} = \boxed{71}$$

Worksheet 2: Runoff curve number and runoff

Project: Easton Crossing (2683-01)
 Location: Easton, CT
 Circle one: Present Developed

By: FAB Date: Rev 9/8/2016
 Checked: _____ Date: _____
 Watershed: WS 14 - Proposed Conditions

** Adjusted for roofdrain leaders connected to infiltration galleries capable of storing 1.0" of runoff. See attached calculations.*

1.) Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value ^{1.}			Area <div style="border: 1px solid black; border-radius: 50%; padding: 2px;">Acres</div> Sq. Ft. %	Product of CN x Area
		Table 2-2	Figure 2-3	Figure 2-4		
B	WOODS (GOOD)	55			0.17	9.34
B	OPEN SPACE / LAWN AREA (GOOD)	61			2.83	172.78
B	PASTURE, GRASSLAND	61			0.28	16.95
B	FALLOW - BARE SOIL	83			0.16	13.07
B	GRAVEL	85			0.02	1.78
C	WOODS (GOOD)	70			0.02	1.62
C	OPEN SPACE / LAWN AREA (GOOD)	74			0.32	23.47
C	PASTURE, GRASSLAND	74			0.01	0.91
C	FALLOW - BARE SOIL	88			0.02	1.55
D	OPEN SPACE / LAWN AREA (GOOD)	80			0.02	1.41
N/A	EXISTING BUILDING	98			0.04	3.72
N/A	EXISTING PAVED / IMPERVIOUS	98			0.26	25.26
N/A	PROPOSED PAVED / IMPERVIOUS	98			0.88	85.86
N/A	PROPOSED IMPERVIOUS (BUILDING) *	90			0.14	12.40
		Totals =			5.16	370.13

^{1.} Use only one CN value source per line.

(0.00806 sq mi)

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{370.13}{5.16} \quad \text{Use CN} = \boxed{72}$$

Worksheet 2: Runoff curve number and runoff

Project: Easton Crossing (2683-01)
 Location: Easton, CT
 Circle one: Present Developed

By: FAB Date: Rev 9/8/2016
 Checked: _____ Date: _____
 Watershed: WS 15 - Proposed Conditions

** Adjusted for roofdrain leaders connected to infiltration galleries capable of storing 1.0" of runoff. See attached calculations.*

1.) Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value ^{1.}			Area <div style="border: 1px solid black; border-radius: 50%; padding: 2px;">Acres</div> Sq. Ft. %	Product of CN x Area
		Table 2-2	Figure 2-3	Figure 2-4		
A	WOODS (GOOD)	30			1.00	29.92
A	OPEN SPACE / LAWN AREA (GOOD)	39			1.52	59.27
A	GRAVEL	76			0.03	2.28
B	WOODS (GOOD)	55			0.57	31.60
B	OPEN SPACE / LAWN AREA (GOOD)	61			5.78	352.67
B	GRAVEL	85			0.08	6.71
D	OPEN SPACE / LAWN AREA (GOOD)	80			0.02	1.37
D	GRAVEL	91			0.02	1.43
N/A	PROPOSED PAVED / IMPERVIOUS	98			1.34	131.72
N/A	PROPOSED IMPERVIOUS (BUILDING) *	90			0.64	57.85
Totals =					11.00	674.81

^{1.} Use only one CN value source per line.

(0.01719 sq mi)

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{674.81}{11.00} \quad \text{Use CN} = \boxed{61}$$

Worksheet 2: Runoff curve number and runoff

Project: Easton Crossing (2683-01)
 Location: Easton, CT
 Circle one: Present Developed

By: FAB Date: Rev 9/8/2016
 Checked: _____ Date: _____
 Watershed: WS 20 - Proposed Conditions

1.) Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value ^{1.}			Area Acres Sq. Ft. %	Product of CN x Area
		Table 2-2	Figure 2-3	Figure 2-4		
B	PAVER	52			0.01	0.77
B	WOODS (GOOD)	55			5.84	320.95
B	MEADOW	58			0.67	38.65
B	OPEN SPACE / LAWN AREA (GOOD)	61			2.38	144.93
B	FALLOW - BARE SOIL	83			1.15	95.55
B	GRAVEL	85			0.02	1.30
C	WOODS (GOOD)	70			2.90	203.12
C	MEADOW	71			0.78	55.28
C	OPEN SPACE / LAWN AREA (GOOD)	74			3.07	226.99
C	FALLOW - BARE SOIL	88			2.59	227.59
D	WOODS (GOOD)	77			16.96	1,305.91
D	MEADOW	78			0.08	6.09
D	OPEN SPACE / LAWN AREA (GOOD)	80			0.67	53.38
D	FALLOW - BARE SOIL	90			0.12	10.75
N/A	EXISTING BUILDING	98			0.37	36.47
N/A	EXISTING PAVED / IMPERVIOUS	98			0.68	66.65
N/A	PROPOSED PAVED / IMPERVIOUS	98			0.00	0.00
		Totals =			38.27	2794.38
					(0.05980	sq mi)

^{1.} Use only one CN value source per line.

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{2794.38}{38.27} \quad \text{Use CN} = \boxed{73}$$

Worksheet 2: Runoff curve number and runoff

Project: Easton Crossing (2683-01)
 Location: Easton, CT
 Circle one: Present Developed

By: FAB
 Checked: _____
 Watershed: WS 21 - Proposed Conditions

Date: Rev 9/8/2016

Date: _____

** Adjusted for roofdrain leaders connected to infiltration galleries capable of storing 1.0" of runoff. See attached calculations.*

1.) Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value ^{1.}			Area <div style="border: 1px solid black; border-radius: 50%; padding: 2px;">Acres</div> Sq. Ft. %	Product of CN x Area
		Table 2-2	Figure 2-3	Figure 2-4		
B	PAVER	52			0.26	13.39
B	WOODS (GOOD)	55			3.61	198.81
B	OPEN SPACE / LAWN AREA (GOOD)	61			4.40	268.45
B	GRAVEL	85			0.12	10.14
D	WOODS (GOOD)	77			1.58	121.52
D	OPEN SPACE / LAWN AREA (GOOD)	80			0.14	11.37
D	GRAVEL	91			0.01	0.46
N/A	PROPOSED PAVED / IMPERVIOUS	98			0.67	65.29
N/A	PROPOSED IMPERVIOUS (BUILDING) *	90			0.41	37.19
Totals =					11.20	726.60

^{1.} Use only one CN value source per line.

(0.01750 sq mi)

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{726.60}{11.20} \quad \text{Use CN} = \boxed{65}$$

Worksheet 2: Runoff curve number and runoff

Project: Easton Crossing (2683-01)
 Location: Easton, CT
 Circle one: Present Developed

By: FAB Date: Rev 9/8/2016
 Checked: _____ Date: _____
 Watershed: WS 22 - Proposed Conditions

** Adjusted for roofdrain leaders connected to infiltration galleries capable of storing 1.0" of runoff. See attached calculations.*

1.) Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value ^{1.}			Area <div style="border: 1px solid black; border-radius: 50%; padding: 2px;">Acres</div> Sq. Ft. %	Product of CN x Area
		Table 2-2	Figure 2-3	Figure 2-4		
B	PAVER	52			0.18	9.31
B	WOODS (GOOD)	55			4.92	270.53
B	OPEN SPACE / LAWN AREA (GOOD)	61			4.68	285.29
B	GRAVEL	85			0.06	4.97
D	OPEN SPACE / LAWN AREA (GOOD)	80			0.15	12.23
D	PAVER	72			0.01	0.36
N/A	PROPOSED PAVED / IMPERVIOUS	98			1.06	104.33
N/A	PROPOSED IMPERVIOUS (BUILDING) *	90			0.32	28.93
Totals =					11.38	715.94

^{1.} Use only one CN value source per line.

(0.01778 sq mi)

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{715.94}{11.38} \quad \text{Use CN} = \boxed{63}$$

Worksheet 2: Runoff curve number and runoff

Project: Easton Crossing (2683-01)
 Location: Easton, CT
 Circle one: Present Developed

By: FAB
 Checked: _____
 Watershed: WS 23 - Proposed Conditions

Date: Rev 9/8/2016

Date: _____

** Adjusted for roofdrain leaders connected to infiltration galleries capable of storing 1.0" of runoff. See attached calculations.*

1.) Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value ^{1.}			Area <div style="border: 1px solid black; border-radius: 50%; padding: 2px;">Acres</div> Sq. Ft. %	Product of CN x Area
		Table 2-2	Figure 2-3	Figure 2-4		
B	WOODS (GOOD)	55			0.40	22.20
B	OPEN SPACE / LAWN AREA (GOOD)	61			1.91	116.68
B	GRAVEL	85			0.10	8.81
D	WOODS (GOOD)	77			0.82	63.23
D	OPEN SPACE / LAWN AREA (GOOD)	80			0.50	39.71
N/A	PROPOSED PAVED / IMPERVIOUS	98			0.66	65.09
N/A	PROPOSED IMPERVIOUS (BUILDING) *	90			0.32	28.93
Totals =					4.72	344.65

^{1.} Use only one CN value source per line.

(0.00738 sq mi)

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{344.65}{4.72} \quad \text{Use CN} = \boxed{73}$$

Worksheet 2: Runoff curve number and runoff

Project: Easton Crossing (2683-01)
 Location: Easton, CT
 Circle one: Present Developed

By: FAB Date: Rev 9/8/2016
 Checked: _____ Date: _____
 Watershed: WS 24 - Proposed Conditions

** Adjusted for roofdrain leaders connected to infiltration galleries capable of storing 1.0" of runoff. See attached calculations.*

1.) Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value ^{1.}			Area Acres Sq. Ft. %	Product of CN x Area
		Table 2-2	Figure 2-3	Figure 2-4		
B	PAVER	52			0.02	1.02
B	WOODS (GOOD)	55			1.45	79.82
B	OPEN SPACE / LAWN AREA (GOOD)	61			0.81	49.45
D	WOODS (GOOD)	77			0.79	61.08
D	OPEN SPACE / LAWN AREA (GOOD)	80			0.15	11.67
N/A	EXISTING BUILDING	98			0.03	3.41
N/A	EXISTING PAVED / IMPERVIOUS	98			0.05	5.25
N/A	PROPOSED PAVED / IMPERVIOUS	98			0.01	0.87
N/A	PROPOSED IMPERVIOUS (BUILDING) *	90			0.05	4.13
		Totals =			3.36	216.69

^{1.} Use only one CN value source per line.

(0.00526 sq mi)

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{216.69}{3.36} \quad \text{Use CN} = \boxed{64}$$

Worksheet 2: Runoff curve number and runoff

Project: Easton Crossing (2683-01)
 Location: Easton, CT
 Circle one: Present Developed

By: FAB
 Checked: _____
 Watershed: WS 30 - Proposed Conditions

Date: Rev 9/8/2016

Date: _____

** Adjusted for roofdrain leaders connected to infiltration galleries capable of storing 1.0" of runoff. See attached calculations.*

1.) Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value ^{1.}			Area Acres Sq. Ft. %	Product of CN x Area
		Table 2-2	Figure 2-3	Figure 2-4		
A	WOODS (GOOD)	30			1.49	44.80
B	WOODS (GOOD)	55			32.18	1,770.06
B	ORCHARD OR TREE FARM	58			5.20	301.82
B	OPEN SPACE / LAWN AREA (GOOD)	61			8.26	503.72
B	ROW CROPS (SR+CR) - GOOD	75			0.49	36.44
B	FALLOW - BARE SOIL	83			0.48	39.95
B	GRAVEL ROAD	85			0.38	32.56
C	WOODS (GOOD)	70			0.84	58.96
C	OPEN SPACE / LAWN AREA (GOOD)	74			0.27	19.90
C	FALLOW - BARE SOIL	88			0.01	1.30
D	WOODS (GOOD)	77			23.42	1,802.99
D	OPEN SPACE / LAWN AREA (GOOD)	80			2.48	198.41
D	GRAVEL ROAD	91			0.11	10.44
N/A	EXISTING BUILDING	98			1.00	98.19
N/A	EXISTING PAVED / IMPERVIOUS	98			4.46	437.46
W	EXISTING POND	98			0.54	53.34
N/A	PROPOSED IMPERVIOUS (BUILDING) *	90			0.23	20.66
N/A	PROPOSED PAVED / IMPERVIOUS	98			0.25	24.88
Totals =					82.12	5455.86

^{1.} Use only one CN value source per line.

(0.12831 sq mi)

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{5455.86}{82.12} \quad \text{Use CN} = \boxed{66}$$

Worksheet 2: Runoff curve number and runoff

Project: Easton Crossing (2683-01)
 Location: Easton, CT
 Circle one: Present Developed

By: FAB Date: Rev 9/8/2016
 Checked: _____ Date: _____
 Watershed: WS 31 - Proposed Conditions

1.) Runoff curve number (CN)

Soil Name and Hydrologic Group (appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN Value ^{1.}			Area Acres Sq. Ft. %	Product of CN x Area
		Table 2-2	Figure 2-3	Figure 2-4		
B	PAVER	52			0.06	3.21
B	OPEN SPACE / LAWN AREA (GOOD)	61			0.80	48.92
N/A	PROPOSED PAVED / IMPERVIOUS	98			0.21	20.97
Totals =					1.08	73.10

^{1.} Use only one CN value source per line.

(0.00168 sq mi)

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = $\frac{73.10}{1.08}$ Use CN = 68