

ADDENDUM NO. 1
TO
CITY OF AUBURN, MAINE
2024-017 WINTER OAKS
Feb 15, 2024

This addendum amends and /or supplements the bid documents as indicated below. Only these items alter the bid documents. Any verbal discussions or responses are hereby declared null and void. Please acknowledge this addendum on the Bid Form.

Clarifications to the Bid Documents:

The following changes have been made to the Bid Documents:

Question: Is DEP Planning Approval regarding site location and development required?

Answer: City has delegated Authority to approve up to 10 acres of impervious surfaces under site law and stormwater law. There is no secondary application required.

Question: Are there copies available of the reference plans to consult?

Answer: Yes. Attached to addendum.

Question: Are there previous surveys for the site?

Answer: Yes. 1990 subdivision plan and related planning board materials attached to addendum.

Question: Are there known wetland on site?

Answer: What is known is reflected on the city ARC GIS mapping system.

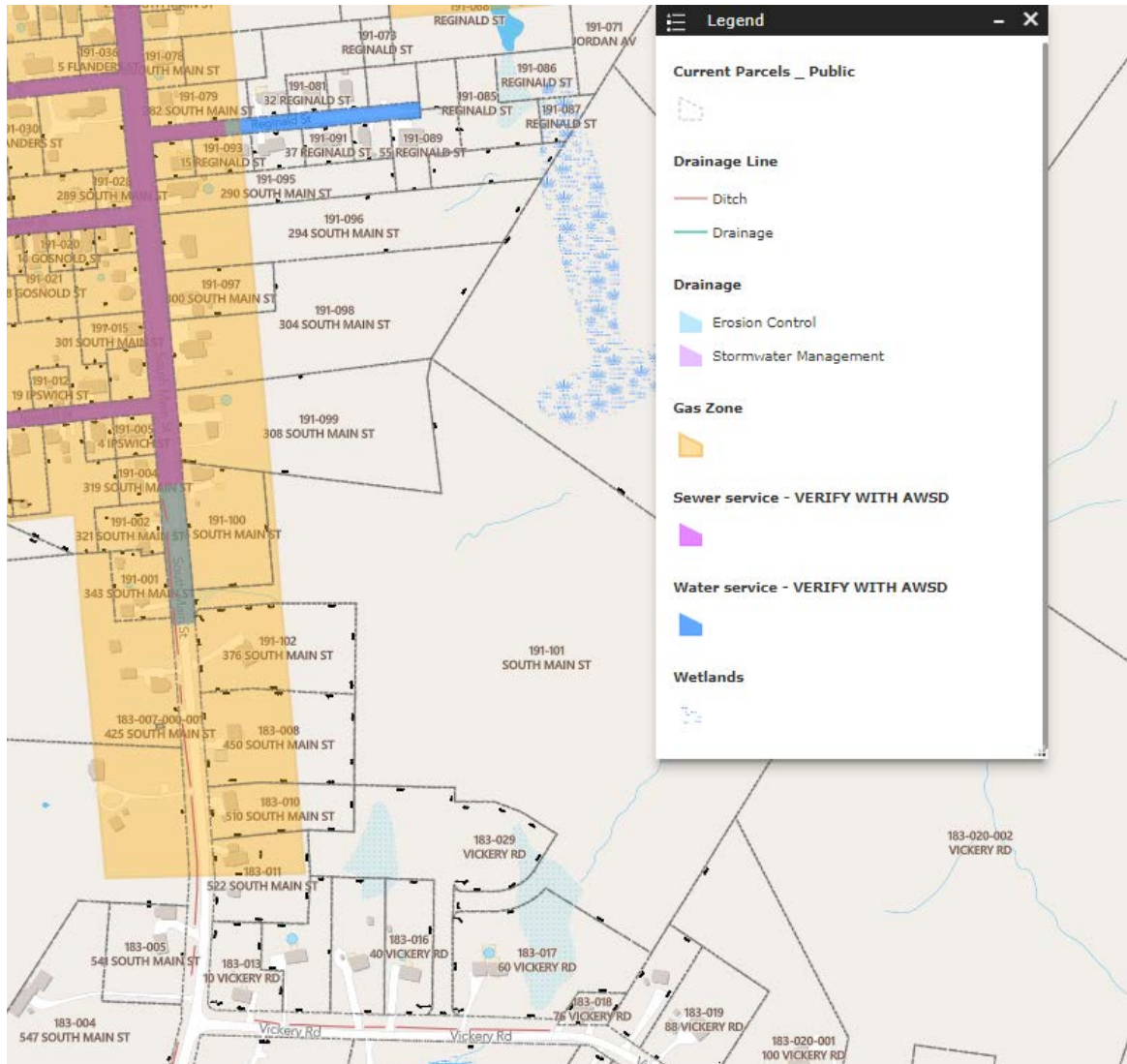
<https://auburnme.maps.arcgis.com/home/index.html>



Question: Are there public utilities on site?

Answer: Utility proximity is reflected on the city ARC GIS mapping system.

<https://auburnme.maps.arcgis.com/home/index.html>



2024 Winter Oaks Master Plan Prebid Meeting List		
Name	Company	Email
John Kenney	Dubois & King Inc	jkenney@dubois-king.com

Reference data:

- City of Auburn Comprehensive Plan

<https://www.auburnmaine.gov/CMSContent/Planning/Comp%20Plan/Comprehensive%20Plan%202021%20State%20Approved.pdf>

- New Auburn Master Plan

https://www.auburnmaine.gov/CMSContent/Planning/New_Auburn_Redevelopment/NA%20Village%20Center%20Plan%20Update%2011_29_2016/1_2010%20Comprehensive%20Plan_New%20Auburn%20Master%20Plan.pdf

- 2023 RFP for Sale “2023-026” and supporting documents

<https://www.auburnmaine.gov/CMSContent/Bids%20-%20FY23/2023-026%20Winter%20Oaks/Winter%20Oaks%20RFP.pdf>

Attachments:

- PLAN FILE Data Sheet #1040 dated 1/10/1997
- AWD 2022 New Auburn Public Water System Extension Study
- ASD 2023 New Auburn & Washington St Sewer Routing Study



PLAN TITLE *WINTER OAKS - LOT REALIGNMENT 1*

PLAN #: 1040

PLAN TYPE: SUBDIVISION

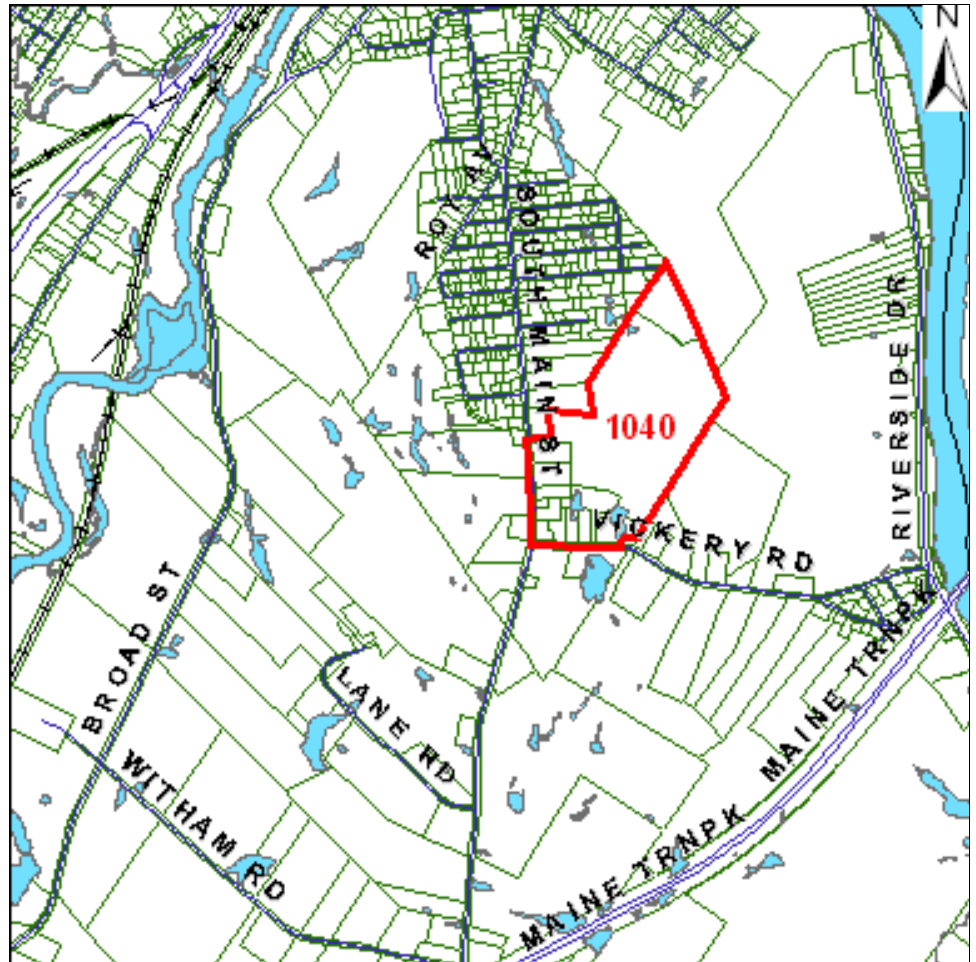
DATE: 1/10/1997

SHEETS: 1

OTHER INFORMATION:

MYLAR PLAN

LOCATION MAP:



<u>STREET NAME ON PLAN</u>	<u>EXISTING STREET NAME</u>
BLACK CHERRY DR	(PROPOSED)
VICKERY RD	VICKERY RD
RED MAPLE DR	(PROPOSED)
WHITE PINE AV	(PROPOSED)

THIS IS NOT A STANDARD BOUNDARY SURVEY
(SEE NOTES BELOW)

"WINTER OAKS" LOT REALIGNMENT 1

SOUTH MAIN STREET & VICKERY ROAD
AUBURN, MAINE
ANDROSCOGGIN COUNTY
PREPARED FOR
MICHAEL BERUBE
80 VICKERY ROAD
AUBURN, MAINE

NOTES:

- 1) THE PURPOSE OF THIS PLAN IS TO FACILITATE DEVELOPMENT REVIEW BY THE CITY OF AUBURN BY SHOWING THE GROUPING AND PORTIONS OF LOTS TO BE COMBINED TO CREATE INDIVIDUAL LARGER LOTS.
- 2) THIS PLAN IS BASED ON A PLAN ENTITLED "WINTER OAKS" DATED NOVEMBER 21, 1989 AND RECORDED AT THE ANDROSCOGGIN COUNTY REGISTRY OF DEEDS IN PLAN FILE BOOK 36 PAGE 53, AND A PLAN ENTITLED "STANDARD BOUNDARY SURVEY - WINTER OAKS DEVELOPMENT SITE" DATED DECEMBER 1988, BY MEGUIER HILL DEVELOPMENT ASSOC. AND RECORDED AT SAID REGISTRY OF DEEDS IN PLAN FILE BOOK 34 PAGE 185. NO INDEPENDENT VERIFICATION OF THE VERACITY OF INFORMATION CONTAINED ON SAID PLANS WAS CONDUCTED BY THE PREPARER OF THIS PLAN. THEREFORE THE USE OF THIS PLAN SHALL BE FOR THE SOLE PURPOSE OF IDENTIFYING LOTS AND PORTION OF LOTS THAT ARE TO BE GROUPED IN ORDER TO CREATE LARGER LOTS. THE REFERENCE TO THE "WINTER OAKS" PLANS SHALL BE THE SOLE SOURCE OF INFORMATION FOR THE ESTABLISHMENT OF PROPERTY LINES AND ORIGINAL LOT LINES. THIS PLAN SHALL NOT BE USED FOR THE BASIS OF ANY BOUNDARY SURVEYS.
- 3) THIS PLAN HAS BEEN PREPARED AND APPROVED PURSUANT TO THE CITY OF AUBURN SUBDIVISION ORDINANCE, CHAPTER 23, ARTICLE V (STAFF APPROVALS AND WAIVERS).



LOT LINE CURVE DATA

LOT	CURVE	RADIUS	LENGTH	TANGENT	CHORD	DELTA
1	CV1	20.00	32.04	20.63	28.72	91°46'35"
8	CV2	20.00	31.42	20.00	28.28	90°00'00"
42	CV3	20.00	31.70	20.29	28.48	90°00'00"
50	CV4	625.00	90.06	45.14	89.95	09°49'43"
50	CV5	20.00	35.18	24.17	30.82	100°47'01"
51	CV6	20.00	24.22	13.84	22.76	69°22'32"
51	CV7	625.00	103.81	52.07	103.64	11°14'45"
52	CV8	20.00	31.13	19.72	28.08	89°11'04"
53	CV9	20.00	31.02	19.61	28.00	88°51'29"
53	CV10	175.00	26.86	13.46	26.84	08°47'42"
54	CV11	20.00	31.81	20.40	28.56	91°08'51"
54	CV12	125.00	126.23	69.09	120.93	57°51'34"
59	CV13	475.00	55.57	27.82	55.54	06°42'11"
63	CV14	175.00	119.71	62.30	117.39	39°11'37"
66	CV15	175.00	30.13	15.11	30.11	09°52'13"
90	CV16	475.00	139.29	70.15	138.79	18°48'07"
98	CV17	475.00	62.12	31.11	62.08	07°29'36"
149	CV18	125.00	119.44	64.72	114.95	54°44'57"
153	CV19	125.00	76.91	39.71	75.70	35°15'03"
154	CV20	20.00	31.42	20.00	28.28	90°00'00"
161	CV21	125.00	119.44	64.72	114.95	54°44'57"
164	CV22	60.00	58.18	31.61	55.93	55°33'36"
167	CV23	175.00	8.25	4.13	8.25	02°42'10"
168	CV24	175.00	99.41	51.09	98.08	32°32'53"
169	CV25	20.00	31.42	20.00	28.28	90°00'00"
169	CV26	175.00	47.03	23.66	46.89	15°23'54"
170	CV27	175.00	108.07	54.72	104.45	34°43'54"
171	CV28	175.00	14.13	7.07	14.12	04°33'28"
172	CV29	20.00	13.35	6.94	13.11	38°14'58"
181	CV30	20.00	15.56	8.20	15.17	44°34'11"
181	CV31	60.00	103.14	69.62	90.90	98°29'12"
182	CV32	60.00	113.91	83.76	97.56	108°46'21"

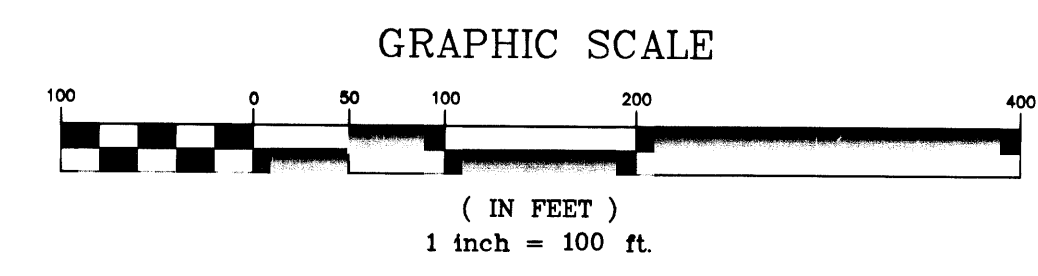
RECORDING DATA:

ANDROSCOGGIN COUNTY REGISTRY OF DEEDS
RECEIVED _____ AT _____ h _____ m _____ M
AND RECORDED IN PLAN BOOK _____ PAGE _____
ATTEST _____ REGISTRAR

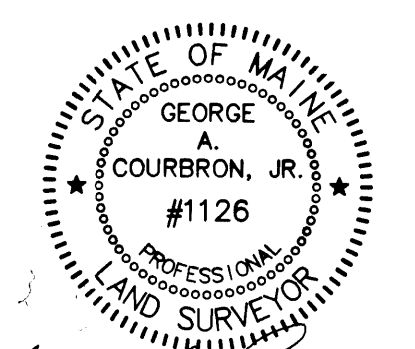
APPROVAL: (SEE NOTE 3)

Joseph K. ...
AUBURN PLANNING BOARD, CHAIRMAN
DATE 6/10/97
James P. ...
DIRECTOR OF LAND USE PLANNING & ENFORCEMENT
DATE 6-10-97
Mary Ann ...
AUBURN CITY CLERK
DATE 6-10-97

RECREATION AREA
(TO BE DEEDED TO CITY)
276,793 SF
6.35 AC



PREPARED BY
SurveyWorks, Inc.
Land Use Consultants
1544 Main Street
Lewiston, Maine 04240



REVISED: MAY 28, 1997
JANUARY 10, 1997

JOB NO. 96-4055
FILE NAME WINTOAKS.DWG

1045
48 Winter Oaks
South Main & Cherry
1/10/97



**AUBURN
WATER
DISTRICT**

AUBURN WATER DISTRICT, AUBURN MAINE

JANUARY 2023

New Auburn Public Water System Extension Study

New Auburn Public Water System Extension Study

Auburn Water District, Auburn Maine

January 2023

Prepared By:

Wright-Pierce

11 Bowdoin Mill Island, Suite 140
Topsham, ME 04086
207.725.8721 | www.wright-pierce.com

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1 Introduction

The Auburn Water District (District) has commissioned Wright-Pierce to complete a study on the New Auburn Public Water System Extension. The New Auburn expansion area is generally described as the extension of Washington Street North, South Main Street, Riverside Drive, and Broad Street, as well as Vickery Road, Witham Road and Hackett Road. Areas south of the Maine Turnpike are not envisioned for public water service at this time.

2 New Auburn Expansion Layout

2.1 Expansion Zones

The New Auburn expansion area can be described as two zones.

- **Zone 1** encompasses the area east of Washington Street North to the Little Androscoggin River. And the extension of the water main on Washington Street North, south to East Hardscrabble Rd.
- **Zone 2** encompasses the extensions of Broad Street, South Main Street, and Riverside Drive and their connections to via Vickery Road, Witham Road and Hackett Road

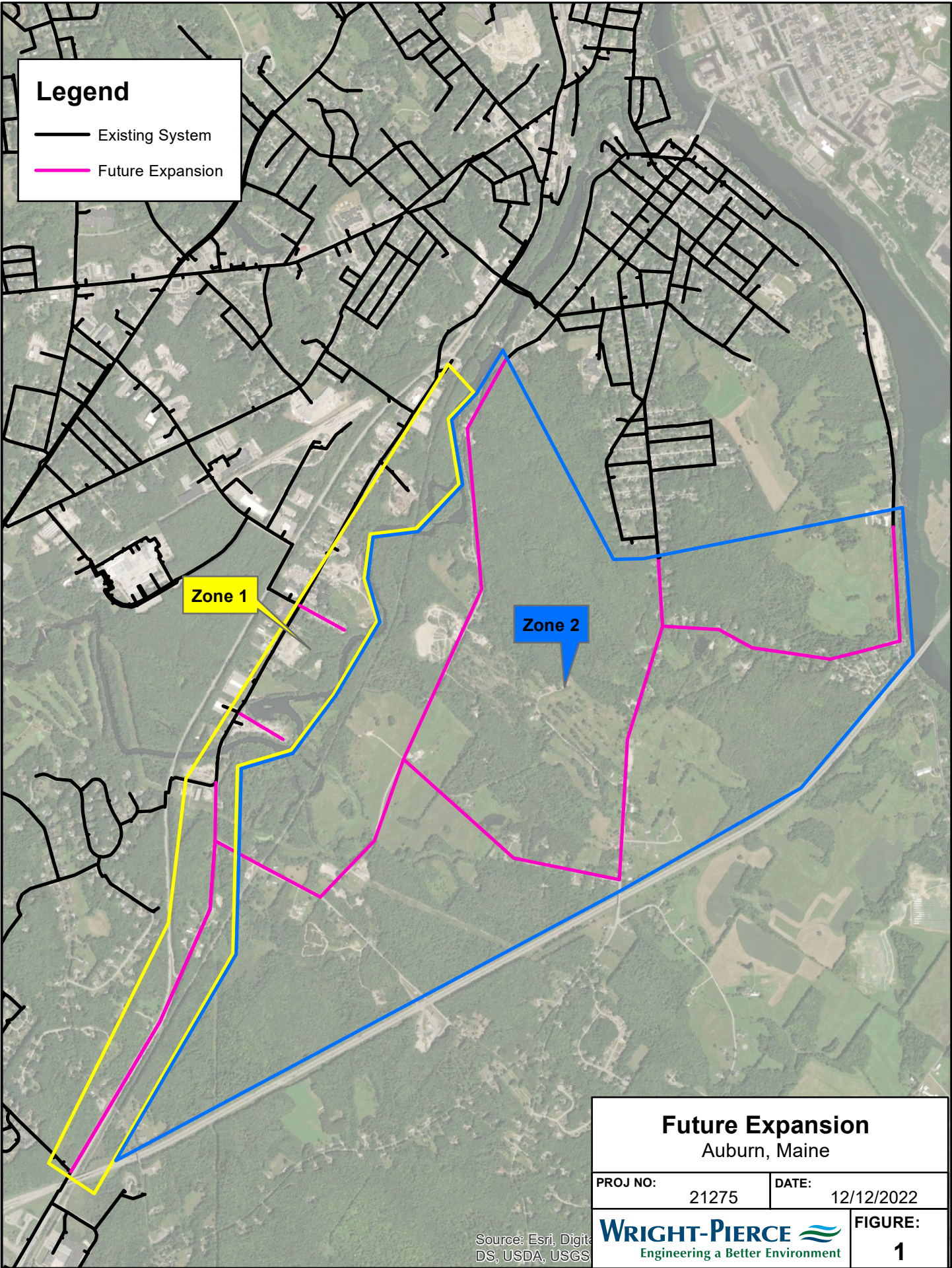
The proposed water main layout and zoning is shown in figure 1.

2.2 Pressure Zones

The Auburn water district distribution system has two zones, a high zone operating at approximately El. 439 ft and a low zone operating at approximately El. 356 ft. The majority of the New Auburn expansion is in the high zone; however, River Road is in the low zone. In order to loop River Road, a pressure reducing valve (PRV) will be required on Vickery Road. An approximate location is shown on the figures hereinafter.

2.3 Demand

The estimated average day demand density for Auburn Water District is 100 gpm per square mile. The expansion zone is approximately 2.5 square miles; therefore, a complete buildout average day demand of 250 gpm was used. Maximum day demand was calculated to be 1.5 times the maximum day demand, based on Auburn Water District's 2020 annual report. Therefore, the maximum day buildout of 375 gpm was used.



Legend

- Existing System
- Future Expansion

Zone 1

Zone 2

Future Expansion Auburn, Maine	
PROJ NO: 21275	DATE: 12/12/2022
WRIGHT-PIERCE Engineering a Better Environment	FIGURE: 1

Source: Esri, DigitalGlobe, GeoEye, IGN, Aeri, USDA, USGS

3 Expansion Phases

The primary purpose of phasing the system expansion is to identify any temporary fire flow or pressure limitations during the expansion before the system is looped and fully build-out. The expansion was separated into a six phased expansion. The phases are not meant to be requirements for the order of construction.

Demand was also broken up into phases. Average day demands in later phases were set at incrementally larger amounts to account for more customers connecting throughout the passage of time. Figure 2 depicts the modeled phases.

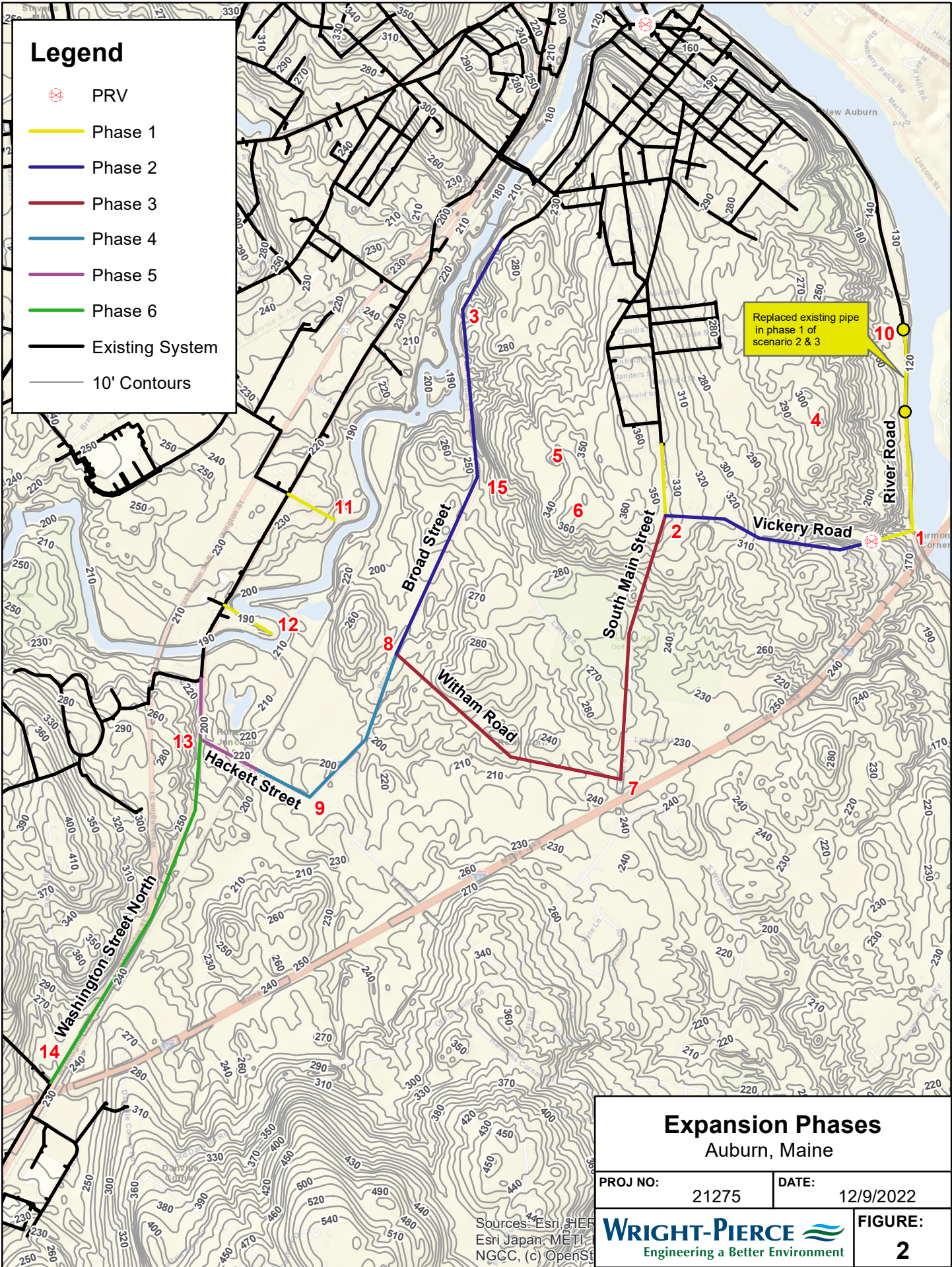
The following outline reviews the phased approach.

- Phase 1
 - Zone 1 –Dead End branches off Washington Street North
 - Zone 2
 - Extend South Main Street to Vickery Road
 - Riverside Drive to Vickery Road
 - Average day demand - 25 gpm
 - Maximum day demand – 37.5 gpm
- Phase 2
 - Zone 2
 - Connect South Main Street and Riverside Drive via Vickery Road
 - PRV on Vickery Road
 - Extend Broad Street to Witham Road
 - Average day demand - 50 gpm
 - Maximum day demand – 75 gpm
- Phase 3
 - Zone 2
 - Extend South Main Street to Witham Road
 - Connect Broad Street to South Main Street via Witham Road
 - Average day demand - 75 gpm
 - Maximum day demand – 112.5 gpm
- Phase 4
 - Zone 2
 - Extend Broad Street to Hackett Road
 - Hackett Road to railroad
 - Average day demand - 100 gpm
 - Maximum day demand – 150 gpm
- Phase 5
 - Zone 2
 - Railroad Crossing on Hackett Road
 - Hackett Road to Washington Street North
 - Average day demand - 150 gpm
 - Maximum day demand – 225 gpm
- Phase 6
 - Zone 1
 - Washington Street North from Hackett Road to East Hardscrabble Road
 - Average day demand - 250 gpm
 - Maximum day demand – 375 gpm






3.1 Water Main Sizing Alternatives

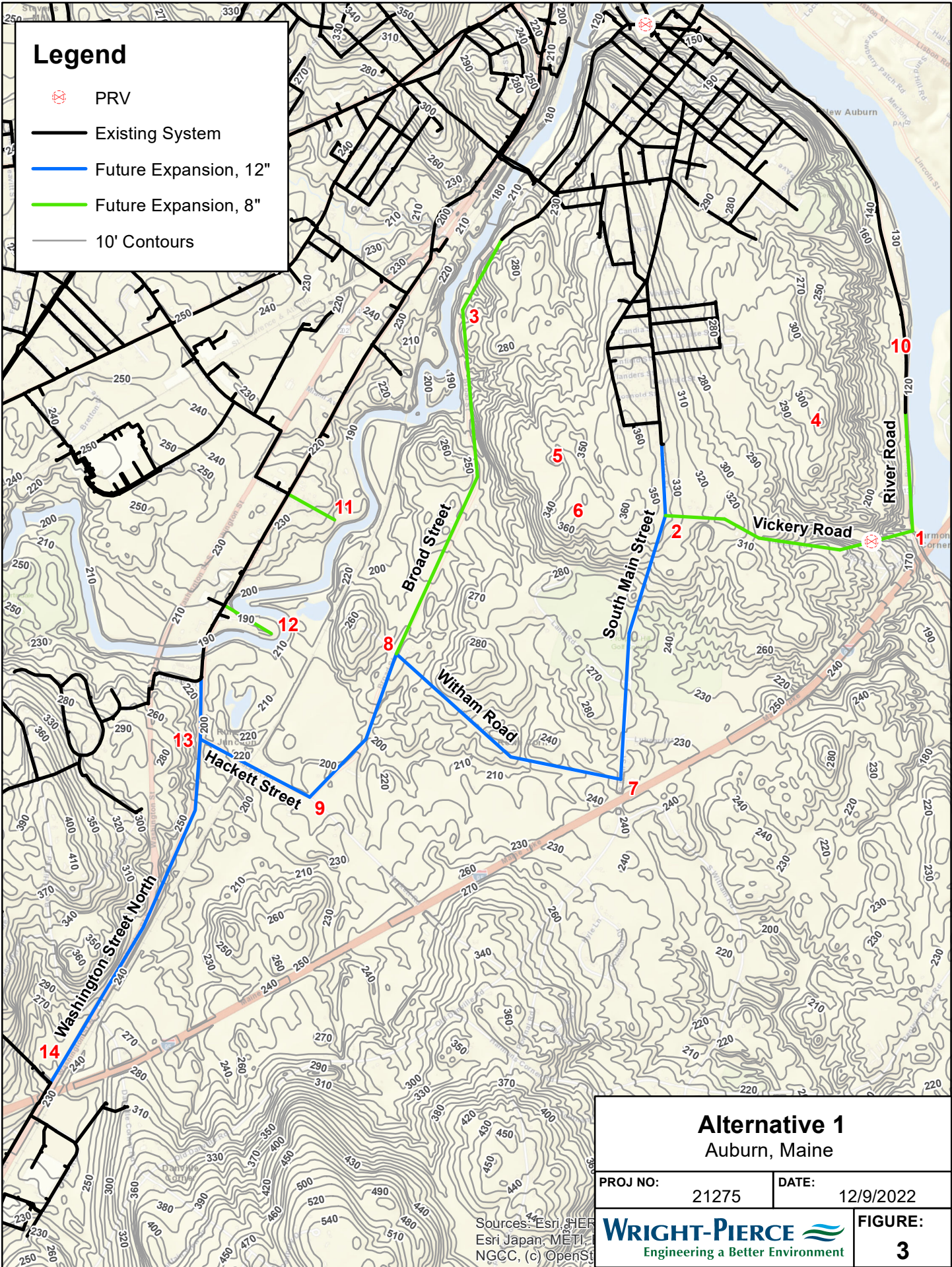
Three water main sizing alternatives were selected for modeling. These alternatives use the before mentioned phases but include different water main sizes within the layout. The alternatives are outlined below;

- Alternative 1: creates a primary 12-inch loop between South Main Street and Washington Street. River Road and Broad Street loops are created using 8-inch water main. Alternative 1 is depicted in Figure 3.
- Alternative 2: creates a 12-inch loops from South Main Street to Washington Street and River Road via Vickery Road to South Main Street. Broad Street is a 8-inch loop. This alternative upgrades the existing 8-inch water main on River Road with 12-inch water main. Alternative 2 is depicted in Figure 4.
- Alternative 3: creates all 3 loops using 12-inch main. This alternative upgrades the existing 8-inch water main on River Road with 12-inch water main. Alternative 3 is depicted in Figure 5.

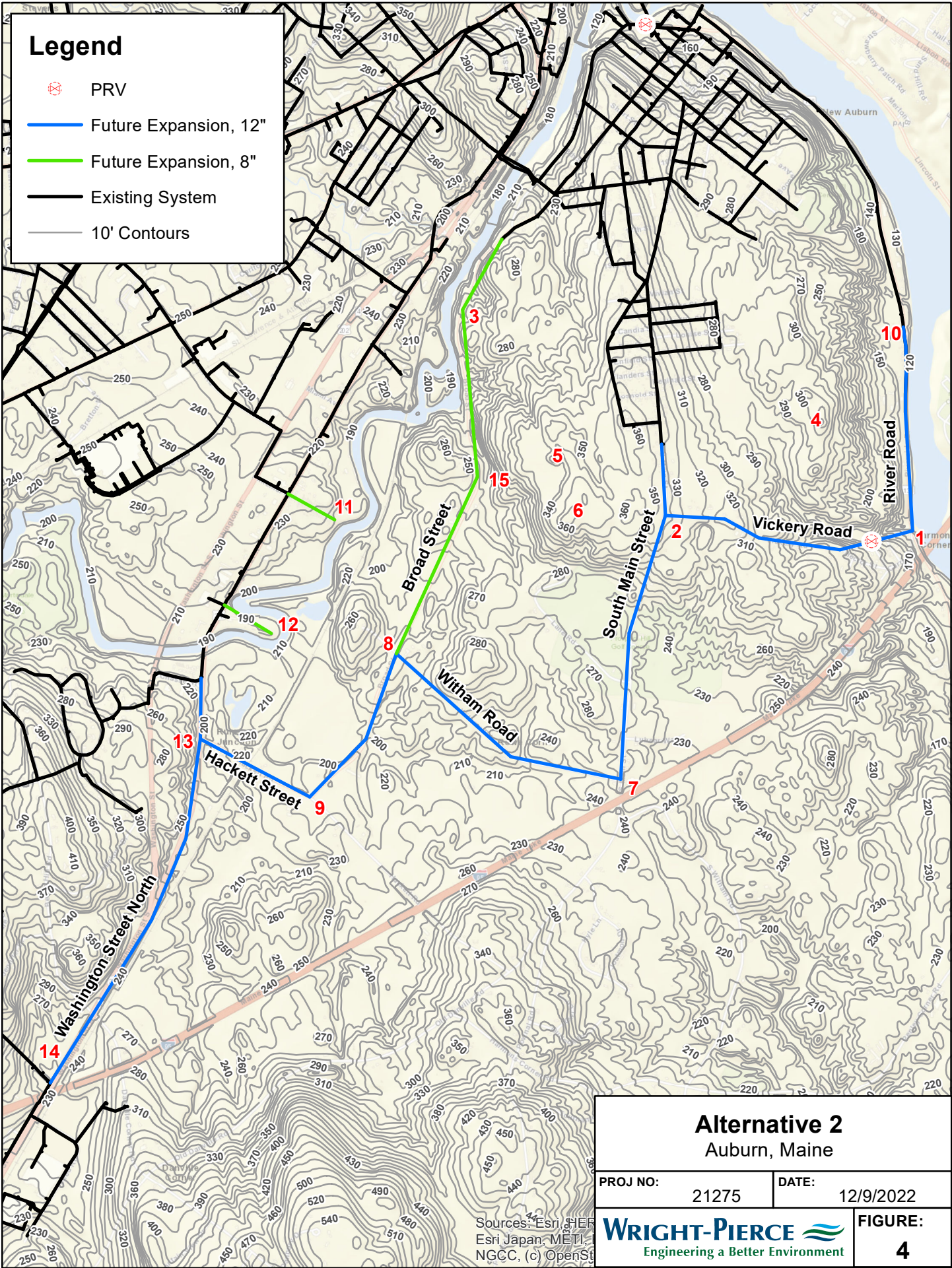


Legend






-  PRV
-  Existing System
-  Future Expansion, 12"
-  Future Expansion, 8"
-  10' Contours




Alternative 1	
Auburn, Maine	
PROJ NO: 21275	DATE: 12/9/2022
Sources: Esri, HERE, Esri Japan, METI, NGCC, (c) OpenSt	
WRIGHT-PIERCE Engineering a Better Environment	FIGURE: 3



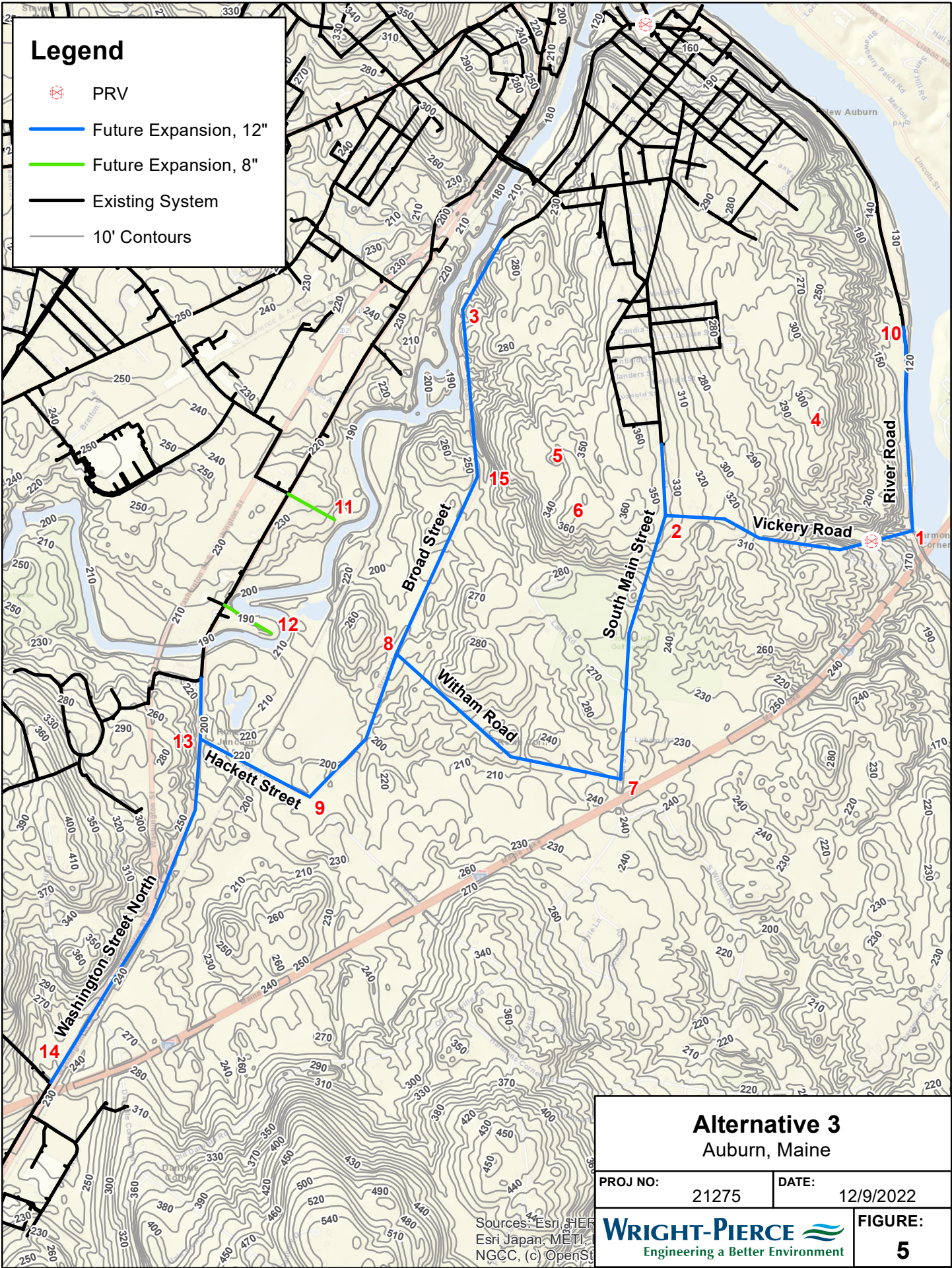
Legend

-  PRV
-  Future Expansion, 12"
-  Future Expansion, 8"
-  Existing System
-  10' Contours






Alternative 2
Auburn, Maine

PROJ NO: 21275	DATE: 12/9/2022
	
Engineering a Better Environment	
FIGURE:	
4	

Sources: Esri, HERE, Esri Japan, METI, NGCC, (c) OpenSt



Legend

-  PRV
-  Future Expansion, 12"
-  Future Expansion, 8"
-  Existing System
-  10' Contours

Alternative 3
Auburn, Maine

PROJ NO: 21275 DATE: 12/9/2022

WRIGHT-PIERCE 
Engineering a Better Environment

FIGURE:
5

Sources: Esri, HERE, Esri Japan, METI, NGCC, (c) OpenSt

4 Hydraulic Modeling

4.1 Updating of The Computer Model Schematic

The model contains all water mains with fire flow capabilities, generally 6-inches in diameter and larger. Hazen Williams C values were retained from previous model calibrating, and new pipes were assumed to have a C factor of 120. For a specified demand condition (maximum day, average day) the computer model will solve a series of mathematical algorithms for the flow in each pipe and the pressure at each node.

The following background system settings were used for all scenarios.

Demand: The existing system demands are 2.4 MGD for an average day and 3.5 mgd max day.

Treatment Plant: Off

Tank Levels: El. 439

4.2 Fire Flow Requirements

The ability to provide fire protection is a valuable asset for a community. Guidelines for fire flow requirements are provided by the Insurance Services Office (ISO) now under the name Verisk. Verisk is an insurance service organization responsible for evaluating and classifying communities for insurance rating purposes.

Specific fire protection requirements at a given locale vary with the physical characteristics of a building. The required fire flows are based on the worst-case premise in a general location using the following factors: (1) materials of construction, (2) its occupancy use, (3) proximity to other structures, (4) height and size of building, (5) the existence of fire walls, (6) presence or absence of sprinklers, and other factors. Specific buildings may have required fire flows as high as 12,000 gpm. Table 1-1 shows typical fire flow requirements for various building types and uses. This data will be used to assess the adequacy of the available fire flows at select locations throughout the distribution system.

Municipal fire insurance ratings are partially based on a water utility's ability to provide needed fire flows up to a maximum flow of 3,500 gpm. The ISO requirement of 3,500 gpm was the criteria used for all non-residential land uses. This is the largest fire flow that the ISO recognizes as necessary for any system to be required to provide.

If a specific building has a required fire flow greater than 3,500 gpm, than the community's fire rating will only be based on the water system's ability to provide 3,500 gpm.

Table 1 Typical Fire Flow Requirements

Land-Use or Building Type	Range of Required Fire Flows
Single and Two-Family Dwellings	
Over 100 feet Building Separation	500 gpm
31 to 100 feet Building Separation	750 gpm
11 to 30 feet Building Separation	1,000 gpm
10 feet or less Building Separation	1,500 gpm
Multiple Family Residential Complexes	2,000 to 3,000 gpm
Average Density Commercial	1,500 to 2,500 gpm
High Value Commercial	2,500 to 3,500 gpm
Light Industrial	2,000 to 3,500 gpm
Heavy Industrial	2,500 to 3,500 gpm

Since the expansion area is largely undeveloped at this point, the future zoning of the area should be considered when determining the desired fire flow within the expansion area. ISO location #7 is located on River Road just North of the expansion area. Location #7 has a fire flow requirement of 3500 gpm. The capital improvement plan identified that this location could not meet the requirement without large improvements to the system, including increasing the diameter of the existing pipe, which is currently a dead-end water main. However, the expansion and looping of the dead-end water main will benefit ISO 7 and could make ISO requirements feasible. ISO 7 has been included in the hydraulic modeling for comparison.

4.3 Pressure

Standard water works practice is to maintain minimum pressures in the distribution system above 30-35 psi under normal operating conditions. Pressures during fire flow conditions should be maintained above 20 psi at all locations in the system. Normal high pressures should not exceed 80 psi without pressure reduction at service connections, as requested by the State of Maine Plumbing Code.

4.4 New Auburn Expansion

The above water main alternatives and phases were added to the hydraulic model and the model was used to calculate both pressure and fire flow throughout the expansion. The model is set to maintain 20 psi in the entire system unless designated as a low pressure service agreement area. In the expansion area, the high points are all centrally located between the roads. An additional modeling sub-alternative was completed to compare the fire flow if the development remains only along the main streets. This alternative is labeled "Phase 6- Main Lines Only". This column is the same as phase 6 for each alternative but does not take into consideration the off-street high points when calculating fire flow.

Tables 2, 3 and 4 summarize the modeling results for the expansion during max day. Tables 5, 6 and 7 summarize the results during average day demand. The location identifiers included in the tables are shown on figures 3-5. Locations off the main roads (4, 5, 6) were modeled using 8-inch dead end branches off the closest main roads. Location 4 is served from the high pressure zone on Vickery Road in order to provide sufficient pressure. The low zone can only provide 35 psi up to El 275 ft.

Table 2 Alternative 1: South Main Street 12-inch Loop under Maximum Day Demand

Location Identifier	Location	Elevation (feet)	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5		Phase 6		Phase 6 Main Lines Only	
			Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)
1	Corner of Riverside Drive and Vickery Road	125	99	1000	100	1100	100	1150	100	1150	100	1150	100	1100	100	2200
2	Corner of South Main Street and Vickery Road	340	42	2000	42	1050	42	1250	42	1200	42	1600	42	1550	42	2800
3	Broad Street	225	NA	NA	92	1250	92	1950	92	1950	92	2250	92	2250	92	3350
4	Golf Course High Point	320	NA	NA	51	650	50	650	50	650	50	650	49	650	NA	NA
5	Broad Street High Point	340	NA	NA	43	600	42	900	42	900	42	950	42	950	NA	NA
6	South Main Street High Point	370	NA	NA	29	600	29	600	29	600	29	650	29	650	NA	NA
7	Corner of Witham Road and South Main Street	250	NA	NA	NA	NA	81	1350	81	1300	81	1950	81	1900	81	3500
8	Broad Street and Witham Road	230	NA	NA	90	700	89	1400	89	1350	90	2450	89	2550	89	4800
9	Broad Street and Hackett Road	210	NA	NA	NA	NA	NA	NA	98	1350	98	2900	98	3250	98	6150
10	ISO 7- Existing on River Road	154	86	1450	87	2550	87	2550	87	2550	87	2550	87	2550	87	2550
11	Northern branch off Washington	210	99	2100	99	2100	99	2100	99	2100	99	2100	98	2150	98	2100
12	Southern branch off Washington	190	107	2100	107	2100	107	2100	107	2100	107	2150	107	2200	107	2150
13	Hackett Road and Washington Street South	210	NA	NA	NA	NA	NA	NA	NA	NA	98	3450	98	4450	98	8600
14	Hardscrabble Road	234	88	3050	88	3050	88	3050	89	3000	89	3000	88	4450	88	4500
15	Broad Street (South)	235	NA	NA	88	700	88	1300	88	1250	88	1450	88	1400	88	2700

Table 3 Alternative 2: 12-inch loops on South Main Street and River Road under Maximum Day Demand

Location Identifier	Location	Elevation (feet)	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5		Phase 6		Phase 6 Main Lines Only	
			Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)
1	Corner of Riverside Drive and Vickery Road	125	99	2000	100	1150	100	1400	100	1350	100	1850	100	1800	100	3800
2	Corner of South Main Street and Vickery Road	340	42	2000	42	1000	42	1200	42	1150	42	1500	42	1500	42	2750
3	Broad Street	225	NA	NA	92	1200	92	1950	92	1900	92	2250	92	2200	92	3350
4	Golf Course High Point	320	NA	NA	50	950	50	1000	50	1000	50	1050	50	1000	NA	NA
5	Broad Street High Point	340	NA	NA	43	600	42	900	42	900	42	950	42	950	NA	NA
6	South Main Street High Point	370	NA	NA	29	550	29	600	29	600	29	650	29	600	NA	NA
7	Corner of Witham Road and South Main Street	250	NA	NA	NA	NA	81	1250	80	1250	81	1850	81	1800	81	3450
8	Broad Street and Witham Road	230	NA	NA	90	700	90	1350	90	1300	90	2350	90	2400	89	4650
9	Broad Street and Hackett Road	210	NA	NA	NA	NA	NA	NA	98	1300	98	2800	99	3050	99	6000
10	ISO 7- Existing on River Road	154	86	2050	87	4700	87	4850	87	4850	87	5050	87	5050	87	5050
11	Northern branch off Washington	210	99	2100	99	2100	99	2100	99	2100	99	2100	99	2100	99	2100
12	Southern branch off Washington	190	107	2100	107	2100	107	2100	107	2100	107	2100	107	2150	107	2150
13	Hackett Road and Washington Street South	210	NA	NA	NA	NA	NA	NA	NA	NA	99	3250	99	4200	99	8300
14	Hardscrabble Road	234	88	3050	88	3050	89	3000	89	3000	89	3000	89	4450	89	4450
15	Broad Street (South)	235	NA	NA	88	700	88	1250	88	1250	88	1450	88	1400	88	2700

Table 4 Alternative 3: All Looping Pipes 12-inch under Maximum Day Demand

Location Identifier	Location	Elevation (feet)	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5		Phase 6		Phase 6 Main Lines Only	
			Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)
1	Corner of Riverside Drive and Vickery Road	125	99	2000	100	1150	100	1650	100	1600	100	1850	100	1800	100	3850
2	Corner of South Main Street and Vickery Road	340	42	2000	42	1000	42	1400	42	1350	42	1550	42	1500	42	2800
3	Broad Street (North)	225	NA	NA	92	2300	92	2250	92	2250	92	3250	92	3300	92	6200
4	Golf Course High Point	320	NA	NA	50	950	50	1000	50	1000	50	1050	51	1000	NA	NA
5	Broad Street High Point	340	NA	NA	42	1050	42	1200	42	1200	42	1300	42	1300	NA	NA
6	South Main Street High Point	370	NA	NA	29	550	29	600	29	600	29	650	29	600	NA	NA
7	Corner of Witham Road and South Main Street	250	NA	NA	NA	NA	81	1550	81	1550	81	1950	81	1850	81	3550
8	Broad Street and Witham Road	230	NA	NA	90	1650	89	1800	90	1750	90	2700	90	2700	89	5200
9	Broad Street and Hackett Road	210	NA	NA	NA	NA	NA	NA	98	1750	98	3250	99	3500	98	6850
10	ISO 7- Existing on River Road	154	86	2050	87	4700	87	4950	87	4950	87	5050	87	5050	87	5050
11	Northern branch off Washington	210	99	2100	99	2100	99	2100	99	2100	99	2100	99	2100	99	2100
12	Southern branch off Washington	190	107	2100	107	2100	107	2100	107	2100	107	2100	107	2150	107	2200
13	Hackett Road and Washington Street South	210	NA	NA	NA	NA	NA	NA	NA	NA	98	3800	98	4800	98	9450
14	Hardscrabble Road	234	89	3050	89	3050	88	3000	88	3000	87	3000	88	4450	88	4500
15	Broad Street (South)	235	NA	NA	88	1650	88	2000	88	1950	88	3000	88	3000	88	5800

Table 5 Alternative 1: South Main Street 12-inch Loop under Average Day Demand

Location Identifier	Location	Elevation (feet)	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5		Phase 6		Phase 6 Main Lines Only	
			Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)
1	Corner of Riverside Drive and Vickery Road	125	99	1000	100	1150	100	1200	100	1200	100	1250	100	1200	100	2250
2	Corner of South Main Street and Vickery Road	340	43	2050	42	1550	42	1350	42	1350	42	1750	42	1750	42	3000
3	Broad Street	225	NA	NA	92	1250	92	2050	92	2050	92	2350	92	2350	92	3400
4	Golf Course High Point	320	NA	NA	51	700	51	700	51	700	51	700	51	700	NA	NA
5	Broad Street High Point	340	NA	NA	43	650	42	950	42	950	42	1000	42	1000	NA	NA
6	South Main Street High Point	370	NA	NA	29	600	29	700	29	650	29	700	29	700	NA	NA
7	Corner of Witham Road and South Main Street	250	NA	NA	NA	NA	81	1500	81	1450	81	2150	81	2200	81	3800
8	Broad Street and Witham Road	230	NA	NA	90	750	90	1550	90	1550	90	2800	90	3000	90	5200
9	Broad Street and Hackett Road	210	NA	NA	NA	NA	NA	NA	99	1550	99	3350	99	3850	99	6700
10	ISO 7- Existing on River Road	154	86	1450	87	2550	87	2550	87	2550	87	2600	87	2550	87	2550
11	Northern branch off Washington	210	99	2100	99	2150	99	2150	99	2100	99	2150	99	2150	99	2150
12	Southern branch off Washington	190	108	2100	108	2150	108	2150	108	2100	108	2200	108	2200	108	2200
13	Hackett Road and Washington Street South	210	NA	NA	NA	NA	NA	NA	NA	NA	99	3950	99	5350	99	9350
14	Hardscrabble Road	234	89	3300	89	3300	89	3300	89	3300	89	3300	88	4900	89	4900
15	Broad Street (South)	235	NA	NA	88	750	88	1350	88	1300	88	1500	88	1450	88	2750

Table 6 Alternative 2: 12-inch loops on South Main Street and River Road under Average Day Demand

Location Identifier	Location	Elevation (feet)	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5		Phase 6		Phase 6 Main Lines Only	
			Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)
1	Corner of Riverside Drive and Vickery Road	125	99	2000	100	1300	100	1600	100	1550	100	2050	100	2050	100	4000
2	Corner of South Main Street and Vickery Road	340	43	2050	42	1550	42	1350	42	1350	42	1750	42	1750	42	3000
3	Broad Street	225	NA	NA	92	1250	92	2050	92	2050	92	2350	92	2350	92	3400
4	Golf Course High Point	320	NA	NA	51	1000	51	1050	51	1050	51	1100	51	1050	NA	NA
5	Broad Street High Point	340	NA	NA	43	650	42	950	42	950	42	1000	42	1000	NA	NA
6	South Main Street High Point	370	NA	NA	29	600	29	650	29	650	29	700	29	700	NA	NA
7	Corner of Witham Road and South Main Street	250	NA	NA	NA	NA	81	1500	81	1450	81	2150	81	2200	81	3750
8	Broad Street and Witham Road	230	NA	NA	90	750	90	1550	90	1550	90	2800	90	3000	90	5150
9	Broad Street and Hackett Road	210	NA	NA	NA	NA	NA	NA	99	1550	99	3350	99	3850	99	6700
10	ISO 7- Existing on River Road	154	86	2050	87	4750	87	4950	87	4950	87	5100	87	5100	87	5100
11	Northern branch off Washington	210	99	2100	99	2150	99	2150	99	2100	99	2150	99	2150	99	2150
12	Southern branch off Washington	190	108	2100	108	2150	108	2150	108	2100	108	2200	108	2200	108	2200
13	Hackett Road and Washington Street South	210	NA	NA	NA	NA	NA	NA	NA	NA	99	3950	99	5350	99	9250
14	Hardscrabble Road	234	89	3300	89	3300	89	3300	89	3300	89	3300	89	4850	89	4850
15	Broad Street (South)	235	NA	NA	88	750	88	1350	88	1300	88	1450	88	1500	88	2750

Table 7 Alternative 3: All Looping Pipes 12-inch under Average Day Demand

Location Identifier	Location	Elevation (feet)	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5		Phase 6		Phase 6 Main Lines Only	
			Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)	Pressure (psi)	Fire Flow (gpm)
1	Corner of Riverside Drive and Vickery Road	125	98	2000	100	1300	100	1850	100	1850	100	2100	100	2100	100	4050
2	Corner of South Main Street and Vickery Road	340	43	2050	42	1150	42	1600	42	1600	42	1800	42	1800	42	3050
3	Broad Street	225	NA	NA	92	2400	92	2700	92	2650	92	3850	92	3950	92	6800
4	Golf Course High Point	320	NA	NA	51	1000	51	1050	51	1250	51	1100	51	1050	NA	NA
5	Broad Street High Point	340	NA	NA	43	1100	43	1250	42	1250	42	1350	42	1350	NA	NA
6	South Main Street High Point	370	NA	NA	29	600	29	700	29	700	29	700	29	700	NA	NA
7	Corner of Witham Road and South Main Street	250	NA	NA	NA	NA	81	1850	81	1850	81	2250	81	2250	81	3900
8	Broad Street and Witham Road	230	NA	NA	90	1750	90	2100	90	2100	90	3200	90	3350	90	5800
9	Broad Street and Hackett Road	210	NA	NA	NA	NA	NA	NA	99	2100	99	3900	99	3400	99	7650
10	ISO 7- Existing on River Road	154	98	2050	87	4800	87	5050	87	5050	87	5150	87	5100	87	5150
11	Northern branch off Washington	210	99	2150	99	2100	99	2150	99	2150	99	2150	99	2150	99	2150
12	Southern branch off Washington	190	108	2150	108	2100	108	2150	108	2150	108	2200	107	2200	108	2200
13	Hackett Road and Washington Street South	210	NA	NA	NA	NA	NA	NA	NA	NA	99	4650	99	6050	99	9750
14	Hardscrabble Road	234	89	3300	89	3300	89	3300	89	3300	89	3300	89	4900	89	4900
15	Broad Street (South)	235	NA	NA	88	1750	88	2250	88	2350	88	3200	88	3300	88	6250

5 Results and Recommendations

The hydraulic modeling shows;

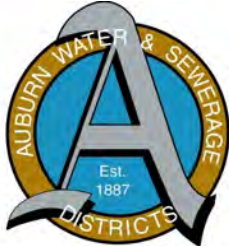
1. Under all alternatives and phases the entire expansion area can be served with greater than 20 psi.
2. The main roads can all be supplied with greater than 35 psi and 1000 gpm under all phases of the project.
3. A small highpoint located between Broad Street and South Main Street (location identifier 6) does not receive 30 psi (29 psi).
4. ISO 7 can meet the ISO required flow of 3500 gpm in alternative 2 and 3.
5. 12-inch water mains should be used if large commercial or industrial users requiring 3500 gpm are expected.
6. As previously discussed, the phases presented in this report were chosen to provide fire flow estimates before the completion of looping. Due to the variations in elevation the sewer phasing and routing will be more limited. The actual phasing of the water system buildout should be based on customer demand and sewer phasing.

The fire flow, and pressure estimates presented in this report are for planning purposes only. Hydraulic modeling provides a mathematical representation of an average or maximum day in reality. Hourly fluctuations in demand were not considered. A water system is a dynamic entity, differences between system operation and the modeled operation will result in differences in results.



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DRAFT



AUBURN SEWERAGE DISTRICT

Report

JANUARY 2023

New Auburn & Washington Street Sewer Routing Study



New Auburn & Washington Street Sewer Routing Study

AUBURN SEWERAGE DISTRICT

January 2023

Prepared By:

Wright-Pierce

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Section 1 Executive Summary

The City of Auburn and Auburn Sewerage District have begun looking at areas of the City to increase housing stock within the community. Increasing housing availability will require investments in infrastructure to support development in these previously undeveloped and rural areas of the City. This letter report outlines how new sewer infrastructure would potentially serve development in the New Auburn and Washington Street study areas. Similar expansions would be required to extend public water service into the study areas. Figure 1 identifies the location of the two areas within the City limits. Improvements to the water system have been summarized in a separate report.

The New Auburn study area includes the portions of South Main Street to the south of Ipswich Street and extends to the Hackett and Old Danville Road intersection. Broad Street is also included in the New Auburn study area and includes the section from the Broad Street apartments to the Hackett Road intersection. Existing sewer service in this area terminates at South Main and Ipswich, Carrier Court and Vickery Road, and at Broad Street and Mill Street. These study areas are identified in Figure 2.

The Washington Street area includes the area beginning at Brickyard Circle and extends south to Philomar Street. From Philomar Street the study area extends further south to the Little Androscoggin River and then to Hardscrabble Road. Both the north-bound and south bound travel lanes would need to be connected to the existing sewer system. Existing sewer service is available at Brickyard Circle, Philomar Street and Hardscrabble Road.

Each of the proposed sewer service areas are described in Sections 2 and 3.

Section 2 New Auburn Study Area

Extending sewer service into the New Auburn area can be achieved with four different sewer shed areas. These areas include:

- Vickery Road Sewer Extension – Figure 3
- Prospect Hill Sewer and Pump Station – Figure 4
- Broad Street Sewer and Pump Stations – Figure 5
- Witham and Hackett Road Sewer and Pump Station – Figure 6

2.1 Vickery Road Sewer Extension

The Vickery Road sewer extension would be an all gravity system and would extend sewer beginning at Riverside Drive and continuing up the hill to South Main Street. Sewer would then extend north towards the Ipswich Street intersection where the existing collection system ends. This area would require approximately 4,600-feet of new sewer mains.

Photo1- Vickery Road Gulley



About 600-feet west of the Hector and Vickery intersection there is a culvert crossing and significant dip in the road that prevents gravity flow reaching the manhole at the Hector and Vickery Intersection. Gravity flow can be achieved by routing this sewer cross country to Riverside Drive or possibly the lower end of Vickery Road.

There is a significant gully on the north side of lower Vickery which carries runoff towards the Androscoggin River. Ledge is present at the edges of the roadway near 101 and 150 Vickery Road. There are currently no other underground utilities in the roadway through this section, with the exception of a natural gas pipeline crossing near 150 Vickery Road.

Providing a sewer main along Vickery Road could provide sewer service to areas to the west of South Main Street and on the north and south sides of Vickery Road.

2.2 Prospect Hill Sewer and Pump Station

The Prospect Hill sewer service area would include the former Prospect Hill golf course, the Lane Road area, Lubear Way and a section of Old Danville Road to Hackett Road. The area will require a pump station to transport wastewater flows to the South Main and Vickery intersection, or to the Ipswich and South Main intersection. The connection at Vickery and South Main would require the construction of the Vickery Road sewer extension first. A possible location of a pump station would be at the end of Lubear Way. Lane Road can be connected to this system with gravity sewer mains. Just to the north of the former Prospect Hill Golf Course Club House is a culvert crossing. Any gravity sewer in South Main Street would likely follow the topography at the former golf course to direct gravity flow to Lubear Way.

The southern leg of this system would extend to the Hackett Road and Old Danville Road intersection. It is possible to extend this line further south towards the Harmons Corner Road. The southern portion of this system would require a crossing of the Maine Turnpike near South Witham Road to connect to the proposed pump station at Lubear Way.

Photo 2 - Lubear Way Potential Pump Station Location



There are three potential runs of cross-country sewers in this service area. One is on Lane Road and potentially cutting across the old golf course, sewer flowing south down Prospect Hill would cut cross country across the former golf course, and the third would be from South Witham Road to Lubear Way under the Maine Turnpike. A total of 13,300 feet of new gravity sewer and 6,100 feet of force main would be needed to service this entire area. The area could be broken into phases as well once the Lubear Way Pump Station is established.

Photo 3 – Prospect Hill Looking North



2.3 Broad Street Sewer and Pump Stations

Providing sewer service on the southern portion of Broad Street would require a combination of gravity sewer and pump stations due to the hilly nature of the roadway and presence of the Little Androscoggin River to the west. The proposed service area would extend nearly 5,000-feet south of the Mill and Broad Street intersection to the intersection with Witham Road. Ledge outcrops are present in several areas along Broad Street.

We anticipate that two pump stations would be needed in this service area. One of the pump stations would be located approximately 1,400 feet south of the Mill and Broad Street sewer. The second Broad Street pump station would be located approximately 3,200 feet south of the Mill and Broad Street area.

Several large tracts of land are present along the east side of Broad Street, including the parcel that the Sherwood Heights School occupies. Much of the west side of Broad abuts the Little Androscoggin River. Sewer along Broad Street would need to be undertaken in phases with the section closest to Mill Street completed first.

2.4 Witham, Broad and Hackett Road Sewer and Pump Station

The southern end of the New Auburn area covers the southern end of Broad Street, Witham Road, and Hackett Road. The low area for this section is located near the Broad and Hackett Road intersection at a small stream crossing. The force main route for a pump station near this stream crossing would require connection to a future Washington Street sewer main. The force main would cross under the railroad tracks on Hackett Road. An alternate force main route would be to follow Witham Road to the proposed pump station at Lubear Way.

Photo 4 - Lower Broad Street Potential Pump Station Location



Photo 5 - Hackett Road Railroad Crossing



The area between Witham Road and the southern end of Broad Street is very hilly. Sewer from the Witham Road area would require a length of cross-country sewer to connect to Broad Street. Sewer would flow east to west beginning at South Main Street, and then west to east to the start of a cross country run of sewer.

The East side of Hackett Road crosses the Maine Turnpike which would require securing a gravity main to the bridge structure. A large area to the south of Hackett Road could possibly be served by this sewer main.

Sewer service in the Witham and Hackett Road area will require development of other sewer collection and transport sections prior to installing sewer in this area. The total length of gravity sewer would be roughly 8,800 feet and require 3,400 feet of force main (assuming a connection to Washington Street is possible).

Any utility crossing of an active rail line will require close coordination with the rail line operator. A new force main or gravity sewer will be required to be installed in a steel casing pipe that is jacked under the railroad tracks. A Rail line inspector will need to be present while any work is taking place with the railroad right-of-way.

Section 3 Washington Street Study Area

Extending sewer service along the Washington Street corridor has been broken into three sections.

- North End Sewer – Figure 7
- Little Androscoggin River Crossing – Figure 8
- South End Sewer – Figure 9

Any sewer extensions in Washington Street would require permitting with the Maine Department of Transportation under their Utility Accommodation Policy. Specifically, this would include the Utility Location permit and Highway Opening Permit. Development potential along the east side of Washington is somewhat limited by an active rail line.

3.1 North End Sewer Extension

The north end of Washington Street would connect to an existing sewer from Brickyard Circle before it crosses the Little Androscoggin River. This sewer extension would begin near the Dysart's Fleet facility along the northbound lanes of Washington Street. This extension would require approximately 2,700 feet of gravity sewer main.

For the south bound lanes new sewer could be established near Chapman Auto and connect to the Rodman Road sewer. Miami Avenue could be connected to this sewer main to pick up some of the businesses on the northbound side of Washington. Approximately 3,500 feet of new sewer would be required in this area.

Photo 6- Washington Street Crossing of the Little Androscoggin River



3.2 Little Androscoggin River Crossing

The middle section of Washington Street includes a few subareas as a result of the Little Androscoggin River crossing. On the north side of the Little Andy, a new gravity sewer can connect to the Rodman Road sewer along the southbound lanes of Washington. Along the northbound lanes, new sewer would begin around Greeley's Garage and extend south to Philomar Street. Another section of gravity line would provide service to parcels from Maine Trailer to the Little Andy.

A pump station would be located around Chasse Street to pump flows north to the Philomar sewer. On the south side of the Little Andy, new gravity sewer would be installed along the northbound lanes and pick up sewer from Hackett Road and the pump station near the Hackett and Broad intersection. For potential sewers connections along the southbound lanes, new sewer could flow north to Chasse Street as well as south from the high point to the reverse direction crossover.

New sewer construction in this section is complicated by the bridge crossing of the Little Androscoggin River. This bridge is constructed on a horizontal curve which makes attaching pipe for either new gravity or force mains more difficult and expensive. Installing pipe below the river channel is a potential option as well and would involve more extensive permitting under the Natural Resource Protection Act and US Army Corps of Engineers.

3.3 South End Sewer Extension

The southern end of Washington Street has existing sewer service at Hardscrabble Road which flows south to the Washington Street pump station. Sewer service could be extended to the north towards Beech Hill Road and capture a portion of Washington Street north of the Beech Hill Road intersection. This would provide an opportunity to extend sewer service into the Beech Hill Road area towards Jennifer and Hickory Drives. This sewer extension would not require any pump stations. Approximately 2,600 feet of gravity sewer would be needed to make this connection,

Section 4 Phasing Options

The phasing of extending sewer service into the New Auburn and Washington Street areas will be driven in part by proposed developments and their location in relation to existing sewers. The primary connection points in both areas are listed below.

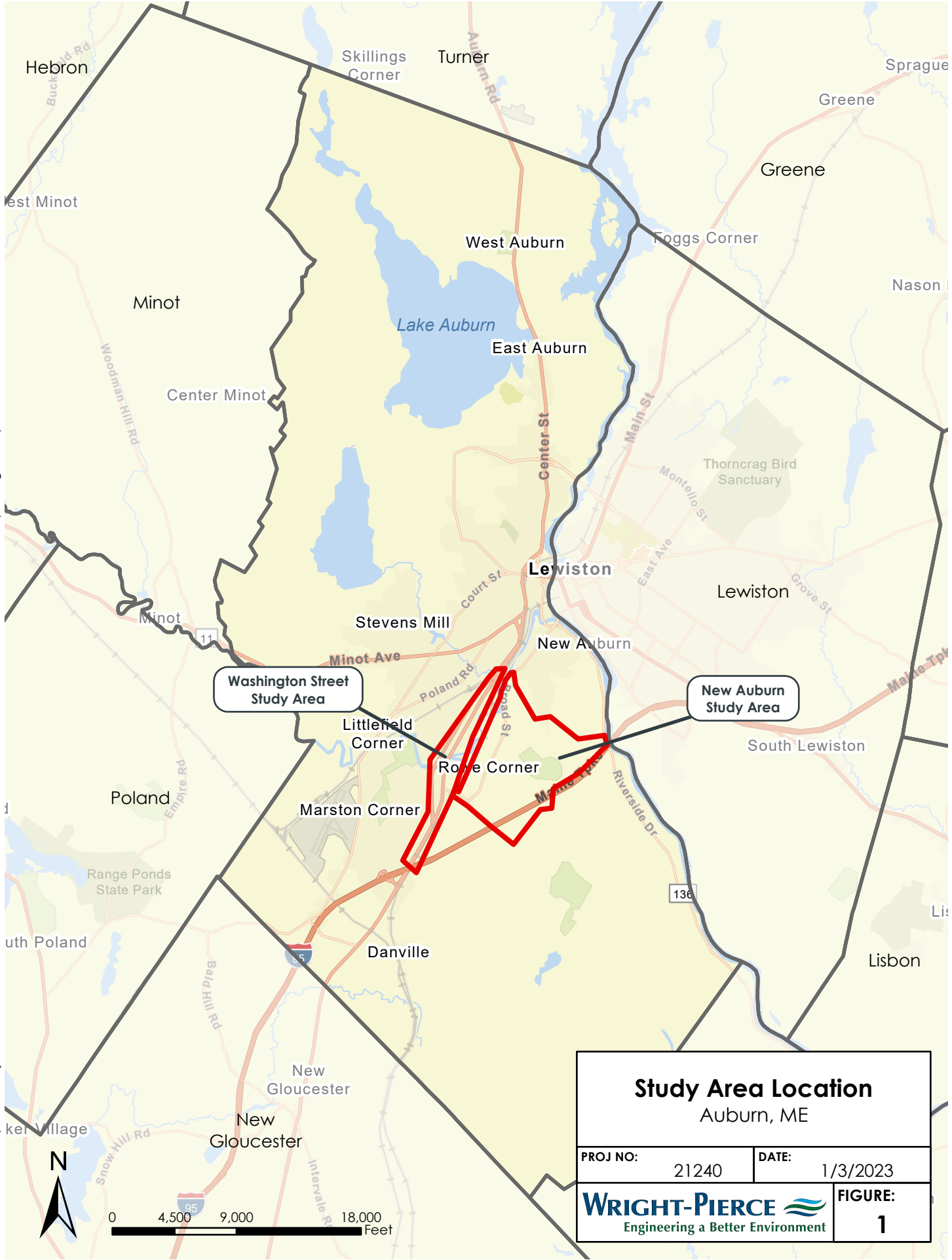
- Broad Street at Mill Street
- Vickery Road at Riverside Drive or Hector Street
- Hardscrabble Road at Washington
- Brickyard Circle at Washington

The likely first sewer extensions into these areas would require construction of sewers on the north end of Washington Street and the Prospect Hill Systems. The south end of Washington Street could also be included in this list. Once these areas are established continued expansion of the sewer service area can take place. It is anticipated that water service would be extended into these areas at the same time as sewer extensions.



Appendix A
Figures

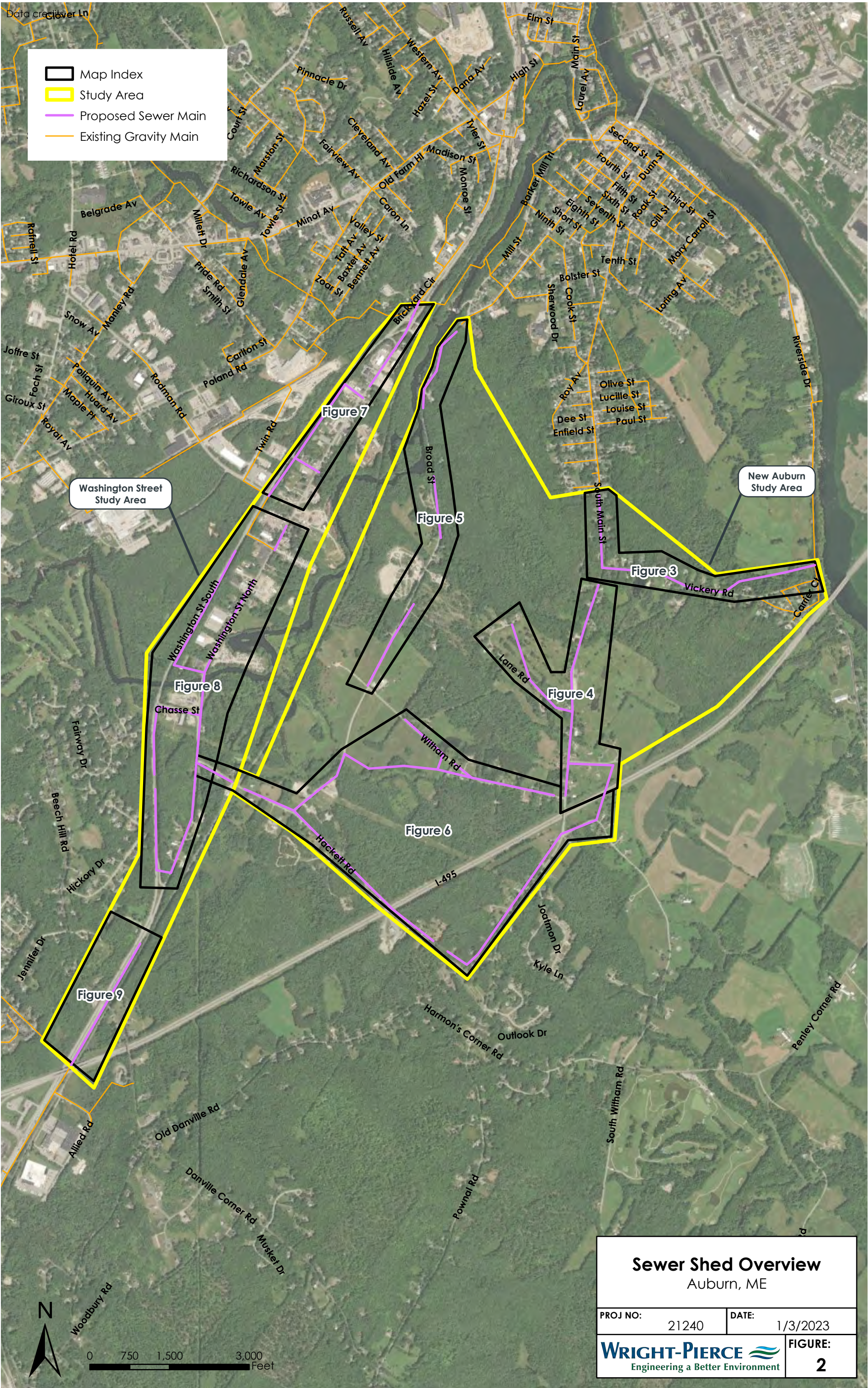
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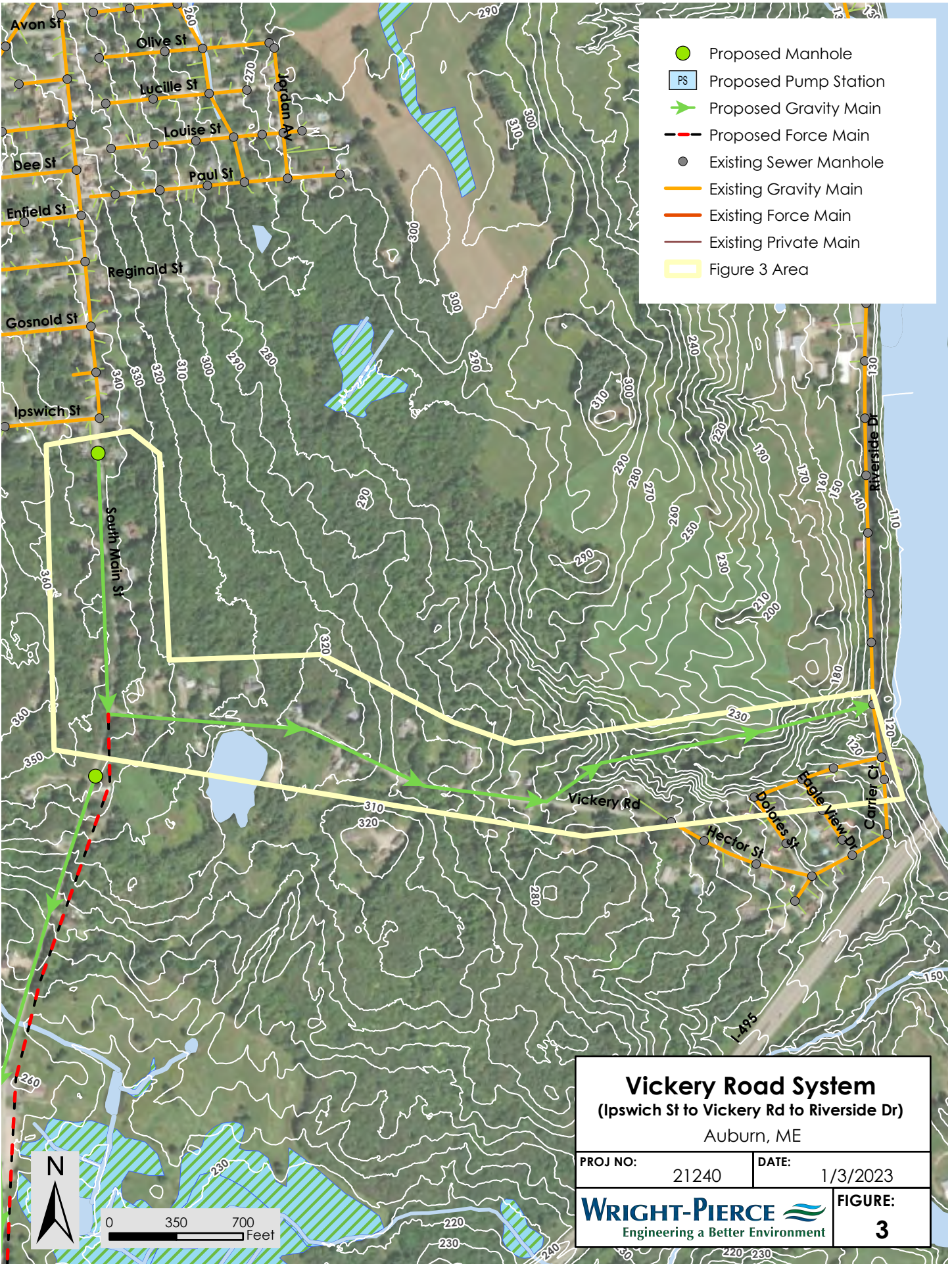
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 Study Area
 Proposed Sewer Main
 Existing Gravity Main

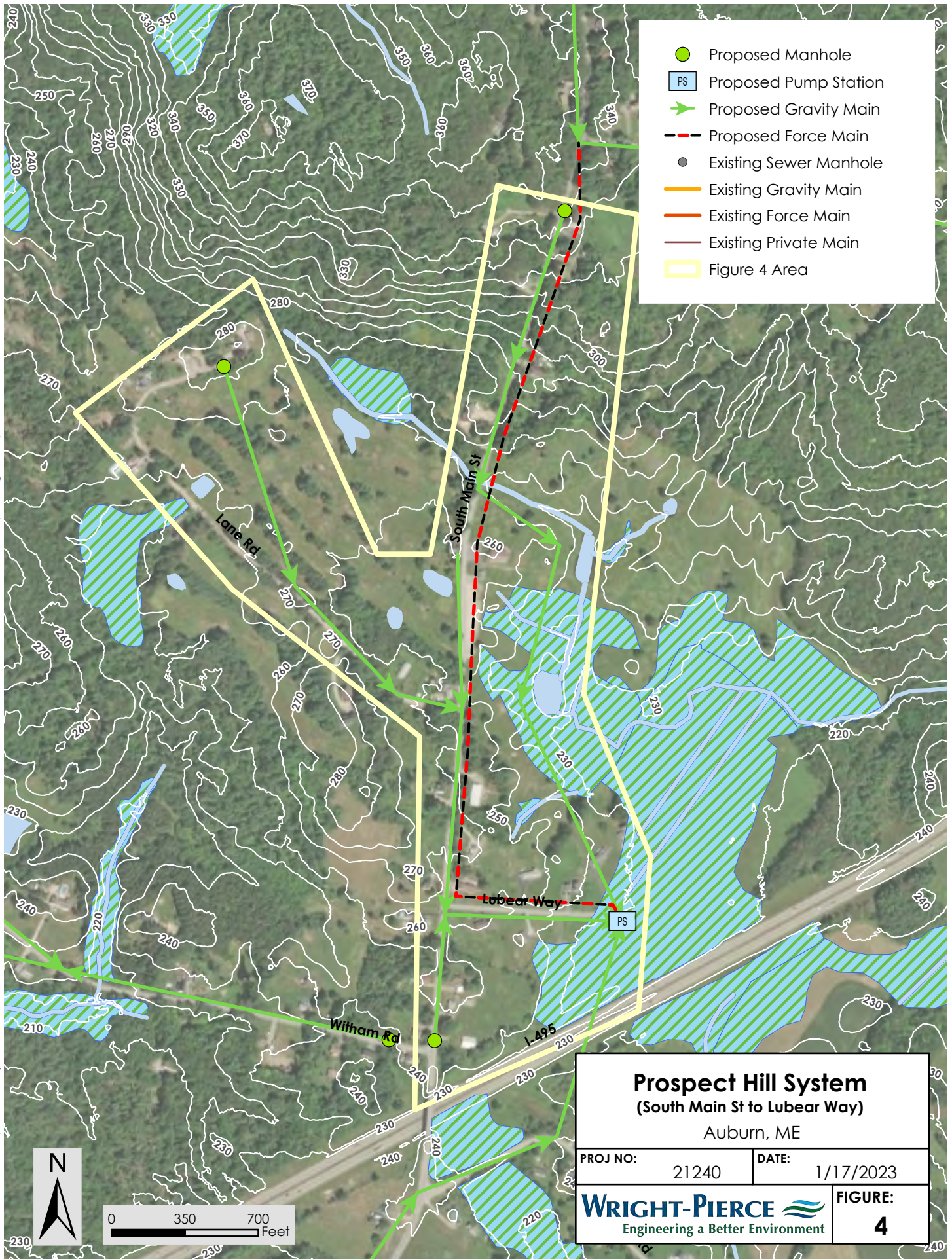


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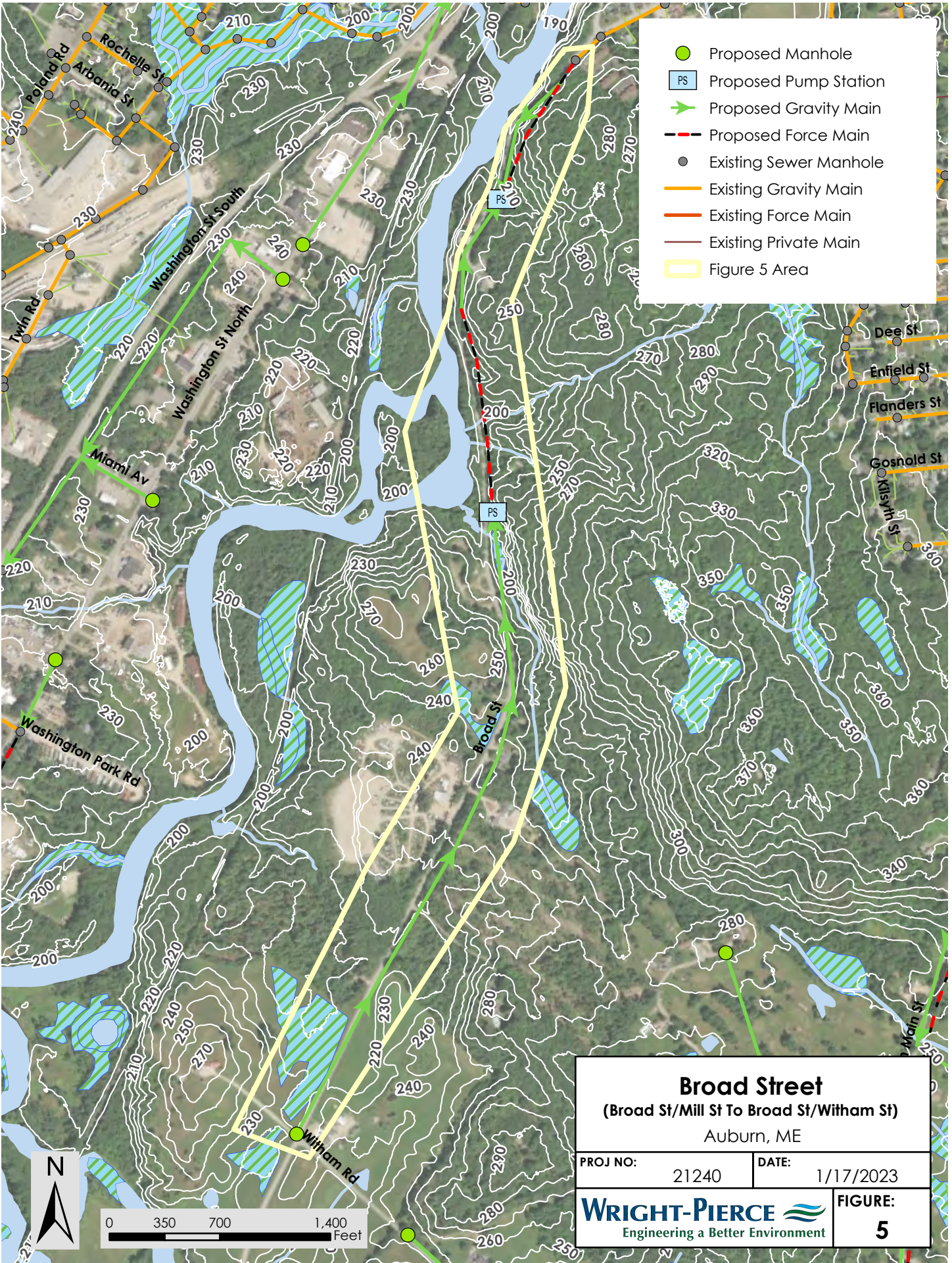
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DATE:	1/3/2023
WRIGHT-PIERCE 	
Engineering a Better Environment	
FIGURE:	
2	

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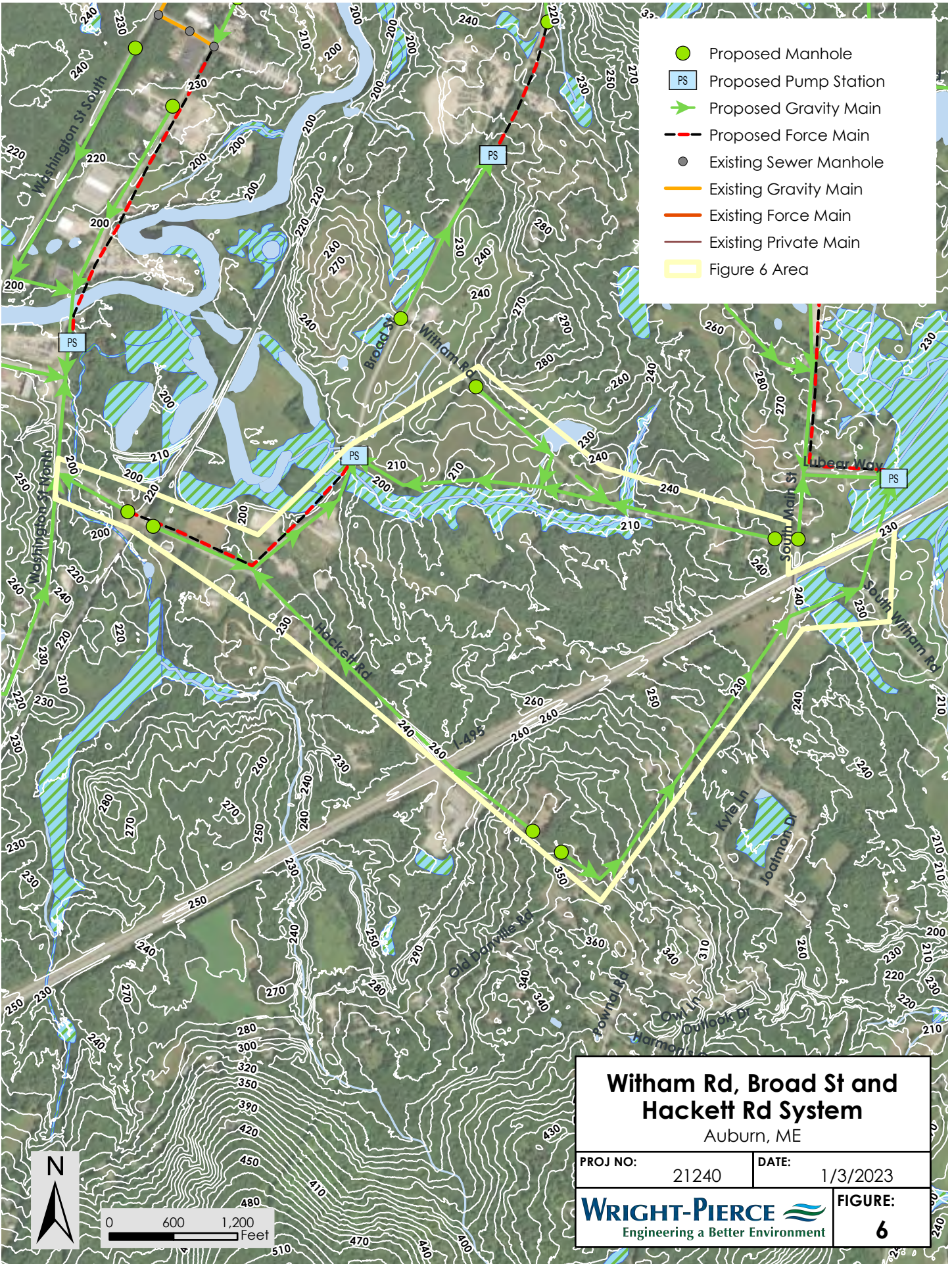


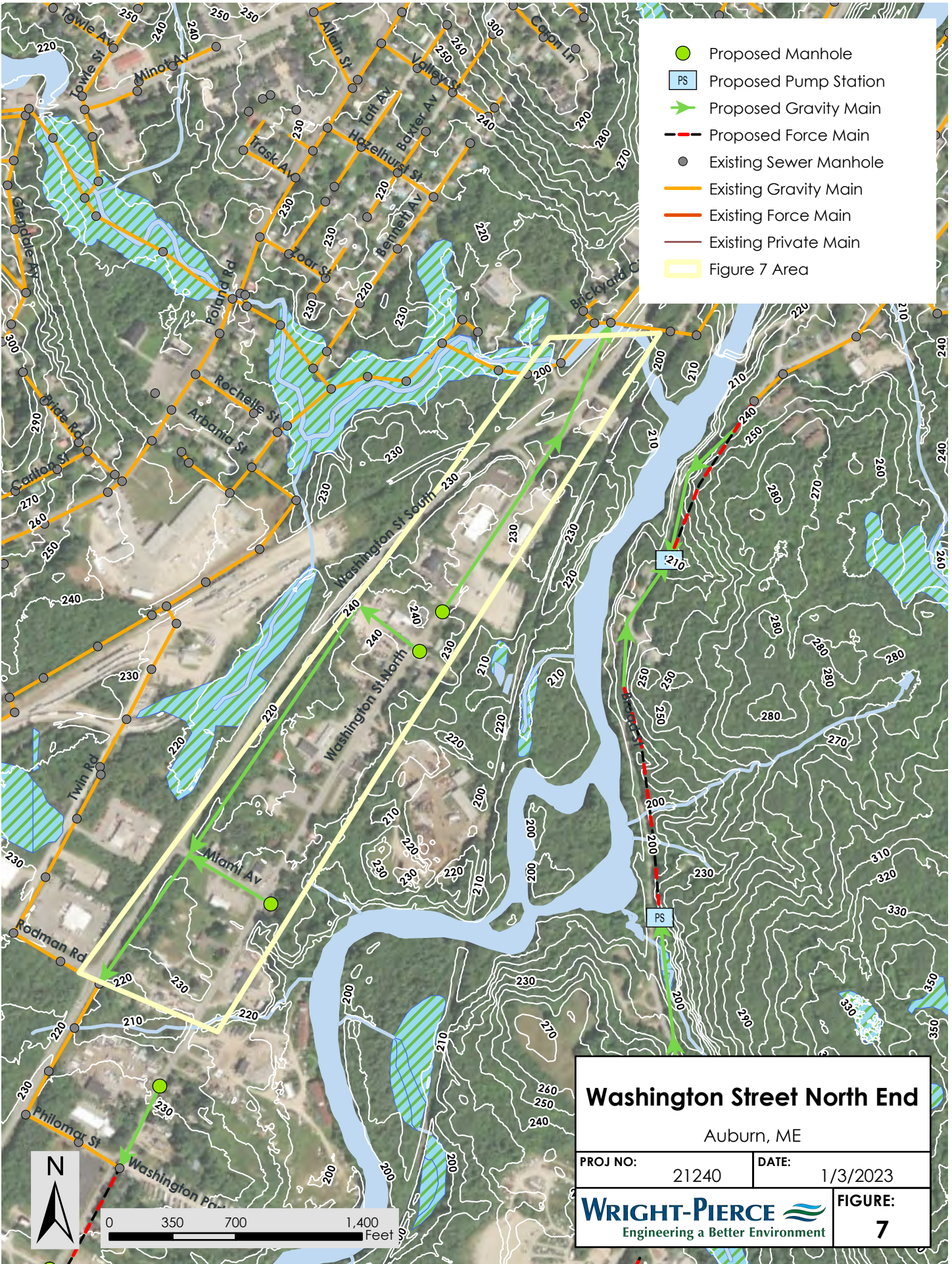


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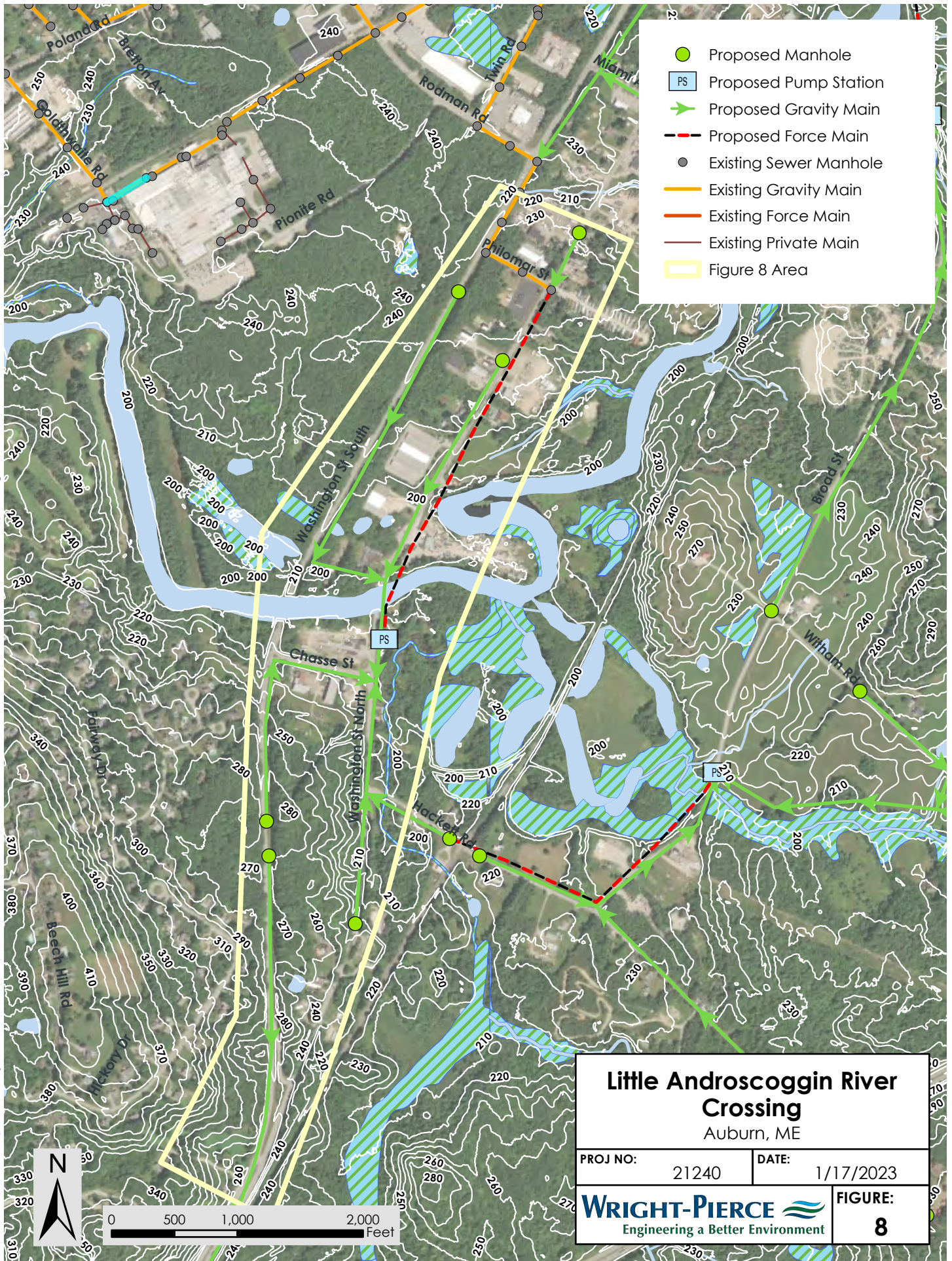


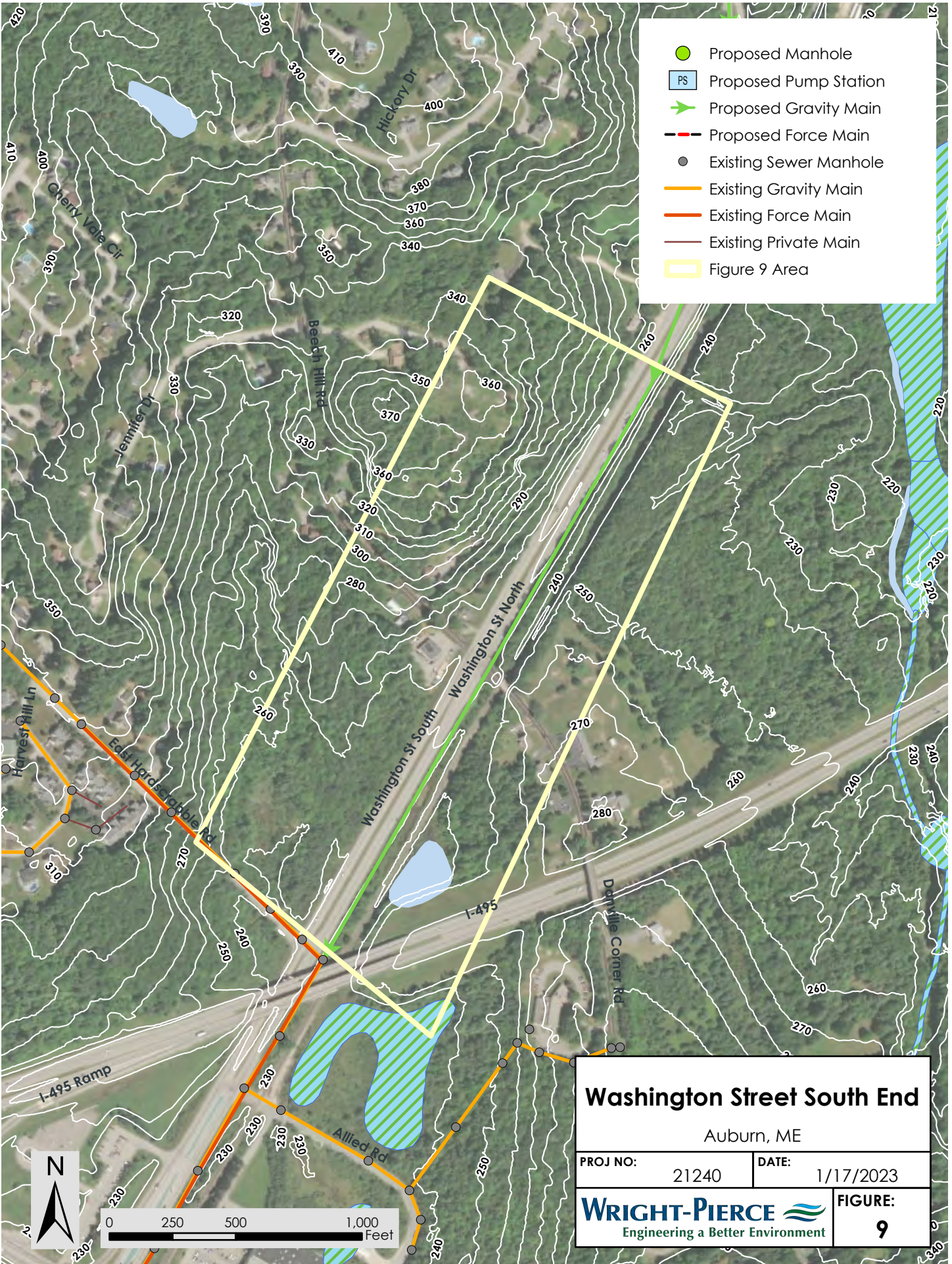


- Proposed Manhole
- PS Proposed Pump Station
- Proposed Gravity Main
- Proposed Force Main
- Existing Sewer Manhole
- Existing Gravity Main
- Existing Force Main
- Existing Private Main
- Figure 7 Area

Washington Street North End	
Auburn, ME	
PROJ NO:	21240
DATE:	1/3/2023
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FIGURE:	7

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