Weston&Sampson®
environmental/infrastructure consultants

273 Dividend Road, Rocky Hill, CT 06067
tel: 860-513-1473 fax: 860-513-1483

report

Town Center Sanitary Sewer Preliminary Engineering Report

Town of Colrain, Massachusetts

April 2014

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1.0 GENERAL

The Town of Colrain, Massachusetts (Town) retained Weston & Sampson Engineers, Inc. (Weston & Sampson) to evaluate the feasibility and costs associated with developing a sanitary sewer system for the Town Center. The Scope of Services includes the following:

- Review of existing information
- Review of existing septic data
- Review of existing conditions
- Prepare a build-out analysis
- Review available capacity of the existing industrial wastewater treatment facility
- Complete an evaluation of alternatives for addressing wastewater needs for the Town Center
- Prepare a Preliminary Engineering Report

This Preliminary Engineering Report (PER) serves as the Feasibility Study Report and has been formatted in accordance with the United States Department of Agriculture (USDA) Rural Development Bulletin 1780-3 to seek funding for design and construction of a sanitary sewer system.

1.1 Geography

The Town of Colrain is a rural community located in the northwest corner of Franklin County, Massachusetts and has a total area of 43.4 square miles. The Town is located in the northeastern part of the Berkshires and is bordered by Halifax and Guilford, Vermont, to the north, Leyden to the east, Greenfield to the southeast, Shelburne to the south, Charlemont to the southwest, and Heath to the west. The eastern border lies along the Green River, which flows through neighboring Greenfield into the Deerfield River. The east and west branches of the North River also meet in the Town and flow into the Deerfield River, just south of the Town along the Shelburne-Buckland town line. The Town is also home to two state forests, Catamount State Forest to the southwest, and half of the H.O. Cook State Forest to the northwest.

The Town includes nine historic village areas:

- Catamount Hill
- Colrain Village (Town Center)
- Elm Grove
- Foundry Village
- Gimletville
- Griswoldville
- Lyonsville
- Shattuckville
- Stewartville

Much of the Town's land area lies outside of these villages. The project planning area for this PER includes the Town Center, which includes Greenfield Road from Main Road to approximately 1,200 feet south of Main Road, Jacksonville Road from Main Road to River Street, River Street, and Main Road from Jacksonville Road to Coburn Street. The limits of the Project Planning Area are shown on Figure 1.

1.2 Wastewater System Background

Within the Town Center (project/planning area) there are no existing public sewer facilities. All properties are currently served using on-site wastewater disposal (septic) systems. However, since the 1960s 21 of the 44 homes in the village of Griswoldville have been served by the industrial facility (mill) in the area. In 1973, the Kendall Company constructed a secondary wastewater treatment facility (WWTF) to serve the mill and residents of Griswoldville. The mill has since gone through a series of ownership changes and is currently owned by Barnhardt Manufacturing Company (Barnhardt). In the past, previous owners have indicated their unwillingness to treat municipal wastewater discharged from the residents of Griswoldville. In response, the residents of Griswoldville created the Colrain Sewer District (CSD) by a special act of the Massachusetts Legislature in October 1997. In addition, there have been a number of reports completed regarding the installation of a municipal wastewater treatment system in Griswoldville. A summary of each report is provided below.

As part of this study, the Town of Colrain and Weston & Sampson met with representatives of Barnhardt in October 2013. At this meeting Barnhardt representatives indicated their willingness to continue to accept flows from Griswoldville and to accept potential future flows from the Town Center. In order for the Town to connect to the Barnhardt WWTF a connection fee is required. At the October 2013 meeting, the Barnhardt representatives indicated that the connection fee would be $300,000.

1.2.1 Preliminary Design Report (October 1993)

Veratec, Inc., as subsidiary of International Paper, Co., a predecessor to Barnhardt, retained Tighe & Bond, Inc. to identify the preferred alternative for installation of a new domestic wastewater treatment facility to treat wastewater generated by the residents of Griswoldville that are connected to the WWTF. The need for an additional treatment facility was based on desire to protect the industrial treatment process from potential upsets related to the residential users. The draft report prepared in October 1993 summarized the evaluation of various small package plants utilizing either “suspended growth” or “attached-growth” technologies. Based on capital and energy cost differential, the use of sequencing batch reactors (SBRs) was recommended for treatment of domestic wastewater. This alternative was not implemented.

1.2.2 Wastewater Treatment Options for Village of Griswoldville (February 1999)

The Town, through the CSD, retained Almer Huntley, Jr. & Associates, Inc. (Huntley) to evaluate alternatives for handling (treating) wastewater in the village of Griswoldville. The treatment processes that were considered include the following:

- Aerated Lagoons
- Activated Sludge Systems
- Community Septic System
- Innovative Systems
- Sand Filtration
- Rotating Biological Contactor (RBC)
- Amphidrome and Bioclere Treatment Systems

The following alternatives were evaluated further, based on system complexity, capital costs, and operating and maintenance costs:

- Community Septic System
- Recirculating Sand Filters (RSF)
- Amphidrome and Bioclere Treatment Systems
- Continued use of the BBA Nonwoven, a predecessor to Barnhardt, WWTF

The evaluation also included a review of six potential locations for a new WWTF. Based on a cost analysis, the recommended plan included the continued use of septic systems and the installation of two RSF WWTFs. This alternative was not implemented.

1.2.3 Preliminary Engineering Report (January 4, 2001)

The Town of Colrain, through the CSD, retained Camp Dresser & McKee (CDM) to evaluate and prepare a report on the need for an independent wastewater treatment facility for the homes in the village of Griswoldville and to evaluate solutions for disposal of wastewater. The evaluation included an analysis the following:

- Two options for discharge:
  - Surface water discharge to the North River
  - Groundwater discharge through leaching facility
- Three alternatives for location:
  - BBA Nonwoven (currently Barnhardt) Tractor-Trailer Parking Site
  - Former Grange Hall Site
  - BBA Nonwovens West Site
- Three alternative technologies for treatment:
  - FAST System
  - Bioclere System
  - Amphidrome System

The recommended solution included the installation of a Bioclere packaged wastewater treatment system at the BBA Nonwoven, previous owners of the Barnhardt facility, tractor-trailer site. The system recommended design flow was 20,000 gallons per day (gpd) with a surface water discharge to the North River. This alternative was not implemented.

1.3 Project Goals

The purpose of this project is to evaluate alternatives and develop a recommended plan for meeting the project goals, which include:

- Eliminate pollution of the Town's environmental/natural resources
- Allow for economic development within the project planning area

The Franklin Regional Council of Governments (FRCOG) is currently working on a Master Plan for economic development in the Town Center. Options for development include a small restaurant, affordable multi-family housing, small bed and breakfast, and other similar uses. These proposed uses are consistent with the Town's Protective Zoning Bylaws (May 9, 2012). The Town Center is zoned Center Village District (CV), which encourage *a mix of uses that reflect traditional land use patterns: compact development of land, buildings, and structures by integrating a variety of complimentary uses, such as residential, retail, office, civic and entertainment*.

Within the Center Village District (CV) development of lots shall meet the specifications outlined in Table 1-1.

Table 1-1
Center Village District Dimensional Schedule

Criteria	Dimension
Minimum Area[(a)]	20,000 square feet
Minimum Frontage[(b)]	100 feet
Minimum Front Yard[(c)]	30 feet
Minimum Side Yard	15 feet
Minimum Rear Yard	30 feet
Maximum Height	35 feet
Maximum Lot Coverage	70%

[(a)]Any lot having a two-family dwelling shall be no less than 30,000 square feet.
[(b)]A lot having an area or frontage less than the Bylaw may be considered if the lot was shown on a plan or recorded/registered at the time of the adoption of the Bylaw.
[(c)]Measured from the right-of-way liner or from a line 25 feet from the centerline of the travel way.

2.0 PROJECT PLANNING AREA

2.1 Location

The project planning area is the Town Center area located in the Town of Colrain, Massachusetts. This report and the proposed project are limited to the Town Center, which includes a portion of Greenfield Road, Main Road, Jacksonville Road, and River Street. The project planning area includes 67 properties.

A location map is shown on Figure 1.

2.2 Environmental Resources Present

Environmental resources present within the project planning area include:

- North River
- Soils that are classified as “farmland of statewide importance,” “prime farmland,” and “very limited” for suitability for septic
- Wetland buffer zone(s)

The land uses within the project area include commercial, cropland, forested land, high-density to low-density residential, multi-family residential and urban public/institutional. According to the Federal Emergency Management Agency (FEMA) a portion of the project area is located within a flood area. That area, designated as Zone A7 and B on the Flood Insurance Rate Map (FIRM) Community Panel Number 2501130010B, is described as areas of 100-year flood; base flood elevations and flood hazard factors determined and areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where there contributing drainage area is less than one square mile; or areas protected by levees from the base flood.

The proposed project is not expected to negatively impact any environmental resources because all work is proposed within existing roadways, easements, or previously disturbed areas. If the Town moves forward with USDA funding, an Environmental Report will be prepared and will include additional information regarding the environmental issues for the project.

2.3 Growth Areas and Population Trends

Population information was collected from available U.S. Census Data from 1850 to 2010. A summary of the population during this time period is presented in Table 2-1. As shown in Table 2-1, the Town experienced a general decline in growth from the 1880 to 1970. Following 1970 there is a slow growth in population, with the exception of the decline from 2000 to 2010. This decline may be attributed to the down turn in the economy and resultant loss of jobs and industry in the area.

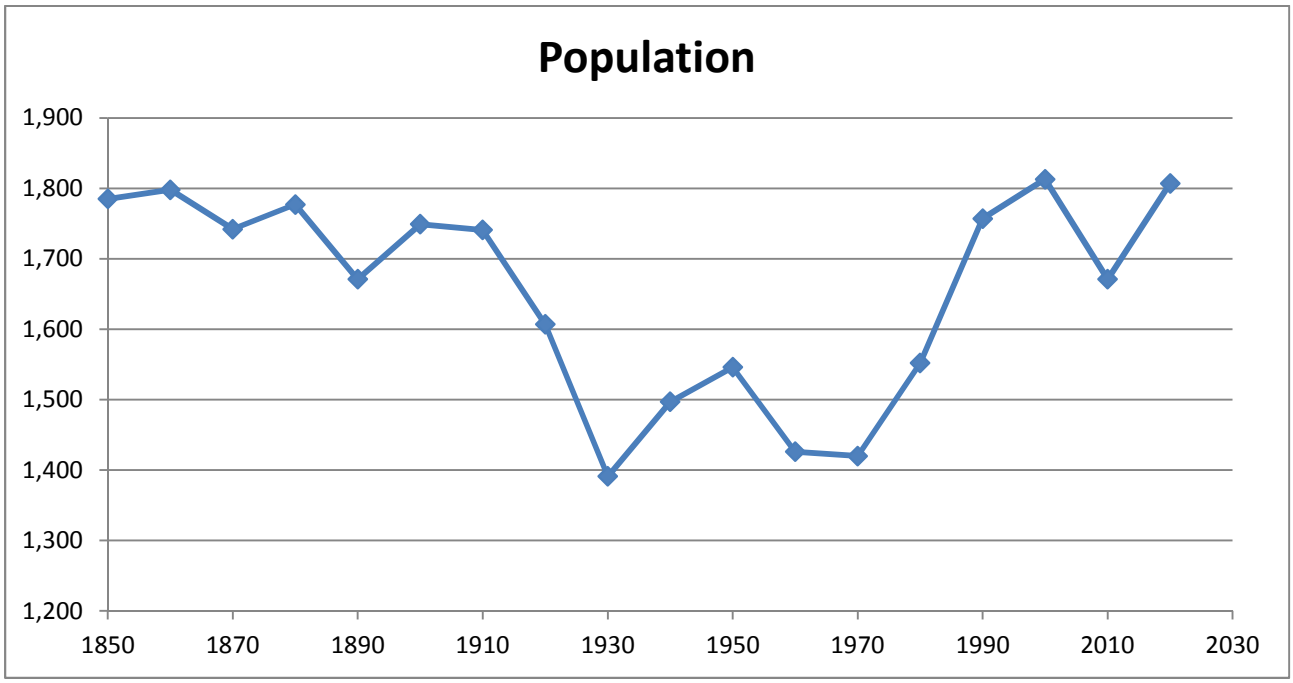
The Massachusetts Institute for Social and Economic Research (MISER) projects a slight increase in growth for the population of Colrain. The MISER project is based on the 2000 census data.

Table 2-1
Population Data
Town of Colrain, Massachusetts

Year	Population Data	Change in Population
1850	1,785	--
1860	1,798	13
1870	1,742	-56
1880	1,777	35
1890	1,671	-106
1900	1,749	78
1910	1,741	-8
1920	1,607	-134
1930	1,391	-216
1940	1,497	106
1950	1,546	49
1960	1,426	-120
1970	1,420	-6
1980	1,552	132
1990	1,757	205
2000	1,813	56
2010	1,671	-142
2020*	1,807	136

*MISER projection (based on 2000 Census)

For the purpose of this evaluation it has been assumed that a portion of the growth would occur within the Town Center area when sewer service is provided and the remainder of the will occur outside the extents of the project area and the village of Griswoldville.



3.0 EXISTING FACILITIES

3.1 Location Map

A location map of the project planning area is shown on Figure 1.

3.2 History

3.2.1 Town Center

Within the Town Center (project/planning area) there are no existing wastewater facilities. All properties include on-site septic systems.

3.2.2 Griswoldville Collection System (Colrain Sewer District)

The village of Griswoldville includes an existing collection system that is owned and operated by the Colrain Sewer District (CSD). The existing collection system was constructed 1998 and is comprised of approximately 2,200 linear feet of 8-inch PVC gravity sewers on Church Street, High Street, and Main Road; approximately 2,100 linear feet of 8-inch PVC gravity sewer on Call Road, Griswoldville Street, and King's Bluff; one pumping station located on Call Road; and approximately 1,200 linear feet of 3-inch force main on Call Road. The Call Road Pumping Station is equipped with two pumps that are rated for 115 gallons per minute (gpm) at 61 feet of total dynamic head. The Call Road Pumping Station is currently not in use and will serve the properties on Call Road, Griswoldville Street, and King's Bluff once they connect to the system.

The homes on Church Street, High Street, and Main Road discharge to the wastewater treatment facility (WWTF) currently owned and operated by the Barnhardt Manufacturing Company. The flows discharge through a metering/sampling station vault located across from the Barnhardt facility on Main Road then combines with the industrial wastewater prior to treatment.

3.3 Condition of Facilities

3.3.1 Griswoldville Collection System (Colrain Sewer District)

The existing collection system is less than 20 years old and is in good operational condition. The system is suitable for continued use and is adequate for existing and proposed flows. In addition, based on system flows, there do not appear to be any significant sources of infiltration and inflow associated with the collection system.

3.3.2 Wastewater Treatment Facility (WWTF)

The Barnhardt Manufacturing Company WWTF includes a biological treatment system that utilizes the activated sludge process for secondary treatment and nitrification. The WWTF process consists of the following:

Preliminary Treatment Processes

- One (1) – Mechanical Screen
- Two (2) – Influent Wastewater Pumps

Preliminary Chemical Feed Systems
- Pathogen Destruction Feed System
- Anti-Foam Feed System

Biological Processes
- Two (2) – Extended Aeration Activated Sludge Lagoons
- Two (2) – 55-foot Diameter Secondary Clarifiers
- Three (3) – Aeration Blowers
- Two (2) – Return Activated Sludge Pumps
- Two (2) – Waste Activated Sludge Pumps

Solids Handling Processes
- One (1) – Belt Filter Press
- One (1) – Polymer Feed System
- One (1) – Sludge Cake Truck Loading Bay

Final Treatment Processes
- One (1) – Parshall Flume

The WWTF operates under National Pollutant Discharge Elimination System (NPDES) Permit No. MA0003697, which was issued on October 29, 2010 and expires on October 29, 2015. A complete copy of the permit and operational letter is included in Appendix A. The current effluent permit limits for key parameters are summarized in Table 3-1.

Table 3-1
Barnhardt Wastewater Treatment Facility
NPDES Discharge Permit Limits

Parameter	Average Monthly	Maximum Daily
Flow, MGD	Report	0.890
pH	6.5-90	
Production Rate	Report	Report
BOD_5, lbs/d	300	510
TSS, lbs/d	250	510
COD, lbs/d	3,807	7,614
Total Sulfide, lbs/d	1.0	2.0
Total Chromium, lbs/d	Report	1.1
Total Phenols, lbs/d	Report	1.0
Ammonia Nitrogen (as N), lbs/d	-	42
TKN, mg/L	-	Report
Nitrite-Nitrate (as N), mg/L	-	Report
Total Phosphorous, mg/L	-	Report
Total Copper, mg/L	-	Report
Temperature, ^oF	Report	Report
E. Coli (4/1 to 10/31), cfu/100 ml	126	409

The WWTF is currently in compliance with all NPDES permit requirements and is operating at approximately 50% of its rated capacity.

3.4 Financial Status of any Existing Facilities

The existing wastewater collection system in the Griswoldville portion of Town includes 21 users and is owned by the CSD with the potential to service additional users on Call Road, Griswoldville Road, and King's Bluff. The system discharges into the WWTF owned and operated by Barnhardt. Currently the fees are minimal. The CSD needs to develop a new user fee structure for operation and maintenance of the existing collection system in Griswoldville, including long-term replacement/repair, and capital and O&M costs associated with existing and any future service areas.

4.0 NEED FOR PROJECT

The purpose of this section is to determine if within the Town Center conventional on-site individual subsurface disposal systems are sufficient to prevent public health issues due to contamination of natural resources and allow for economic development. In other words, the purpose of this section is to determine whether or not conventional septic systems will meet the project goals. The criteria used to evaluate the need for additional collection and treatment systems are as follows:

1. *The presence of wellhead protection areas*: wellhead protection areas are intended to protect public drinking water supplies from contamination. The presence of failing septic systems in proximity to a wellhead protection area could place the public water supply in danger of contamination. The location of wellhead protection areas was determined from a GIS data layer from the Massachusetts Office of Geographic Information (MassGIS) and is shown on Figure 2 and in Appendix B.
2. *The presence of priority habitat of endangered species*: priority and estimated habitats of endangered species indicated land with important environmental functions. The ability of the land to provide these important functions could be impacted by nearby failing septic systems. The location of priority habitats of endangered species was determined from a GIS data layer from MassGIS and is shown in Appendix B.
3. *The size of lots with septic systems*: small lots make it difficult to provide the appropriate amount of area for a soil adsorption system (SAS), and may not allow for appropriate separation between private wells and septic systems. This may require the use of Innovative/Alternative (I/A) systems increasing the cost of a Title 5 compliant system. This information was gathered from Town Assessor's data and is shown in Appendix B.
4. *The number of documented septic system failures*: a high frequency of septic system failures in an area may indicate that the area is not suitable for a standard septic system, increasing the cost of constructing a Title 5 compliant system such as an I/A system. This also places any environmental and water resources in the area in danger of contamination. This information was gathered from Town of Colrain Board of Health records. Based on discussions with Town Staff, many more systems in the project planning area are in failure, but are not documented as they have not been sold and is shown in Appendix B.
5. *The number of documented septic system variances*: a high frequency of septic system variances in an area may indicate that the area is not suitable for a standard septic system, increasing the cost of constructing a Title 5 compliant system such as an I/A system. This information was gathered from Town of Colrain Board of Health records and is shown in Appendix B.
6. *The number of lots with groundwater limitations to the construction of septic systems*: a lot was determined to have groundwater limitations to the construction of septic systems if there was less than 72 inches to estimated seasonal high groundwater level. High groundwater levels may require the use of mounded or I/A systems to achieve compliance with Title 5, increasing the cost of septic system construction. This information was gathered from Town of Colrain Board of Health records and is shown in Appendix B.
7. *The frequency of septic tank pump-outs*: a property with a high number of septic tank pump-outs may have a failed SAS or high groundwater levels increasing the possibility

of contamination of environmental and water resources. This information was gathered from the Town of Colrain Board of Health records and is shown in Appendix B.

8. *The density of residential development*: the density of residential development increases the density of septic systems. A high density of septic systems due to small lots decreases the effectiveness of the system and can lead to contamination of groundwater from failing or ineffective septic systems. This information was gathered from Town Assessor's data and is shown in Appendix B.
9. *Expected future commercial/industrial development*: commercial/industrial wastewater may not be properly treated by a septic system or may be cost prohibitive to design a proper treatment system. This information was gathered from discussions with Town staff and is shown in Appendix B.

4.1 Health, Sanitation, and Security

As shown on Figure 1 the project planning area is located in the Town Center adjacent to the North River. The project planning area includes:

- Two wellhead protection areas
- Approximately 35% of the area is within an estimated habitat for rare or endangered species
- 100-year flood plain
- Wetland buffer zone(s)
- 45 properties that are ½-acre or less
- 55 developed properties, only one of which was developed after 1978 (the year Title 5 was promulgated)
- Approximately 0.50 developed properties per acre

Based on the information obtained from the Colrain Board of Health the project planning area includes four properties where the septic systems failed, and two properties with variances. The area includes properties with groundwater limitations and contains seven properties where the property owners had their system pumped two or more times in one year.

Based on the United States Department of Agriculture's Soil Conservation Service (SCS), all of the soils in the project planning area are characterized by soil conditions with that are very limited for the construction of septic systems. All of the properties in this area are currently served by public water.

In order to evaluate the need for wastewater treatment and disposal in the project planning area, a scoring system was established. Each criteria discussed above is allocated a score of one or more points. If the project planning area does not meet the criteria, a score of zero points is given. The scoring system is as follows:

1. Area contains wellhead protection area(s).
   Zero = No wellhead protection area.
   One = Contains wellhead protection area

2. Area contains priority habitat(s) for rare wildlife.
   Zero = Priority habitat areas comprises less than 10% of the entire area.
   One = Priority habitat areas comprises greater than or equal to 10%, but less than 20% of the entire area.

Two = Priority habitat comprises greater than or equal to 20% of the entire area.

3. Area contains lots that are approximately ½ acre in size or less.
   Zero = The area contains less than 10 lots are ½ acre in size or less.
   One = The area contains greater than or equal to 10 lots, but less than 30 lots that are ½ acre in size or less.
   Two = The area contains greater than or equal to 30 lots that are ½ acre in size or less.

4. Area contains households with Title 5 and/or soil adsorption system (SAS) failures.
   Zero = No known failures.
   One = Less than 5 known failures.
   Two = Greater than or equal to 5 known failures.

5. Area contains households with local and Title 5 variances.
   Zero = No known variances.
   One = Less than 5 known variances.
   Two = Greater than or equal to 5 variances.

6. Area is characterized by groundwater conditions with limitations for the construction of septic systems.
   Zero = Groundwater conditions do not limit the construction of septic systems.
   One = Groundwater conditions limit the construction of septic systems.

7. Area contains households where the septic systems are pumped more than once per year.
   Zero = Less than 5 have pumped their system more than once per year.
   One = Greater than or equal to 5, but less than 10 have pumped their system more than once per year.
   Two = Greater than or equal to 10 have pumped their system more than once per year.

8. Area is comprised of significant dense residential development, which is defined by the average number of building per acre.
   Zero = The area contains less than 0.500 building per acre.
   One = The area contains greater than or equal to 0.500 buildings per acre.

9. Area is expected to involve expansion of commercial, industrial, and/or large recreational developments.
   Zero = The area is not expected to involve expansion of commercial, industrial, and/or large recreational developments.
   One = The area is expected to involve expansion of commercial, industrial, and/or large recreational developments.

A summary of the needs evaluation criteria for the project planning area in shown in Table 4-1 below.

Table 4-1
Summary of Need Evaluation Criteria

Criteria	Description	Possible Score	Planning Area Score
1	Wellhead Protection Area	0 or 1	1
2	Endangered Species	0, 1, or 2	2
3	½ acre lots or less	0, 1, or 2	2
4	Title 5 and/or SAS Failures	0, 1, or 2	1
5	Septic Variances	0, 1, or 2	1
6	Groundwater Limitations	0 or 1	1
7	Pump More than Once per Year	0, 1, or 2	1
8	Dense Residential Development	0 or 1	1
9	Commercial/Industrial Development	0 or 1	1
	TOTAL	14 (max)	11

As shown in Table 4-1, the project planning area scored 11 out of a maximum of 14 points, which places the project planning area within the top 75th percentile. Therefore, the project planning area qualifies as an area where there is a need for wastewater treatment and disposal.

A copy of the figures showing the environmental resources and summarizing the Colrain Board of Health and SCS information is presented in Appendix B.

4.2 System Operation and Maintenance

The existing sanitary sewer collection system in the village of Griswoldville was constructed in early 1998 and based on system flows does not appear to include a significant source of infiltration and inflow. The collection system is owned by the town, but operated by the Colrain Sewer District (CSD). The collection system and the Barnhardt WWTF are adequately sized to accepted additional wastewater flows. Prior to expanding the sewer district, the CSD should develop a user fee structure that allows for managing not only the existing operational and maintenance costs, but the capital and O&M costs for the project planning area.

4.3 Growth

As noted in Section 2.3, it has been assumed that a portion of the growth would occur within the Town Center area when sewer service is provided and the remainder of the will occur outside the extents of the project area and the village of Griswoldville.

5.0 ALTERNATIVES CONSIDERED

5.1 Alternative 1 – On-Site Conventional/Alternative Treatment Systems

5.1.1 Description and Design Criteria

This alternative includes the continued use of onsite treatment systems that are fully compliant with Title 5. Systems include conventional (non-mounded), mounded, and systems that utilize approved innovative and alternative (I/A) technologies. In most cases, I/A technologies will allow for a reduction in leach field size and separation to groundwater because, they will provide some secondary treatment of the wastewater. The design criteria for this alternative based on 110 gallons per day (gpd) per bedroom. The design criteria is summarized in Table 5-1.

Table 5-1
Alternative 1 Design Criteria

No. of Households	55
Average No. of Bedrooms	3
Total Average Daily Flow (gpd)	18,150

See Figure 3 for additional information.

5.1.2 Environmental Impacts

This alternative has the potential to impact the environmental resources within the project planning area including: the North River, endangered species, and groundwater resources.

5.1.3 Land Requirements

There are no sites or easements required for this alternative.

5.1.4 Construction Problems

This alternative does not include construction concerns that could adversely affect the construction cost.

5.1.5 Cost Estimates

All costs associated with this alternative will be at the property owners' expense and no public funds would be required.

5.1.6 Advantages/Disadvantages

Based on the needs analysis completed as part of Section 4.0 and review of existing information, this alternative does not meet the overall project objective for mitigating environmental impacts within the project planning area nor does it allow for economic development. This alternative relays solely on the property owners' ability to install and maintain a fully compliant on-site treatment system and therefore will not be evaluated further.

5.2 Alternative 2A – Sewer Extension: Gravity and Force Main

5.2.1 Description and Design Criteria

This alternative includes construction of 8-inch gravity sewer on Main Road from Coburn Street to Greenfield Road, on Greenfield Road from Jacksonville Road to approximately 1,230 feet

south of Main Road, on Jacksonville Road from Main Road to River Street, and on River Street. A pumping station will be installed on River Street and will pump via a 6-inch force main to the existing WWTF owned and operated by Barnhardt Manufacturing. Main Road and Jacksonville Road (Route 112) are state roads and will require approval from the Massachusetts Department of Transportation (MassDOT). The design criteria for this alternative is based on an average of 70 gpd per person and 3 people per household or 210 gpd per household. Due to the distance to from the proposed pumping station on the discharge point in the Griswoldville system a 6-inch force main is proposed. In order to achieve cleansing velocities a minimum pumping rate of 250 gallons per minute (gpm) is required. The design criteria is summarized in Table 5-2.

Table 5-2
Alternative 2A Design Criteria

No. of Households	55
Residential Wastewater Flow	11,550
Commercial Development	5,000
Total Average Daily Flow (gpd)	16,550
Peaking Factor	5.6
Peak Flow (gpm)	64

See Figures 4 and 5 for additional information.

5.2.2 Environmental Impacts

No environmental impacts are anticipated. An Environmental Report will be generated if the Town pursues USDA funding for design and implementation.

5.2.3 Land Requirements

The site of the proposed pumping station is not currently owned by the Town and will need to be acquired possibly through an easement.

5.2.4 Construction Problems

During the preliminary evaluation and review of the project the following potential construction issues were noted:

1. State Road
   Work within a state road (Route 112) may include the removal and disposal of concrete road base, furnishing and installing controlled density fill, and milling and overlay from curb to curb. Weston & Sampson met with the Massachusetts Department of Transportation regarding this project and they indicated that controlled density fill would be required within the travel way on all state roads outside of the proposed Transportation Improvement Program (TIP) Project. The TIP Project includes Jacksonville Road from River Street to Main Road and Main Road from Jacksonville Road to the Town Hall.

5.2.5 Cost Estimates

The engineer's opinion of probable construction cost for this alternative is approximately $2.56 million, which includes 20% contingency. The engineer's opinion of probable 20-year operation and maintenance costs for this alternative is approximately $360,000. A detailed opinion of costs is provided in Appendix C.

5.2.6 Advantages/Disadvantages

This alternative meets the overall objective of the project by providing a centralized collection system that can be sized to accommodate the proposed economic development. In addition, this alternative limits the environmental impacts within the project area and eliminates on-site septic systems in the area. This alternative however will not provide an opportunity to serve any areas between the project planning area and the Griswoldville System.

5.3 Alternative 2B – Sewer Extension: Gravity, Force Main, and Variable Slope Gravity

5.3.1 Description and Design Criteria

This alternative includes construction of 8-inch gravity sewer on Main Road from Coburn Street to Greenfield Road, on Greenfield Road from Jacksonville Road to approximately 1,230 feet south of Main Road, Jacksonville Road from Main Road to River Street, and on River Street. A pumping station will be installed on River Street and will pump via a 6-inch force main to a new variable slope gravity sewer on Main Road. The variable slope gravity sewer will begin approximately 1,000 feet west of Foundry Village Road and will discharge at the existing collection system. Main Road and Jacksonville Road (Route 112) are state roads and will require approval from MassDOT. The force main is connected to the variable slope gravity sewer. A variable slope gravity sewer is designed to only handle the grey water. As a result, this alternative will require the installation of a septic tank effluent pumps or septic tank effluent gravity systems at each property. The design criteria for this alternative is based on an average of 70 gpd per person and 3 people per household or 210 gpd per household. Due to the distance to from the proposed pumping station on the discharge point in the Griswoldville system a 6-inch force main is proposed. In order to achieve cleansing velocities a minimum pumping rate of 250 gallons per minute (gpm) is required. The design criteria is summarized in Table 5-3.

Table 5-3
Alternative 2B Design Criteria

No. of Households	55
Residential Wastewater Flow	11,550
Commercial Development	5,000
Total Average Daily Flow (gpd)	16,550
Peaking Factor	5.6
Peak Flow (gpm)	64

See Figures 6 and 7 for additional information.

5.3.2 Environmental Impacts

No environmental impacts are anticipated. An Environmental Report will be generated if the Town pursues USDA funding for design and implementation.

5.3.3 Land Requirements

The site of the proposed pumping station is not currently owned by the Town and will need to be acquired possibly through an easement.

5.3.4 Construction Problems

During the preliminary evaluation and review of the project the following potential construction issues were noted:

1. State Road
   Work within a state road (Route 112) may include the removal and disposal of concrete road base, furnishing and installing controlled density fill, and milling and overlay from curb to curb. Weston & Sampson met with the Massachusetts Department of Transportation regarding this project and they indicated that controlled density fill would be required within the travel way on all state roads outside of the proposed Transportation Improvement Program (TIP) Project. The TIP Project includes Jacksonville Road from River Street to Main Road and Main Road from Jacksonville Road to the Town Hall.

5.3.5 Cost Estimates

The engineer's opinion of probable construction cost for this alternative is approximately $2.55 million, which includes 20% contingency. The engineer's opinion of probable 20-year operation and maintenance costs for this alternative is approximately $340,000. A detailed opinion of costs is provided in Appendix C.

5.3.6 Advantages/Disadvantages

This alternative meets the overall objective of the project by providing a centralized collection system. In addition, this alternative limits the environmental impacts within the project planning garea and allows for economic development. This alternative will also eliminate on-site septic systems in the area and provide service to areas between the project area and the Griswoldville System via a variable slope gravity sewer. Any customers connected to the variable slope sewer will need to be connected via a septic tank effluent pump or septic tank effluent gravity system, such that only grey water, no solids, are transmitted downstream.

5.4 Alternative 3 – Community Septic System

5.4.1 Description and Design Criteria

This alternative includes construction of gravity sewer on Main Road from Coburn Street to Greenfield Road, on Greenfield Road from Jacksonville Road to approximately 1,230 feet south of Main Road, Jacksonville Road from Main Road to River Street, and on River Street. A pumping station will be required on River Street and will pump via a 4-inch force main to a new community septic system located on Jacksonville Road approximately 1,700 linear feet north of River Street. Main Road and Jacksonville Road (Route 112) are state roads and will require approval from MassDOT. The design criteria for this alternative based on 110 gallons per day (gpd) per bedroom. The design criteria is summarized in Table 5-4.

Table 5-4
Alternative 1 Design Criteria

No. of Households	55
Average No. of Bedrooms	3
Total Average Daily Flow (gpd)	18,150

Title 5 regulations limit shared systems to 10,000 gallons per day (gpd) or approximately 30-40 homes. Shared community systems do not prove any secondary treatment of wastewater. Wastewater flows in excess of 10,000 gpd must be treated prior to discharge. That is, a treatment plant would be required for a community septic system.

See Figure 8 for additional information.

5.4.2 Environmental Impacts

No environmental impacts besides those noted in the environmental report are anticipated. Additional information will be provided in the Environmental Report.

5.4.3 Land Requirements

The site of the proposed community septic system is not currently owned by the Town and will need to be acquired or an easement obtained.

5.4.4 Construction Problems

During the preliminary evaluation and review of the project the following potential construction issues were noted:

1. State Road
   Work within a state road may include the removal and disposal of concrete road base, furnishing and installing controlled density fill, and milling and overlay from curb to curb. Weston & Sampson met with the Massachusetts Department of Transportation regarding this project and they indicated that controlled density fill would be required within the travel way on all state roads outside of the proposed Transportation Improvement Program (TIP) Project. The TIP Project includes Jacksonville Road from River Street to Main Road and Main Road from Jacksonville Road to the Town Hall.

5.4.5 Cost Estimates

The engineer's opinion of probable construction cost for this alternative is approximately $4.07 million, which includes 20% contingency. The engineer's opinion of probable 20-year operation and maintenance costs for this alternative is approximately $590,000. A detailed opinion of costs is provided in Appendix C.

5.4.6 Advantages/Disadvantages

This alternative meets the overall objective of the project by providing a centralized collection system. This alternative does limit the environmental impacts within the project area and will allow for economic development. This alternative will also eliminate on-site septic systems in the area The location of the proposed community system is on Coburn Street near Main Road. Based on the regulations, because the average daily flow is estimated to be greater than 10,000 gpd, nitrogen removal would be required. A WWTF would be required prior to the groundwater discharge. Although a proposed location was selected for purposes of this evaluation, additional investigations would need to be completed in addition the town would need to acquire the property, which may not be feasible. As a result, this alternative is not considered feasible and is removed from further consideration.

5.5 Alternative 4 – New Wastewater Treatment Facility

5.5.1 Description and Design Criteria

This alternative includes construction of gravity sewer on Main Road from Coburn Street to Greenfield Road, on Greenfield Road from Jacksonville Road to approximately 1,230 feet south of Main Road, Jacksonville Road from Main Road to River Street, and on River Street. A pumping station will be required on River Street and will pump via a 4-inch force main to a new satellite WWTF located on Jacksonville Road approximately 1,700 feet north of River Street. This alternative will require installation of piping across the North River. Main Road and Jacksonville Road (Route 112) are state roads and will require approval from MassDOT. The design criteria for this alternative is based on an average of 70 gpd per person and 3 people per household or 210 gpd per household. In order to achieve cleansing velocities a minimum pumping rate of 120 gallons per minute (gpm) is required. The design criteria is summarized in Table 5-3.

Table 5-5
Alternative 2B Design Criteria

No. of Households	55
Residential Wastewater Flow	11,550
Commercial Development	5,000
Total Average Daily Flow (gpd)	16,550
Peaking Factor	5.6
Peak Flow (gpm)	64

Satellite WWTF facilities typically treat less than 35,000 gpd and provide secondary wastewater treatment. Weston & Sampson reviewed various pre-packaged options some of which included the following:

- Dynatec Membrane Bioreactor (MBR): The Dynatec system utilizes ultrafiltration membrane technology in a low-power external tubular membrane configuration. The proposed cost is approximately $1.2 million, not including site work, buildings, electrical, controls, or backup power.
- Amphidrome® Plus: The Amphidrome® system utilizes a biologically active filter (BAF) operating as a sequencing batch in which the waste water is cycled back and forth through the filter The system includes anoxic/equalization tank(s), Amphidrome® reactor(s), two clear wells, and an Amphidrome® Plus denitrification filter. The Amphidrome® system is typically installed underground. The proposed cost range from $265,000 to $315,000 (not including tanks) based on proposed flows ranging from 20,000 to 40,000 gpd. These costs do not include site work, buildings, electrical, controls, or backup power.
- Rotating Biological Contactor (RBC): multitude of plastic media sheets in bundles. The RBC is immersed in wastewater to a depth that submerges approximately 40% of the media. When the RBC is rotated the media is alternately exposed to the air and wastewater. Once exposed to wastewater a biological growth begins to develop on the plastic media, using the contaminants in the effluent as their food source. The proposed cost range from $445,000 to $535,000 (not including tanks) based on proposed flows ranging from 20,000 to 40,000 gpd. These costs do not include site work, buildings, electrical, controls, or backup power.

See Figure 9 for additional information.

5.5.2 Environmental Impacts

No environmental impacts besides those noted in the environmental report are anticipated. Additional information will be provided in the Environmental Report.

5.5.3 Land Requirements

The site of the proposed satellite WWTF is not currently owned by the Town and will need to be acquired or an easement obtained.

5.5.4 Construction Problems

During the preliminary evaluation and review of the project the following potential construction issues were noted:

1. State Road
   Work within a state road may include the removal and disposal of concrete road base, furnishing and installing controlled density fill, and milling and overlay from curb to curb. Weston & Sampson met with the Massachusetts Department of Transportation regarding this project and they indicated that controlled density fill would be required within the travel way on all state roads outside of the proposed Transportation Improvement Program (TIP) Project. The TIP Project includes Jacksonville Road from River Street to Main Road and Main Road from Jacksonville Road to the Town Hall.

2. North River Crossing
   This alternative will most likely require a bridge crossing where the force main piping is hung from the bridge over the North River. Another option would be to directionally drill below the river.

5.5.5 Cost Estimates

The engineer's opinion of probable construction cost for this alternative is approximately $4.59 million, which includes 20% contingency. The engineer's opinion of probable 20-year operation and maintenance costs for this alternative is approximately $3.61 million. A detailed opinion of costs is provided in Appendix C.

5.5.6 Advantages/Disadvantages

This alternative meets the overall objective of the project by providing a centralized collection system. This alternative will limit the environmental impacts within the project planning area and will allow for economic development. This alternative will also eliminate on-site septic systems in the area However, based on discussions with the Environmental Protection Agency (EPA) it is highly unlikely that new surface water National Pollutant Discharge Elimination System (NPDES) permit will be issued. That is, it is very difficult to permit and the permitting process and required analysis are typically cost prohibitive. Any new surface water discharge would be subject to anti-degradation laws and as such would need to treat to the limits of technology for Phosphorous, Nitrogen and Metals. This would require treatment beyond the ground water standards. In addition, the capital costs associated with this alternative is the most expensive. Therefore this alternative is not considered feasible and has been removed from further consideration.

6.0 SELECTION OF AN ALTERNATIVE

As discussed in Section 5.0, Alternatives 1, 3, and 4 are not feasible and do not meet the project goals and therefore are not considered further. Alternatives 2A and 2B meet the projects goals, are feasible, and therefore are considered further in this section. A summary of the Engineer's opinion of probable costs, including capital, engineering, and operation and maintenance costs used in our selection analysis is presented below in Table 6-1 below.

Table 6-1
Project Alternatives – Engineer's Opinion of Probable Costs

Alternative	2A – Gravity	2B – STEP
Capital Cost	$2,131,350	$2,124,300
Contingency	$426,300	$424,900
Engineering Cost	$255,800	$254,900
Connection Fee	$300,000	$300,000
Project Cost	$3,113,450	$3,104,100
Annual Operating Cost	$13,953	$13,971
20-Year Life Cycle Costs	$3,472,514	$3,443,524

As shown in Table 6-1, the capital and life cycle costs for Alternatives 2A and 2B are essentially even, considering the level of accuracy of the estimates at this time. Other less quantifiable factors must be taken into account such as additional users, to identify the preferred alternative. Based on the life cycle cost analysis and less quantifiable factors, Weston & Sampson recommends the installation of gravity sewers, one pumping station, force main, and variable gravity slope sewers (Alternative 2B). This alternative meets the projects goals by providing a centralized collection system to promote economic development while providing environmental protection.

7.0 PROPOSED PROJECT (RECOMMENDED ALTERNATIVE)

Alternative 2B is the recommended alternative because it meets the project goals and is cost-effective. A summary of the recommended alternative is provided below.

7.1 Project Design

The project design information for the proposed improvements is described in detail in Section 5.0. A summary of the improvements is provided below:

- Installation of new 8-inch gravity sewers
- Installation of new 6-inch force main
- Installation of new 6-inch variable slope gravity sewer
- Installation of a new submersible pumping station

In addition, property owners will be required to install either a septic tank effluent pumping (STEP) system or a septic tank effluent gravity (STEG) system.

7.2 Engineer's Opinion of Probable Construction Costs

The engineer's opinion of probable construction costs (OPCC) for the recommended alternative is $4,36 million, which includes a 20% contingency. A detailed OPCC is provided in Appendix C. Please note the engineer's OPCC does not include legal services. All of these costs are reimbursable costs under the USDA Rural Utility Services Program.

7.3 Annual Operating Budget

Additional information for this section will be completed at the time of a full application for funding and provided within the application and will include a proposed rate structure, operation and maintenance costs, debt repayment plan, and debt service reserve plan.

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1 Permitting Requirements

8.1.1 Colrain Conservation Commission

A portion of the work will be within the buffer zone of wetlands or within the riverfront area of the North River. As a result, a Notice of Intent must be filed with the Colrain Conservation Commission and the Massachusetts Department of Environmental Protection. Prior to submitting the NOI, the resource areas within the project limit will need to be delineated and shown on the project drawings. Once the project is approved by the Colrain Conservation Commission, an Order of Conditions will be issued. The Order of Conditions will outline the required conditions for conducting the work within the buffer zone and the resource areas.

8.1.2 Massachusetts DEP Sewer Extension/Connection Permit (BRP WP 55, 71, 74)

A permit from the Massachusetts Department of Environmental Protection (DEP) is required for sewer extensions equal to or greater than 1,000 feet (BRP WP 71) and sewer connections for discharge greater than 50,000 gpd (BRP WP 74). As part of the permit application, the municipal official for the Town of Colrain needs to sign off on the DEP application.

8.1.3 MassDOT Application for Permit to Access State Highway

A portion of the work is proposed with the Massachusetts Department of Transportation State Highway Layout. As a result the Town will be required to obtain a Non-vehicular Access Permit. The Standard Operating Procedures outline the application process, which includes an Access Permit Determination of Need, a Pre-Review of the Application Submission, a Detailed Access Permit Application Review, and finally issuance of the Access Permit or denial of the Access Permit.

8.1.4 Massachusetts Environmental Policy Act (MEPA)

The Massachusetts Environmental Policy Act is administered by the Executive Office of Energy and Environmental Affairs. The MEPA Regulations were recently modified. The modifications became effective on May 10, 2013. A MEPA review is required when one or more review thresholds are met or exceeded and the subject matter of at least one review threshold is within MEPA jurisdiction. The threshold that is met or exceeded specifies whether MEPA review should consist of an Environmental Notification Form (ENF) or an ENF and an Environmental Impact Report (EIR). The wastewater thresholds are as follows:

ENF and Mandatory EIR

1. Construction of a new wastewater treatment and/or disposal facility with a Capacity of 2.5 million gallons per day (mgd) or more.
2. New interbasin transfer of wastewater of 1.0 mgd or more or any amount determined significant by the Water Resource Commission.
3. Construction of one or more New Sewer mains ten or more miles in length.
4. New sewer service to a municipality or sewer district across a municipal boundary through new or existing pipelines
5. New discharge or expansion in discharge of any amount of sewage, industrial wastewater or untreated stormwater directly to an outstanding resource water.

6. New capacity or expansion in capacity for storage, treatment, processing, combustion or disposal of 150 or more wet tons per day (tpd) of sewage sludge, sludge ash, grit, screenings, or other sewage sludge residual materials.

ENF

1. Construction or a new wastewater treatment and/or disposal facility with a capacity of 100,000 or more gallons per day (gpd).
2. Expansion of an existing wastewater treatment and/or disposal facility by the greater of 100,000 gpd or 10% of existing capacity.
3. Construction of one or more new sewer mains:
   a. that will result in an expansion in the flow to a wastewater treatment and/or disposal facility by 10% of existing capacity;
   b. five or more miles in length; or
   c. ½ or more miles in length, provided the sewer mains are not located in the right of way of existing roadways.
4. New discharge or expansion in discharge:
   a. to a sewer system of 100,000 or more gpd of sewage, industrial wastewater or untreated stormwater;
   b. to a surface water of:
      i. 100,000 or more gpd of sewage;
      ii. 20,000 or more gpd of industrial wastewater; or
      iii. any amount of sewage, industrial wastewater or untreated stormwater requiring a variance from applicable water quality regulations; or
   c. to groundwater of:
      i. 10,000 gpd or more gpd of sewage within an area, zone or district established, delineated or identified as necessary or appropriate to protect a public drinking water supply, an area established to protect a nitrogen sensitive embayment, an area within 200 feet of a tributary to a public surface drinking water supply, or an area within 400 feet of public surface drinking water supply;
      ii. 50,000 or more gpd of sewage within any other area;
      iii. 20,000 or more gpd of industrial wastewater; or
      iv. any amount of sewage, industrial wastewater or untreated stormwater requiring approval by the DEP of a variance from Title 5 of the State Environmental Code for New Construction.
5. New capacity or expansion in capacity for:
   a. combustion or disposal of any amount of sewage sludge, sludge ash, grit, screenings, or other sewage sludge residual materials; or
   b. storage, treatment, or processing of 50 or more wet tpd of sewage sludge or sewage sludge residual materials.

None of the wastewater thresholds have been met or exceeded by this project. As a result a MEPA review does not appear to be required.

8.2 Potential Funding Sources

Potential funding sources include the following:

- *United States Department of Agriculture Rural Utility Services Grogram Grant*: Typically grants are between 25 to 45%, but can be up to 75%. In order to be considered for a USDA Grant, an Environmental Report and Loan Application will need to be completed.

- *MassWorks Infrastructure Program Grant*: The MassWorks Infrastructure Program grants are administered by the Massachusetts Executive Office of Housing and Economic Development. The program is based providing economic development, multifamily housing and the infrastructure required to support such improvements. Grants are typically around $1.0 million, but can be up to $8.0 million.

- *State Revolving Fund (SRF) Loan:* The DEP administers the State Revolving Fund loan program. The program typically includes a loan with a 2% interest rate.

- *Tax Base*: Town-wide increase in property taxes to help support the project.

- Betterment/Assessments: the property owners that will receive the benefit from the project may be assessed.

FIGURES

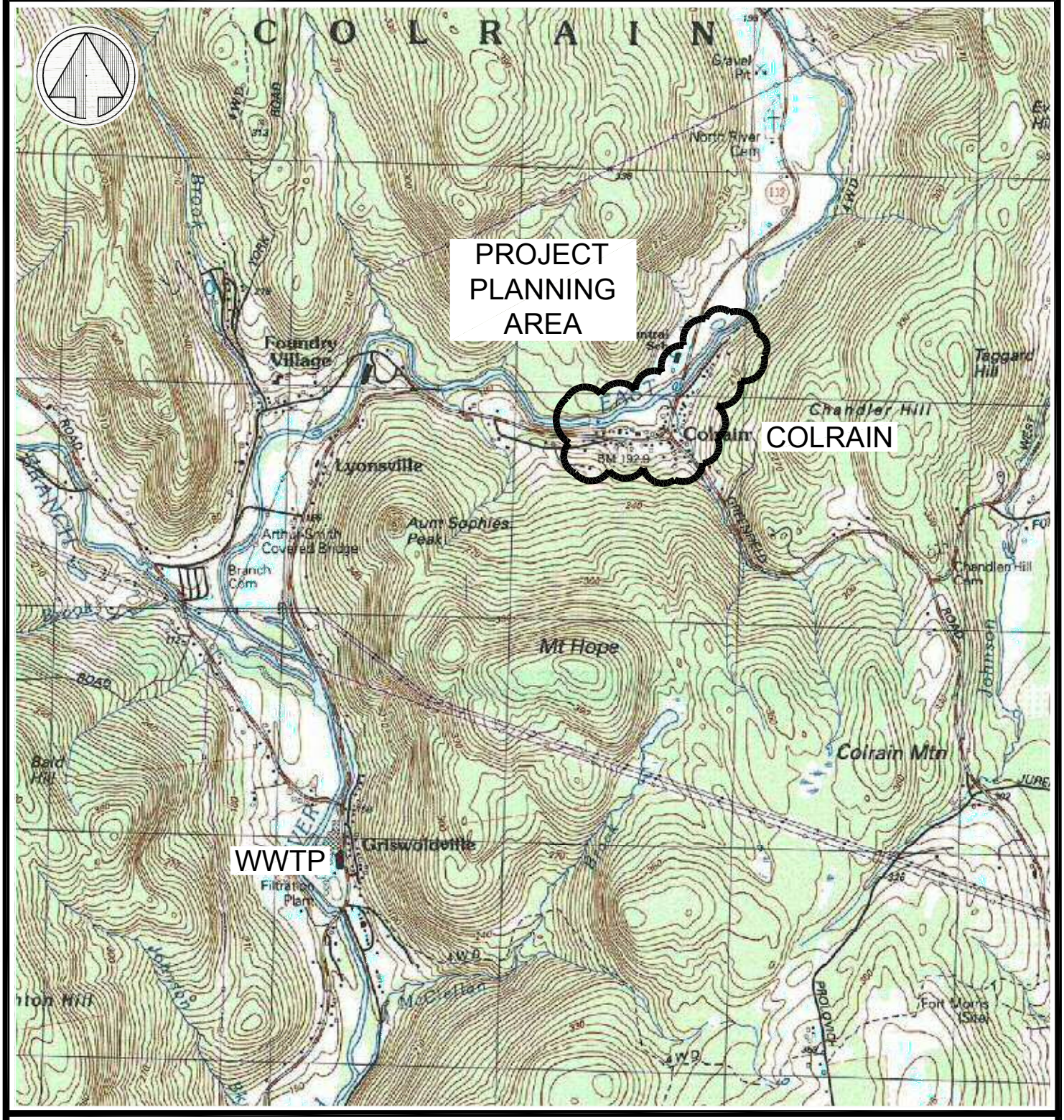


FIGURE 1

LOCATION MAP

FEASIBILITY STUDY

COLRAIN, MASSACHUSETTS

SCALE: 1"=2,000'

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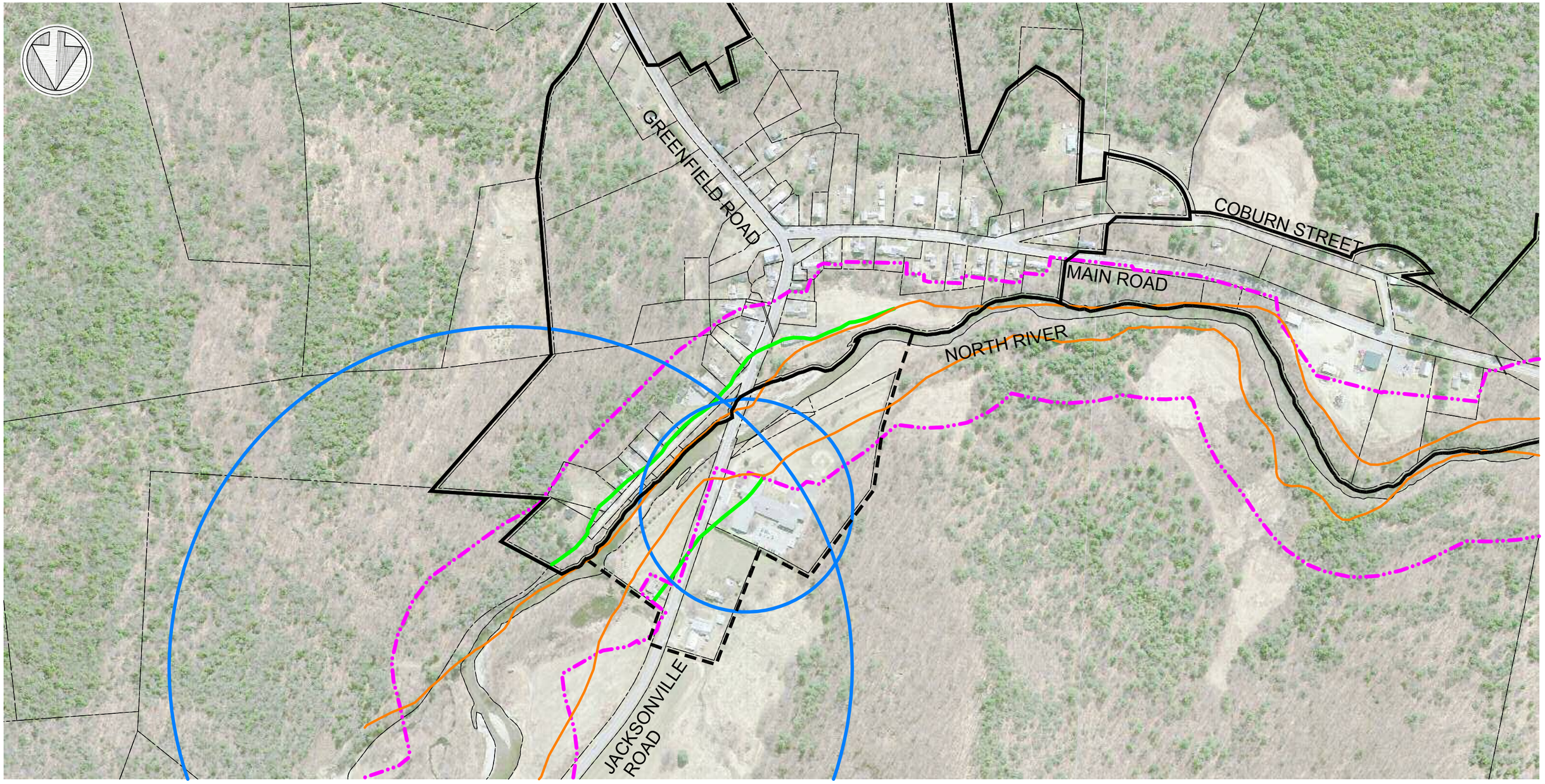

LEGEND

- PROJECT PLANNING AREA
- FUTURE/ADDITIONAL PROJECT LIMITS
- INTERIM WELLHEAD PROTECTION LIMITS
- 100-FLOOD ZONE
- 500-YEAR FLOOD ZONE
- PRIORITY HABITAT

FIGURE 2
ENVIRONMENTAL RESOURCE AREAS
FEASIBILITY STUDY
COLRAIN, MASSACHUSETTS

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GREENFIELD ROAD

COBURN STREET

MAIN ROAD

NORTH RIVER

JACKSONVILLE ROAD

0 400’ 800’ 1200’

LEGEND

- PROJECT PLANNING AREA
- FUTURE/ADDITIONAL PROJECT LIMITS
- SEPTIC SYSTEM FAILURE
- SEPTIC SYSTEM VARIANCE
- SEPTIC SYSTEM - LIMITED
- SEPTIC SYSTEM - FREQUENT PUMP-OUTS

FIGURE 3
ALTERNATE 1
SEPTIC SYSTEMS
FEASIBILITY STUDY
COLRAIN, MASSACHUSETTS

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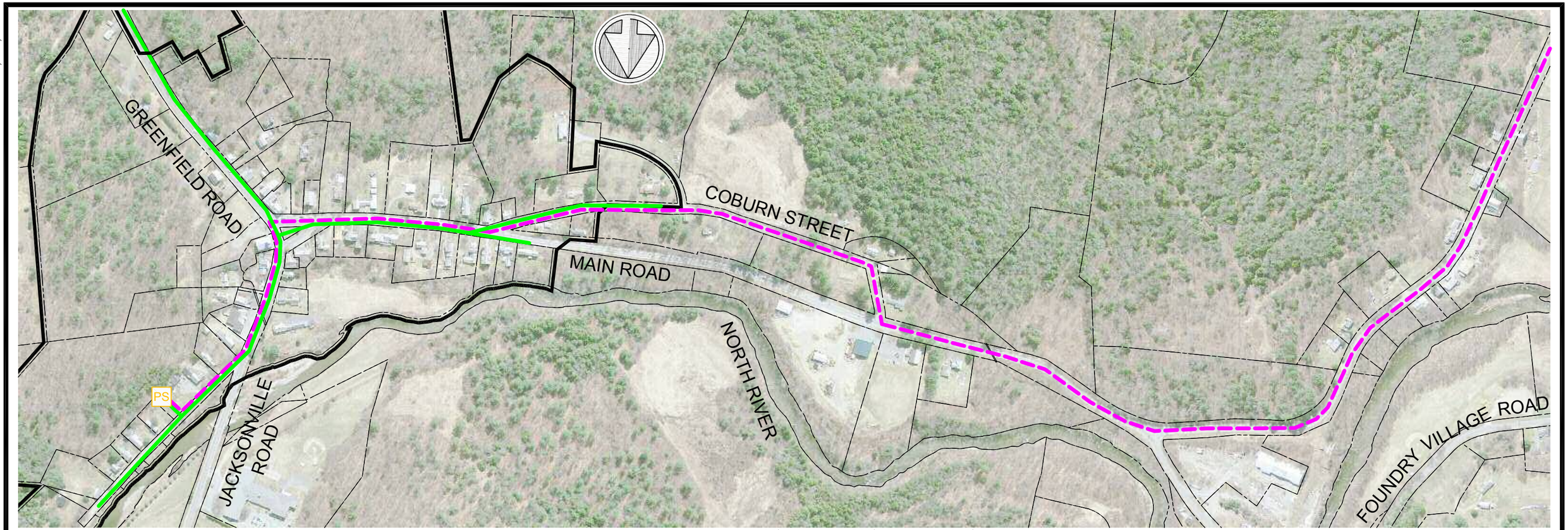

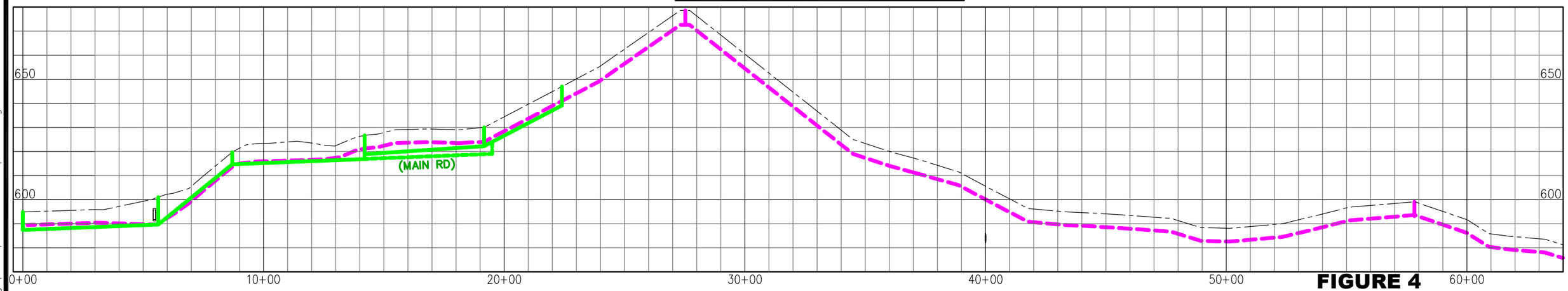

LEGEND

- PROJECT PLANNING AREA
- FUTURE/ADDITIONAL PROJECT LIMITS
- EXISTING GRAVITY SEWER
- EXISTING TREATMENT PLANT — WWTF
- EXISTING CENTERLINE PROFILE
- PROPOSED GRAVITY SEWER
- PROPOSED FORCEMAIN
- PROPOSED PUMPING STATION — PS

FIGURE 4
ALTERNATE 2A
GRAVITY AND FORCE MAIN
FEASIBILITY STUDY
COLRAIN, MASSACHUSETTS

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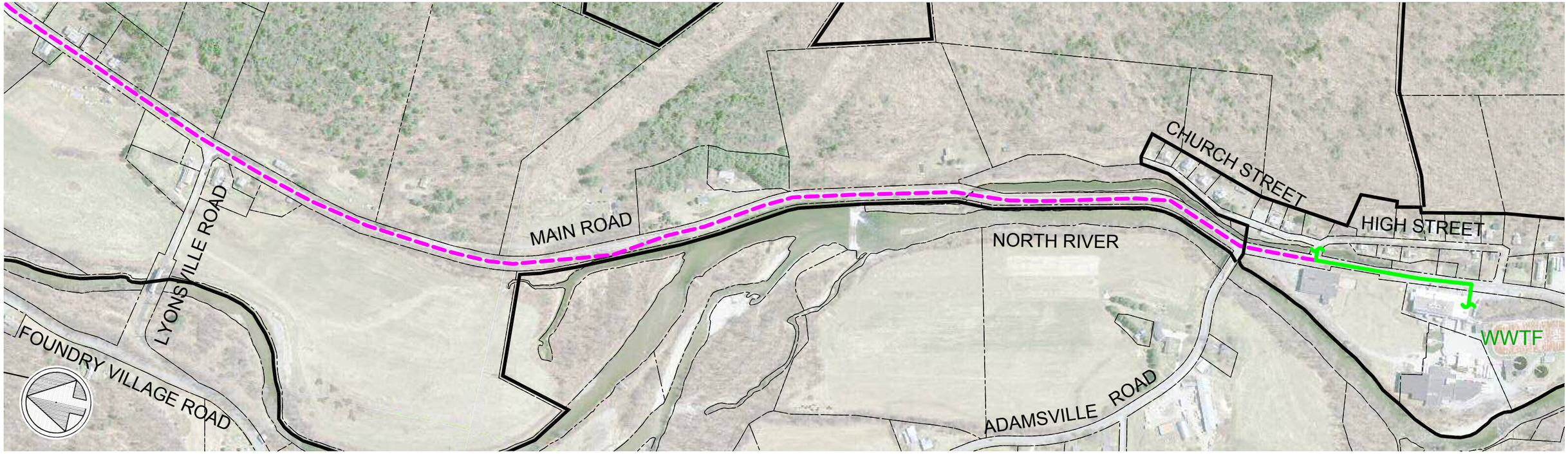

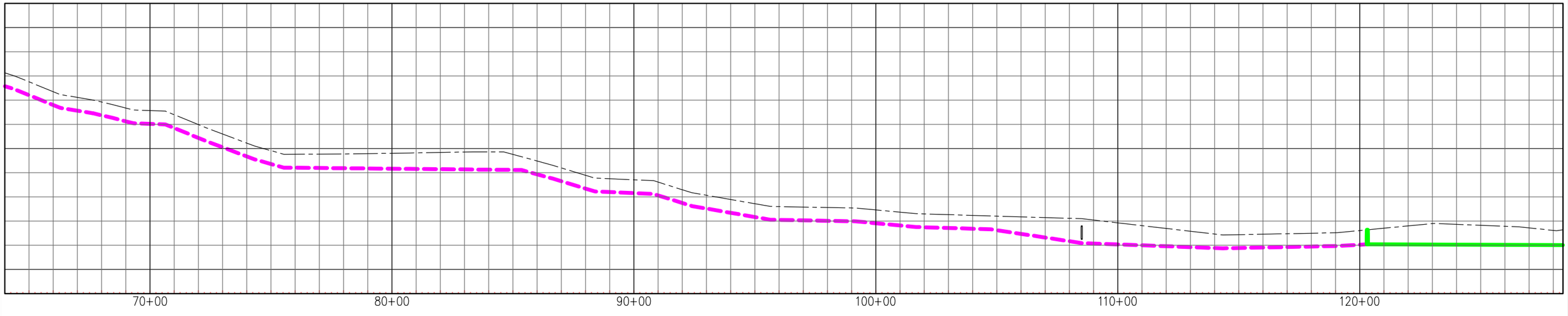

LEGEND

APPROXIMATE LIMITS OF COLRAIN SEWER DISTRICT	
EXISTING GRAVITY SEWER	
EXISTING TREATMENT PLANT	WWTF
EXISTING CENTERLINE PROFILE	
PROPOSED GRAVITY SEWER	
PROPOSED FORCEMAIN	

FIGURE 5

ALTERNATE 2A GRAVITY AND FORCE MAIN

FEASIBILITY STUDY

COLRAIN, MASSACHUSETTS

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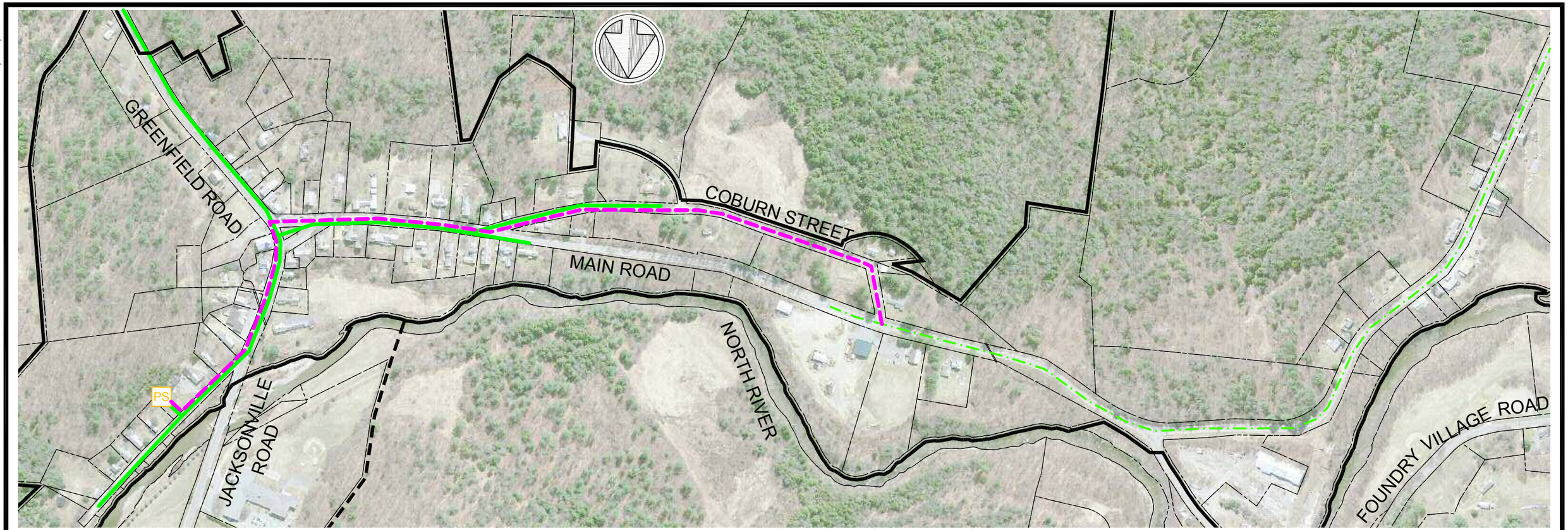

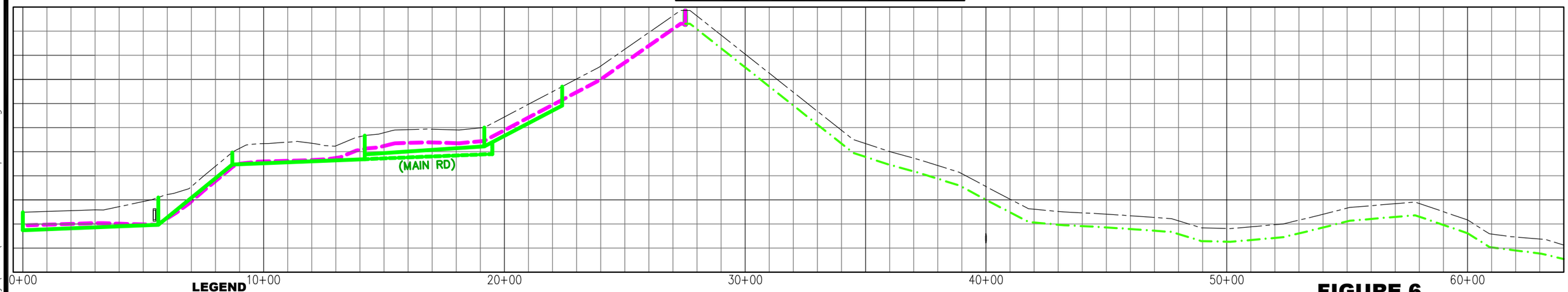

LEGEND

- PROJECT PLANNING AREA
- FUTURE/ADDITIONAL PROJECT LIMITS
- EXISTING GRAVITY SEWER
- EXISTING TREATMENT PLANT — WWTF
- EXISTING CENTERLINE PROFILE
- PROPOSED GRAVITY SEWER
- PROPOSED FORCEMAIN
- PROPOSED VARIABLE SLOPE GRAVITY SEWER
- PROPOSED PUMPING STATION — PS

FIGURE 6
ALTERNATE 2B
GRAVITY, FORCE MAIN AND VARIABLE SLOPE GRAVITY
FEASIBILITY STUDY
COLRAIN, MASSACHUSETTS

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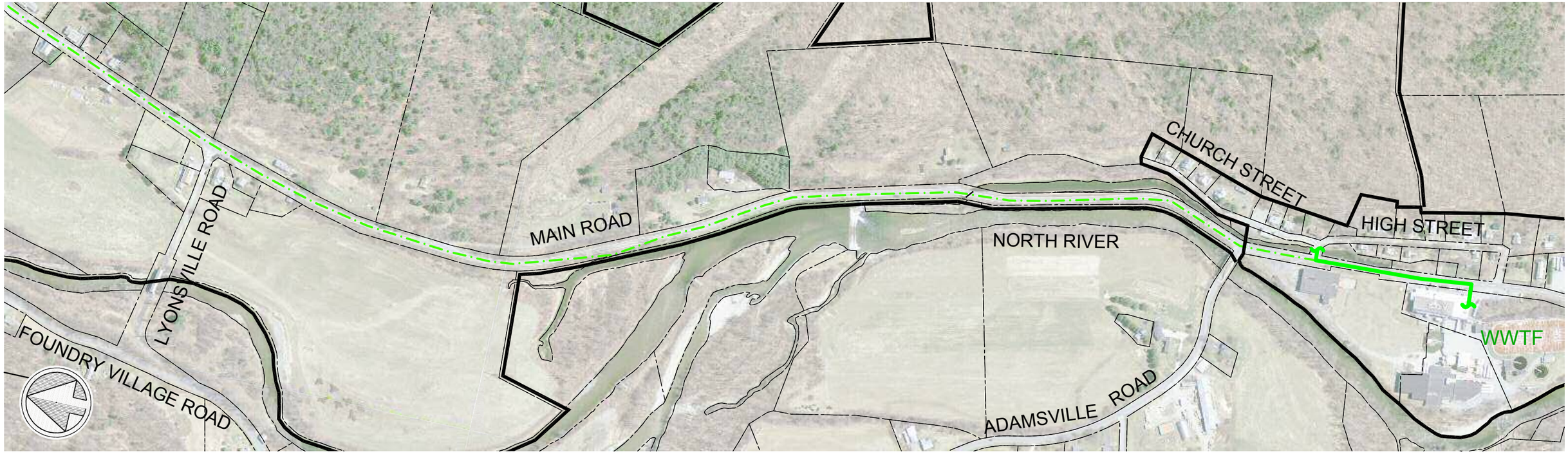

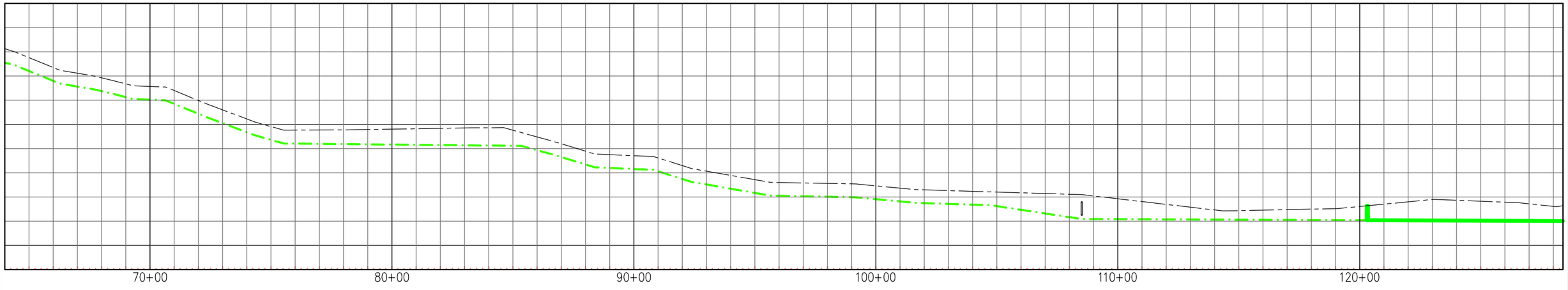

LEGEND

APPROXIMATE LIMITS OF COLRAIN SEWER DISTRICT	
EXISTING GRAVITY SEWER	
EXISTING TREATMENT PLANT	WWTF
EXISTING CENTERLINE PROFILE	
PROPOSED GRAVITY SEWER	
PROPOSED FORCEMAIN	
PROPOSED VARIABLE SLOPE GRAVITY SEWER	
PROPOSED PUMPING STATION	PS

FIGURE 7
ALTERNATE 2B
GRAVITY, FORCE MAIN AND VARIABLE SLOPE GRAVITY
FEASIBILITY STUDY
COLRAIN, MASSACHUSETTS

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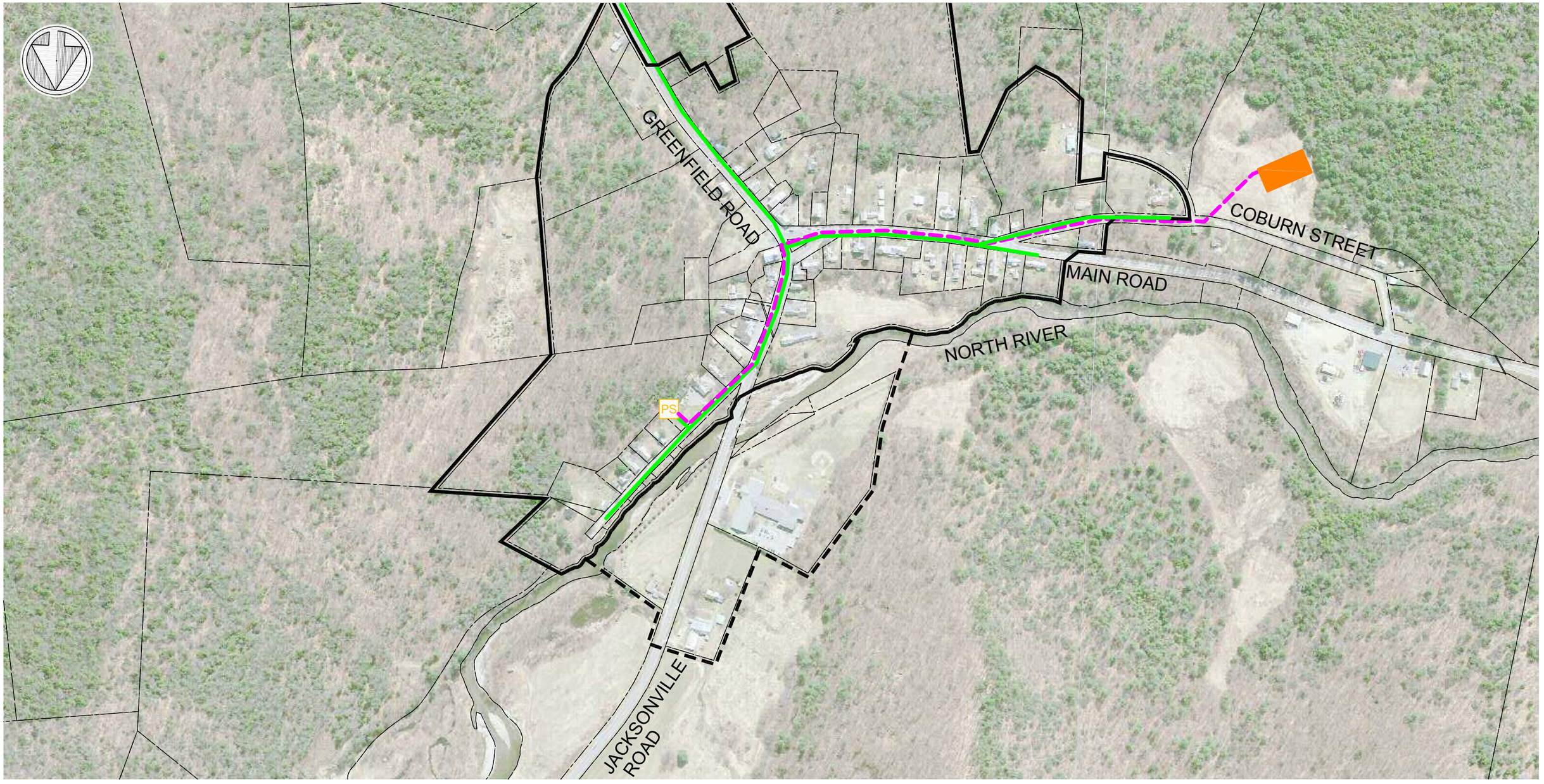

LEGEND

- PROJECT PLANNING AREA
- FUTURE/ADDITIONAL PROJECT LIMITS
- PROPOSED GRAVITY SEWER
- PROPOSED FORCEMAIN
- PROPOSED PUMPING STATION (PS)
- PROPOSED SEPTIC AREA

FIGURE 8
ALTERNATE 3
COMMUNITY SEPTIC SYSTEM
FEASIBILITY STUDY
COLRAIN, MASSACHUSETTS

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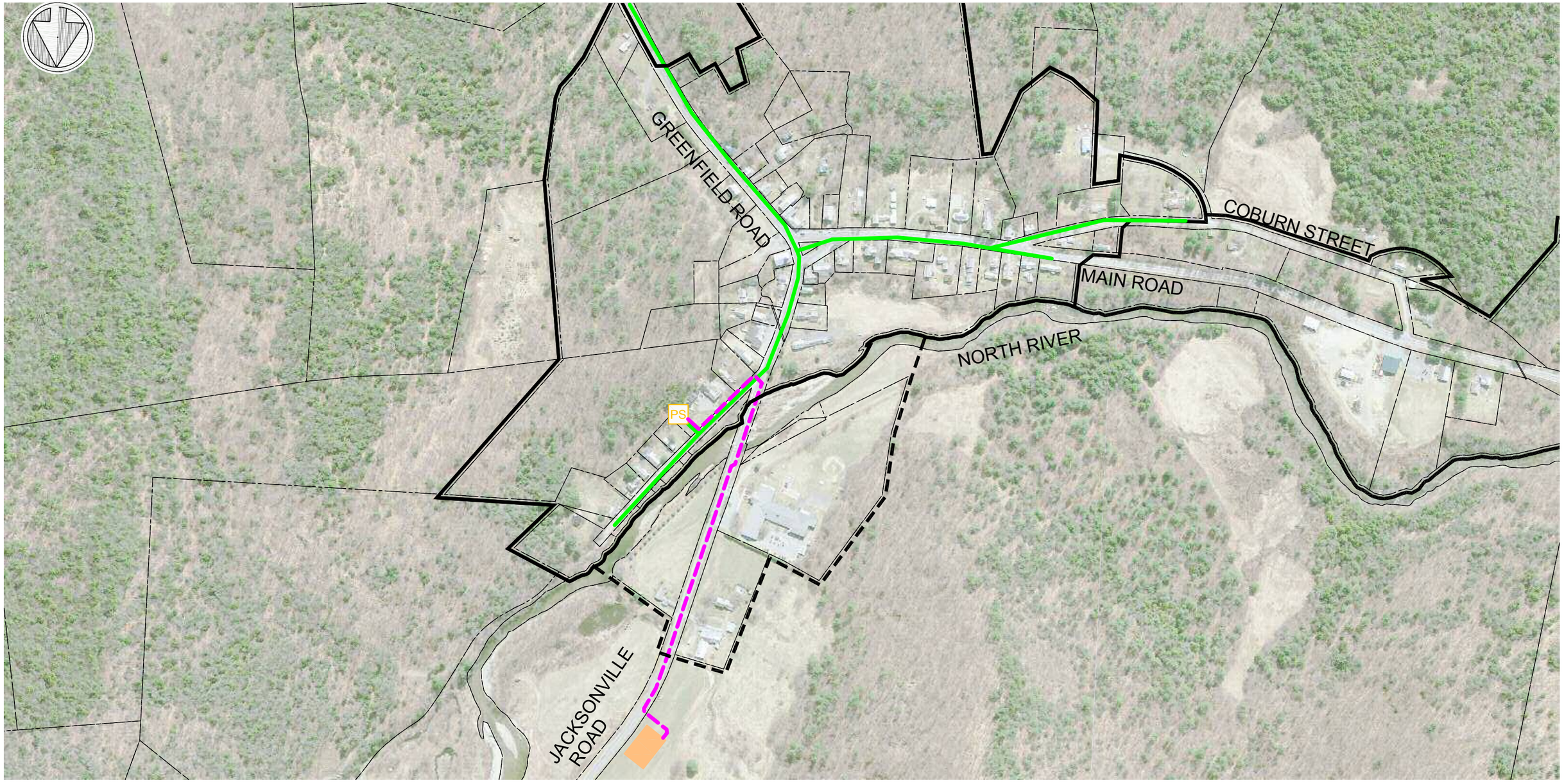

LEGEND

- PROJECT PLANNING AREA
- FUTURE/ADDITIONAL PROJECT LIMITS
- PROPOSED GRAVITY SEWER
- PROPOSED FORCEMAIN
- PROPOSED PUMPING STATION (PS)
- PROPOSED WASTE WATER TREATMENT PLANT

0 400’ 800’ 1200’

FIGURE 9
ALTERNATE 4
WASTE WATER TREATMENT PLANT
FEASIBILITY STUDY
COLRAIN, MASSACHUSETTS

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APPENDIX A

Barnhardt Manufacturing Company NPDES Permit
and
Operational Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 1
5 Post Office Square, Suite 100
BOSTON, MA 02109-3912

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

October 29, 2010
Mr. Albert Sheridan, Plant Manager
Barnhardt Manufacturing Company
247 Main Road
Colrain, MA 01340

Re: NPDES Permit No. MA0003697
(for) Barnhardt Manufacturing Company

Dear Mr. Sheridan:

Enclosed is your final National Pollutant Discharge Elimination System (NPDES) permit issued pursuant to the Clean Water Act (the "Federal Act"), as amended, and the Massachusetts Clean Waters Act (the "State Act"), 21 M.G.L. §§43-45, as amended. The Environmental Permit Regulations, at 40 C.F.R. §124.15, 48 Fed. Reg. 14271 (April 1, 1983), require this permit to become effective on the date specified in the permit.

Also enclosed is a copy of the Massachusetts State Water Quality Certification for your final permit, the EPA's response to the comments received on the draft permit, Part II General Conditions, and information relative to appeals and stays of NPDES permits. Should you desire to contest any provision of the permit, your petition should be submitted to the Environmental Appeals Board as outlined in the enclosure and a similar request should also be filed with the Director of the Office of Watershed Management in accordance with the provisions of the Massachusetts Administrative Procedures Act, the Division's Rules for the Conduct of Adjudicatory Proceedings and the Timely Action Schedule and Fee Provisions (see enclosure).

We appreciate your cooperation throughout the development of this permit. Should you have any questions concerning the permit, feel free to contact Nicole Kowalski at 617-918-1746.

Sincerely,

David M. Webster

David Webster, Chief
Industrial Permits Unit
Office of Ecosystem Protection

Enclosures: Final Permit, MA State Water Quality Certification, Response to Comments, Part II General Conditions, Appeals Information

cc: MassDEP, Division of Watershed Management

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

DEVAL L. PATRICK
Governor

TIMOTHY P. MURRAY
Lieutenant Governor

IAN A. BOWLES
Secretary

LAURIE BURT
Commissioner

September 28, 2010

David Webster
NPDES Industrial Permits Branch
USEPA – New England
5 Post Office Square, Suite 100 (OEP06-1)
Boston, MA 02109-3912

Re: Water Quality Certification
NPDES Permit MA0003697
Barnhardt Manufacturing Company, Colrain

Dear Mr. Webster:

Your office has requested the Massachusetts Department of Environmental Protection to issue a water quality certification pursuant to Section 401(a) of the Federal Clean Water Act ("the Act") and 40 CFR 124.53 for the above referenced NPDES permit. The Department has reviewed the proposed permit and has determined that certain conditions of the permit listed below are more stringent that necessary to achieve compliance with sections 208(e), 301, 302, 303, 306, and 307 of the Federal Act, and with the provisions of the Massachusetts Clean Waters Act, M.G.L. c. 21, ss. 26-53, and regulations promulgated thereunder. The permit conditions are sufficient to comply with the antidegradation provisions of the Massachusetts Surface Water Quality Standards [314 CMR 4.04] and the policy [October 21, 2009] implementing those provisions.

- The acute tests are not indicative of the actual instream conditions. MassDEP and the facility have conducted instream chronic and acute tests which documented no evidence of instream acute toxicity. Therefore, the acute whole effluent toxicity (WET) testing required in Part I.A1 should be replaced with more frequent chronic testing at 6 tests per year.

The Department hereby certifies the referenced permit modified as described above.

Sincerely,

Glenn Haas, Director
Division of Watershed Management
Bureau of Resource Protection

cc: Kathleen Keohane
File

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Clean Water Act as amended, (33 U.S.C. §§1251 et seq.; the "CWA", and the Massachusetts Clean Waters Act, as amended, (M.G.L. Chap. 21, §§26-53),

Barnhardt Manufacturing Company

is authorized to discharge from a facility located at

Barnhardt Manufacturing Company
247 Main Road
Colrain, MA 01340

to receiving water named

North River (Deerfield River Watershed)

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective on the first day of the calendar month following 60 days after signature if comments are received. If no comments are received, this permit shall become effective following signature.

This permit and the authorization to discharge expire at midnight, five (5) years from the last day of the month preceding the effective date.

This permit supersedes the permit issued on March 26, 2001, modified on August 17, 2004 and expired on May 25, 2006.

This permit consists of 10 pages in Part I including effluent limitations, monitoring requirements, 7 pages in Attachment 1 – Freshwater Chronic Toxicity Test Procedure and Protocol, and 25 pages in Part II including Standard Conditions.

Signed this 26th day of October, 2010

Stephen S. Perkins, Director
Office of Ecosystem Protection
Environmental Protection Agency Program
Boston, MA

David Ferris, Director
Massachusetts Wastewater Management
Department of Environmental Protection
Commonwealth of Massachusetts
Boston, MA

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning on the effective date and lasting through the expiration date, the permittee is authorized to discharge treated process water through **Outfall Serial Number 001** to the North River. Such discharge shall: 1) be limited and monitored by the permittee as specified below; and 2) not cause a violation of the State Surface Water Quality Standards of the receiving water.

Effluent Characteristic	Units	Discharge Limitation		Monitoring Requirements [1]	
		Average Monthly	Maximum Daily	Measurement Frequency [2]	Sample Type
Flow [3]	MGD	Report	0.89	Continuous	Recorder
pH [10]	SU	6.5 – 9.0		1/Day	Grab
Production Rate [11]	lbs/day	Report	Report	1/Day	Estimate
BOD_5	lbs/day	300	510	1/Month	Composite [4]
Total Suspended Solids (TSS)	lbs/day	250	510	1/Month	Composite [4]
COD	lbs/day	3,807	7,614	1/Quarter	Composite [4]
Sulfide, Total	lbs/day	1.0	2.0	1/Quarter	Grab
Chromium, Total [13]	lbs/day	Report	1.1	1/Quarter	Composite [4]

Effluent Characteristic	Units	Discharge Limitation		Monitoring Requirements [1]	
		Average Monthly	Maximum Daily	Measurement Frequency [2]	Sample Type
Phenols, Total	lbs/day	Report	1.0	1/Quarter	Grab
Ammonia-Nitrogen (as N)	lbs/day	----	42	1/Quarter	Composite [4]
TKN	mg/L	----	Report	1/Month	Composite [4]
Nitrite-Nitrate (as N)	mg/L	----	Report	1/Month	Composite [4]
Total Phosphorus	mg/L	----	Report	1/Quarter	Composite [4]
E. coli (April 1st – October 31st) [12]	cfu/100 ml	126	409	1/Week	Grab
Total Copper	mg/L	----	Report	1/Month	Composite [4]
Temperature	°F	Report	Report	1/Month	Grab

Effluent Characteristic	Units	Discharge Limitation		Monitoring Requirements [1]	
		Average Monthly	Maximum Daily	Measurement Frequency [2]	Sample Type
Whole Effluent Toxicity (WET)					
Acute LC50 [5,6,8]	%	≥100		1/Quarter	Composite [4]
Chronic C-NOEC [5,7,8]	%	≥ 5		1/Quarter	Composite [4]
Hardness [9]	mg/L	Report		1/Quarter	Composite [4]
Alkalinity [9]	mg/L	Report		1/Quarter	Composite [4]
pH [9]	SU	Report		1/Quarter	Composite [4]
Specific Conductance [9]	µmhos/cm	Report		1/Quarter	Composite [4]
Total Solids [9]	mg/L	Report		1/Quarter	Composite [4]
Total Ammonia Nitrogen (as N) [9]	mg/L	Report		1/Quarter	Composite [4]
Total Organic Carbon [9]	mg/L	Report		1/Quarter	Composite [4]
Total Residual Chlorine [9]	mg/L	Report		1/Quarter	Composite [4]
Dissolved Oxygen [9]	mg/L	Report		1/Quarter	Composite [4]
Total Cadmium [9]	mg/L	Report		1/Quarter	Composite [4]
Total Chromium [9]	mg/L	Report		1/Quarter	Composite [4]
Total Lead [9]	mg/L	Report		1/Quarter	Composite [4]
Total Copper [9]	mg/L	Report		1/Quarter	Composite [4]
Total Zinc [9]	mg/L	Report		1/Quarter	Composite [4]
Total Nickel [9]	mg/L	Report		1/Quarter	Composite [4]
Total Aluminum [9]	mg/L	Report		1/Quarter	Composite [4]
Total Magnesium [9]	mg/L	Report		1/Quarter	Composite [4]
Total Calcium [9]	mg/L	Report		1/Quarter	Composite [4]

See pages 5 –6 for explanation of footnotes.

(Part I.A.1, Continued)

Footnotes:

1. All samples shall be tested in accordance with the procedures in 40 CFR §136, unless specified elsewhere in the permit. All sampling shall be representative of the effluent that is discharged through Outfall 001 to the North River. All required effluent samples shall be collected immediately after the final filtration unit. A routine sampling program shall be developed in which samples are taken at the same location, same time and same days of the month. Any deviations from the routine sampling program shall be documented in correspondence appended to the applicable discharge monitoring report submitted to EPA. In addition, all samples shall be analyzed using the analytical methods found in 40 CFR §136, or alternative methods approved by EPA in accordance with the procedures in 40 CFR §136. Any change in sampling location must be reviewed and approved in writing by EPA and MassDEP.

2. Sampling frequency of 1/day is defined as the sampling of one (1) discharge event during each 24-hour period, when discharge occurs. Sampling frequency of 1/month is defined as the sampling of one (1) discharge event in each calendar month, when discharge occurs. Sampling frequency of 1/quarter is defined as the sampling of one (1) discharge event in each calendar quarter, when discharge occurs. Quarterly samples shall be collected during the second weeks in January, April, July, and October. The permittee shall submit the results to EPA of any additional testing done to that required herein, if it is conducted in accordance with EPA approved methods consistent with the provisions of 40 CFR §122.41(l)(4)(ii).

3. For flow, report maximum daily effluent flow for all operating dates and average monthly effluent flow.

4. A 24-hour composite will consist of twenty-four (24) grab samples collected at hourly intervals during a twenty-four hour period (e.g., 0700 Monday to 0700 Tuesday), combined proportionally to flow.

5. The permittee shall conduct quarterly chronic (and modified acute) toxicity tests. The permittee shall test the daphnid, Ceriodaphnia dubia. Samples shall be collected during the months of January, April, July, and October. The test results shall be submitted by the last date of the following month. The tests must be performed in accordance with test procedures and protocols specified in Attachment 1 of this permit. After submitting two years of consecutive sets of whole effluent toxicity (WET) test results, all of which demonstrate compliance with the WET permit limits (at least 8 consecutive tests), the permittee may request a reduction in the frequency of required WET testing to no less than two times per year. The permittee is required to continue testing at the frequency specified in the permit until notice is received by certified mail from EPA that the WET testing requirement has been changed.

6. LC50 is defined as the concentration of effluent which causes mortality to 50% of the test organisms. Therefore, a 100% limit means that a sample of 100% effluent (no dilution) shall cause no more than a 50% mortality rate.

7. C-NOEC (chronic-no observed effect concentration) is defined as the highest concentration of toxicant or effluent to which organisms are exposed in a life cycle or partial life cycle test which causes no adverse effect on growth, survival, or reproduction at a specific time of observation as determined from hypothesis testing where the results exhibit a linear dose-response relationship. However, where the test results do not exhibit a linear dose-response relationship, the permittee must report the lowest concentration where there is no observable effect. The effluent C-NOEC limit is based upon effluent flow from the treatment facility. This is a maximum daily limit derived as a percentage of the inverse of the dilution factor. Based on the chronic dilution factor of 20.2, the C-NOEC maximum daily limit is 5%.

8. If toxicity test(s) using receiving water as diluent show the receiving water to be toxic or unreliable, the permittee shall follow procedures outlined in Section IV (Dilution Water) of Attachment 1 in order to obtain permission to use an alternate dilution water. In lieu of individual approvals for alternate dilution water required in Attachment 1, EPA-New England has developed a Self-Implementing Alternative Dilution Water Guidance document (called "Guidance Document") which may be used to obtain automatic approval of an alternate dilution water, including the appropriate species for use with that water. If this Guidance Document is revoked, the permittee shall revert

to obtaining approval as outlined in Attachment 1. The "Guidance Document" has been sent to all permittees with their annual set of DMRs and Revised Updated Instructions for Completing EPA's Pre-Printed NPDES Discharge Monitoring Report (DMR) Form 3320-1 and is not intended as a direct attachment to this permit. Any modification or revocation to this "Guidance Document" will be transmitted to the permittees as part of the annual DMR instruction package. However, at any time, the permittee may choose to contact EPA-New England directly using the approach outlined in Attachment 1.

9. For each Whole Effluent Toxicity (WET) test the permittee shall report on the appropriate Discharge Monitoring Report (DMR), the concentration of the hardness, total ammonia nitrogen as nitrogen, alkalinity, pH specific conductance, total solids, total organic carbon, total residual chlorine, dissolved oxygen, aluminum, cadmium, chromium, copper, lead, nickel, zinc, magnesium and calcium found in the 100 percent effluent sample. Metals shall be reported as total recoverable concentrations. The permittee should note that all chemical parameter results must still be reported in the appropriate toxicity report. The permittee shall also document the outfall sampling locations and dilution water sampling location by providing either the USGS coordinates and/or a map of these locations.

10. See Part I.A.3

11. Total production rate of finished goods in lbs/day.

12. The permittee may submit a written request to the EPA requesting a reduction in the frequency (to not less than once per month) of required testing for E. coli, after completion of an entire season (April 1st – October 31st) of weekly successive monitoring results of effluent, all of which must demonstrate levels of E. coli below the permit effluent limitations. Until written notice is received by certified mail from the EPA indicating that the E. coli testing requirement has been changed, the permittee is required to continue testing at the frequency specified in the permit.

13. The permittee may submit a written request to the EPA requesting a reduction in the frequency (to not less than once per year) of required testing for chromium, after completion of a minimum of eight (8) successive monitoring results of effluent, taken over a period of two (2) years, all of which must demonstrate levels of chromium below the 1.1 lbs/day daily maximum limit. Until written notice is received by certified mail from the EPA indicating that the chromium testing requirement has been changed, the permittee is required to continue testing at the frequency specified in the permit.

Part I.A. (Continued)

2. The discharge shall not cause objectionable discoloration of the receiving waters.

3. The pH of the effluent shall not be less than 6.5 or greater than 9.0 at any time, unless these values are exceeded due to natural causes.

4. The effluent shall contain neither a visible oil sheen, foam, nor floating solids at any time in other than trace amounts.

5. The permittee shall not use fungicides or slimacides containing trichlorophenol or pentachlorophenol.

6. No intake water shall be used solely for cooling purposes.

7. The rise in temperature of the receiving water due to a discharge shall not exceed 3°F.

8. The discharge shall not contain materials in concentrations or combinations which are hazardous or toxic to human health, aquatic life of the receiving surface waters or which would impair the uses designated by its classification.

9. EPA may modify this permit in accordance with EPA regulations in 40 Code of Federal Regulations (CFR) §122.62 and §122.63 to incorporate more stringent effluent limitations, increase the frequency of analyses, or impose additional sampling and analytical requirements.

10. All existing manufacturing, commercial, mining and silvicultural dischargers must notify the Director as soon as they know or have reason to believe:

    a. That any activity has occurred or will occur which would result in the discharge, on a routine basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

        (1) One hundred micrograms per liter (100 µg/l);

        (2) Two hundred micrograms per liter (200 µg/l) for acrolein and acrylonitrite; five hundred micrograms per liter (500 µg/l) for 2,4-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;

        (3) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 C.F.R.§122.21(g)(7); or

        (4) Any other notification level established by the Director in accordance with 40 C.F.R.§122.44(f).

b. That any activity has occurred or will occur which would result in the discharge, on a non-routine or infrequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) Five hundred micrograms per liter (500 µg/l);

(2) One milligram per liter (1 mg/l) for antimony;

(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 C.F.R.§122.21(g)(7).

(4) Any other notification level established by the Director in accordance with 40 C.F.R.§122.44(f).

c. That they have begun or expect to begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant which was not reported in the permit application.

11. Toxics Control

a. The permittee shall not discharge any pollutant or combination of pollutants in toxic amounts.

b. Any toxic components of the effluent shall not result in any demonstrable harm to aquatic life or violate any state or federal water quality standard which has been or may be promulgated. Upon promulgation of any such standard, this permit may be revised or amended in accordance with such standards.

B. REOPENER CLAUSES

This permit shall be modified, or alternately, revoked and reissued, to comply with any applicable standard or limitation promulgated or approved under sections 301(b)(2)(C) and (D), 304(b)(2), and 307(a)(2) of the Clean Water Act, if the effluent standard or limitation so issued or approved:

a. Contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or

b. Controls any pollutants not limited in the permit.

C. SPECIAL CONDITIONS AND REQUIREMENTS

1. A plan shall be developed which establishes Best Management Practices (BMPs) to be followed in operating the facility, cleaning of any equipment, and disposing of any liquid and solid waste. The purpose of the plan is to identify and to describe the practices which minimize the amounts of pollutants (biological and chemical) discharged to surface waters.

a. The BMP plan shall be completed within 120 days after the effective date of this pemit and submitted to the MassDEP and the EPA Region 1. The plan should be modified as necessary during the life of the permit. A current copy of the plan shall be maintained at the facility.

b. The BMP plan is a fully enforceable element of this permit.

c. The permittee shall amend the BMP plan within thirty (30) days following a change in facility design, construction, operation, or maintenance which affects the potential for the discharge of pollutants into surface waters. A letter summarizing any amendments of the BMP plan shall be submitted to EPA and MassDEP as in subparagraph 1.b above.

d. The permittee shall develop and implement site specific BMPs in order to reduce and/or eliminate the acute toxicity of the discharge. The BMPs shall include, at a minimum, investigation of the following alternative treatments:

   i. Replacement of chemical scouring using sodium hydroxide with enzymatic scouring; and

   ii. Use of micro/ultrafiltration using membranes to recover sodium hydroxide from spent solutions, with subsequent reuse of the recovered alkaline solution in facility processes.

e. The permittee shall develop and implement site specific BMPs in order to reduce and/or eliminate the source(s) of nitrogen at the facility.

2. Within 1 year of the effective date of the permit, the permittee shall complete an evaluation of alternative methods of operating the existing wastewater treatment facility to optimize the removal of nitrogen, and submit a report to EPA and MassDEP documenting this evaluation and presenting a description of recommended operational changes. The permittee shall implement the recommended operational changes in order to maintain the existing mass discharge loading of total nitrogen. The annual average total nitrogen load from this facility (for the period of June 2001 – September 2009) is estimated to be 66 lbs/day.

   The permittee shall also submit an annual report to EPA and MassDEP that summarizes activities related to optimizing nitrogen removal efficiencies, documents the annual nitrogen discharge load from the facility, and tracks trends relative to the previous year.

D. MONITORING AND REPORTING

Monitoring results obtained during the previous month shall be summarized for each month and reported on separate Discharge Monitoring Report Form(s) postmarked no later than the 15th day of the following month. Signed and dated originals of these, and all other reports required herein, shall be submitted to EPA at the following address:

U.S. Environmental Protection Agency
Water Technical Unit (OES04-SMR)
5 Post Office Square - Suite 100
Boston, MA 02109-3912

Signed and dated Discharge Monitoring Report Form(s) and all other reports, except the Whole Effluent Toxicity (WET) report, required by this permit shall also be submitted to the State at the following addresses:

Massachusetts Department of Environmental Protection
Western Regional Office
Bureau of Waste Prevention
436 Dwight Street
Springfield, Massachusetts 01103

and

Massachusetts Department of Environmental Protection
Division of Watershed Management
Surface Water Discharge Permit Program
627 Main Street, 2nd Floor
Worcester, Massachusetts 01608

E. STATE PERMIT CONDITIONS

1. This discharge permit is issued jointly by the EPA and the MassDEP under Federal and State law, respectively. As such, all the terms and conditions of this permit are hereby incorporated into and constitute a discharge permit issued by the Commissioner of the MassDEP pursuant to M.G.L. Chap. 21, §43 and 314 C.M.R. 3.00. All of the requirements contained in this authorization, as well as the standard conditions contained in 314 CMR 3.19, are hereby incorporated by reference into this state surface water discharge permit.

2. Each Agency shall have the independent right to enforce the terms and conditions of this permit. Any modification, suspension or revocation of this permit shall be effective only with respect to the Agency taking such action, and shall not affect the validity or status of this permit as issued by the other Agency, unless and until each Agency has concurred in writing with such modification, suspension or revocation. In the event any portion of this permit is declared, invalid, illegal or otherwise issued in violation of State law such permit shall remain in full force and effect under Federal law as a NPDES permit issued by the U.S. Environmental Protection Agency. In the event this permit is declared invalid, illegal or otherwise issued in violation of Federal law, this permit shall remain in full force and effect under State law as a permit issued by the Commonwealth of Massachusetts.

Response to Comments on Draft National Pollutant Discharge Elimination System (NPDES) Permit No. MA0003697- Barnhardt Manufacturing Company

Introduction:

In accordance with the provisions of 40 C.F.R. §124.17, this document presents EPA's responses to comments received on the Draft NPDES Permit (MA0003697). The responses to comments explain and support the EPA determinations that form the basis of the Final Permit. The Barnhardt Manufacturing Company Draft Permit public comment period began April 16, 2010 and ended May 15, 2010. Comments on the draft permit were received from Cushing, Jammallo & Wheeler, Inc. (CJW), on behalf of Barnhardt Manufacturing Company (Barnhardt), the Connecticut River Watershed Council (CRWC), and the Connecticut Department of Environmental Protection (CTDEP). .

The Final Permit is almost identical to the Draft Permit that was available for public comment. Although EPA's knowledge of the facility has benefited from the various comments and additional information submitted, the information and arguments presented did not raise any substantial new questions concerning the permit. EPA did, however, make certain changes and clarifications in response to comments. These changes are listed below.

Changes to Permit:

1. In the table at Part I.A.1, the monitoring frequency for E. coli has been changed from 1/month to 1/week.
2. In the table at Part I.A.1, the daily maximum effluent limitation for ammonia (as N) has been reduced to 42 lbs/day.
3. Footnote 5 in Part I.A.1 has been revised to state, "Samples shall be collected during the months of January, April, July, and October..."
4. Footnote 11 in Part I.A.1 has been added to state, "Total production rate of finished goods in lbs/day."
5. Footnote 12 in Part I.A.1 has been added to state:
   The permittee may submit a written request to the EPA requesting a reduction in the frequency (to not less than once per month) of required testing for E. coli, after completion of an entire season (April 1st – October 31st) of weekly successive monitoring results of effluent, all of which must demonstrate levels of E. coli below the permit effluent limitations. Until written notice is received by certified mail from the EPA indicating that the E. coli testing requirement has been changed, the permittee is required to continue testing at the frequency specified in the permit.
6. Footnote 13 in Part I.A.1 has been added to state:
   The permittee may submit a written request to the EPA requesting a reduction in the frequency (to not less than once per year) of required testing for chromium, after completion of a minimum of eight (8) successive monitoring results of effluent, taken over a period of two (2) years, all of which must demonstrate levels of chromium below the 1.1

lbs/day daily maximum limit. Until written notice is received by certified mail from the EPA indicating that the chromium testing requirement has been changed, the permittee is required to continue testing at the frequency specified in the permit.

7. Part I.C.1 of the final permit states, "A plan shall be developed which establishes Best Management Practices (BMPs) to be followed in operating the facility, cleaning of any equipment, and disposing of any liquid and solid waste."

Comments from CJW, on behalf of Barnhardt:

Comment 1:
Reduction in Permitted Flow Volume
The 2001 NPDES permit included a limitation on effluent flow of 1.35 million gallons per day (MGD). The draft permit includes a limitation on effluent flow of 0.89 MGD. Barnhardt acknowledges that effluent flow from current operations has been significantly less than the 0.89 MGD contained in the draft permit. However, if the Barnhardt facility were to increase its operating level at the facility, the potential increase in waste water generated may approach or exceed the draft permit amount. Barnhardt requests that the flow limitation be returned to the 1.35 MGD contained in the 2001 permit.

Response to Comment 1:
The reduced flow limit in the draft permit is based on significant reduced water usage at the facility over the past decade due to several factors: the closing of the Kendall/AF&F facility in 1998, water conservation measures instituted, and reduction in product production. Review of DMR data shows that the monthly average flow has ranged from 0.14 – 0.38 MGD, and averaged 0.27 MGD.

Due to the significant water usage reduction at the facility, and the authorization to withdraw 0.89 MGD of intake water from the North River under a Massachusetts Department of Environmental Protection (MassDEP) Water Management Act registration (#10306601), the draft permit requires a maximum daily flow limit of 0.89 MGD. This flow limit shall continue to be required in the final permit.

The conditions in the permit are based on the facility operations at the time of permit re-issuance. Upon any change in operating conditions, Barnhardt may submit a request to EPA for a permit modification to adjust the flow limit.

Comment 2:
The 2001 NPDES permit included an average monthly limit for BOD_5 of 323 pounds per day. The draft permit includes an average monthly limit of 300 pounds per day. Barnhardt has had one test in excess of the new 300 pounds per day limit. Barnhardt views this new limit as a reduction that could lead to an exceedence of a permit limitation. Since Barnhardt has not modified any of its treatment works that would lead to enhanced performance for BOD_5, we do not believe that there is any justification for

changing the limitation. Barnhardt requests that the limitation be returned to the 350 pounds per day contained in the 2001 permit.

Response to Comment 2:
The Massachusetts Division of Water Pollution Control originally evaluated the necessary waste load allocation (WLA) for the Kendall Fibers Mills in Colrain, MA (before it was transferred to BBA Nonwovens) which is now owned by Barnhardt Manufacturing. The evaluation was conducted in the 1970's and the results published in the report, *The Deerfield River Basin Water Quality Management Plan 1975* (MDWPC-MWRC). The WLA provided the basis for effluent limitations (for BOD_5 and TSS) which formally established performance criteria for the wastewater treatment plant at Barnhardt. Therefore, based on the 1975 waste load allocation (WLA), the draft permit requires an average monthly BOD_5 limit of 300 lbs/day. This limit shall continue to be required in the final permit.

Comment 3:
The 2001 NPDES permit included an average monthly limit for TSS of 350 pounds per day. The draft permit includes an average monthly limit of 250 pounds per day. Barnhardt views this new limit as a reduction that could lead to an exceedence of a permit limitation. Since Barnhardt has not modified any of its treatment works that would lead to enhanced performance for TSS, we do not believe that there is any justification for changing the limitation. Barnhardt requests that the limitation be returned to the 350 pounds per day contained in the 2001 permit.

Response to Comment 3:
The Massachusetts Division of Water Pollution Control originally evaluated the necessary waste load allocation (WLA) for the Kendall Fibers Mills in Colrain, MA (before it was transferred to BBA Nonwovens) which is now owned by Barnhardt Manufacturing. The evaluation was conducted in the 1970's and the results published in the report, *The Deerfield River Basin Water Quality Management Plan 1975* (MDWPC-MWRC). The WLA provided the basis for effluent limitations (for BOD_5 and TSS) which formally established performance criteria for the wastewater treatment plant at Barnhardt. Therefore, based on the 1975 waste load allocation (WLA), the draft permit requires an average monthly TSS limit of 250 lbs/day. This limit shall continue to be required in the final permit.

Review of DMR data shows that the highest monthly average mass of TSS discharged through Outfall 001 was 186 lbs/day. Therefore, based on current operating conditions, the discharge is not expected to violate the monthly average limit of 250 lbs/day.

Comment 4:
In the past, Barnhardt conducted extensive testing for Total Chromium concentrations in the facility effluent. This testing requirement was suspended by USEPA approximately

four years ago. Barnhardt believes that the level of testing is sufficient to demonstrate that the presence of chromium in the facility effluent does not have an impact on the receiving waters. Barnhardt requests that the requirement for testing total chromium be dropped from the final NPDES permit.

Response to Comment 4:
The current permit chromium limit of 1.1 lbs/day maximum daily has been retained in the draft permit based on anti-backsliding requirements found in 40 CFR §122.44(l). Since review of DMR data shows that this limit has not been exceeded on any occasion, with a maximum chromium level of 0.009 lbs/day, the monitoring frequency has been reduced from monthly to quarterly. EPA believes that quarterly monitoring of chromium is not over-burdensome; however, the following condition has been added to the permit as Footnote 13 to the Table at Part I.A.1:

> The permittee may submit a written request to the EPA requesting a reduction in the frequency (to not less than once per year) of required testing for chromium, after completion of a minimum of eight (8) successive monitoring results of effluent, taken over a period of two (2) years, all of which must demonstrate levels of chromium below the 1.1 lbs/day daily maximum limit. Until written notice is received by certified mail from the EPA indicating that the chromium testing requirement has been changed, the permittee is required to continue testing at the frequency specified in the permit.

Comment 5:
The draft permit contains a discharge limitation for Whole Effluent Toxicity (WET) that includes an acute LC50 of 100%.

Summary of Previously Proposed Limits
Barnhardt's position relative to the limitation for Whole Effluent Toxicity was outlined in a series of letters from BBA Fiberweb to the MA DEP in March 2005 and to USEPA in November of 2005. CJW has reproduced salient parts of the 2005 texts and requests that USEPA and MA DEP consider the alternative approach presented in the letters. Excerpts from the letters are presented below.

Taken from a letter from BBA Fiberweb (predecessor to Barnhardt Manufacturing Company) to Mr. David Pincumbe, USEPA dated November 30, 2005.

> "BBA believes that total dissolved solids (TDS) in this effluent are the most significant contributor to the toxicity issue. The TDS levels in the effluent have varied between approximately 1,800 and 3,800 mg/L. BBA has already taken proactive, constructive steps to mitigate acute toxicity that might be related to effluent TDS by modifying the effluent neutralization process. The primary source of TDS is from sodium hydroxide used to elevate the pH during the cotton bleaching process. Previously, the elevated pH bleaching effluent was neutralized with sulfuric acid prior to treatment in the activated sludge process. To minimize the impact of TDS, BBA modified the neutralization process to take advantage of

carbon dioxide from the boiler flue gas as a replacement for most of the sulfuric acid demand. Sulfuric acid use has dropped by 75 percent since that change was made and the effluent TDS has decreased accordingly. However, the residual TDS remains at a level that, by itself, could result in a 50 percent mortality effect on test organisms in an acute toxicity test.

The attached Figure 1 illustrates the TDS concentrations measured in the 40 toxicity tests accomplished by BBA since June 2001. Note that only 18 of the tests were for compliance and the other 22 were accomplished at BBA's direction in efforts to investigate and understand the source of the toxicity issue. Two points should be observed in the data plotted in Figure 1. First, the general decreasing trend line of the data demonstrates that BBA has made progress in their efforts to reduce the TDS present in the discharge. The second point is that the level of TDS in these toxicity tests has averaged 3,026 mg/L.

BBA believes that this circumstance of elevated TDS in a discharge into Massachusetts fresh waters is a relatively rare situation that justifies an individualized approach to its resolution. In March, 2005, letter to Mr. Paul Hogan of the MA DEP, BBA proposed to use the CORMIX model to define an acceptable mixing zone for the discharge in the North River, in accordance with the Massachusetts surface water quality standards (314 CMR 4.03(2)). Several technical publications that describe toxic effects due solely to ionic constituents were cited and attached to that letter. The publications make the point that toxicity due solely to TDS is less of a regulatory problem because of rapid dilution to below toxic levels and because these constituents do not present a bioaccumulation problem and have no human health impacts. BBA still believes that this mixing zone approach would be a proper response and would result in acute toxicity tests being accomplished at dilutions less than the 100 percent effluent currently used. Dilution in the toxicity tests that accurately reflect dilutions actually occurring in the receiving water would represent a more realistic test condition."

Additional documentation supporting the use of a mixing zone was presented in a letter from RMT Consulting Engineers to Paul Hogan of MA DEP in a letter dated March 29, 2005. Excerpts from this letter are presented below.

BBA is proposing to conduct a computer-based dispersion/mixing model and use the results to quantify a "mixing zone" for BBA's discharge. If use of a mixing zone is granted in the permit, the effect will be to change the permit test condition for acute toxicity from 100 percent effluent to a lower concentration because of the dilution afforded in the mixing zone.

The requirement for aquatic organisms to be able to live in 100 percent effluent, or to be able to live within BBA's discharge pipe, is not a realistic requirement because that condition does not physically exist at any point in the North River. BBA's discharge pipe is not in the river. Instead, BBA's discharge exits the

discharge pipe and has a freefall of several feet before impacting the river. The effluent received immediate mixing upon contact with the receiving stream. There is no evidence that BBA's effluent causes any of the deleterious effects that would prevent a mixing zone from being implemented.

According to United States Environmental Protection Agency's (USEPA's) Technical Support Document for Water Quality-based Toxics Control (EPA/505/3-90-001), "it is not always necessary to meet all water quality criteria within the discharge pipe to protect the integrity of the water body as a whole. Sometimes it is appropriate to allow for ambient concentrations above the Criteria in small areas near the outfalls. These areas are called mixing zones."

The Massachusetts surface water quality standards (314 CMR 4.03(2)) allow incorporation of a mixing zone in NPDES permits, with certain qualifications. Based on a review of those qualifications, it appears that BBA can justify the use of a mixing zone for Outfall 004 [sic]. A mixing zone is an area within a receiving stream where a discharged effluent undergoes initial dilution. Water quality criteria can be exceeded within that mixing zone as long as the wastewater does not interfere with migration or free movement of fish or other aquatic life, no nuisance conditions are created, and pollutants do not accumulate in the sediments or within the biota in toxic amounts.

RMT has successfully used the currently accepted mixing model, the Cornell Mixing Zone Expert System (CORMIX), to assess the impacts of the discharges into various receiving streams. CORMIX is a USEPA-approved software system (USEPA 1991, USEPA 1991B, and Jirka 1992) for the analysis, prediction, and design of aqueous discharges into diverse water bodies. The model can simulate BBA's discharge into the North River and will model the plume centerline, plume width and depth, and centerline dilution as the plume moves down the river. This information can be used to determine the size of an acceptable mixing zone.

If a mixing zone is developed for BBA's discharge, the effect would be to change the concentration of effluent on which acute toxicity is conducted. That concentration will be lower than the current 100 percent effluent and the diluted sample will have a much higher probability of passing the LC50 requirement. The amount of dilution that might be allowed for the toxicity test will depend on the size of the mixing zone justified by the model. Since the permitted discharge is 1.35 mgd (2001 NPDES permit), the 7Q10 flow rate of the North River is 5 mgd, the maximum dilution that could be obtained would be 21 percent. That means that BBA could have no more than 50 percent mortality of Ceriodaphnia dubia in a sample that was 21 percent BBA effluent and 79 percent dilution water. However, it is unknown if the CORMIX model would support a dilution at that ideal maximum value. The mixing zone modeling will likely suggest that acute toxicity tests conducted at some immediate dilution, between 21 and 100 percent BBA effluent, will best characterize BBA's mixing within the North River.

Barnhardt's position for controlling toxicity has not changed since presenting these recommendations in 2005. Barnhardt requests that the toxicity requirement in the draft NPDES permit be modified to incorporate the use of a mixing zone.

Alternative Approaches for Controlling Toxicity
In addition to the approach recommended in the BBA Fiberweb letter, Barnhardt presents the further supporting information that previous biological studies conducted by MA DEP does not indicate the presence of any in stream toxicity in the North River associated with the effluent from the Barnhardt facility. Based on this lack of toxicity, an alternative approach for establishing a limitation that is still protective of the receiving waters would be the elimination of the acute toxicity limitation and relying on the proposed chronic toxicity limitation. Barnhardt believes that this is a conservative approach that will successfully control impacts to the North River.

Finally, since there is limited information supporting the notion that Barnhardt effluent is having a toxic effect on the North River, Barnhardt recommends consideration to changing the species used for the toxicity testing. Use of the Ceriodaphnia dubia consistently yields results indicating toxicity due to the presence of dissolved salt. Barnhardt recommends consideration of an alternative species, such as Daphnia magna, that might be suitable substitute for the Ceriodaphnia dubia.

In summary, the toxicity limitation contained in the draft NPDES permit creates a permit condition that will not be possible for the existing Barnhardt treatment works to routinely meet. Barnhardt believes that previous testing conducted by MA DEP demonstrates that there is no evidence of toxicity related to Barnhardt effluent. Barnhardt believes that the required test is overly conservative and serves as the basis for committing Barnhardt to pursue a costly program aimed at removing salts from the wastewater discharge. Barnhardt requests modification of the WET limits in a manner that is still protective of the receiving waters.

Response to Comment 5:
Response to Barnhardt's request that the toxicity requirement in the draft NPDES permit be modified to incorporate the use of a mixing zone:

Acute WET limits are established to ensure that there is no acute toxicity at the edge of the acute mixing zone. Specific acute mixing zones are not defined in the Massachusetts Water Quality Standards, but acute mixing zones are defined as an area "immediately surrounding the discharge outfall, sized to prevent lethality to passing organisms" (see EPA Whole Effluent Toxicity Policy (WET) Control Policy).

The LC50 limit of ≥100% in the current permit was established using the Massachusetts Implementation Policy for Control of Toxic Pollutants in Surface Waters, which establishes LC50 limitations based on ranges of dilution. The Massachusetts policy recommends an acute water quality criterion of 0.3 toxic units (TU) in the receiving water. (A toxic unit is 100/LC50). This criterion is

based on an adjustment factor of one-third, used to extrapolate the LC50 to an LC1 (concentration at which 1% of the test organisms die). Therefore, the policy establishes the acute mixing zone as the area surrounding the outfall where the acute toxicity due to the discharge is greater than 0.3 TU.

In order to ensure that this criteria is met within a short distance of the effluent pipe, the Massachusetts policy establishes an end-of-pipe limit of 1.0 TU for dilutions less than or equal to 100 and 2.0 TU for dilution factors greater than 100. The acute dilution factor for the discharge based on daily maximum flow (0.89 MGD, or 1.38 cfs) and 1Q10 (6.76 cfs) is 4.90. Therefore, a limit of 1.0 TU, which is an LC50 of ≥ 100% shall continue to be required in the draft permit. This limit is based on the available dilution at the point of discharge, since Massachusetts policy establishes an end-of-pipe limit of 1.0 TU for dilutions less than or equal to 100.

The LC50 limit of ≥ 100% does not require that the test organisms shall "be able to live in 100 percent effluent, or be able to live within...[the] discharge pipe," as Barnhardt suggests. Rather, a 100% limit means that a sample of 100% effluent shall cause no more than a 50% mortality rate. Thus, the effluent may be lethal to half of the test organisms and still meet the acute toxicity limit.

Response to Barnhardt's request for elimination of the acute toxicity limitation and reliance on the proposed chronic toxicity limitation:

The current permit contains an LC50 of ≥ 100%, and the discharge through Outfall 001 has consistently violated this limit. Therefore, the acute toxicity limit shall be retained in the permit based on anti-backsliding requirements found in 40 CFR §122.44(l). The permit shall also require a chronic toxicity limit of ≥ 5%.

The Massachusetts Implementation Policy for Control of Toxic Pollutants in Surface Waters states, that for dilution factors less than 10, effluent toxicity poses a high risk to receiving waters. These waters are considered water quality limited in that the effluent limit of 1.0 Toxic Unit may not be stringent enough to protect receiving waters. The Division requires both acute and chronic end points to be reported.

Therefore, compliance with both the acute and chronic toxicity limits is necessary to ensure the discharge from the facility is not toxic under either condition.

Response to Barnhardt's request for consideration of an alternative species, such as Daphnia magna, as a substitute for the Ceriodaphnia dubia:

The effluent was shown to not be acutely toxic to *Daphnia magna (D. magna)*, another test species used for toxicity tests. It has been shown that *D. magna*

routinely exhibits less sensitivity to Total Dissolved Solids (TDS) than *C. dubia*.[1] These species generally show similar sensitivities to most toxicants;[2] however, the difference in sensitivity to TDS can be useful in characterizing TDS toxicity. Therefore, the permit shall continue to require toxicity testing using *C. dubia*, since this species has indicated higher sensitivity to the discharge from the facility, and thus is more likely to be protective of a range of species in the receiving water.

Comment 6:
Testing Schedules
Section 2 of the footnotes of Part I.A.1 specifies that quarterly samples will be collected during the second weeks of January, April, July, and October. Section 5 of the footnotes requires toxicity testing in March, June, September, and December. Barnhardt requests that the testing schedule be combined into one specific month each quarter in order to minimize the potential for confusion of the required sample collection dates.

Response to Comment 6:
The permit has been changed in response to this comment. The quarterly WET testing shall be collected simultaneously with quarterly parameter testing required in the Table at Part I.A.1 of the permit. Footnote 5 in Part I.A.1 has been revised to state, "Samples shall be collected during the months of January, April, July, and October." This is consistent with Footnote 2 in Part I.A.1, which states that quarterly samples shall be collected during the second weeks in January, April, July, and October.

Comment 7:
Limitation of Temperature Rise of Receiving Water
The draft permit includes a limitation indicating that the rise in temperature of the receiving water due to a discharge shall not exceed 3°F. While Barnhardt is not opposed to the concept of limiting temperature impacts on the receiving waters from the Barnhardt effluent, Barnhardt cannot accept the 3°F limitation without conducting research into determining what the appropriate limit might be and determining the proper methodology for monitoring the temperature rise in the receiving waters. Barnhardt recommends the reconsideration of this limitation in favor of collecting additional data that would support a later decision making on an appropriate limit.

Response to Comment 7:
State Water Quality Criteria for temperature require that Class B waters shall not exceed 68°F (20°C) based on the mean of the daily maximum temperature over a seven day period in cold water fisheries, unless naturally occurring, and that the rise in temperature due to a discharge shall not exceed 3°F (1.7°0C) in rivers and

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[1] American Petroleum Institute (API). API. 1998. *The Toxicity of Common Ions to Freshwater and Marine Organisms.* Washington, DC, November 1998, Doc. No. 0300–029.
[2] Mount, D.R., and D.D. Gulley. 1992. *Development of a Salinity/Toxicity Relationship to Predict Acute Toxicity of Saline Waters to Freshwater Organisms.* Gas Research Institute, Environment and Safety Research Department, Chicago, IL, October, 1992.

streams designated as cold water fisheries. Therefore, the requirement that the rise in temperature due to the discharge from the facility shall not exceed 3°F shall be retained in the final permit, based on State Water Quality Criteria for Class B waters.

Comment 8:
Special Conditions C.1 specifies a requirement for the development of a Best Management Practices plan to be followed in operating the facility for cleaning tanks and other equipment in order to minimize the amounts of pollutants discharged to surface waters. Barnhardt is not opposed to the preparation of management documentation aimed at reducing or eliminating discharging pollutant to surface waters. However, Barndhardt personnel indicate that operating procedures for their bulk storage of process chemicals has never involved the periodic clean out for any reason. Barnhardt has always been able to utilize methodology that does not involve the clean out of storage tanks to demonstrate that their storage tanks are suitable for use. Barnhardt has no plans to institute a program requiring the emptying of storage tanks as part of their routine operations. For this reason, Barnhardt requests the elimination of a requirement for a Best Management Practice Plan for the clean out of their storage tanks.

Response to Comment 8:
This is standard language included in NPDES permits to require development of a Best Management Practices (BMP) plan to identify and describe the practices at the facility which minimize the amount of pollutants (biological and chemical) discharged to surface waters.

Since the facility currently does not perform cleaning of storage tanks and does not plan to clean storage tanks in the future, the requirement to develop BMPs to be followed for cleaning tanks has been removed from the permit. However, in the event that cleaning of storage tanks is necessary in the future, Barnhardt shall update the BMP plan to consider this practice by development of appropriate BMPs to minimize the amount of pollutants discharged to surface waters. Part I.C.1 of the final permit states, "A plan shall be developed which establishes Best Management Practices (BMPs) to be followed in operating the facility, cleaning of any equipment, and disposing of any liquid and solid waste."

Comment 9:
Development of BMPs to Reduce or Eliminate the Acute Toxicity in the Discharge
Special Condition C.1.d specifies a requirement for the development and implementation of site specific Best Management Practices in order to reduce and/or eliminate the acute toxicity of the discharge. The requirement specifically identifies the need to investigate two alternative treatment technologies.

- Replacement of NaOH with enzymatic scouring, and
- Use of microfiltration to recover NaOH

As discussed in Section 2, Barnhardt believes that the presence of salt in the effluent for the facility is a special condition that does not result in toxicity in the receiving waters.

Consequently, we believe that the evaluation and implementation of technologies aimed solely for the removal of salt imposes an unnecessary economic burden on Barnhardt without any measurable environmental benefits to the condition of the receiving waters. Barnhardt requests elimination of this provision of the draft permit until such time that it can be demonstrated that these investments are necessary for address toxicity in the receiving waters.

Response to Comment 9:
Part I.A.11 of the permit requires that the permittee shall not discharge any pollutant or combination of pollutants in toxic amounts. However, the discharge from the facility has consistently failed acute toxicity tests. Therefore, Part I.C.1.d of the permit requires the permittee to "develop and implement site specific BMPs in order to reduce and/or eliminate the acute toxicity of the discharge." The permit further requires that the BMPs include, at a minimum, investigation of the following alternative treatments: Replacement of chemical scouring using sodium hydroxide with enzymatic scouring; and use of micro/ultrafiltration using membranes to recover sodium hydroxide from spent solutions, with subsequent reuse of the recovered alkaline solution in facility processes.

In the event that investigation of these treatment technologies does not indicate potential to reduce toxicity of the discharge, implementation is not required. However, the permit does require reduction and/or elimination of the acute toxicity of the discharge in the form of development and implementation of site specific BMPs. Therefore, in the event that these treatment technologies do not reduce and/or eliminate the acute toxicity of the discharge, the permittee shall develop and implement alternative site specific BMPs to meet this permit requirement.

Comment 10:
Section C.1.e requires Barnhardt to develop and implement site specific BMPs to reduce and/or eliminate the sources of nitrogen at the facility. In the supporting materials provided with the draft permit on p. 19, the justification for reducing the levels of nitrogen in the facility effluent is required by the need to reduce loading in the Connecticut, Housatonic, and Thames River watersheds. While we understand the need to reduce nitrogen loading in these watersheds, it has not been demonstrated that there is any measureable benefit for either the North River or the Connecticut, Housatonic, and Thames River watersheds by reducing nitrogen loading from the facility. In essence, Barnhardt is being told to bear the financial burden to reduce nitrogen loading in its effluent with no clear justification. Barnhardt requests that this provision of the draft permit be suspended until it can be demonstrated that there is a benefit associated with the requested activity.

Response to Comment 10:
The facility discharges to the North River which drains to the Connecticut River via the Deerfield River in Massachusetts. The Connecticut River subsequently

drains to Long Island Sound (LIS). Hypoxic conditions in LIS, which occur annually in the summer, have been documented to result from excessive amounts of nitrogen (See comment 13, below, from CTDEP). In response to this occurrence, Connecticut and New York jointly developed a Total Maximum Daily Load (TMDL) for nitrogen which was approved by the EPA in April, 2001. In addition to a number of nitrogen reduction efforts, the TMDL specifies a 25% reduction in the estimated nitrogen load from states upstream of Connecticut (Massachusetts, Vermont, and New Hampshire).

Therefore, to reduce the occurrence of hypoxic conditions in LIS and ensure consistency with the TMDL, the draft permit requires that the permittee develop and implement site specific BMPs in order to reduce and/or eliminate the source(s) of nitrogen at the facility, as specified in Part I.C.1.e of the draft permit. This condition shall continue to be required in the final permit.

Comment 11:
Conduct Study to Operate WWTP to Optimize the Removal of Nitrogen
Section C.2 requires Barnhardt to complete an evaluation of alternative methods of operating the existing wastewater treatment facility to optimize the removal of nitrogen. In the supporting materials provided with the draft permit on p.19, the justification for reducing the levels of nitrogen in the facility effluent is required by the need to reduce loading in the Connecticut, Housatonic, and Thames River watersheds. While we understand the need to reduce nitrogen loading in these watersheds, it has not been demonstrated that there is any measureable benefit for either the North River or the Connecticut, Housatonic, and Thames River watersheds by reducing nitrogen loading from the facility. In essence, Barnhardt is being told to bear the financial burden to reduce nitrogen loading in its effluent with no clear justification. Barnhardt requests that this provision of the draft permit be suspended until it can be demonstrated that there is a benefit associated with the requested activity.

Response to Comment 11:
The facility discharges to the North River which drains to the Connecticut River via the Deerfield River in Massachusetts. The Connecticut River subsequently drains to Long Island Sound (LIS). Hypoxic conditions in LIS, which occur annually in the summer, have been documented to result from excessive amounts of nitrogen (See comment 13, below, from CTDEP). In response to this occurrence, Connecticut and New York jointly developed a Total Maximum Daily Load (TMDL) for nitrogen which was approved by the EPA in April, 2001. In addition to a number of nitrogen reduction efforts, the TMDL specifies a 25% reduction in the estimated nitrogen load from states upstream of Connecticut (Massachusetts, Vermont, and New Hampshire).

Therefore, to reduce the occurrence of hypoxic conditions in LIS and ensure consistency with the TMDL, as specified in Part I.C.2 of the permit, the permittee shall complete an evaluation of alternative methods of operating the existing wastewater treatment facility to optimize the removal of nitrogen, and submit a

report to EPA and MassDEP documenting this evaluation and presenting a description of recommended operational changes. The permittee shall implement the recommended operational changes in order to maintain the existing mass discharge loading of total nitrogen.

Comment 12:
Error in Fact Sheet Related to pH Violation
Page 12 of the Fact Sheet attached to the draft permit in Section 1c contained a statement indicating that the facility has violated the current low range pH of 6.5 SU on two occasions. Barnhardt's review of the Discharge Monitoring Report information did not reveal any violations in pH over the life of the permit. Barnhardt requests that this statement be corrected in any future listing of factual information about Barnhardt's compliance with its pH limitation.

Response to Comment 12:
Since the fact sheet is a final document and therefore cannot be altered, this response to comment serves to document the error in the fact sheet. Review of DMR data taken during the period of June 2001 through September 2009 indicates that the discharge through Outfall 001 has not violated the pH limit on any occasion.

Comment 13:
Barnhardt believes that the comments provided in this letter identify technical issues requiring further consideration by USEPA and MA DEP before issuing a final permit. Barnhardt requests the opportunity to meet with USEPA and MA DEP to provide further justification and to better understand the reasoning for the proposed limitations included in the permit.

Response to Comment 13:
EPA and MassDEP met with Barnhart on June 15th in response to this comment. Barnhardt re-iterated the comments which they submitted prior to the close of the comment period, which are outlined and responded to above, specifically the comment concerning acute toxicity.

Comments from CTDEP:

Comment 14:
The Connecticut Department of Environmental Protection (CTDEP) appreciates this opportunity to comment on the draft NPDES permit for the Barnhardt Mfg. Co. (facility). The draft permit authorizes the facility to discharge treated process wastewater as well as domestic wastewater from 21 residential homes. The facility discharges to the North River which drains to the Connecticut River via the Deerfield River in Massachusetts. The Connecticut River subsequently drains to Long Island Sound (LIS). The CTDEP has an interest in discharges to waters that drain to Long Island Sound since hypoxic conditions, which occur annually in the summer, have been documented to result from excessive amounts of nitrogen. Discharges from wastewater treatment plants contribute

to the nitrogen loading to LIS. In response to this occurrence, Connecticut and New York jointly developed a Total Maximum Daily Load (TMDL) for nitrogen which was approved by the Federal Environment Protection Agency (EPA) in April, 2001. In addition to a number of nitrogen reduction efforts, the TMDL specifies a 25% reduction in the estimated nitrogen load from states upstream of Connecticut (Massachusetts, Vermont, and New Hampshire).

The facility's draft discharge permit demonstrated initial efforts aimed at reducing the amount of nitrogen discharged to LIS from upstream states. It includes a Special Condition for the facility to maintain a nitrogen load of approximately 66 pounds/day based on an annual average of data collected during 2001-2009 and requires the facility to conduct an evaluation of optimization methods designed to maintain this nitrogen load. The draft permit also requires the facility to submit an annual report that outlines nitrogen removal efficiencies, documents the annual nitrogen load discharged, and tracks trends in the nitrogen load. The CTDEP is pleased that such stipulations targeted at nitrogen loading have been proposed in the draft NPDES permit and hopes to see this Special Condition incorporated in the final version.

Response to Comment 14:
The nitrogen requirements in Part I.C.1.e and Part I.C.2 shall continue to be required in the final permit. See response to comments 10 and 11, above.

Comment 15:
Also noted in the draft discharge permit is a requirement for monthly monitoring of nitrogen species based on composite sampling. This type of data will serve to refine nitrogen loading estimates to LIS from upstream states and assist the Connecticut River Workgroup (EPA, NEIWPCC, CT, NY, MA, VT, NH) in determining supportable management actions. However, we also recommend concurrent sampling along the process or treatment chain, especially the influent. Those data will help determine treatment efficiency and, should nutrient removal be required at some time in the future for local or Long Island Sound management, they will be helpful in determining appropriate technologies and management options.

Response to Comment 15:
Part I.C.2 of the permit requires the permittee to evaluate alternative methods of operating the existing wastewater treatment facility to optimize the removal of nitrogen. The permittee shall consider concurrent sampling of the effluent nitrogen along with the required monthly effluent sampling to determine treatment efficiency; however, influent sampling has not been added as a monthly requirement to the permit.

Comments from CRWC:

Comment 16:
Protection of existing uses is required under 40 CFR 131.12(a)(1). The North River at the confluence of the Deerfield River, 2.7 miles downstream from the discharge, is a very popular swimming hole.

Response to Comment 16:
Part VI.E of the fact sheet indicates that all existing uses of the North River must be protected. The North River is classified as a Class B water, cold water fishery, by the Commonwealth of Massachusetts (314 CMR 4.06). These waters are designated at habitat for fish, other aquatic life, and wildlife, and for primary and secondary contact recreation. Where designated they shall be suitable as a source of public water supply with appropriate treatment. They shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value.

EPA believes the limitations, monitoring requirements, and additional conditions in the final permit are sufficient to protect the existing uses of the North River.

Comment 17:
CRWC supports EPA's decision to decrease the permit limits for flow, BOD, TSS, and COD. We also support the new requirement for reporting total phosphorus levels, total copper, and temperature.

Response to Comment 17:
The decreased permit limits for flow, BOD, TSS and COD shall remain in the final permit. The reporting requirements for phosphorus, copper, and temperature shall also remain in the final permit.

Comment 18:
CRWC thinks that, given the lower permit limits for BOD, TSS, and COD, it does not make sense to decrease the measuring frequency at this time. We recommend keeping the existing monitoring frequency requirements, and if the facility consistently falls under the new limits, they can petition to have the frequency decreased after a year or two.

Response to Comment 18:
The current permit (as modified on August 17, 2004) requires monthly monitoring of both BOD and COD. The draft permit monthly monitoring requirements for BOD and COD have not been revised from the monthly monitoring requirements in the current permit. Thus, the monitoring frequency in the final permit shall remain unchanged as monthly.

Review of DMR data reveals that the highest monthly average TSS value during the period of June 2001 through September 2009 was 186 lbs/day. Therefore, the discharge is not expected to violate the reduced monthly average limit of 250

lbs/day. The maximum daily TSS limit, which remains unchanged from the current permit to the draft permit, has not been violated on any occasion. Thus, the monitoring frequency in the final permit for both monthly average and daily maximum shall remain as monthly (reduced from weekly in the current permit), since the reduced monthly average limit and unchanged maximum daily limit for TSS are expected to be met by the discharge.

Comment 19:
Page 17 of the Fact Sheet indicates that the facility consistently discharges ammonia levels significantly less than the maximum discharge limit of 63 lbs/day. The Fact Sheet says that the highest level has been 22.7 lbs/day. In the spirit of the NPDES program, which is supposed to lead to pollutant discharge *elimination*, we recommend lowering the limit to something like 30 lbs/day. Theoretically, this would not impact the company at all.

Response to Comment 19:
The ammonia (as N) limit is based on anti-backsliding from the September 6, 1989 permit, which required an ammonia (as N) water quality-based limit of 5.6 mg/L as a monthly average. The current permit converted the concentration-based limit to a mass-based limit of 63 lbs/day. The mass-based limit was carried over to the draft permit.

Permit effluent limitations are derived based on applicable technology and water quality standards. Permit writer guidance states that the more stringent of the technology-based limit and water quality-based limit is required to be applied as an effluent limitation in the permit.[3] Since the suggested limit of 30 lbs/day is not based on applicable technology or water quality standards, it has not been required as an effluent limitation in this permit. However, the mass-based limit has been recalculated based on the reduced flow limit in the permit. The water quality-based limit of 5.6 mg/L (calculated based on the average discharge pH of 8 SU) converts to a mass-based limit based on the flow of 0.89 MGD of 42 lbs/day. This limit has replaced the 63 lbs/day limit of ammonia (as N) in the final permit.

Comment 20:
The existing permit contained a footnote explaining what "production rate" meant. Although the draft permit does give some units of measurement, it might be a good idea to specify in the permit what "production rate" means to EPA.

Response to Comment 20:
A footnote has been added to the permit at Part I.A.1 to define the production rate. Footnote 11 now clarifies that production rate is the "total production rate of finished goods in lbs/day."

[3] USEPA NPDES Permit Writer's Manual, EPA-833-B-96-003, December 1996, p. 24.

Comment 21:
Given the use of the North River for recreation, CRWC believes weekly *E.coli* measurements are more appropriate than the proposed change to monthly monitoring.

Response to Comment 21:
EPA has reconsidered the reduction in monitoring for E. coli from weekly to monthly. In response to this comment, EPA has determined that weekly monitoring in place of monthly monitoring is appropriate for this parameter since the monitoring requirement has been changed from fecal coliform to E.coli and the facility accepts domestic wastewater from approximately 21 homes in the Village of Griswoldville. The monitoring requirement for E. coli has therefore been changed from monthly to weekly.

A condition has also been added to the permit, Part I.A.1, footnote 12, to allow the permittee to request a reduction in monitoring as follows:

> The permittee may submit a written request to the EPA requesting a reduction in the frequency (to not less than once per month) of required testing for E. coli, after completion of an entire season (April 1st – October 31st) of weekly successive monitoring results of effluent, all of which must demonstrate levels of E. coli below the permit effluent limitations. Until written notice is received by certified mail from the EPA indicating that the E. coli testing requirement has been changed, the permittee is required to continue testing at the frequency specified in the permit.

Comment 22:
CRWC supports the permit requirement of a BMP plan to reduce or eliminate the acute toxicity of the effluent. We recommend that permit section C(1) be edited to say, "A plan shall be developed and implemented that establishes Best Management Practices (BMPs)..." The word implemented is mentioned in subsection d, but it is important to say it up front in the main heading to this section. CRWC also recommends that EPA establish a deadline for implementation some time after the deadline for the BMP plan and before the expiration date of the renewed permit.

Response to Comment 22:
This is standard permit language common to recently issued NPDES permits. No change to the permit was made in response to this comment.

Comment 23:
Section VIII of the Fact Sheet says that the North River is not designated Essential Fish Habitat for any federally managed species. We are not sure if EPA is aware that the MA Department of Fish and Game stocks Atlantic salmon fry in the east and west branches of the North River upstream of the discharge in April each year. Any salmon that reach smolt stage and migrate out of Long Island Sound will swim past the outfall location. It also seems possible that some fry stocked further upstream may find habitat in lower sections of the North River. Atlantic salmon is a federally managed species.

Response to Comment 23:
Since the fact sheet is a final document, it cannot be edited. However, this response to comment shall serve to document the concerns of the CRWC. EPA believes the requirements in the permit including the effluent limitations, monitoring requirements, and site specific BMPs are sufficient to minimize adverse effects to EFH. If adverse effects are detected as a result of this permit action, NMFS will be notified and an EFH consultation will promptly be initiated.

Section 401 Certification

In its Section 401 certification of the permit, MassDEP states that the conditions of the permit listed below are more stringent than necessary to achieve compliance with sections 208(e), 301, 302, 303, 306, and 307 of the Federal Act, and with the provisions of the Massachusetts Clean Waters Act, M.G.L. c.21, ss.26-53, and regulations promulgated thereunder. Specifically, MassDEP raised the issue of whether or not the existing instream monitoring information is a sufficient indicator that there is no concern of acute toxicity resulting from the effluent, and thus grounds to remove the requirement for acute toxicity testing in the permit with addition of more frequent chronic testing. MassDEP states:

> The acute tests are not indicative of the actual instream conditions. MassDEP and the facility have conducted instream chronic and acute tests which documented no evidence of instream acute toxicity. Therefore, the acute whole effluent toxicity (WET) testing required in Part I.A.1 should be replaced with more frequent chronic testing at 6 tests per year.

EPA has consulted MassDEP and reviewed all available monitoring data, including surface water quality biological impact information collected downstream. However, the results of these ambient biological tests (collected over two miles downstream from the discharge) are not directly related to the potential effluent acute toxicity. Acute mixing zones are defined as an area "immediately surrounding the discharge outfall, sized to prevent lethality to passing organisms" (see EPA Whole Effluent Toxicity Policy (WET) Control Policy). Since the biological tests were performed more than two miles downstream, they are not valid indicators of the acute toxicity of the discharge through Outfall 001, which has consistently violated the LC50 limit in the current permit of ≥100%. Therefore EPA does not believe that the available ambient monitoring data is a sufficient basis for removal of the acute WET testing requirement.

Additionally, EPA also does not believe that replacement of the acute WET testing requirement with chronic testing is an option in this case. The Massachusetts Implementation Policy for Control of Toxic Pollutants in Surface Waters states, that for dilution factors less than 10, effluent toxicity poses a high risk to receiving waters. These waters are considered water quality limited in that the effluent limit of 1.0 Toxic Unit may not be stringent enough to protect receiving waters. The Division requires both acute

and chronic end points to be reported. Therefore, compliance with both the acute and chronic toxicity limits is necessary to ensure the discharge from the facility is not toxic under either condition.

Therefore, EPA does not have any reason to deviate from the acute WET testing requirement in the draft permit. The permit shall continue to require acute WET testing. The current permit contains an LC50 of ≥ 100%, and the discharge through Outfall 001 has consistently violated this limit. Therefore, the acute toxicity limit shall be retained in the permit based on anti-backsliding requirements found in 40 CFR §122.44(l).

Section 401(a)(1) of the CWA requires all NPDES permit applicants to obtain a certification from the appropriate state agency validating the permit's compliance with the pertinent federal and state water pollution control standards. *See* CWA § 401(a)(1). The regulatory provisions pertaining to state certification provide that EPA may not issue a permit until a certification is granted or waived by the state in which the discharge originates. 40 C.F.R. § 124.53(a). The regulations further provide that "when certification is required...no final permit shall be issued...unless the final permit incorporates the requirements specified in the certification under § 124.53(e)." 40 C.F.R. § 124.55(a). Section 124.53(e) provides that the State certification shall include "any conditions more stringent than those in the draft permit which the State finds necessary to "assure compliance with, among other things, state water quality standards, 40 C.F.R. § 124.53(e)(2), and shall include "[a] statement of the extent to which each condition of the draft permit can be made less stringent without violating the requirements of State law, including water quality standards," *id.* § 124.53(e)(3). Under 40 C.F.R. § 124.55(c), "a State may not condition or deny a certification on the grounds that State law allows a less stringent permit condition."

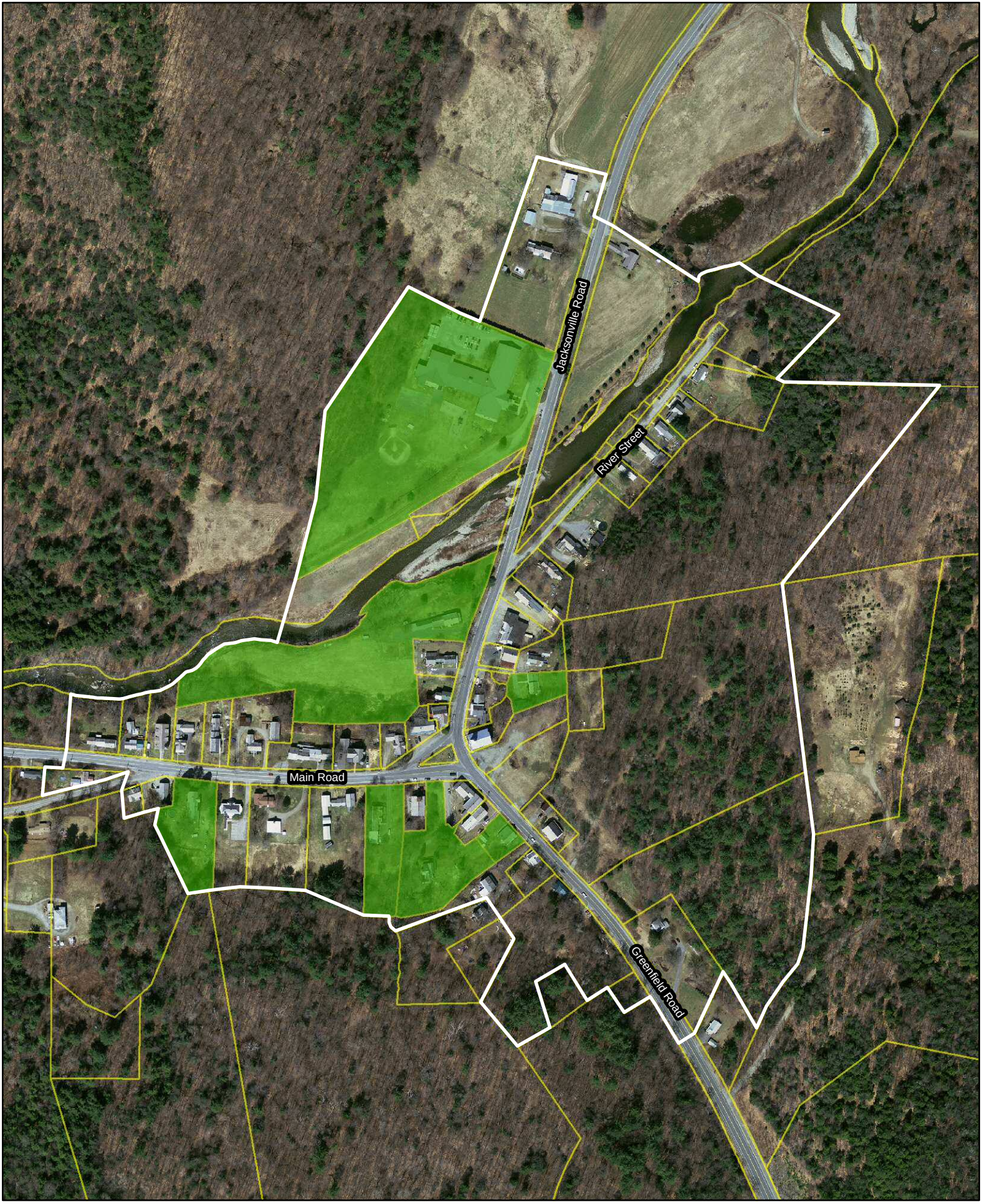
EPA's "duty under CWA section 401 to defer to considerations of State law is intended to prevent EPA from *relaxing* any requirements, limitations, or conditions imposed by the State law." *In re City of Jacksonville,* 4 E.A.D. 150, 157 (EAB 1992); *In re City of Moscow,* 10 E.A.D. 135, 151 (EAB 2001); *accord In re Ina Rd. Water Pollution Control Facility,* 2 E.A.D. 99, 100 (CJO 100). However, "when the Region reasonably believes that a state [WQS] requires a more stringent permit limitation than that specified by the state, the Region has an independent *duty* under section 301(b)(1)(C) of the CWA to include more stringent permit limitations." *Moscow,* 10 E.A.D. at 151 (emphasis in original); *accord In re City of Marlborough,* 12 E.A.D. 235, 252 n. 22 (EAB 2005); *Jacksonville,* 4 E.A.D. at 158; *Ina Rd.,* 2 E.A.D. at 100 (stating that such "duty is independent of State certification under [section] 401"). EPA's regulations similarly interpret the statute to impose such an independent duty when EPA issues an NPDES permit. 40 C.F.R. §§ 122.4(a), (d); 122.44(d)(1), (5).

Thus, EPA is requiring a permit that is more stringent than the Section 401 certification language. EPA believes the permit, as written, is consistent with the Massachusetts Implementation Policy for Control of Toxic Pollutants in Surface Waters, as well as with sections 208(e), 301, 302, 303, 306, and 307 of the Federal Act, and with the provisions of the Massachusetts Clean Waters Act, M.G.L. c.21, ss.26-53, and regulations

promulgated thereunder. EPA believes the acute WET testing of the effluent is crucial, especially since the discharge from the facility has consistently failed acute toxicity tests.

APPENDIX B

Needs Evaluation Figures



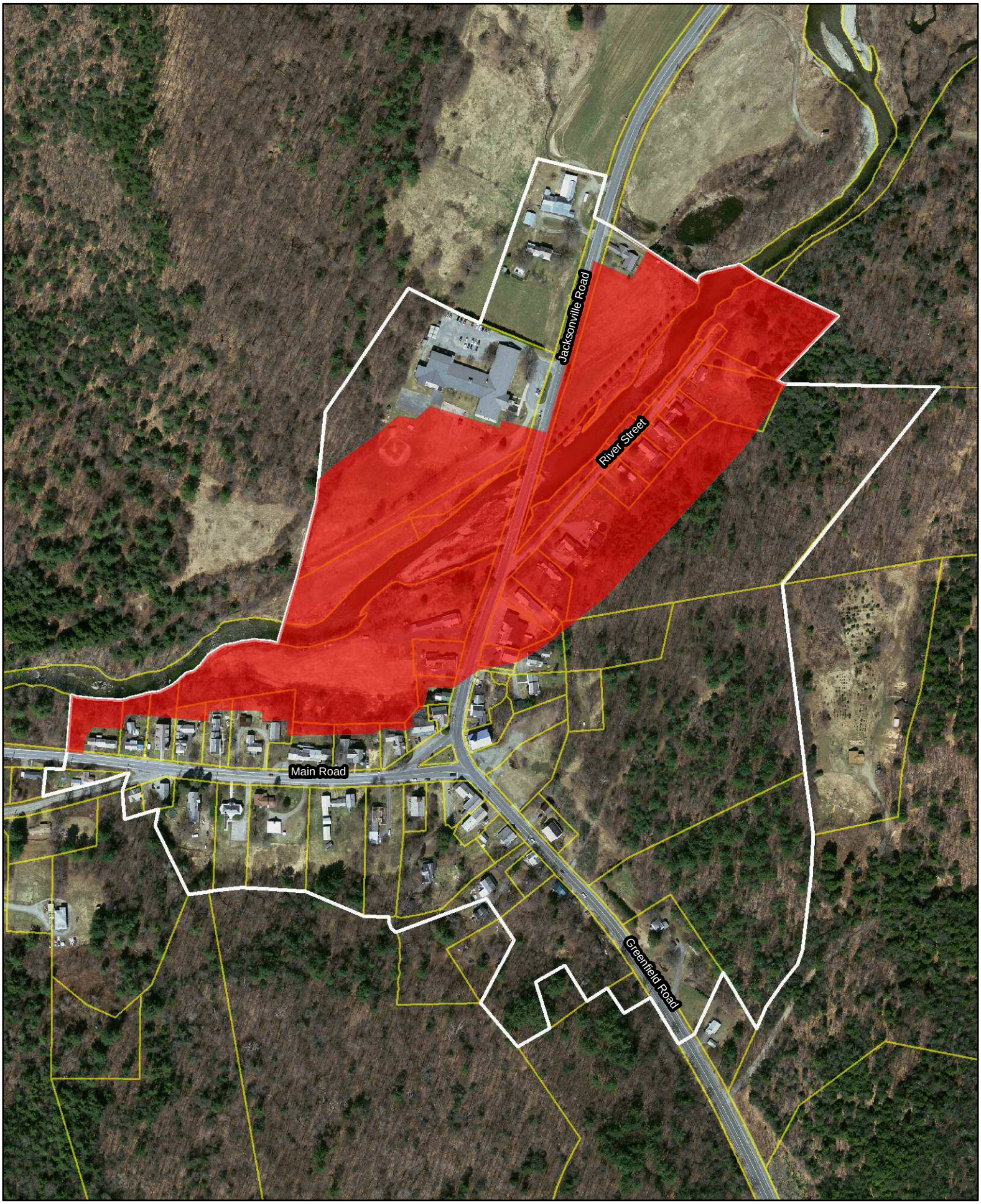
Legend

Consecutive Pumping

Feasibility Study

Colrain, Massachusetts

Weston&Sampson



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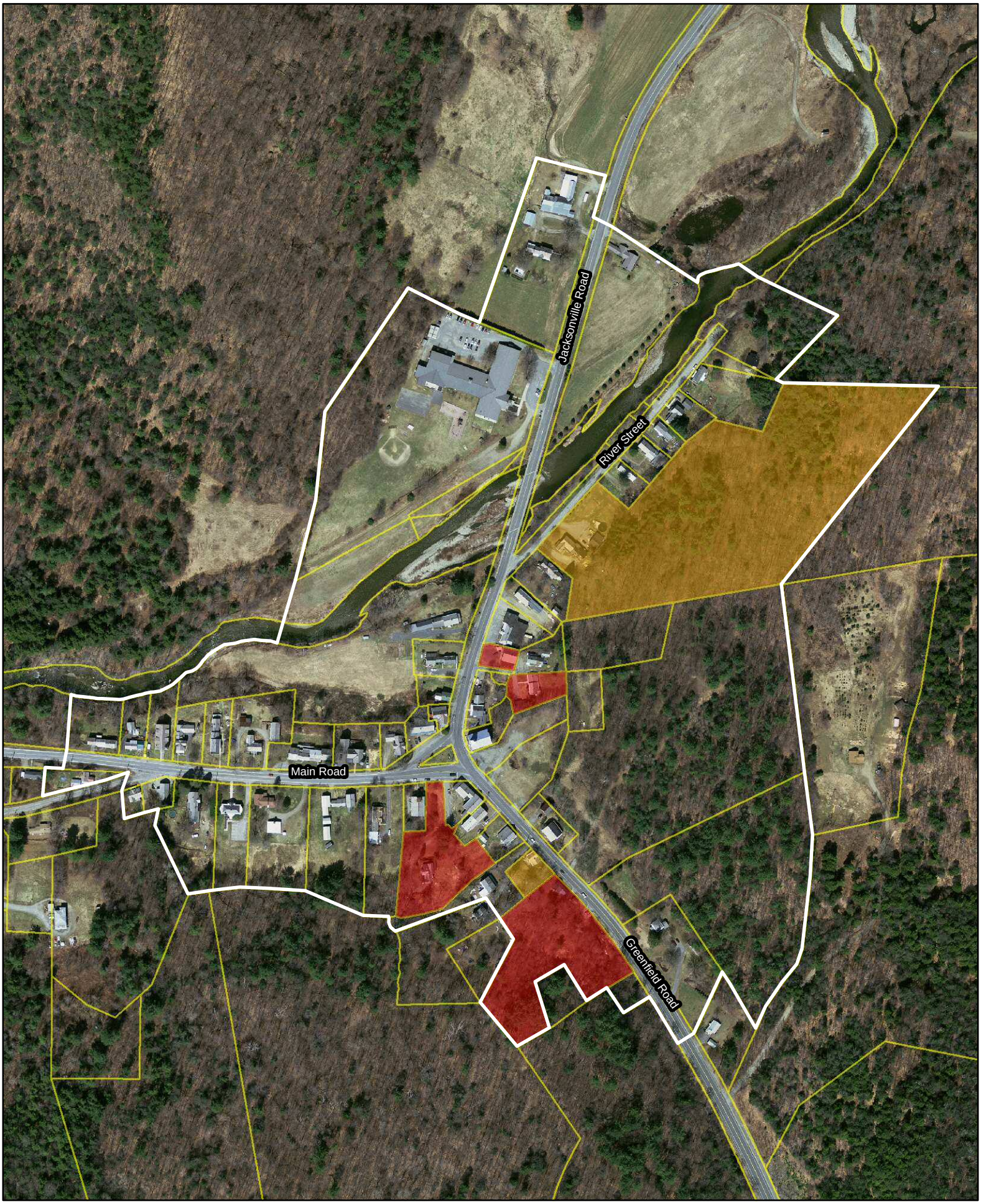
Endangered Species Habitats

Feasibility Study

Colrain, Massachusetts

Weston&Sampson®



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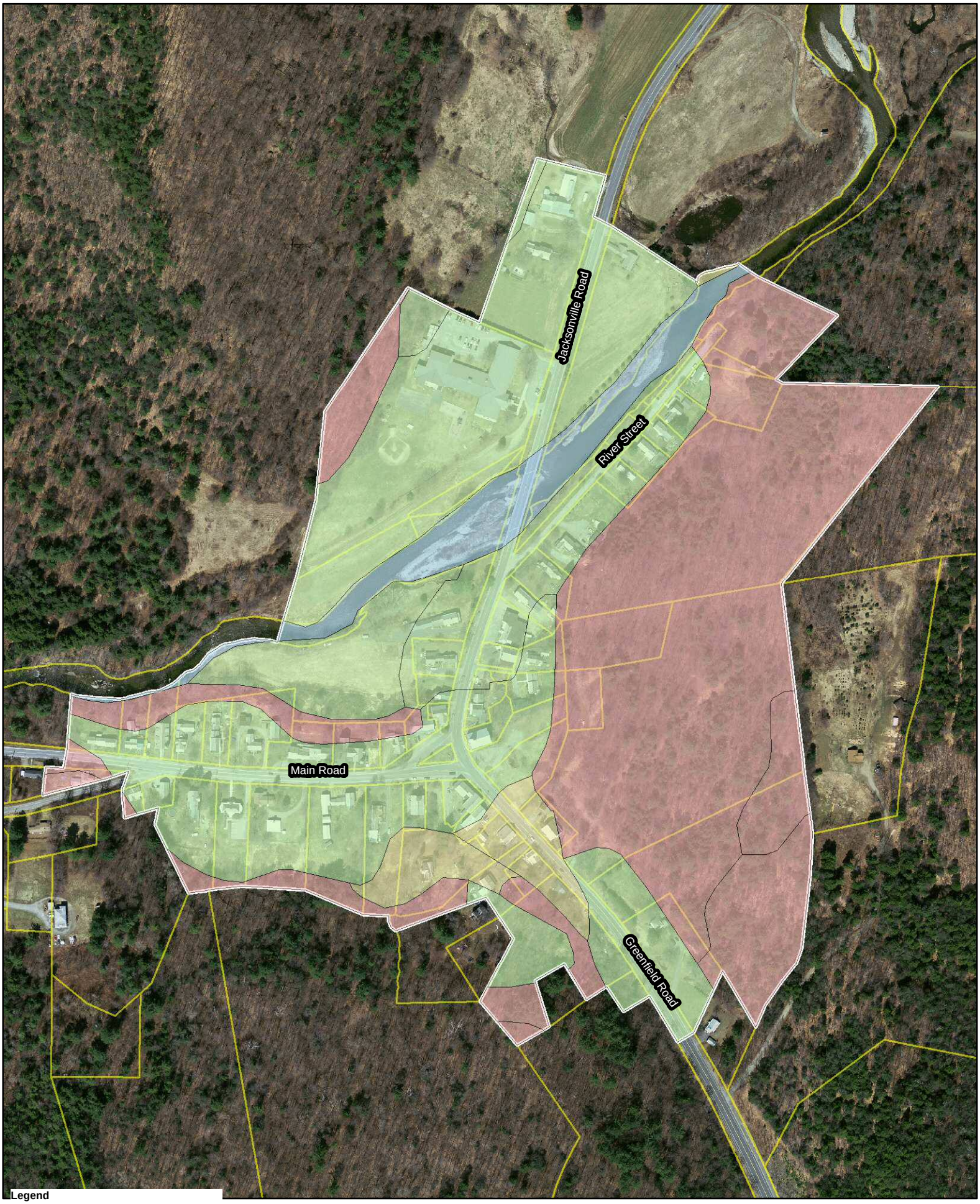
- Failures
- Variances

Feasibility Study

Colrain, Massachusetts

Weston&Sampson®



Legend

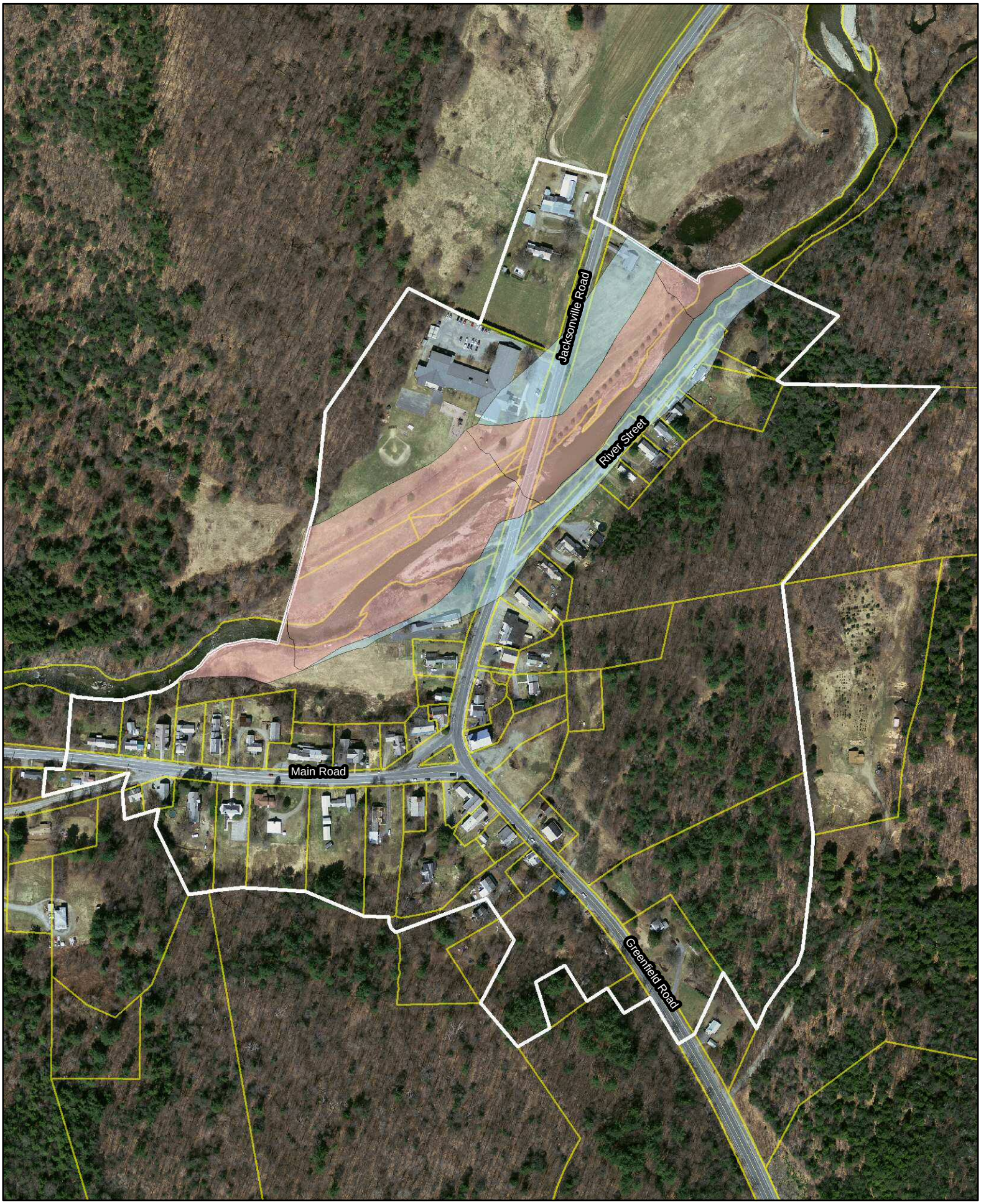
Farmland Soils

- All areas are prime farmland
- Farmland of statewide importance
- Not prime farmland
- Water

Feasibility Study

Colrain, Massachusetts

Weston&Sampson®



Legend

Flood Zones

Zone

Areas of 100-Year Flood

Areas Between 100-Year and 500-Year Flood

Feasibility Study

Colrain, Massachusetts

Weston&Sampson®

Legend

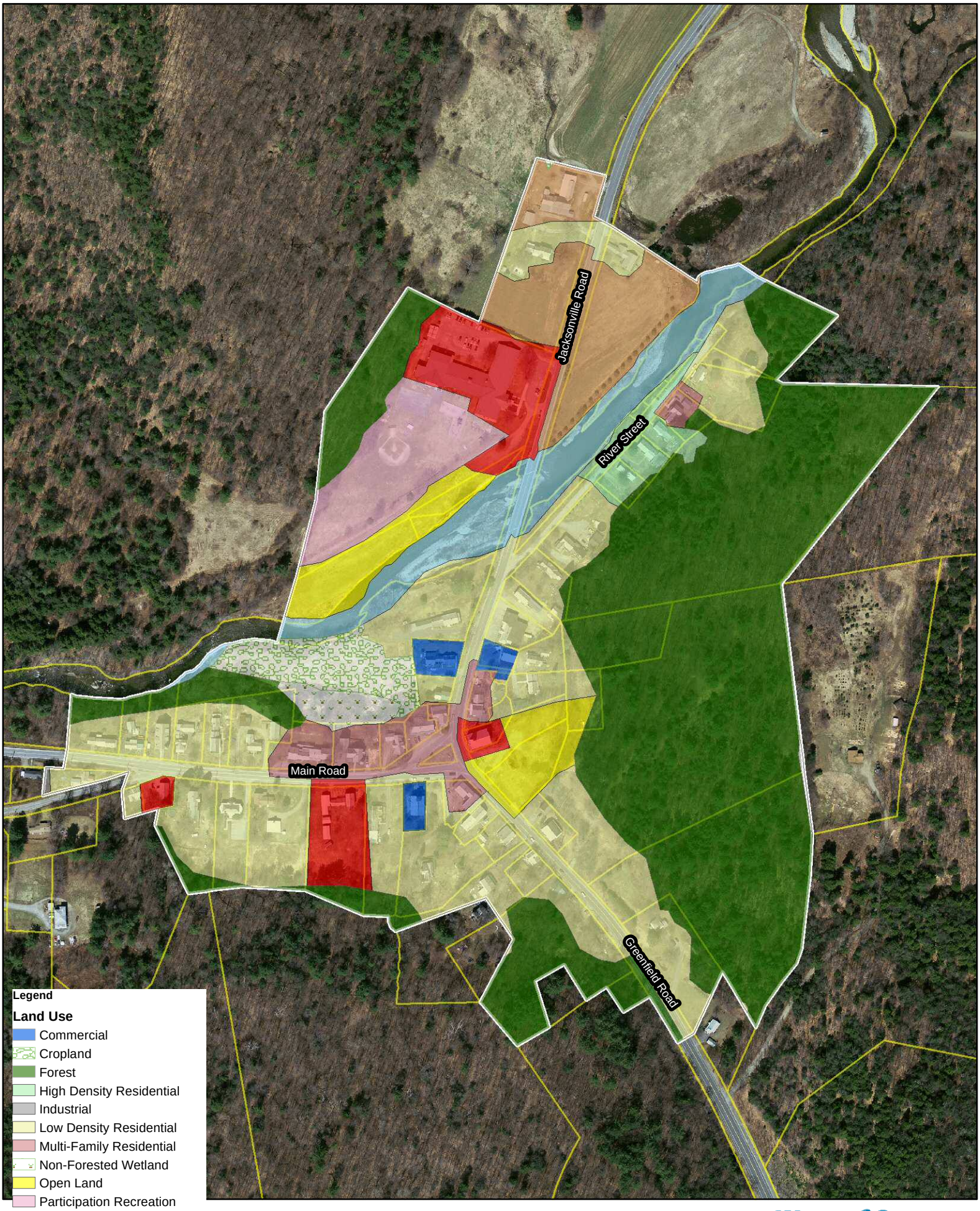
IWPA

- COLRAIN CENTRAL ELEM SCHOOL
- COLRAIN FIRE DISTRICT 1

Feasibility Study

Colrain, Massachusetts

Weston&Sampson®



Feasibility Study

Colrain, Massachusetts

Weston&Sampson®

Legend

- Not rated
- Very limited

Feasibility Study

Colrain, Massachusetts

Weston&Sampson®

Legend

OPEN WATER

SHRUB SWAMP

Feasibility Study

Colrain, Massachusetts

Weston&Sampson®

APPENDIX C

Preliminary Engineer's Opinion of Probable Construction Costs

Alternative 2A
Preliminary Engineer's Opinion of Probable Construction Cost
Town Center Sanitary Sewer Feasibility Study
Town of Colrain, Massachusetts
April 2014

Description	Unit	Unit Cost	Estimated Quantity	Total Cost
6-inch variable slope gravity sewer on local roads	LF	$ 60.00	0	$ -
6-inch variable slope gravity sewer on state roads	LF	$ 65.00	0	$ -
6-inch force main on local roads	LF	$ 60.00	2,320	$ 139,200.00
6-inch force main on state roads	LF	$ 65.00	10,100	$ 656,500.00
6-inch service connection on local roads	LF	$ 60.00	300	$ 18,000.00
8-inch gravity sewer on local roads	LF	$ 60.00	2,950	$ 177,000.00
8-inch gravity sewer on state roads	LF	$ 65.00	1,570	$ 102,050.00
Precast concrete manholes	EA	$ 3,500.00	15	$ 52,500.00
Air release structures	EA	$ 11,000.00	3	$ 33,000.00
Rock excavation and disposal	CY	$ 80.00	600	$ 48,000.00
Temporary trench pavement - local road	LF	$ 15.00	5,270	$ 79,050.00
Temporary trench pavement - state road	LF	$ 25.00	1,035	$ 25,875.00
Permanent trench pavement - state road	LF	$ 45.00	1,035	$ 46,575.00
Controlled density fill	CY	$ 80.00	770	$ 61,600.00
Milling on state road	SY	$ 4.00	1,150	$ 4,600.00
Overlay on state road	SY	$ 16.00	1,150	$ 18,400.00
Traffic Control	HR	$ 70.00	1,200	$ 84,000.00
Submersible wastewater pumping station	LS	$ 500,000.00	1	$ 500,000.00
Flow meter	LS	$ 10,000.00	1	$ 10,000.00
Odor control allowance	LS	$ 75,000.00	1	$ 75,000.00
Community septic system	LS	$ 2,000,000.00	0	$ -
Wastewater treatment plant	LS	$ 2,500,000.00	0	$ -

Sub-Total	**$ 2,131,350.00**
Contingency (20%)	**$ 426,300.00**
Total Construction Cost	**$ 2,557,650.00**
Engineering & Construction Administration Costs (12%)	**$ 255,800.00**
Barnhardt Manufacturing Connection Fee	**$ 300,000.00**
Total Project Cost	**$ 3,113,450.00**

Opionion of Lifecycle Costs
Energy and Operational Costs

	40	HP	Operational Horsepower
	10	Minutes	Operational Minutes per hour
	4	Hours	Operational Hours per day
	104	kw*hr/d	Energy Utilized per day
	37,960	kw*hr/yr	Energy Utilized per year
$	6,453	per Year	Energy Cost @ $0.17 / kw*hr
$	5,000	per Year	Labor Costs
$	2,500	per Year	Miscellaneous O&M Costs
$	13,953	per Year	Opionion of Annual Station O&M

Equipment Replacement Costs

$	80,000	Pump Motor Replacement

Opinion of 20-Year Lifecycle Costs

$	359,064	20-Year O&M Costs
$	3,472,514	20-Year Project Costs (2014 Dollars)

Notes:
1. Costs for pavement restoration within state roads includes only temporary and permanent pavement within the TIP project area and temporary and permanent trench pavement, controlled density fill, and milling and overlay of one lane from Station 100+50 to 110+84.

2. Costs do not include costs associated with land acquisitions.

Alternative 2B
Preliminary Engineer's Opinion of Probable Construction Cost
Town Center Sanitary Sewer Feasibility Study
Town of Colrain, Massachusetts
February 2014

Description	Unit	Unit Cost	Estimated Quantity	Total Cost
6-inch variable slope gravity sewer on local roads	LF	$ 60.00	0	$ -
6-inch variable slope gravity sewer on state roads	LF	$ 65.00	8,840	$ 574,600.00
6-inch force main on local roads	LF	$ 60.00	2,320	$ 139,200.00
6-inch force main on state roads	LF	$ 65.00	1,490	$ 96,850.00
6-inch service connection on local roads	LF	$ 60.00	300	$ 18,000.00
8-inch gravity sewer on local roads	LF	$ 60.00	2,950	$ 177,000.00
8-inch gravity sewer on state roads	LF	$ 65.00	1,570	$ 102,050.00
Precast concrete manholes	EA	$ 3,500.00	15	$ 52,500.00
Air release structures	EA	$ 11,000.00	1	$ 11,000.00
Rock excavation and disposal	CY	$ 80.00	600	$ 48,000.00
Temporary trench pavement - local road	LF	$ 15.00	5,270	$ 79,050.00
Temporary trench pavement - state road	LF	$ 25.00	1,035	$ 25,875.00
Permanent trench pavement - state road	LF	$ 45.00	1,035	$ 46,575.00
Controlled density fill	CY	$ 80.00	770	$ 61,600.00
Milling on state road	SY	$ 4.00	1,150	$ 4,600.00
Overlay on state road	SY	$ 16.00	1,150	$ 18,400.00
Traffic Control	HR	$ 70.00	1,200	$ 84,000.00
Submersible wastewater pumping station	LS	$ 500,000.00	1	$ 500,000.00
Flow meter	LS	$ 10,000.00	1	$ 10,000.00
Odor control allowance	LS	$ 75,000.00	1	$ 75,000.00
Community septic system	LS	$ 2,000,000.00	0	$ -
Wastewater treatment plant	LS	$ 2,500,000.00	0	$ -

Sub-Total	**$ 2,124,300.00**
Contingency (20%)	**$ 424,900.00**
Total Construction Cost	**$ 2,549,200.00**
Engineering & Construction Administration Costs (12%)	**$ 254,900.00**
Barnhardt Manufacturing Connection Fee	**$ 300,000.00**
Total Project Cost	**$ 3,104,100.00**

Opionion of Lifecycle Costs
Energy and Operational Costs

25	HP	Operational Horsepower
10	Minutes	Operational Minutes per hour
4	Hours	Operational Hours per day
64	kw*hr/d	Energy Utilized per day
23,360	kw*hr/yr	Energy Utilized per year
$ 3,971	per Year	Energy Cost @ $0.17 / kw*hr
$ 5,000	per Year	Labor Costs
$ 5,000	per Year	Miscellaneous O&M Costs
$ 13,971	per Year	Opionion of Annual Station O&M

Equipment Replacement Costs

$ 60,000	Pump Motor Replacement

Opinion of 20-Year Lifecycle Costs

$ 339,424	20-Year O&M Costs
$ 3,443,524	20-Year Project Costs (2014 Dollars)

Notes:

1. Costs for pavement restoration within state roads includes only temporary and permanent pavement within the TIP project area and temporary and permanent trench pavement, controlled density fill, and milling and overlay of one lane from Station 100+50 to 110+84.
2. Costs do not include costs associated with land acquisitions.

Alternative 3
Preliminary Engineer's Opinion of Probable Construction Cost
Town Center Sanitary Sewer Feasibility Study
Town of Colrain, Massachusetts
February 2014

Description	Unit	Unit Cost	Estimated Quantity	Total Cost
6-inch variable slope gravity sewer on local roads	LF	$ 60.00	0	$ -
6-inch variable slope gravity sewer on state roads	LF	$ 65.00	0	$ -
6-inch force main on local roads	LF	$ 60.00	1,550	$ 93,000.00
6-inch force main on state roads	LF	$ 65.00	1,490	$ 96,850.00
6-inch service connection on local roads	LF	$ 60.00	300	$ 18,000.00
8-inch gravity sewer on local roads	LF	$ 60.00	2,950	$ 177,000.00
8-inch gravity sewer on state roads	LF	$ 65.00	1,570	$ 102,050.00
Precast concrete manholes	EA	$ 3,500.00	15	$ 52,500.00
Air release structures	EA	$ 11,000.00	1	$ 11,000.00
Rock excavation and disposal	CY	$ 80.00	400	$ 32,000.00
Temporary trench pavement - local road	LF	$ 15.00	4,500	$ 67,500.00
Temporary trench pavement - state road	LF	$ 25.00	3,060	$ 76,500.00
Permanent trench pavement - state road	LF	$ 45.00	3,060	$ 137,700.00
Controlled density fill	CY	$ 80.00	0	$ -
Milling on state road	SY	$ 4.00	0	$ -
Overlay on state road	SY	$ 16.00	0	$ -
Traffic Control	HR	$ 70.00	400	$ 28,000.00
Submersible wastewater pumping station	LS	$ 500,000.00	1	$ 500,000.00
Flow meter	LS	$ 10,000.00	0	$ -
Odor control allowance	LS	$ 75,000.00	0	$ -
Community septic system	LS	$ 2,000,000.00	1	$ 2,000,000.00
Wastewater treatment plant	LS	$ 2,500,000.00	0	$ -

Sub-Total	**$**	**3,392,100.00**
Contingency (20%)	**$**	**678,400.00**
Total Construction Cost	**$**	**4,070,500.00**
Engineering & Construction Administration Costs (18%)	**$**	**610,600.00**
Barnhardt Manufacturing Connection Fee	**$**	**-**
Total Project Cost	**$**	**4,681,100.00**

Opionion of Lifecycle Costs
Energy and Operational Costs

	10	HP	Operational Horsepower
	10	Minutes	Operational Minutes per hour
	4	Hours	Operational Hours per day
	28	kw*hr/d	Energy Utilized per day
	10,220	kw*hr/yr	Energy Utilized per year
$	1,737	per Year	Energy Cost @ $0.17 / kw*hr
$	5,000	per Year	Labor Costs
$	2,500	per Year	Miscellaneous O&M Costs
$	9,237	per Year	Opionion of Annual Station O&M
	35	HP	Operational Horsepower
	30	Minutes	Operational Minutes per hour
	12	Hours	Operational Hours per day
	276	kw*hr/d	Energy Utilized per day
	100,740	kw*hr/yr	Energy Utilized per year
$	17,126	per Year	Energy Cost @ $0.17 / kw*hr

Equipment Replacement Costs

$	60,000	Pump Motor Replacement

Opinion of 20-Year Lifecycle Costs

$	587,264	20-Year O&M Costs
$	5,268,364	20-Year Project Costs (2014 Dollars)

Notes:

1. Costs for pavement restoration within state roads includes only temporary and permanent pavement within the TIP project area; temporary and permanent trench pavement from the Coburn Street and Main Street intersection to Station 100+50; and temporary and permanent trench pavement, controlled density fill, and milling and overlay of one lane from Station 100+50 to 110+84.

2. Costs do not include costs associated with land acquisitions.

Alternative 4
Preliminary Engineer's Opinion of Probable Construction Cost
Town Center Sanitary Sewer Feasibility Study
Town of Colrain, Massachusetts
February 2014

Description	Unit	Unit Cost	Estimated Quantity	Total Cost
6-inch variable slope gravity sewer on local roads	LF	$ 60.00	0	$ -
6-inch variable slope gravity sewer on state roads	LF	$ 65.00	0	$ -
6-inch force main on local roads	LF	$ 60.00	430	$ 25,800.00
6-inch force main on state roads	LF	$ 65.00	1,590	$ 103,350.00
6-inch service connection on local roads	LF	$ 60.00	300	$ 18,000.00
8-inch gravity sewer on local roads	LF	$ 60.00	2,950	$ 177,000.00
8-inch gravity sewer on state roads	LF	$ 65.00	1,570	$ 102,050.00
Precast concrete manholes	EA	$ 3,500.00	15	$ 52,500.00
Air release structures	EA	$ 11,000.00	1	$ 11,000.00
Rock excavation and disposal	CY	$ 80.00	400	$ 32,000.00
Temporary trench pavement - local road	LF	$ 15.00	3,380	$ 50,700.00
Temporary trench pavement - state road	LF	$ 25.00	3,160	$ 79,000.00
Permanent trench pavement - state road	LF	$ 45.00	3,160	$ 142,200.00
Controlled density fill	CY	$ 80.00	0	$ -
Milling on state road	SY	$ 4.00	0	$ -
Overlay on state road	SY	$ 16.00	0	$ -
Traffic Control	HR	$ 70.00	400	$ 28,000.00
Submersible wastewater pumping station	LS	$ 500,000.00	1	$ 500,000.00
Flow meter	LS	$ 10,000.00	0	$ -
Odor control allowance	LS	$ 75,000.00	0	$ -
Community septic system	LS	$ 2,000,000.00	0	$ -
Wastewater treatment plant	LS	$ 2,500,000.00	1	$ 2,500,000.00

Sub-Total	**$ 3,821,600.00**
Contingency (20%)	**$ 764,300.00**
Total Construction Cost	**$ 4,585,900.00**
Engineering & Construction Administration Costs (18%)	**$ 687,900.00**
Barnhardt Manufacturing Connection Fee	**$ -**
Total Project Cost	**$ 5,273,800.00**

Opionion of Lifecycle Costs
Energy and Operational Costs

10	HP	Operational Horsepower
60	Minutes	Operational Minutes per hour
24	Hours	Operational Hours per day
168	kw*hr/d	Energy Utilized per day
61,320	kw*hr/yr	Energy Utilized per year
$ 10,424	per Year	Energy Cost @ $0.17 / kw*hr
$ 100,000	per Year	Labor Costs
$ 50,000	per Year	Miscellaneous O&M Costs
$ 160,424	per Year	Opionion of Annual Station O&M

35	HP	Operational Horsepower
30	Minutes	Operational Minutes per hour
12	Hours	Operational Hours per day
276	kw*hr/d	Energy Utilized per day
100,740	kw*hr/yr	Energy Utilized per year
$ 17,126	per Year	Energy Cost @ $0.17 / kw*hr

Equipment Replacement Costs

$ 60,000	Pump Motor Replacement

Opinion of 20-Year Lifecycle Costs

$ 3,611,004	20-Year O&M Costs
$ 8,884,804	20-Year Project Costs (2014 Dollars)

Notes:

1. Costs for pavement restoration within state roads includes only temporary and permanent pavement within the TIP project area; temporary and permanent trench pavement from the Coburn Street and Main Street intersection to Station 100+50; and temporary and permanent trench pavement, controlled density fill, and milling and overlay of one lane from Station 100+50 to 110+84.

2. Costs do not include costs associated with land acquisitions.