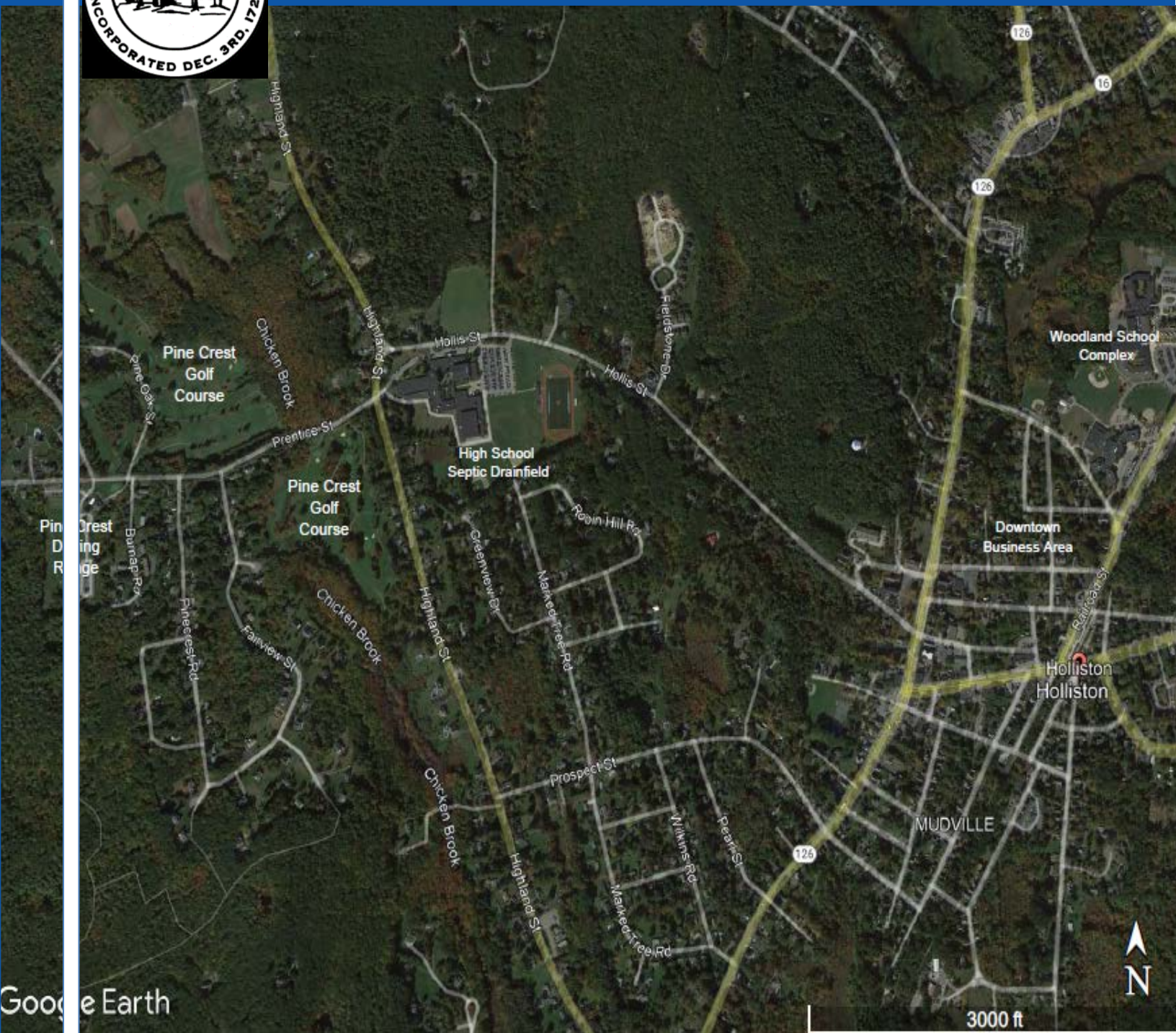
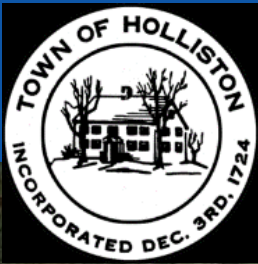


# HOLLISTON DOWNTOWN BUSINESS DISTRICT SEWER FEASIBILITY ANALYSIS



Submitted to:  
Town of Holliston  
703 Washington Street  
Holliston, MA 01746

October 17, 2022

Environmental Engineers/Consultants  
**LOMBARDO ASSOCIATES, INC.**

188 Church Street, Newton, Massachusetts 02458

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**Authorization:** The Town of Holliston retained Lombardo Associates, Inc. to perform Wastewater Treatment Plant Modernization and Downtown Sewer Connectivity Analysis, along with a preliminary estimate of Woodland Street site disposal capacity. This Report provides downtown Holliston sewer layout options and preliminary cost estimates.

Other Project Reports are:

- ✓ Existing Hydrogeologic Conditions Report & Initial Disposal Capacity Estimates
- ✓ Modernization Recommendations
  - Immediate – issued Sept. 23, 2022
  - Report – October – November 2022



# 1 INTRODUCTION

## 1.1 INTRODUCTION

The Town of Holliston retained Lombardo Associates, Inc. (LAI) for planning and design engineering services to modernize / upgrade its existing Wastewater Treatment Plant (WWTP), located at 100 Linden Street, and evaluate connecting the downtown Holliston business district to the existing WWTP, expanded as needed. This Report addresses the project's evaluation of sewerage the downtown Holliston Business District I (Study Area) and connecting to the Woodland School Complex WWTP. The Study Area consists of the Village Commercial Zone and downtown Industrial Zone as defined in the Town Zoning Code and as shown on Figure 1-1, which was extracted from the Holliston GIS website, <https://www.mapsonline.net/hollistonma/index.html>.

## 1.2 STUDY AREA WASTEWATER FLOWS

Wastewater design flows are determined based upon building type and size and code flow tables for building type. When a building type category is not available, wastewater design flows are calculated as 200% of average water use. For planning purposes only, existing Study Area development wastewater design flows were estimated based upon water use rather than an examination of uses of each building in the Study Area.

To determine water use in the Study Area, available Town water use records were obtained. For properties that did not have available water use data, water use was estimated by Town personnel. Table A-1 in Appendix A presents a lot-by-lot summary of water use, including information on if it was estimated. For the Study Area properties, the water use based average daily flow is 14,663-gpd, which would result in an existing wastewater design flow of 29,327-gpd, say 30,000 gpd. Of the 127 properties in the Study Area, 111 have water use records or estimates (i.e., 16 are vacant) and 72 have water use records.

## 1.3 STUDY AREA SEWER OPTIONS

The Study Area topography generally slopes from the West and East towards the Winthrop Canal that runs North-South near the center. The topography also generally slopes down from North to South, with a high point on Linden Road.

The Study Area topography presents the following challenges:

- Gravity sewers on streets that slope down to a local low point will require pump stations near the low points to avoid excessively deep sewers. The majority of the streets in the northeast portion of the Study Area have numerous low points, a condition that favors pressure sewers.
- Siting pump stations near each low point requires unsuitable sites which do not appear to be available.
- Lack of consistent slope in the Study Area requires individual house pumps and low-pressure sewers to avoid deep gravity sewers where roads change slope from downhill to uphill in the direction of flow

- State Highway 16 (Washington Street) runs through a portion of the Study Area. Connecting properties along this route with sewers and house connections installed in the State Highway introduces significant permitting and construction issues.

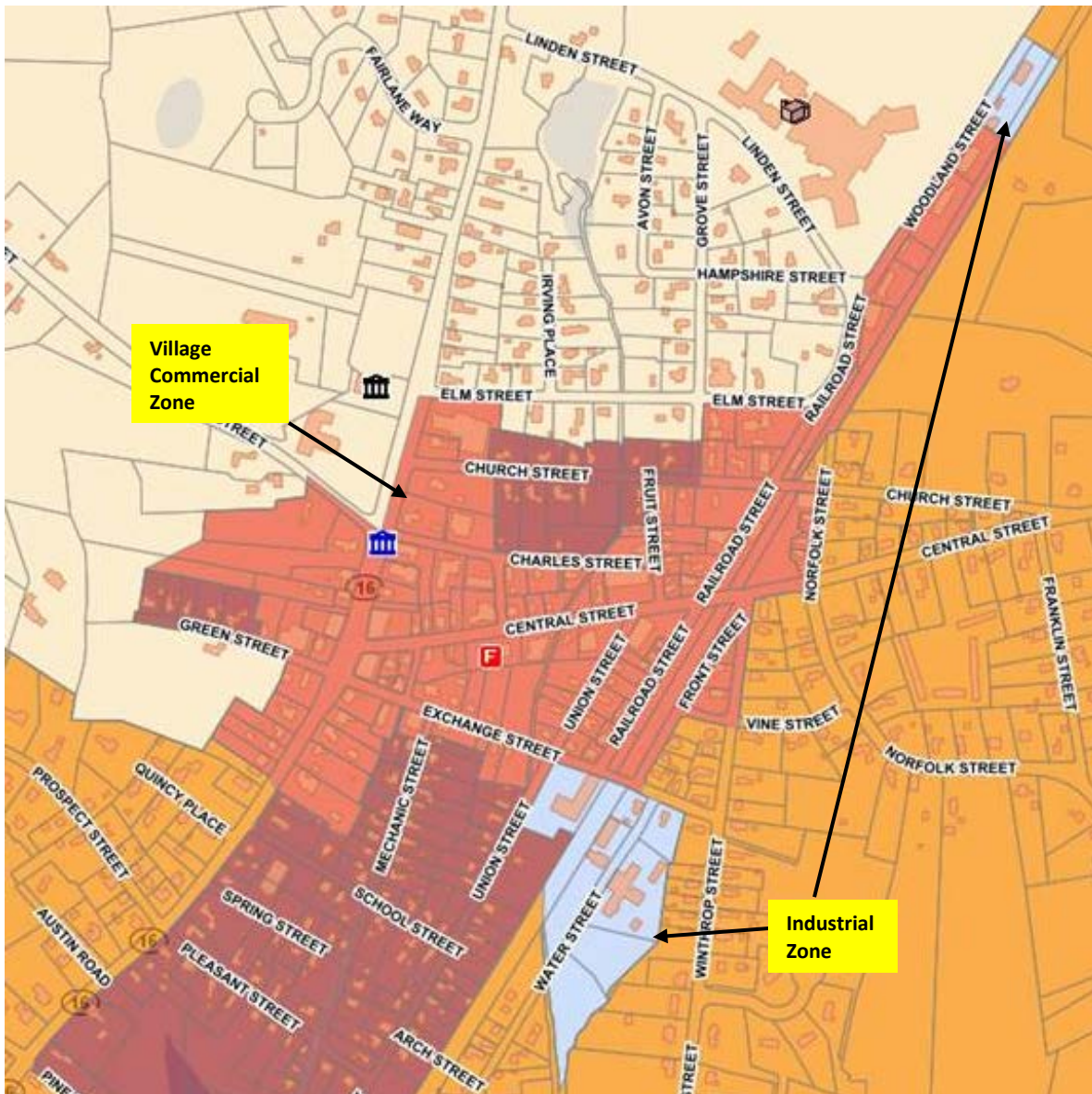


Figure 1-1 Downtown Holliston Business District Map

The following sewerage scenarios were developed and evaluated:

- Option 1 – Hybrid System with Cross-Property Routes.** This approach minimizes sewers in the street and utilizes a combination of gravity sewers, a pump station and pressure sewers with individual house pumps. Gravity and pressure sewers are proposed to traverse lots to avoid sewers in Washington and other Streets and to shorten the length of house connections. Easements will be needed for the Cross-Property Route.
- Option 2 – Hybrid System – No Cross-Property Routes.** This option uses gravity sewers to a pump station with house pumps and low-pressure sewers for properties that

are not feasible to connect by gravity. All sewer piping will be in the streets and/or on Town property. Sewers for this option are generally deeper due to undulating topography along the sewer route/roadways. In addition, many of the septic tanks are in the back yards requiring significantly longer house connections to the sewer in the street.

- **Option 3 – All pressure – No Cross-Property Routes.** This option utilizes house pumps for all connected properties and low-pressure sewers in the streets.

The all gravity with multiple pump stations and no cross-country lines option was not evaluated due to the large number of pump stations required and the lack of available sites to locate the needed pump stations.

Option 1 – Hybrid with Cross Country Route

Figure 1-2 & 1-2A

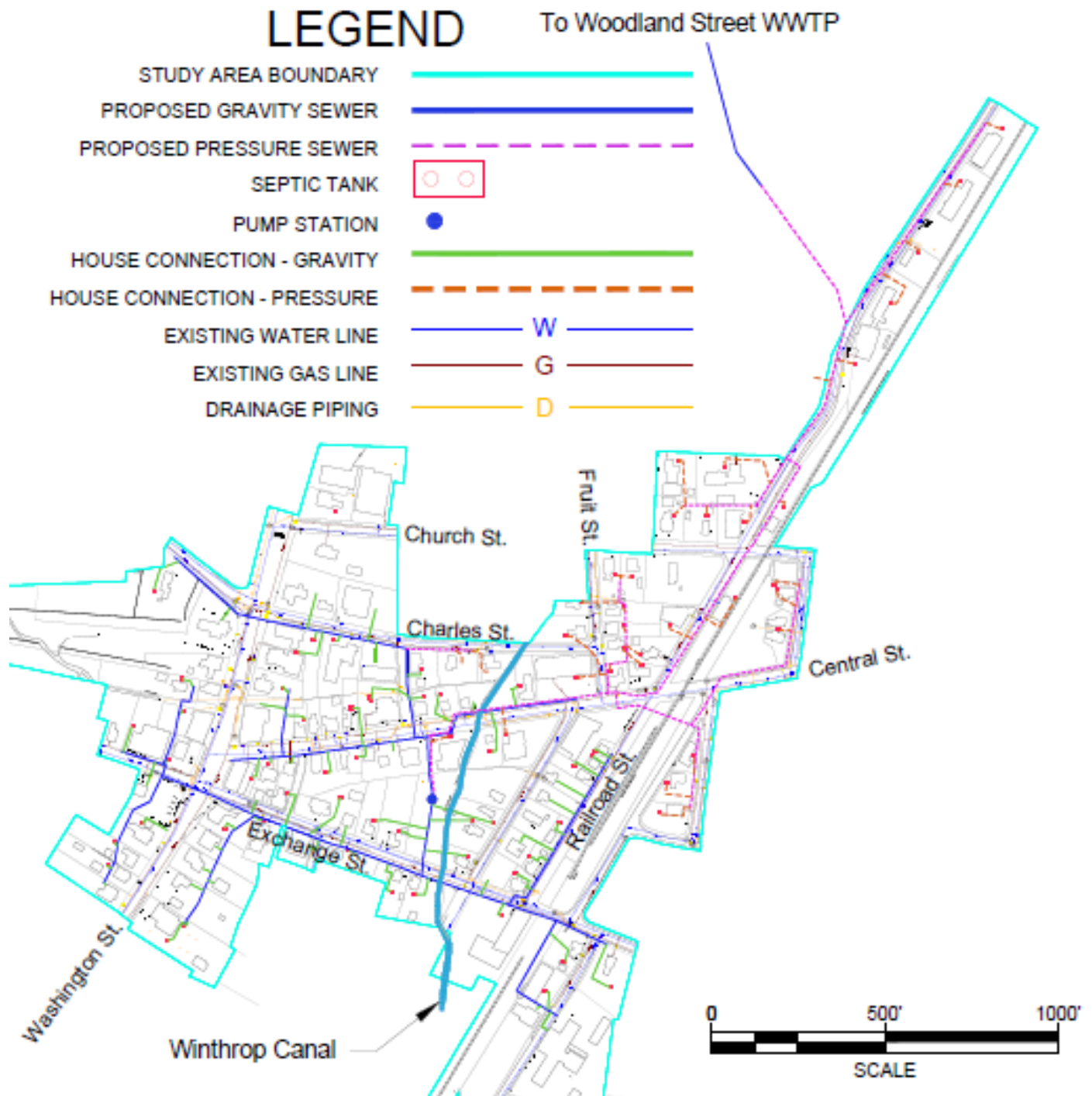
Option 2 – Hybrid System – No Cross-Property Routes

Figure 1-3

Option 3 – All pressure – No Cross-Property Routes

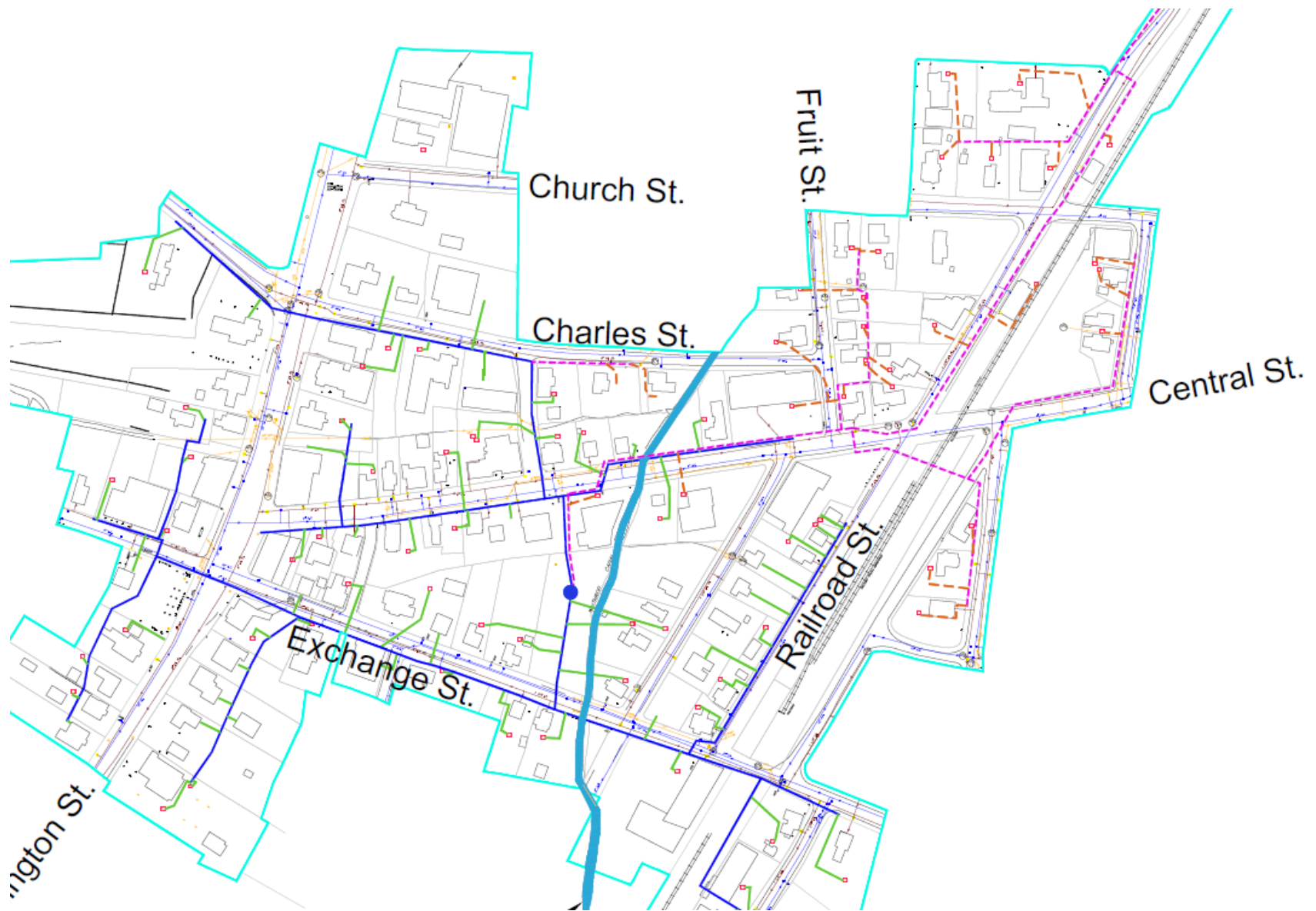
Figure 1-4

Option 1 is presented on Figure 1-2, with expanded scale detail on Figure 1-2A. Full scale (24" x 36") drawings of the three options are presented in Appendix B. Full scale (24" x 36") drawings of Option 1 – Hybrid with Cross Country Route are presented in Appendix C.

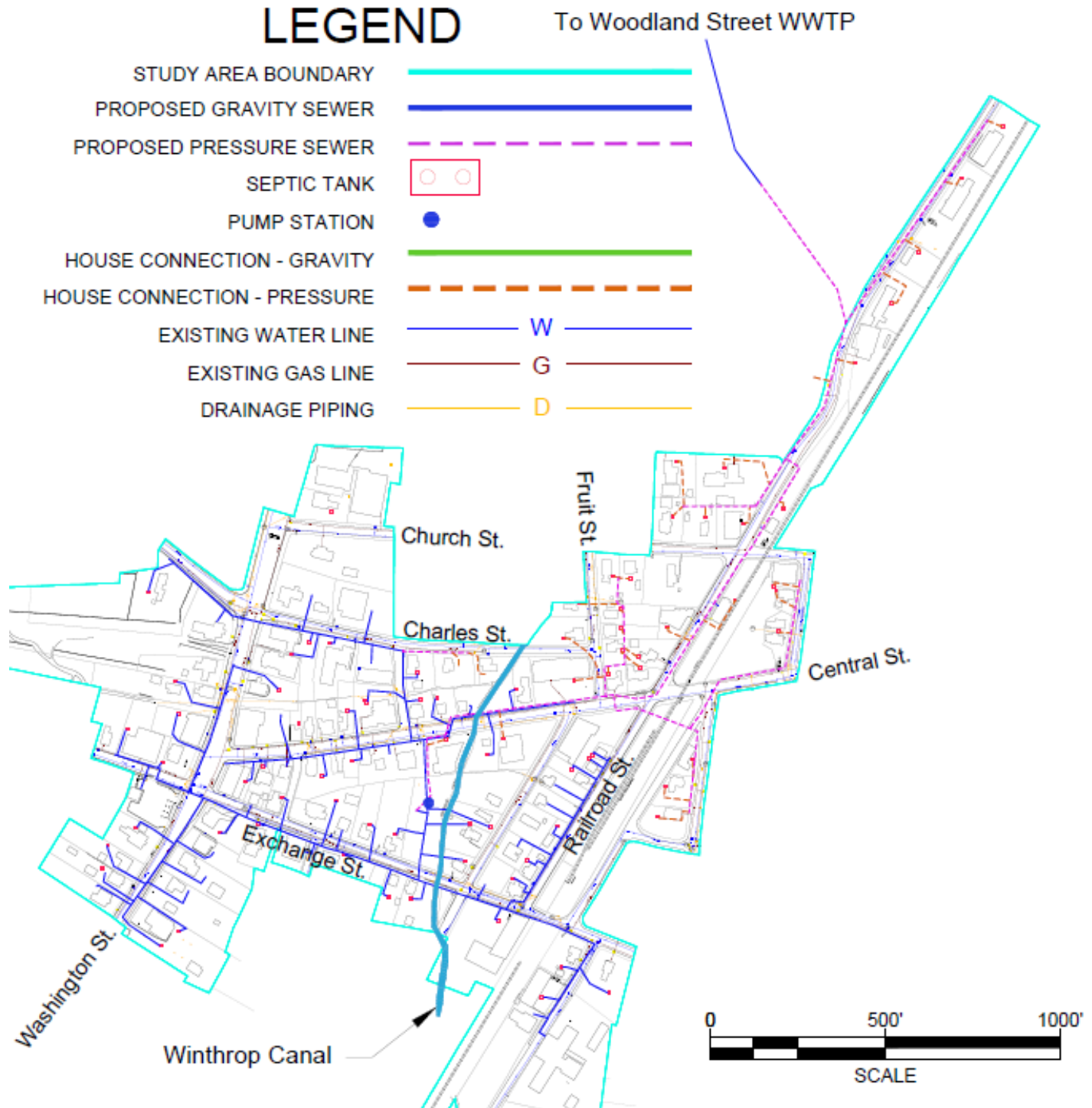


**Figure 1-2 Downtown Holliston Sewer Option 1 – Hybrid w/Cross Country**



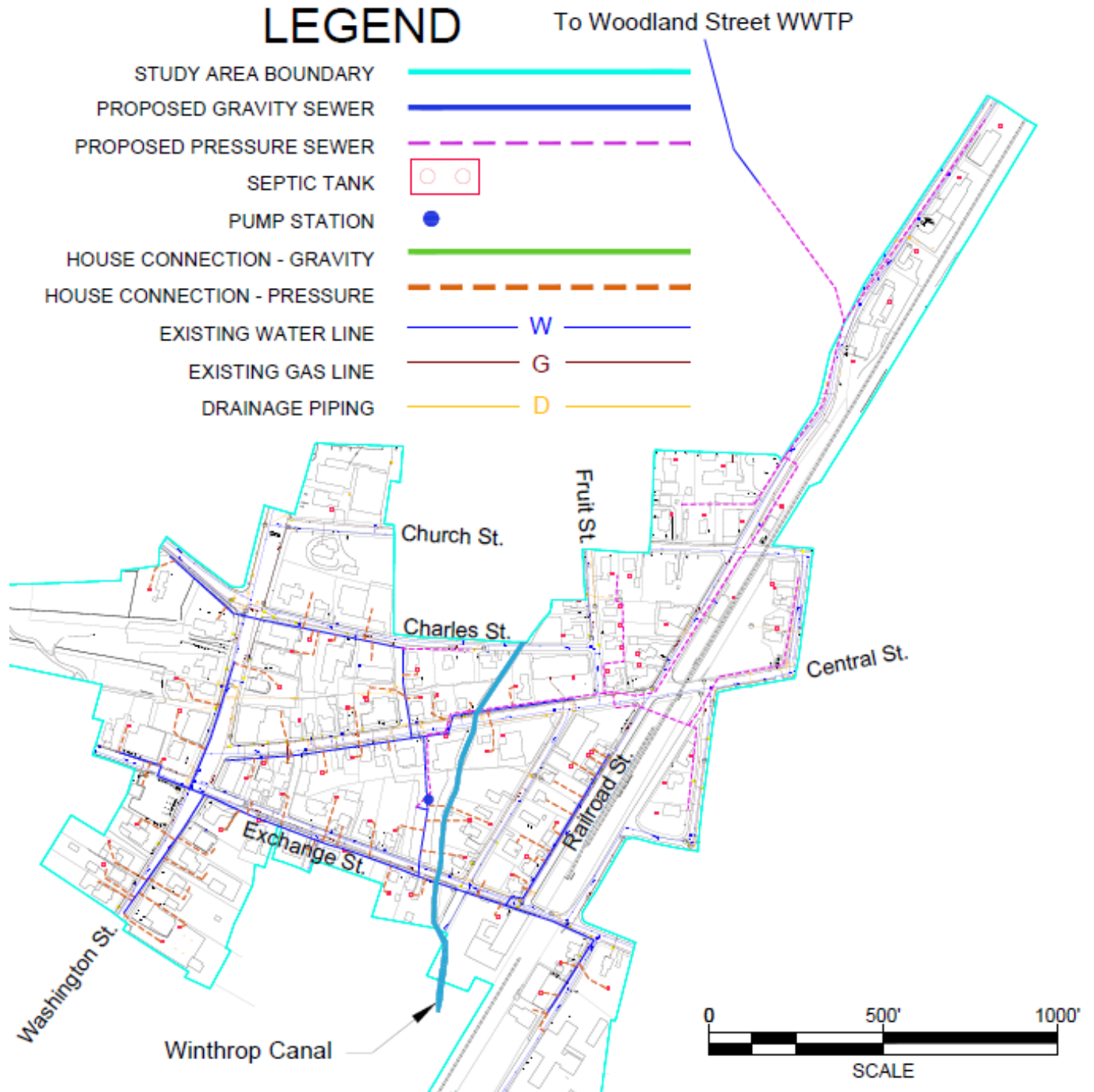


**Figure 1-2A Downtown Holliston Sewer Option 1 Hybrid w/Cross Country–Enlarged Detail**



**Figure 1-3 Downtown Holliston Sewer Option 2 – Hybrid no Cross Country**





## 1.4 COLLECTION SYSTEM COSTS

Cost estimates have been developed for the various options on the following Tables.

Option 1 – Hybrid with Cross Country Route	Table 1-1
Option 2 – Hybrid System – No Cross-Property Routes	Table 1-2
Option 3 – All pressure – No Cross-Property Routes	Table 1-3

A summary of the options costs is presented on Table 1-4.

**Table 1-1 Sewer Option 1 - Hybrid with Cross Country Route - Cost Estimate**

Holliston Collection System Quantities and Preliminary Cost Estimate							
On-Prop. Work	Pressure House Sys., Existing Tank			24	EA	\$7,500.00	\$180,000
	Pressure House Sys., New Tank			11	EA	\$9,000.00	\$99,000
	Gravity Systems			71	EA	\$500.00	\$35,500
	Property Connections to Sewer			106	EA	\$3,000.00	\$318,000
	Abandon Existing Septic Systems			106	EA	\$1,500.00	\$159,000
Collection System	Sewer - Cross Country	SDR 35	4" gravity	2,960	LF	\$80.00	\$236,800
	Sewer - Road Shoulder	SDR 35	4" gravity	2,490	LF	\$100.00	\$249,000
	Stream Crossing - Sewer	SDR 35	4" gravity	80	LF	\$250.00	\$20,000
	Town Road Crossing - Sewer	SDR 35	4" gravity	150	LF	\$150.00	\$22,500
	State Road Crossing - Sewer	SDR 35	4" gravity	170	LF	\$300.00	\$51,000
	Force Main - In Trench w/Gravity	SDR 26	3" pressure	650	LF	\$50.00	\$32,500
	Force Main - Cross Country	SDR 26	3" pressure	810	LF	\$80.00	\$64,800
	Force Main - Road Shoulder	SDR 26	3" pressure	3,970	LF	\$150.00	\$595,500
	Small Pump Station			0	EA	\$90,000	\$0
	Large Pump Station			1	EA	\$150,000	\$150,000
	Asphalt cut, remove and replace	4	ft wide	3,698	SY	\$65.00	\$240,000
	<b>Subtotal - Collection System Construction Costs</b>						<b>\$2,453,600</b>
	Miscellaneous			10%			\$245,400
	Contingency			20%			\$490,700
	Engineering & Admin			25%			\$797,400
	<b>Total Collection System Capital Costs</b>						<b>\$3,987,100</b>

**Table 1-2 Sewer Option 2 Hybrid System – No Cross-Property Routes - Cost Estimate**

Holliston Collection System Quantities and Preliminary Cost Estimate							
On-Prop. Work	Pressure House Sys., Existing Tank			24	EA	\$7,500.00	\$180,000
	Pressure House Sys., New Tank			11	EA	\$9,000.00	\$99,000
	Gravity Systems			71	EA	\$500.00	\$35,500
	Property Connections to Sewer			106	EA	\$3,500.00	\$371,000
	Abandon Existing Septic Systems			106	EA	\$1,500.00	\$159,000
Collection System	Sewer - Cross Country	SDR 35	4" gravity	4,660	LF	\$80.00	\$372,800
	Sewer - Road Shoulder	SDR 35	4" gravity	0	LF	\$100.00	\$0
	Stream Crossing - Sewer	SDR 35	4" gravity	80	LF	\$250.00	\$20,000
	Town Road Crossing - Sewer	SDR 35	4" gravity	150	LF	\$150.00	\$22,500
	State Road Sewers	SDR 35	4" gravity	850	LF	\$300.00	\$255,000
	Force Main - In Trench w/Gravity	SDR 26	3" pressure	650	LF	\$50.00	\$32,500
	Force Main - Cross Country	SDR 26	3" pressure	810	LF	\$80.00	\$64,800
	Force Main - Road Shoulder	SDR 26	3" pressure	3,970	LF	\$150.00	\$595,500
	Small Pump Station			0	EA	\$90,000	\$0
	Large Pump Station			1	EA	\$150,000	\$150,000
	Asphalt cut, remove and replace	4	ft wide	2,893	SY	\$65.00	\$188,000
	<b>Subtotal - Collection System Construction Costs</b>						<b>\$2,545,600</b>
	Miscellaneous			10%			\$254,600
	Contingency			20%			\$509,100
	Engineering & Admin			30%			\$992,800
	<b>Total Collection System Capital Costs</b>						<b>\$4,302,100</b>

**Table 1-3 Sewer Option 3 All pressure – No Cross-Property Routes - Cost Estimate**

Holliston Collection System Quantities and Preliminary Cost Estimate							
On-Prop. Work	Pressure House Sys., Existing Tank			80	EA	\$7,500.00	\$600,000
	Pressure House Sys., New Tank			26	EA	\$9,000.00	\$234,000
	Gravity Systems			0	EA	\$500.00	\$0
	Property Connections to Sewer			106	EA	\$3,000.00	\$318,000
	Abandon Existing Septic Systems			106	EA	\$1,500.00	\$159,000
Collection System	Low Pressure Sewer - Town Road	SDR 35	4" gravity	9,000	LF	\$150.00	\$1,350,000
	Low Pressure Sewer - State Highway	SDR 35	4" gravity	810	LF	\$300.00	\$243,000
	Stream Crossing - Sewer	SDR 35	4" gravity	80	LF	\$250.00	\$20,000
	Asphalt cut, remove and replace	4	ft wide	4,396	SY	\$65.00	\$286,000
	<b>Subtotal - Collection System Construction Costs</b>						<b>\$3,210,000</b>
	Miscellaneous			10%			\$321,000
	Contingency			20%			\$642,000
	Engineering & Admin			25%			\$1,043,300
	<b>Total Collection System Capital Costs</b>						<b>\$5,216,300</b>



**Table 1-4 Sewer Options – Costs Summary**

<b>SCENARIO</b>	<b>Description</b>	<b>Capital Costs</b>	<b># of Pressure Systems</b>	<b># of Gravity Systems</b>
<b>OPTION 1</b>	Hybrid gravity / pump station / pressure sewers with some intercepting sewers running through properties (cross country)	<b>\$3,987,100</b>	<b>35</b>	<b>71</b>
<b>OPTION 2</b>	Hybrid gravity / pump station / pressure sewers with intercepting sewers in streets only (no cross country runs)	<b>\$4,302,100</b>	<b>35</b>	<b>71</b>
<b>OPTION 3</b>	Pressure Sewer System, no cross country runs	<b>\$5,216,300</b>	<b>106</b>	<b>0</b>

## APPENDIX A WATER USE BASED WASTEWATER FLOWS

Table A-1 Study Area Water Use 2019 & 2021-2022

#	PARCEL ID	SITE_ADDR	REPORT YES / (N=ESTIMATED) (N/A=VACANT)	ANNUAL USAGE CF	Daily Avg. Water Use (gpd)	Water Use Based WW Design Flow (gpd)
1	008.F-0002-0002.0	21 CENTRAL ST	N	1,604	33	66
2	008.F-0002-0005.0	29 CENTRAL ST	Y	4,041	83	166
3	008.F-0003-0014.0	30 CENTRAL ST	Y	5,448	112	223
4	008.F-0003-0013.0	36 CENTRAL ST	N	5,108	105	209
5	008.F-0003-0012.0	44 CENTRAL ST	Y	2,830	58	116
6	008.F-0003-0011.0	48 CENTRAL ST	Y	519	11	21
7	008.F-0002-0007.0	49 CENTRAL ST	N	5,692	117	233
8	008.F-0003-0009.0	54 CENTRAL ST	Y	1,412	29	58
9	008.F-0002-0009.0	59 CENTRAL ST	N	2,868	59	118
10	008.F-0003-0016.0	64 CENTRAL ST	N	700	14	29
11	008.F-0003-0017.0	70 CENTRAL ST	Y	2,196	45	90
12	008.F-0002-0010.0	75 CENTRAL ST	N	928	19	38
13	008.F-0003-0018.0	76 CENTRAL ST	N	1,228	25	50
14	008.F-0002-0011.0	79 CENTRAL ST	Y	890	18	36
15	008.F-0002-0012.0	85 CENTRAL ST	N	2,540	52	104
16	008.F-0003-0022.0	88 CENTRAL ST	Y	12,578	258	516
17	008.F-0003-0023.0	100 CENTRAL ST	Y	19,226	394	788
18	008.F-0002-0013.0	101 CENTRAL ST	Y	5,341	109	219
19	008.F-0003-0042.0	110 CENTRAL ST	N	5,230	107	214
20	008.F-0008-0002.0	132 CENTRAL ST	Y	18,321	375	751
21	008.F-0003-0007.0	21 CHARLES ST	Y	10,486	215	430
22	008.F-0003-0033.0	26 CHARLES ST	N	5,230	107	214
23	008.F-0003-0047.0	27 CHARLES ST	N	5,212	107	214
24	008.F-0003-0015.0	35 CHARLES ST	N	12,325	253	505
25	008.F-0003-0019.0	43 CHARLES ST	Y	4,245	87	174
26	008.F-0003-0020.0	51 CHARLES ST	Y	3,277	67	134
27	008.A-0004-0001.0	8 CHURCH ST	Y	15,139	310	620
28	008.F-0003-0037.0	77 CHURCH ST	Y	6,767	139	277
29	008.A-0004-0018.0	86 CHURCH ST	N	734	15	30
30	008.F-0003-0038.0	89 CHURCH ST	Y	2,252	46	92
31	008.A-0004-0017.0	96 CHURCH ST	Y	5,967	122	245
32	008.A-0004-0016.0	102 CHURCH ST	Y	24,013	492	984
33	008.A-0005-0001.0	110 CHURCH ST	Y	700	14	29
34	008.A-0004-0014.0	83 ELM ST	Y	10,218	209	419
35	008.A-0004-0015.0	95 ELM ST	Y	26,946	552	1,104

Table A-1, cont.

#	PARCEL ID	SITE_ADDR	REPORT YES / (N=ESTIMATED) (N/A=VACANT)	ANNUAL USAGE CF	Daily Avg. Water Use (gpd)	Water Use Based WW Design Flow (gpd)
36	008.F-0004-0011.0	91 EXCHANGE ST	Y	2,371	49	97
37	008.F-0001-0072.0	EXCHANGE ST	N/A	N/A		0
38	008.F-0002-0028.0	EXCHANGE ST	N/A	N/A		0
39	008.F-0002-0003.0	10 EXCHANGE ST	Y	8,984	184	368
40	008.F-0001-0067.0	13 EXCHANGE ST	Y	5,510	113	226
41	008.F-0002-0004.0	14 EXCHANGE ST	N	4,375	90	179
42	008.F-0001-0065.0	19 EXCHANGE ST	Y	2,158	44	88
43	008.F-0002-0032.0	22 EXCHANGE ST	N	11,867	243	486
44	008.F-0002-0030.0	36 EXCHANGE ST	N	8,052	165	330
45	008.F-0002-0029.0	44 EXCHANGE ST	Y	2,036	42	83
46	008.F-0001-0030.0	45 EXCHANGE ST	N	5,688	117	233
47	008.F-0001-0031.0	49 EXCHANGE ST	Y	4,215	86	173
48	008.F-0002-0022.1	74 EXCHANGE ST	Y	5,189	106	213
49	008.F-0001-0040.0	75 EXCHANGE ST	Y	987	20	40
50	008.F-0004-0012.0	99 EXCHANGE ST	Y	10,168	208	417
51	008.F-0003-0043.0	11 FRUIT ST	Y	5,302	109	217
52	008.F-0003-0044.0	15 FRUIT ST	Y	6,661	137	273
53	008.F-0003-0024.0	16 FRUIT ST	Y	10,110	207	414
54	008.F-0003-0045.0	19 FRUIT ST	Y	6,366	130	261
55	008.F-0003-0025.0	22 FRUIT ST	Y	1,669	34	68
56	008.F-0003-0036.0	29 FRUIT ST	N	3,905	80	160
57	008.E-0003-0069.0	0 GREEN ST	N/A	N/A		0
58	008.E-0003-0061.0	9 GREEN ST	N/A	NO METER		0
59	008.E-0003-0084.0	21 GREEN ST	Y	4,086	84	167
60		1244 HIGHLAND ST	N	4,063	83	167
61	008.E-0003-0078.0	20 HOLLIS ST	N	2,318	48	95
62	008.F-0001-0029.0	4 MECHANIC ST	N	6,324	130	259
63	008.F-0008-0004.0	25 NORFOLK ST	N	10,475	215	429
64	008.F-0008-0018.0	29 NORFOLK ST	Y	6,918	142	284
65	008.F-0008-0003.0	33 NORFOLK ST	Y	2,706	55	111
66	008.F-0002-0034.0	0 RAILROAD ST	N/A	N/A		0
67	008.F-0002-0033.1	0 RAILROAD ST	N/A	N/A		0
68	008.F-0002-0021.1	8 RAILROAD ST	Y	8,740	179	358
69	008.F-0002-0019.0	14 RAILROAD ST	Y	5,387	110	221
70	008.F-0002-0016.0	32 RAILROAD ST	Y	4,664	96	191



Table A-1, cont.

#	PARCEL ID	SITE_ADDR	REPORT YES / (N=ESTIMATED) (N/A=VACANT)	ANNUAL USAGE CF	Daily Avg. Water Use (gpd)	Water Use Based WW Design Flow (gpd)
71	008.F-0002-0015.0	34 RAILROAD ST	Y	4,232	87	173
72	008.F-0002-0014.0	38 RAILROAD ST	N	5,617	115	230
73	008.F-0003-0041.0	62 RAILROAD	Y	10,363	212	425
74	008.F-0003-0040.0	64 RAILROAD ST	N	11,302	232	463
75	008.F-0003-0039.0	76 RAILROAD ST	N	17,390	356	713
76	008.F-0008-0001.0	81 RAILROAD ST	N	13,618	279	558
77	008.F-0002-0006.0	2 SMITH ROW	Y	1,195	24	49
78	008.F-0001-0032.0	UNION ST	N/A	N/A		0
79	008.F-0002-0017.0	16 UNION ST	Y	4,368	90	179
80	008.F-0002-0018.0	20 UNION ST	Y	5,035	103	206
81	008.F-0002-0027.0	25 UNION ST	Y	2,786	57	114
82	008.F-0002-0020.0	28 UNION ST	N	11,920	244	489
83	008.F-0002-0035.0	31 UNION ST	N	44	1	2
84	008.F-0002-0024.0	34 UNION ST	N	13,892	285	569
85	008.F-0002-0026.0	35 UNION ST	Y	10,979	225	450
86	008.F-0002-0023.0	40 UNION ST	Y	2,922	60	120
87	008.F-0002-0025.0	41 UNION ST	Y	3,635	74	149
88	008.F-0003-0003.0	WASHINGTON ST	N/A	N/A		0
89	008.A-0004-0013.0	WASHINGTON ST	N/A	N/A		0
90	008.F-0003-0035.0	726 WASHINGTON ST	N	2,824	58	116
91	008.F-0003-0034.0	736 WASHINGTON ST	Y	8,523	175	349
92	008.F-0003-0006.0	746 WASHINGTON ST	Y	2,073	42	85
93	008.E-0003-0077.0	747 WASHINGTON ST	Y	4,467	92	183
94	008.F-0003-0005.0	752 WASHINGTON ST	N	4,744	97	194
95	008.E-0003-0076.0	755 WASHINGTON ST	N	2,952	60	121
96	008.F-0003-0004.0	760 WASHINGTON ST	Y	1,505	31	62
97	008.E-0003-0081.0	761 WASHINGTON ST	Y	8,948	183	367
98	008.E-0003-0070.0	769 WASHINGTON ST	N	11,884	244	487
99	008.F-0003-0002.0	770 WASHINGTON ST	Y	2978 / 7193		0
100	008.E-0003-0075.1	779 WASHINGTON ST	Y	11,029	226	452
101	008.E-0003-0060.0	799 WASHINGTON ST	Y	0	0	0
102	008.F-0002-0001.0	800 WASHINGTON ST	N	18,067	370	740
103	008.E-0003-0058.0	815 WASHINGTON ST	Y	4,747	97	195
104	008.F-0001-0068.0	818 WASHINGTON ST	N	2,020	41	83
105	008.F-0001-0069.0	830 WASHINGTON ST	Y	3,746	77	154

Table A-1, cont.

#	PARCEL ID	SITE_ADDR	REPORT YES / (N=ESTIMATED) (N/A=VACANT)	ANNUAL USAGE CF	Daily Avg. Water Use (gpd)	Water Use Based WW Design Flow (gpd)
106	008.E-0004-0051.0	838 WASHINGTON ST	Y	10,105	207	414
107	008.E-0003-0055.0	841 WASHINGTON ST	Y	13,951	286	572
108	008.E-0004-0050.0	846 WASHINGTON ST	Y	6,253	128	256
109	008.E-0003-0054.0	847 WASHINGTON ST	N	1,532	31	63
110	008.E-0003-0052.0	851 WASHINGTON ST	Y	2,530	52	104
111	008.E-0004-0049.0	854 WASHINGTON ST	Y	6,729	138	276
112	008.E-0003-0051.0	855 WASHINGTON ST	N	12,823	263	526
113	008.F-0004-0033.0	WATER ST	N/A	N/A		0
114	008.F-0004-0035.0	WATER ST	N/A	N/A		0
115	008.F-0004-0010.1	13 WATER ST	N	11,984	246	491
116	008.F-0004-0018.0	18 WATER ST	Y	11,078	227	454
117	008.F-0007-0012.0	15 WINTHROP ST	Y	2,238	46	92
118	008.F-0007-0011.0	21 WINTHROP ST	Y	6,605	135	271
119	008.F-0007-0010.0	27 WINTHROP ST	Y	7,932	163	325
120	008.A-0005-0010.0	310 WOODLAND ST	Y	6,675	137	274
121	008.A-0005-0009.0	326 WOODLAND ST	N	2,896	59	119
122	008.A-0005-0008.0	340 WOODLAND ST	Y	169	3	7
123	008.A-0005-0007.0	354 WOODLAND ST	N	3,764	77	154
124	008.A-0005-0006.0	360 WOODLAND ST	N	7,927	162	325
125	001.0-0001-0052.3	0 RAIL ROAD BED	N/A	N/A		0
126	001.0-0001-0052.2	0 RAIL ROAD BED	N/A	N/A		0
127	001.0-0001-0052.1	0 RAIL ROAD BED	N/A	N/A		0
TOTAL					14,663	29,327

## **APPENDIX B – COLLECTION SYSTEM OPTION DRAWINGS**

- Option 1 – Hybrid with Cross Country Route
- Option 2 – Hybrid System – No Cross-Property Routes
- Option 3 – All pressure – No Cross-Property Routes



## **APPENDIX C – HYBRID COLLECTION SYSTEM W/CROSS COUNTRY RUNS**

The following Sheets present the conceptual layout used as a basis for feasibility and budgetary cost estimating:

- Sheet 1 – Preliminary Downtown Holliston Sewer Layout Key Map
- Sheet 2 – Plan View Woodland Street
- Sheet 3 – Plan View Study Area Northwest
- Sheet 4 – Plan View Study Area Northeast
- Sheet 5 – Plan View Study Area Southwest
- Sheet 6 – Plan View Study Area Southeast