

Table 3: SSO Inventory
Town of Ludlow, Massachusetts
Revision Date: September, 2021

SSO Location ¹	Discharge Statement ²	Date ³	Time Start ³	Time End ³	Estimated Volume ⁴	Description ⁵	Mitigation Completed ⁶	Mitigation Planned ⁷
90 Center Street	Discharge to catch basin into Chicopee River	10/3/2016	10:30 AM	11:00 AM	5 gallons	Sewer System Blockage	Jetted the sewer line to clear blockage. Area disinfected as well.	N/A
90 Center Street	Discharge to catch basin into Chicopee River	4/9/2018	11:00 AM	11:30 AM	10 gallons	Sewer System Blockage	Jetted the sewer line to clear blockage. Area disinfected as well.	N/A
21 Park Terrace	Discharge to catch basin into Chicopee River	6/18/2018	9:00 AM	12:00 PM	50 gallons	Sewer System Blockage and Root Intrusion.	Jetted the sewer line to clear blockage. Area disinfected as well.	N/A
21 Park Terrace	Discharge to catch basin into Chicopee River	12/11/2018	3:30 PM	4:00 PM	50 gallons	Sewer System Blockage	Jetted the sewer line to clear blockage. Area disinfected as well.	N/A
44 Center Street	Discharge to catch basin into Chicopee River	1/21/2020	12:30 PM	12:35 PM	100 gallons	Sewer System Blockage	Jetted the sewer line to clear blockage.	N/A

¹ Location (approximate street crossing/address and receiving water, if any)

² A clear statement of whether the discharge entered a surface water directly or entered the MS4

³ Date(s) and time(s) of each known SSO occurrence (i.e., beginning and end of any known discharge)

⁴ Estimated volume(s) of the occurrence

⁵ Description of the occurrence indicating known or suspected cause(s)

⁶ Mitigation and corrective measures completed with dates implemented

⁷ Mitigation and corrective measures planned with implementation schedules

Infrastructure and Investigation Information							Catchment Composition						Receiving Water			Ranking Output	
Outfall ID	Stream Segment	Known/ Suspected Problem and/or Complaints?	Past Sewer Conversion or CSO in Catchment?	Culverts Longer Than Street Crossing In Catchment?	Previous Screening Results Indicate Likely Sewer Input? ¹	Infrastructure Score	Catchment Area	Weighted Business Loading Score ²	Weighted Residential Housing Age Score ³	Sewer Pipe Density Score	Septic System Density Score ⁴	Catchment Score	Discharging to Area of Concern to Public Health? ⁵	Stormwater Related Impairments	Receiving Water Score	Outfall Score for Catchment Investigation	Priority Rank
Information Source		Town of Ludlow Staff	Town of Ludlow Staff, GISMaps	Town of Ludlow Staff, GISand Storm Sewer Maps	Outfall inspections and sample results	-	GIS	Town of Ludlow Staff, Parcel IDs/ GIS	Town of Ludlow Parcel Maps	GIS Mapping	GIS Mapping	-	GISMaps	Impaired Waters List	-	-	-
Scoring Criteria		0 or 1 (if 1 automatically problem)	0 or 1	0 or 1	0 or 1 (if 1 automatically problem)	0 to 100	acres	0 to 1	0 to 1	0 to 1	0 to 1	0 to 100	0, 1, 2, or 3 (if >0 automatically high)	0 or 1 (0= Long Island Sound Impairment, 1= Other Impairments, 2 = Fecal Coliform & E. Coli Impairment; if>1 automatically high)	0 to 100	0 to 100 (weighted average of the three scores)	Problem, High, or Low
CHE01	MA36-23	1	0	0	0	25	23.57	0.67	1.00	0.11	0.03	45	0	0	0	23.4	PROBLEM
CHE02	MA36-23	0	0	0	0	0	0.08	0.00	0.00	0.00	0.00	0	0	0	0	0.0	LOW
CHE03	MA36-23	0	0	0	0	0	2.17	0.33	0.33	0.00	0.14	20	0	0	0	6.7	LOW
CHW01	MA36-24	0	0	0	0	0	10.41	0.33	1.00	0.44	0.00	44	0	2	50	31.4	HIGH
CHW02	MA36-24	0	0	0	0	0	43.05	0.33	0.67	0.22	0.00	30	0	2	50	26.8	HIGH
CHW03	MA36-24	0	0	0	0	0	8.13	0.00	0.67	0.28	0.00	24	0	2	50	24.6	HIGH
CHW04	MA36-24	1	1	0	0	50	134.94	1.00	0.67	0.47	0.00	53	1	2	75	59.5	PROBLEM
CHW05	MA36-24	0	0	0	0	0	1.02	0.00	0.00	0.00	0.00	0	1	2	75	25.0	HIGH
CHW06	MA36-24	0	0	0	0	0	24.10	0.33	0.67	0.54	0.00	38	1	2	75	37.8	HIGH
CHW07	MA36-24	0	0	0	0	0	4.02	0.00	0.00	0.00	0.00	0	1	2	75	25.0	HIGH
CHW08	MA36-24	0	0	0	0	0	7.16	0.00	0.00	0.00	0.00	0	1	2	75	25.0	HIGH
CHW09	MA36-24	0	0	0	0	0	1.85	0.00	0.00	0.00	0.00	0	1	2	75	25.0	HIGH
CHW10	MA36-24	0	0	0	0	0	2.93	0.00	0.00	0.00	0.00	0	1	2	75	25.0	HIGH
CHW11	MA36-24	0	1	0	0	25	48.01	0.33	1.00	0.42	0.00	44	0	2	50	39.6	HIGH
CHW12	MA36-24	0	0	0	0	0	3.99	0.33	0.00	0.00	0.00	8	0	2	50	19.4	HIGH
CHW13	MA36-24	0	0	0	0	0	21.36	0.00	1.00	0.30	0.00	32	1	2	75	35.8	HIGH
HGB01	MA36-42	0	0	0	0	0	22.40	0.00	0.67	0.42	0.00	27	0	0	0	9.0	LOW
HGB02	MA36-42	0	0	0	0	0	7.25	1.00	0.67	0.44	0.00	53	0	0	0	17.6	LOW
HGB03	MA36-42	0	0	0	0	0	5.52	0.33	1.00	0.04	0.05	36	0	0	0	11.9	LOW
HGB04	MA36-42	0	0	0	0	0	7.58	0.00	0.67	0.51	0.00	29	0	0	0	9.8	LOW
HGB05	MA36-42	0	0	0	0	0	0.87	0.00	0.67	0.00	0.35	25	0	0	0	8.5	LOW
HGB06	MA36-42	0	0	0	0	0	4.22	0.00	1.00	0.10	0.47	39	0	0	0	13.0	LOW
HGB07	MA36-42	0	0	0	0	0	57.21	0.33	1.00	0.17	0.02	38	0	0	0	12.7	LOW
HGB08	MA36-42	0	0	0	0	0	2.12	0.00	0.67	0.00	1.00	42	0	0	0	13.9	LOW
HGB09	MA36-42	0	0	0	0	0	14.07	0.00	0.67	0.37	0.00	26	0	0	0	8.6	LOW
HGB10	MA36-42	0	0	0	0	0	17.86	0.33	1.00	0.13	0.09	39	1	0	25	21.3	HIGH
HGB11	MA36-42	0	0	0	0	0	1.19	0.00	0.67	0.35	0.00	26	0	0	0	8.5	LOW
HGB12	MA36-42	0	0	0	0	0	10.78	0.00	1.00	0.43	0.00	36	1	0	25	20.2	HIGH
HGB13	MA36-42	0	0	0	0	0	9.46	0.67	0.67	0.50	0.00	46	0	0	0	15.3	LOW
HGB14	MA36-42	0	0	0	0	0	2.15	0.00	0.67	0.50	0.00	29	0	0	0	9.7	LOW
HGB15	MA36-42	0	0	0	0	0	8.00	0.00	0.67	0.36	0.00	26	0	0	0	8.6	LOW

Infrastructure and Investigation Information							Catchment Composition						Receiving Water			Ranking Output	
Outfall ID	Stream Segment	Known/ Suspected Problem and/ or Complaints?	Past Sewer Conversion or CSO in Catchment?	Culverts Longer Than Street Crossing In Catchment?	Previous Screening Results Indicate Likely Sewer Input? ¹	Infrastructure Score	Catchment Area	Weighted Business Loading Score ²	Weighted Residential Housing Age Score ³	Sewer Pipe Density Score	Septic System Density Score ⁴	Catchment Score	Discharging to Area of Concern to Public Health? ⁵	Stormwater Related Impairments	Receiving Water Score	Outfall Score for Catchment Investigation	Priority Rank
HGB16	MA36-42	0	0	0	0	0	34.36	1.00	1.00	0.22	0.00	55	1	0	25	26.8	HIGH
HGB17	MA36-42	0	0	0	0	0	1.52	0.33	0.67	0.37	0.30	42	0	0	0	13.9	LOW
HGB18	MA36-42	0	0	0	0	0	0.40	0.00	0.00	0.60	0.00	15	0	0	0	5.0	LOW
HGB19	MA36-42	0	0	0	0	0	0.75	0.00	0.00	0.15	0.00	4	0	0	0	1.2	LOW
HGB20	MA36-42	0	0	0	0	0	27.55	0.00	0.67	0.33	0.00	25	1	0	25	16.6	HIGH
HGB21	MA36-42	0	0	0	0	0	2.70	0.00	0.00	0.00	0.00	0	1	0	25	8.3	HIGH
HRB01	N/A	0	0	0	0	0	11.37	0.67	1.00	0.00	0.12	45	0	0	0	14.9	LOW
HRB02	N/A	0	0	0	0	0	6.84	0.00	0.67	0.00	0.07	18	0	0	0	6.1	LOW
HRB03	N/A	0	0	0	0	0	36.67	0.00	1.00	0.00	0.10	27	0	0	0	9.2	LOW
HVP01	N/A	0	0	0	0	0	1.20	0.33	0.67	0.66	0.00	41	1	0	25	22.1	HIGH
MBT01	MA36-24	0	0	0	0	0	12.49	0.33	0.67	0.18	0.00	30	1	2	75	34.9	HIGH
MBT02	MA36-24	0	0	0	0	0	4.15	0.00	0.33	0.40	0.00	18	0	2	50	22.8	HIGH
MBT03	MA36-24	0	0	0	0	0	48.51	1.00	1.00	0.14	0.00	54	0	2	50	34.5	HIGH
MBT04	MA36-24	0	0	0	0	0	20.91	0.00	1.00	0.19	0.00	30	0	2	50	26.6	HIGH
MBT05	MA36-24	0	0	0	0	0	1.66	0.00	0.33	0.74	0.00	27	0	2	50	25.6	HIGH
MBT06	MA36-24	0	0	0	0	0	16.81	0.33	1.00	0.39	0.00	43	0	2	50	31.0	HIGH
MBT07	MA36-24	0	0	0	0	0	5.67	0.00	1.00	0.75	0.00	44	0	2	50	31.3	HIGH
MBT08	MA36-24	0	0	0	0	0	69.34	0.33	0.67	0.18	0.00	29	0	2	50	26.5	HIGH
MBT09	MA36-24	0	0	0	0	0	2.80	0.00	0.33	0.18	0.00	13	0	2	50	20.9	HIGH
MCP01	N/A	0	1	0	0	25	72.96	0.33	1.00	0.17	0.01	38	1	1	50	37.6	HIGH
MCP02	N/A	0	0	0	0	0	24.52	1.00	1.00	0.39	0.00	60	0	1	25	28.2	LOW
MCP03	N/A	0	0	0	0	0	95.69	1.00	1.00	0.00	0.00	50	0	1	25	25.0	LOW
MPP01	N/A	0	1	0	0	25	26.42	0.33	1.00	0.17	0.19	42	0	0	0	22.5	LOW
MPP02	N/A	0	0	0	0	0	5.36	0.00	0.67	0.24	0.11	25	0	0	0	8.5	LOW
TBR01	N/A	0	0	0	0	0	13.99	0.00	0.67	0.00	0.00	17	0	0	0	5.6	LOW
TCA01	MA36-24	1	0	0	0	25	138.57	1.00	0.67	0.00	0.00	42	1	2	75	47.2	PROBLEM
TCD01	MA36-23	0	0	0	0	0	7.05	0.00	0.67	0.00	0.19	21	0	0	0	7.2	LOW
TCE01	MA36-23	0	0	0	0	0	47.67	0.00	1.00	0.00	0.07	27	0	0	0	8.9	LOW
TCH01	MA36-23	0	0	0	0	0	29.30	0.00	1.00	0.15	0.08	31	0	0	0	10.3	LOW
TCH02	MA36-23	0	0	0	0	0	2.32	0.00	0.00	0.00	0.00	0	0	0	0	0.0	LOW
TCH03	MA36-23	0	0	0	0	0	4.76	0.00	0.00	0.00	0.22	6	0	0	0	1.9	LOW
TCH04	MA36-23	0	0	0	0	0	26.64	0.00	0.67	0.00	0.22	22	0	0	0	7.4	LOW
TCM01	MA36-23	0	0	0	0	0	1.26	0.00	1.00	0.32	0.00	33	0	0	0	11.0	LOW
TCM02	MA36-23	0	0	0	0	0	20.72	1.00	0.33	0.20	0.00	38	0	0	0	12.8	LOW
TCO01	MA36-23	0	0	0	0	0	1.15	0.00	0.00	0.00	0.00	0	0	0	0	0.0	LOW
TCO02	MA36-23	0	0	0	0	0	2.92	0.33	0.67	0.00	0.26	31	0	0	0	10.5	LOW
TCO03	MA36-23	0	0	0	0	0	8.02	0.33	0.67	0.00	0.09	27	0	0	0	9.1	LOW
TCS01	MA36-23	0	0	0	0	0	3.81	0.00	0.33	0.00	0.44	19	0	0	0	6.4	LOW
TCS02	MA36-23	0	0	0	0	0	5.58	0.33	0.33	0.00	0.30	24	0	0	0	8.0	LOW
TCS03	MA36-23	0	0	0	0	0	2.62	0.33	0.33	0.00	0.17	21	0	0	0	7.0	LOW
TCT01	MA36-24	0	0	0	0	0	18.32	0.00	0.00	0.10	0.03	3	0	2	50	17.8	HIGH
TCT02	MA36-24	0	0	0	0	0	1.45	0.00	0.67	1.00	0.00	42	0	2	50	30.6	HIGH
THB01	MA36-42	0	0	0	0	0	4.04	0.00	0.67	0.00	0.64	33	0	0	0	10.9	LOW
THB02	MA36-42	0	0	0	0	0	8.33	0.00	0.67	0.00	0.16	21	0	0	0	6.9	LOW
THK01	N/A	0	0	0	0	0	96.19	0.00	0.67	0.06	0.00	18	0	0	0	6.0	LOW
THK02	N/A	0	0	0	0	0	16.99	0.33	1.00	0.02	0.00	34	0	0	0	11.2	LOW

Infrastructure and Investigation Information							Catchment Composition						Receiving Water			Ranking Output	
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THK03	N/ A	0	0	0	0	0	4.86	0.67	0.67	0.14	0.00	37	0	0	0	12.3	LOW
THK04	N/ A	0	0	0	0	0	1.84	0.00	0.67	0.25	0.00	23	0	0	0	7.7	LOW
THK05	N/ A	0	0	0	0	0	2.43	0.33	0.67	0.48	0.00	37	0	0	0	12.3	LOW
THK06	N/ A	0	0	0	0	0	2.31	0.00	0.33	0.56	0.26	29	0	0	0	9.6	LOW
THK07	N/ A	0	0	0	0	0	2.64	0.00	0.67	0.39	0.00	26	0	0	0	8.8	LOW
THL01	MA36-42	0	0	0	0	0	1.75	0.00	1.00	0.00	0.26	31	0	0	0	10.5	LOW
THR01	MA36-42	0	0	0	0	0	1.18	0.00	0.00	0.00	0.26	6	0	0	0	2.1	LOW
WHA01	MA36-42	0	0	0	0	0	5.41	0.00	0.33	0.00	0.62	24	0	0	0	7.9	LOW
WHB01	MA36-42	0	0	0	0	0	9.27	0.33	0.67	0.42	0.00	35	0	0	0	11.8	LOW

Notes:

¹ Town of Ludlow has not conducted any recent outfall screenings. Screening results indicate likely sewer input if any of the following are true:

- Olfactory or visual evidence of sewage,
- Ammonia ≥ 0.5 mg/ L, surfactants ≥ 0.25 mg/ L, and bacteria levels greater than the water quality criteria applicable to the receiving water, or
- Ammonia ≥ 0.5 mg/ L, surfactants ≥ 0.25 mg/ L, and detectable levels of chlorine

² The weighted business loading scores are based on the presence of high and medium loading businesses within each catchment. High loading businesses were given twice the weighting of the medium loading businesses.

Medium Loading businesses were defined as: auto repair facilites/ automotive vehicles or supplies sales and service, automobile parking lots or garages, bus transportation facilites and related properties, campgrounds/ RV parks, car dealers, car washes, food stores and wholesale beverage/ supermarkets, small retail and services stores, eating and drinking establishments, gasoline stations/ fuel service areas, marinas, nurseries and garden centers, oil change shops, restaurants, chemical products, food processing, rubber and plastics, colleges and universities, airports, rental car lots, USpostal service trucking companies and distribution centers.

High Loading businesses were defined as: heavy construction equipment rental and leasing, building and heavy construction (for land disturbing activites), buildings for manufacturing operations, apparel and other fabrics, auto recyclers and scrap yards, boat building and repair, chemical products, food processing, garbage truck washout activities, leather tanners, paper and wood products, petroleum storage and refining/ gas production plants, tanks holding fuel and oil for retail distribution, natural or manufactured gas storage, textile mills, transportation equipment, landfills and hazardous waste material disposal, maintenance depots, streets and highways construction, metal production, planting and engraving operations, ports, railroads, petroleum bulk stations or terminals, research and development facilites; and facilites providing business material, hardware, farm equipment, heating, hardware, plumbing, lumber supplies and equipment.

³ The weighted residential housing age scores are based on the presence of houses which are older than 40 years and houses which are between 20 and 40 years of age. Houses older than 40 years were given twice the weighting of the houses which are between 20 and 40 years of age.

⁴ The septic system density scores are based on a scale of 0 to 1, where the catchment with the highest number of septic systems per acre will be given a score of 1, and all other catchments are scored proportionally to the catchment with the highest septic system density.

⁵ Outfalls/interconnections that discharge to or in the vicinity of any of the following areas: public beaches, recreational areas, drinking water supplies, or shellfish beds

Outfall ID	Receiving Water	Date of most Recent Inspection	Pipe or swale?	Dimensions	Shape	Material	Spatial Location (lat/ long w/ in 30ft accuracy)	Physical Condition	Flow?	Indicators of Potential Non-Stormwater Discharges?	If yes, what indicators?	Other Notes
CHE02	Chicopee River (MA36-23)	1/30/2020	Pipe	12"	Round	Clay Tile	lat42.1573 long-72.4240	Good	Dry	No	N/A	
CHW01	Chicopee River (MA36-24)	1/10/2020	Pipe	15"	Round	Concrete	lat42.1624 long-72.5004	Good	Dry	No	N/A	
CHW03	Chicopee River (MA36-24)	1/8/2020	Pipe	18"	Round	Concrete	lat42.1629 long-72.4875	Good	Dry	No	N/A	
CHW06	Chicopee River (MA36-24)	1/10/2020	Pipe	60"	Round	Concrete	lat42.1558 long-72.4819	Good	Submerged	No	N/A	
CHW08	Chicopee River (MA36-24)	1/14/2020	Pipe	24"	Round	Concrete	lat42.1539 long-72.4786	Good	Dry	No	N/A	
CHW10	Chicopee River (MA36-24)	1/24/2020	Pipe	24"	Round	Concrete	lat42.1542 long-72.4757	Good	Trickling	No	N/A	
CHW11	Chicopee River (MA36-24)	1/10/2020	Pipe	42"	Round	Concrete	lat42.1541 long-72.4734	Good	Dry	No	N/A	
CHW04	Chicopee River (MA36-24)	1/10/2020	Pipe	42"	Round	Corrugated Metal	lat42.1580 long-72.4861	Fair	Dry	No	N/A	
MBT06	Minechoag Brook Tributary to Chicopee River (MA36-24)	1/30/2020	Pipe	24"	Round	Concrete	lat42.1587 long-72.4400	Good	Trickling	No	N/A	
MBT07	Minechoag Brook Tributary to Chicopee River (MA36-24)	1/30/2020	Pipe	60"	Round	Concrete	lat42.1587 long-72.4400	Good	Moderate	No	N/A	
MBT08	Minechoag Brook Tributary to Chicopee River (MA36-24)	1/30/2020	Pipe	24"	Round	Corrugated Metal	lat42.1593 long-72.4396	Fair	Dry	No	N/A	
TCA01	Tributary to Chicopee River (MA36-24) (Near Davis St.)	1/8/2020	Pipe	48"	Round	Concrete	lat42.1639 long-72.4866	Good	Moderate	No	N/A	
TCE01	Tributary to Chicopee River (MA36-23) (Near Elizabeth Dr.)	1/30/2020	Pipe	36"	Round	Concrete	lat42.1638 long-72.4201	Good	Trickling	No	N/A	
TCH04	Tributary to Chicopee River (MA36-23) (Starting near Deer	1/30/2020	Pipe	30"	Round	Concrete	lat42.1662 long-72.4307	Good	Trickling	No	N/A	
TCM01	Tributary to Chicopee River (MA36-23) (Miller St. to Chapin	1/30/2020	Pipe	12"	Round	Concrete	lat42.1583 long-72.4301	Good	Dry	No	N/A	
TCM02	Tributary to Chicopee River (MA36-23) (Miller St. to Chapin	1/30/2020	Pipe	18"	Round	Concrete	lat42.1583 long-72.4301	Good	Trickling	No	N/A	

Town of Ludlow BMP Tracking

Revised: September 2021

BMP ID or Description	Location	BMP Type from Plans	Functional BMP Type to Match Model	Total Drainage Area (Ac)	Impervious Drainage Area (Ac)	Estimated Storage Volume (cf)	Estimated Nitrogen Removal (lb/yr)
BMP-CHE03-01	End of Isabel Lane before Chicopee River	Detention Basin	Dry Pond/Detention Basin	2.17	0.86	717	4.0
BMP-HGB10-01	At the Cul-de-sac of Harris lane and discharges into harris pond	Detention Basin	Dry Pond/Detention Basin	17.86	7.15	25,954	58.6
BMP-MBT09-01	End of Irla Drive (second Cul de sac)	Underground Infiltration Chamber	Infiltration Basin (or practice)	1.01	0.39	1,410	3.2
BMP-MCP01-01	BMPs Connected halfway up King Street	Leaching Galley	Infiltration Trench	2.02	0.84	509	3.3
BMP-MCP01-02	BMPs Connected halfway up King Street	Leaching Galley	Infiltration Trench				
BMP-MCP01-03	BMPs Connected halfway up King Street	Leaching Galley	Infiltration Trench				
BMP-MCP01-04	Connected at the end of King St	Leaching Galley	Infiltration Trench	0.70	0.61	339	2.0
BMP-MCP01-05	Connected at the end of King St	Leaching Galley	Infiltration Trench				
BMP-MCP03-01	At the end of Bowles avenue	Leaching basin	Infiltration Trench	2.44	0.59	1,553	4.4
BMP-MCP03-02	At the end of Bowles avenue	Leaching Basin	Infiltration Trench				
BMP-TCH01-01	Between Parker Ln and Miller St	Detention Basin	Dry Pond/Detention Basin	12.00	3.94	14,300	40.2
BMP-TCH01-02	Parker Lane	Detention Basin	Dry Pond/Detention Basin	11.15	1.97	7,139	22.1
BMP-TCS02-01	Northwood Circle first drainage pipe	Detention Basin	Dry Pond/Detention Basin	5.58	2.03	5,793	17.0
BMP-WHA01-01	Allison Lane	Wet Pond	Wet Pond	13.00	2.25	36,694	18.5
BMP-XXX-01	Applewood Drive	Gravel Wetland	Gravel Wetland	1.32	0.75	3,300	3.7
BMP-XXX-02	Applewood Drive	Infiltration Trench	Infiltration Trench	0.44	0.20	420	1.4
BMP-XXX-03	Applewood Drive	Infiltration Trench	Infiltration Trench	0.30	0.13	420	1.0
BMP-XXX-04	Applewood Drive	Infiltration Trench	Infiltration Trench	0.58	0.23	420	1.4
BMP-XXX-05	Applewood Drive	Infiltration Trench	Infiltration Trench	0.31	0.14	420	1.1
BMP-XXX-06	Autumn Ridge Road	Infiltration Basin	Infiltration Basin (or practice)	15.96	1.93	6,992	24.9

Town of Ludlow BMP Tracking

Revised: September 2021

BMP ID or Description	Location	BMP Type from Plans	Functional BMP Type to Match Model	Total Drainage Area (Ac)	Impervious Drainage Area (Ac)	Estimated Storage Volume (cf)	Estimated Nitrogen Removal (lb/yr)
BMP-XXX-07	Intersection of Autumn Ridge Rd and Turning Leaf Rd	Infiltration Basin	Infiltration Basin (or practice)	15.65	1.93	6,992	27.2
BMP-XXX-08	At end of Avelino Way at court	Wet Pond	Wet Pond	8.22	1.64	5,968	9.8
BMP-XXX-09	At intersection of avelino and alden st	Infiltration Trench	Infiltration Basin (or practice)	0.81	0.16	904	1.8
BMP-XXX-10	At intersection of avelino and alden st	Infiltration Trench	Infiltration Basin (or practice)	0.81	0.16	904	1.8
BMP-XXX-11	End of Brook Hollow Drive	Dry Well	Infiltration Trench	4.57	1.23	267	3.0
BMP-XXX-12	Intersection of Brook Hollow and Church St	Dry Well	Infiltration Trench	0.29	0.16	107	0.6
BMP-XXX-13	Intersection of Brook Hollow and Church St	Dry Well	Infiltration Trench	2.88	0.71	68	1.7
BMP-XXX-14	Intersection of Colonial Dr. and Munsing St.	Dry well	Infiltration Trench	0.19	0.06	170	0.5
BMP-XXX-15	Intersection of Colonial Dr. and Munsing St.	Dry Well	Infiltration Trench	0.26	0.15	170	0.8
BMP-XXX-16	Lower basin--Closer to Cady Street between Daisy and Focosi	Wet Pond	Wet Pond	9.22	2.09	7,575	10.1
BMP-XXX-17	Upper basin--at intersection of daisy and focosi	Wet Pond	Wet Pond	3.82	0.89	3,225	4.3
BMP-XXX-18	Daisy Lane	Detention Basin	Dry Pond/Detention Basin	2.59	0.75	2,707	6.1
BMP-XXX-19	Deer Hill Circle	Detention Basin	Dry Pond/Detention Basin	2.92	0.88	18,700	11.3
BMP-XXX-20	Jerad Dr btwn lot 1 and 2	Detention Basin	Dry Pond/Detention Basin	4.70	0.95	3,452	9.8
BMP-XXX-21	Jerad Dr btwn lot 4 and 5	Detention Basin	Dry Pond/Detention Basin	2.95	1.04	3,768	9.4
BMP-XXX-22	West of Jerad Drive Bend	Detention Basin	Dry Pond/Detention	6.58	2.29	8,322	20.9
BMP-XXX-23	Between Emma way and Mariana lane	Wet Pond	Wet Pond	7.36	2.13	7,728	11.8
BMP-XXX-24	Dinis Ave	Detention Basin	Dry Pond/Detention Basin	5.66	1.95	7,090	18.3

Town of Ludlow BMP Tracking

Revised: September 2021

BMP ID or Description	Location	BMP Type from Plans	Functional BMP Type to Match Model	Total Drainage Area (Ac)	Impervious Drainage Area (Ac)	Estimated Storage Volume (cf)	Estimated Nitrogen Removal (lb/yr)
BMP-XXX-25	Pinewood Circle	Detention Basin	Infiltration Basin (or	12.39	4.17	50,901	49.7
BMP-XXX-26	Rosewood Dr. larger basin	Infiltration Basin	Infiltration Basin (or practice)	14.43	2.29	59,833	33.6
BMP-XXX-27	Rosewood Dr. smaller basin	Infiltration Basin	Infiltration Basin (or practice)	12.69	1.37	34,763	21.8
BMP-XXX-28	At Sportsman Rd and Service Area Access Rd	Detention Basin	Dry Pond/Detention Basin	1.56	0.82	2,964	6.6
BMP-XXX-29	near Baird Middle School	Detention Basin	Dry Pond/Detention Basin	4.42	2.58	2,291	11.3
BMP-XXX-30	At Spring Meadow Dr and Sunbriar Ln	Detention Basin	Dry Pond/Detention Basin	6.81	2.45	17,500	26.1
BMP-XXX-31	Watson Lane	Detention Basin	Dry Pond/Detention Basin	10.09	2.89	10,476	27.4
BMP-XXX-32	North of Wedgewood Drive	Detention Basin	Dry Pond/Detention Basin	9.23	2.77	35,925	31.9
BMP-XXX-33	Westover Road near the air force base	Wet Pond	Wet Pond	4.63	0.00	246,586	0.7
BMP-XXX-34	Woodside Road	Detention Basin	Dry Pond/Detention Basin	2.23	0.93	15,300	9.8
BMP-XXX-35	Woodland Circle 1B	Detention Basin	Dry Pond/Detention Basin	4.03	1.55	5,623	14.6
BMP-XXX-36	Woodland Circle 2C	Detention Basin	Dry Pond/Detention Basin	6.44	2.27	8,226	21.4
BMP-XXX-37	Woodland Circle 2D	Detention Basin	Dry Pond/Detention Basin	9.93	2.44	8,845	25.3
BMP-XXX-38	Woodland Circle 2A	Detention Basin	Dry Pond/Detention Basin	4.31	1.47	5,329	13.4
BMP-XXX-39	DPW Yard	Dry Well	Infiltration Trench	0.41	0.37	170	1.1
BMP-XXX-40	DPW Yard	Dry Well	Infiltration Trench	0.43	0.42	170	1.0
Totals:				270.3	71.9		652

Subject CHW11 Catchment Investigation

To James Goodreau

From Billy Krukowski, P.E.
Suzanne Newman, P.E.

Our reference 2021 MS4 Permit Support

Date 9/28/2021

1 Background

The 2016 National Pollution Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Separate Storm Sewer Systems in Massachusetts (MS4) requires catchment investigations and the procedures for this investigation is detailed in the Town's Illicit Discharge Detection and Elimination Program (IDDE). Mott MacDonald has completed the catchment investigation for outfall CHW11, and the results are summarized below. This document is intended to document how the investigation was completed per the requirements of the permit, specifically Section 2.3.4.8.c.iii, which states: "All data collected as part of the dry and wet weather catchment investigations shall be recorded and reported in each annual report".

2 Catchment Description

Catchment area CHW11 is located in the southeastern area of town, a map of the catchment area is provided in **Appendix A**. The northern limit is just south of Windsor Street, and the southern limit is located along State Street. The area is further bounded by Berkshire Street on the west and Oakridge Street to the east. Storm drains are located along State Street only, collecting surface runoff from adjacent streets include Berkshire Street, Hampshire Street, Bristol Street, Duke Street, Essex Street, Franklin Street, Worcester Street, and Norwood Street. Some surface runoff from Oakridge Street flows across State Street, in an area with no curbing, to a wooded and grassy area. The remaining stormwater flows along State Street to catch basins along the northern curb line.

Flows from areas between Essex Street (DMH-1010) and First Avenue (DMH-1204) flow west to DHM-1009 located across from Duke Street. Flows collected between Berkshire Street (DMH-1012) and Bristol Street (DMH-1011) flow east to DMH-1009. Stormwater is then directed south through an easement to outfall CHW11.

Drain Manhole (DMH-1009) is the only key junction manhole in this area. As noted, the flow from upstream manholes is directed to this manhole and then continues to the outfall. Our investigations, as described below, began at this manhole and work upstream in each direction.

3 Catchment Investigation

Mott MacDonald utilized the catchment investigation procedures developed with the Town as part of the IDDE Plan. Prior to conducting field investigations, historic maps and plans were reviewed and system vulnerability factors (SVFs) were identified. After relevant available documents were reviewed and SVFs

identified, Mott MacDonald monitored weather forecasts for potential dry weather days on which the investigation could be conducted. On August 18th, 2021, Mott MacDonald and the Town of Ludlow investigated CHW11's catchment area including the dry weather manhole inspections. On August 19th, 2021, Mott MacDonald returned to the catchment area to perform wet weather manhole inspections

3.1 Maps, Plans and Other Data Sources

Mott MacDonald reviewed the plans titled "State Street Storm Drainage Improvements Combined Sewer Separation Overflow Abatement Project", dated February 2nd, 2001. These plans include sanitary and storm sewer systems as part of separation work performed throughout catchment area CHW11. The records were used to plan field activities and assess system vulnerability factors. Information related to historic septic systems was not available. Based on Town records, it is believed that the homes in the area are currently connected to public sewers, at the time of their construction. GIS data was reviewed and compared to plans; Mott MacDonald updated the GIS data to reflect both the plans and field observations where applicable.

In addition to the most recent construction plans of the storm sewer system, identified above, the table below, shows additional historic plans which were reviewed.

PLAN NUMBER	STREETS	PLAN NAME	PLAN TYPE	PLAN DATE
D-7-23	Berkshire Street, Hampshire Street, Bristol Street, Duke Street, Essex Street and Franklin Street.	Relocation of Domestic and Storm Sewers	Sanitary Relocation	April 20, 1935
D-9-15	State Street, Hamden Street, Berkshire Street, Hampshire Street, Bristol Street, Duke Street, Essex Street, Franklin Street. And Worcester Street	Assessment Plan, East and State Streets Trunk Sewer	Sanitary Relocation	Unknown
D-6-05	Duke Street	Duke Street Outfall Drain	Plan/Profile (outfall)	May, 1962
D-9-10(3)	Worcester Street	Worcester Street Sewer Construction	Sewer Construction	August, 1960
D-9-10(4)	Windsor Street	Windsor Street Sewer Construction	Sewer Construction	August, 1960

3.2 Manhole Inspection Methodology

Mott MacDonald, with the assistance of the Ludlow DPW, inspected manholes starting with the first manhole upstream (DMH-1009) of the outfall. The outfall for catchment area CHW11 is inaccessible due to its location along the Chicopee River. Manhole inspections followed the steps identified in the Town's IDDE Plan for dry weather inspections. Manholes were opened to check for signs of illicit flows and to confirm connection locations and sources. Signs of illicit flows that were checked include olfactory evidence (including odors such as sewerage, must, sulfur, ammonia, and petroleum) and

visual evidence (such as floatables, pet waste, oil sheen, sanitary waste, algae, or foams). No flow was observed and therefore no samples were taken. The area was not flagged for further upstream investigation since no signs of illicit discharge were observed and no flow was observed during inspection. Mott MacDonald returned to DMH-1009 the following day, to collect wet weather samples for screening. Inspections followed the Town's IDDE plan for Wet Weather manhole inspections.

3.3 System Vulnerability Factors (SVF)

During our review of historic records, Mott MacDonald identified system vulnerabilities and has updated the Town's IDDE accordingly. A copy of the system vulnerability factors can be found in **Appendix B**. A sanitary sewer overflow event in the area of 68 Franklin Street, that did not result in a discharge to surface water, occurred in 2016. No other known SSO events have occurred in this area. Other system vulnerability factors identified include an ageing sanitary infrastructure and a sewer separation project which occurred in 2001 along State Street.

The SSO event, caused by a blockage, is now over five (5) years old. With no other events occurring within the catchment area this event is no longer considered a system vulnerability factor. During the catchment investigation, the system was inspected to investigate whether the historic combined sewer system should still be considered a SVF. Drain manholes and sanitary manholes were opened and flows associated with their respective storm and sanitary inputs were observed. While flows from sanitary sewer were present, no identifiable flow from storm sewers were observed during dry weather manhole inspections. Sanitary sewers were flowing approximately 25% full during our dry weather manhole inspections.

3.4 Key Junction Manholes and Piping

The Key junction manhole (DMH-1009) was opened and investigated. A Manhole Inspection form was completed in accordance with the IDDE and is attached in **Appendix C**. Five inlet pipes and one outlet pipe were identified. Inlets are contributing flow from directly connected catch basins (CB-319, 320, & 2466) and from upstream manholes (DMH-1010 & 1011) that convey catch basin flows from within the catchment area. All pipes are constructed of reinforced concrete and appear to be in good condition. The age of the storm infrastructure is approximately 20 years. No flow was observed, no signs of illicit discharges were observed, and no olfactory evidence was noticed.

Mott MacDonald proceeded upstream to DMH-1012, which is the western most upstream manhole in the catchment area. When observing the manhole, Mott MacDonald noticed a large diameter pipe (headed north to Berkshire Street) that was not shown on the record plans and no flow was observed in this pipe. Due to the geometry of the manhole, a limited view upstream of this pipe was available. Mott MacDonald returned to this manhole (DMH-1012) during wet weather manhole inspections and confirmed the pipe is likely bulkheaded and no inflow came from the north.

Mott MacDonald then proceeded to the east and inspected a sanitary manhole of concern. On the historic plans (State Street Storm Drainage, Sheet 3 of 5, Dated February 10, 2001), a secondary pipe to an outfall was identified. The pipe is called out as an 18-inch pipe of unspecified material. This indicated an illicit discharge could be occurring. Upon further review, the pipe in question was previously removed and a new 15-inch PVC pipe serving as a lateral to the Encompass Health complex is currently connected 2 feet above the previous outlet. Thus, no illicit connection is suspected at this location.

Continuing upstream to the east, Mott MacDonald investigated manhole at the intersection of Worcester Street and State Street (DMH01208 & 1207). Based on available mapping, the sanitary and

storm sewers were installed with similar inverts in this area. Where the two systems cross, it was possible that either the sanitary or the storm was laid over the other. Our investigation revealed that the storm sewer was constructed above the existing sanitary sewer, and therefore is not considered a system vulnerability factor.

Mott MacDonald then continued upstream to the most eastern area. This area was investigated to ensure the catchment limits are accurately represented. During this investigation, MacDonald also walked down First Avenue since the topography in the area would not permit stormwater from First Avenue to gravity flow to State Street. Mott MacDonald discovered a previously unknown outfall that discharges to land and potentially reaching the Chicopee River. An outfall (CHW12) and corresponding catchment area were subsequently created, and a separate catchment investigation was completed.

4 Catchment Investigation Results

Mott MacDonald has completed the catchment investigation for catchment area CHW11.

Dry Weather sampling: No samples taken as no flow was observed.

Wet Weather sampling: Wet Weather samples were taken on August 19th, the day following our dry weather inspections. As recorded by the NOAA weather station (KCEF) Westover Air Force Base, rain for August 19th totaled 0.74 inches. At the time of our sampling, the rainfall event started 2 hours beforehand and the first flush is presumed to have passed. Samples were taken from DMH-1009, the key junction manhole. The results of the field screening for ammonia, surfactants, chlorine, salinity/conductivity indicated that all were below the thresholds to indicate an illicit discharge. Mott MacDonald utilized field test kits and field equipment, as indicated below, to obtain these tests. Results are summarized below.

Parameter	Benchmark	Test results	Test Equipment	Indication of illicit discharge?
Ammonia	<.5 mg/L	Below detectable limit	Chemetrics K-1420 Test Kit	No
Surfactants	<.25 mg/L	Below detectable limit	Chemetrics K-9400 Test Kit	No
Chlorine	<.02 mg/L	Less than 0.02 mg/L	HACH Pocket Colorimeter	No
Salinity	1818.5 g/L ¹	624.03 g/L	Oakton 450	No
Conductivity	2000 uS	748.2 uS	Oakton 450	No

¹Salinity benchmark converted from conductivity ($\text{uS}^1 \cdot 1.0878 \cdot .4665 = \text{g/L}$)

Conclusion:

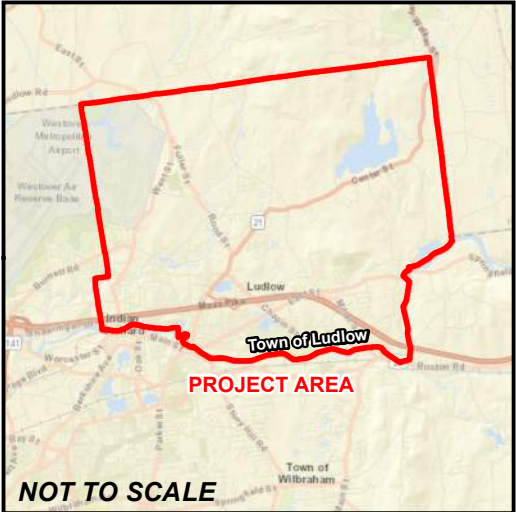
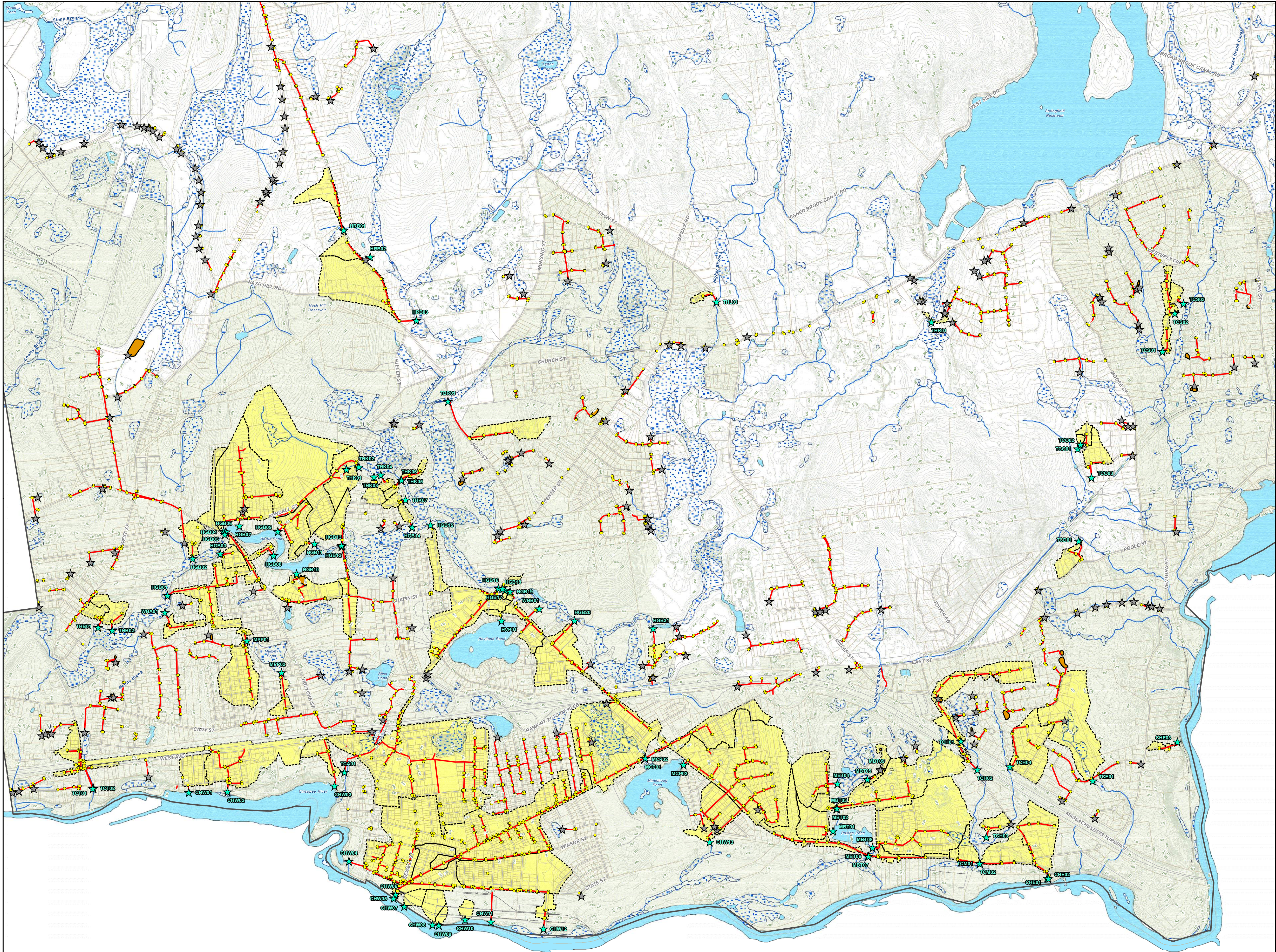
The Catchment Investigation for CHW11 is complete. No illicit discharges were identified. No future action is needed based on the lack of evidence of illicit discharges occurring.

Appendices

Appendix A – Overall Area Map

Appendix B – System Vulnerability Factors

Appendix C – Manhole Inspection Forms



Legend

- | | |
|-------------------|----------------------------------|
| ★ MS4 OUTFALL | — STORM SEWER |
| ★ NON-MS4 OUTFALL | ▨ CATCHMENT |
| ● CATCH BASIN | ▨ MS4 BOUNDARY |
| | ■ STORMWATER TREATMENT STRUCTURE |

EXISTING LAND/ROW

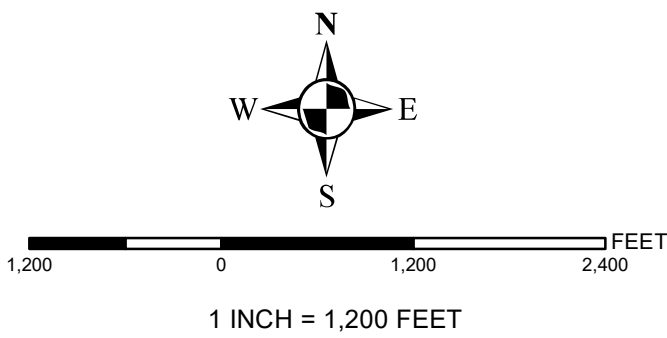
- | |
|-------------------|
| — ROAD |
| — RAILROAD |
| ▨ PARCEL BOUNDARY |
| ▨ TOWN BOUNDARY |

EXISTING ENVIRONMENTAL FEATURES

- | |
|-------------------------|
| — HYDROLOGIC CONNECTION |
| ▨ WETLAND |
| ▨ OPEN WATER |

EXISTING CONTOUR

- | |
|---------------------------|
| — 250' MAJOR CONTOUR (5') |
|---------------------------|



MS4 STORM SEWER SYSTEM MAPPING

Town of Ludlow, MA

NOTES: Basemap data sourced from the Town of Ludlow and MassGIS.
MS4 Boundaries digitized from the EPA US Census map.

FOR INFORMATIONAL PURPOSES ONLY

DRAWN BY: EAP 06/27/2019 REV. DATE: 09/2021

PREPARED BY

M
M
MOTT
MACDONALD

PREPARED FOR



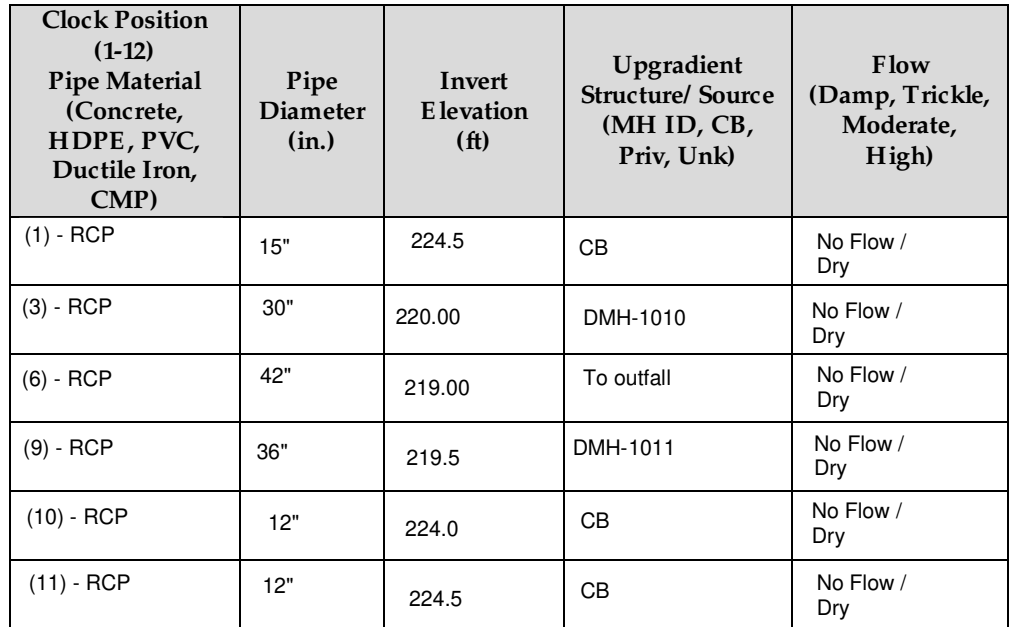
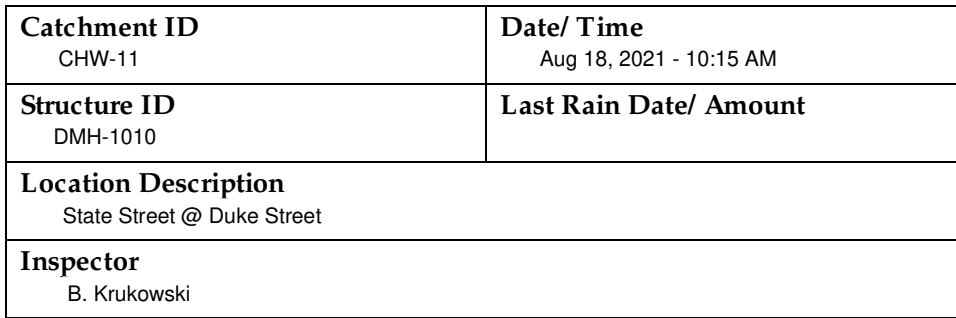
Outfall Catchment System Vulnerability Factor (SVF) Inventory Town
of Ludlow, Massachusetts
Revision Date: September 22, 2021

Outfall ID	Receiving Water	1 History of SSOs	2 Common or Twin Invert Manholes	3 Common Trench Construction	4 Storm/Sanitary Crossings (Sanitary Above)	5 Sanitary Lines with Underdrains	6 Inadequate Sanitary Level of Service	7 Areas Formerly Served by Combined Sewers	8 Sanitary Infrastructure Defects	9 SSO Potential in Event of System Failures	10 Sanitary and Storm Drain Infrastructure >40 years Old	11 Septic with Poor Soils or Water Table Separation	12 History of BOH Actions Addressing Septic Failure
CHW11	MA36-24	No	No	No	No	No	No	Yes	No	No	Yes	No	No

Presence/Absence Evaluation Criteria:

- History of SSOs, including, but not limited to, those resulting from wet weather, high water table, or fat/oil/grease blockages
- Common or twin-invert manholes serving storm and sanitary sewer alignments
- Common trench construction serving both storm and sanitary sewer alignments
- Crossings of storm and sanitary sewer alignments where the sanitary system is shallower than the storm drain system
- Sanitary sewer alignments known or suspected to have been constructed with an underdrain system
- Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints
- Areas formerly served by combined sewer systems
- Sanitary sewer infrastructure defects such as leaking service laterals, cracked, broken, or offset sanitary infrastructure, directly piped connections between storm drain and sanitary sewer infrastructure, or other vulnerability factors identified through Inflow/Infiltration Analyses, Sanitary Sewer Evaluation Surveys, or other infrastructure investigations
- Sewer pump/lift stations, siphons, or known sanitary sewer restrictions where power/equipment failures or blockages could readily result in SSOs
- Any sanitary sewer and storm drain infrastructure greater than 40 years old
- Widespread code-required septic system upgrades required at property transfers (indicative of inadequate soils, water table separation, or other physical constraints of the area rather than poor owner maintenance)
- History of multiple Board of Health actions addressing widespread septic system failures (indicative of inadequate soils, water table separation, or other physical constraints of the area rather than poor owner maintenance)

Appendix C



COMMENTS:

Further investigation needed? ☐ Yes ☒ No