# BOW HOOKSETT
# WATER/SEWER INTERCONNECTION
# FEASIBILITY STUDY

## BOW, NEW HAMPSHIRE

**JULY 23, 2021**

**326184**

DuBois & King inc.

## 0.1 BACKGROUND AND PROJECT PLANNING

The Town of Bow, New Hampshire is exploring the feasibility and costs of expanding municipal water and sewer systems to the South Bow Tax Increment Finance (TIF) District and the Business Development District, and creating an interconnection with the Village of Hooksett. The Hooksett Village Water Precinct owns and operates an existing water system in the northern section of Hooksett. The Town of Hooksett owns and operates A sewer system throughout the Town of Hooksett.

This study includes a review of the areas to be served by the municipal water and sewer system expansion, including projections of water use over a 30-year planning period. Alternatives and options for providing water and sewer service to these areas are briefly summarized as follows:

1. Extending the existing Town of Bow municipal water system with alternative piping routes.
2. Extension and interconnection with the Hooksett Village Water Precinct's water system, which currently terminates on Route 3A at the town line between Bow and Hooksett.
3. Sewer collection and pumping along alternative alignments to the Town of Hooksett for treatment.

## 1.0 GENERAL INFORMATION/EXTENT OF EXISTING WATER WORKS SYSTEM AND SEWERAGE SYSTEM

The Bow Water System was constructed in July 2012 to provide municipal water for the residents of Bow, New Hampshire. The system is made up of the following components.

### 1.1 Water Source and Treatment

The existing municipal water supply source is comprised of two gravel packed wells, located in close proximity to each other, approximately 800 feet north of the Pump Station/treatment plant building. The pump station/treatment building is located off of River Road behind several large commercial buildings. Each well contains a submersible turbine pump with 30 HP motor and capability to deliver approximately 700 gallons per minute (gpm) of water to the treatment plant building.

Well No. 1 is an 18 x 24-inch gravel packed well, with a total depth of approximately 131-feet below ground surface (bgs). A 12-foot long 90-slot screen was installed from 118 to 130-feet. Well No. 2 is a 12 x 18-inch gravel packed well, with a total depth of approximately 133.5-feet bgs. A 4-foot long 125-slot screen and a 10-foot long 85-slot screen (total of 14.5 feet) well screen was installed from 119 to 133.5-feet bgs. Well details are included in **Table 1-1**. Raw water pumps are capable of pumping up to 700 gpm from the wells into the treatment plant.

**Table 1-1 River Road Well Details**

| Description | Well No. 1 | Well No. 2 |
|---|---|---|
| Final Grade at Well Head El. | 266.75’ | 266.75’ |
| Top of Well Head El. | 272.25’ | 272.25’ |
| Discharge El. | 261.0’ | 261.0’ |
| Static Water Level El. | 200.0’ | 200.0’ |
| Low Water level Cut-off El. | 163.0’ | 163.0” |
| Pressure Transducer El. | 158.0’ | 158.0’ |
| Bottom of Pump Intake Screen El. | 153.0’ | 153.0’ |
| Top of Well Screen El. | 148.0’ | 148.0’ |
| Bottom of Well El. | 131.00’ | 133.5’ |

An aeration system provides pretreatment of the raw water. Aeration is provided to remove trace volatile organics that may be present in the groundwater supplies, to remove naturally occurring radon, and to strip/remove carbon dioxide which is corrosive to piping and plumbing materials. Aeration occurs through a process called deep bubble air stripping in which fine bubbles are injected into the water stream within a tank. Dissolved radon and carbon dioxide are volatized through aeration, and vented to the atmosphere through a screened vent. The fine bubbles are created by a blower that pumps air through diffuser pipes in the aeration tank.

Calcium Hypochlorite is injected into the raw water prior to aeration to disinfect and kill bacteria. Potassium hydroxide is injected into the finished water to adjust pH for corrosion control. The finished water is stored in a clear well at the treatment plant on River Road. It is pumped into the distribution system by finished water pumps, and fills a one million gallon concrete atmospheric storage tank. The wells and treatment plant have a design capacity of one million gallons per day. The plant currently operates as needed to fill the atmospheric storage tank. The well pumps are paced to match flow rates of the finished water pumps.

Water quality of the wells has remained fairly consistent since the wells were first developed. Both wells have elevated levels of sodium, chloride, radon, and manganese. The Town’s Drinking Water Protection Committee has been monitoring sodium and chloride levels and trying to identify the source of the contamination, but has not yet been able to pinpoint a source. There are no maximum contamination levels (MCLs) for sodium or chloride at this time. Radon treatment is provided by the Town by aeration at the treatment facility.

Manganese has been detected in the wells at levels ranging from 0.036 milligrams per liter (mg/L) up to 0.183 mg/L. In the past, manganese has been regulated as a secondary contaminant because of aesthetic impacts to the water quality. The New Hampshire

Department of Environmental Services (NHDES) has begun the process of developing a primary MCL for manganese. The contaminant levels will be determined through the rule-making process. However, initial indications are that levels over 0.30 mg/L will require treatment action by the water system, and levels between 0.10-0.30 mg/L will require systems to notify customers about elevated levels and health concerns.

Elevated sodium levels have been detected between 229-249 mg/L in finish water samples over the last 5 years. Elevated chloride levels have been detected between 380-420 mg/L in finish water samples. Road salting from nearby state and local roads has been suspected, but has not been proven. Per- and polyfluoroalkyl substances (PFAS) are a group of recently regulated chemicals that are very persistent in the environment – meaning they don't break down and they accumulate over time. There is evidence that exposure to PFAS can lead to adverse human health effects. NH has adopted the following MCLs for PFAS.

| PFAS Contaminant | MCL (mg/L) |
|---|---|
| PFHxS | 0.000018 (18 ng/L or parts per trillion (ppt)) |
| PFNA | 0.000011 (11 ng/L or ppt) |
| PFOS | 0.000015 (15 ng/L or ppt) |
| PFOA | 0.000012 (12 ng/L or ppt) |

Bow sampled for PFAS in December 2019 and October 2020. Each sample detected PFOS and PFOA at levels below the MCL, and did not detect PFHxS or PFNA.

### 1.2 Water Distribution and Storage

The finished water pumps have a design capacity of 700 gpm at 201 feet of total dynamic head (TDH). The pumps are operated on a variable frequency drive (VFD) that reduces the operating pumping rate, and the pumps are typically run at 400 gpm. The treatment plant and finished water pumps are at an approximate elevation of 262 feet above sea level (ASL).

The atmospheric storage tank is located at a high point between Route 3A and Interstate 93, and is a pre-stressed wire wound concrete tank. The tank has a storage capacity of one million gallons. The base of the tank is at an approximate elevation of 415 feet ASL, and the tank operates with a water level between 15 and 18-feet above the base of the tank (operating elevations range from 430 feet to 433 feet ASL).

The existing distribution system consists of 12-inch diameter ductile iron water mains, and smaller diameter water service pipes to individual customers. Fire hydrants are spread throughout the distribution system along the mains. The system is located in the southeastern General Industrial and Business Development zoning districts along Route 3A between Vaughn Road and River Road, along Dunklee Road, and along River Road between Vaughn Road and Thibeault Road with approximately five miles of water mains.

The service area elevations range from approximately 205 feet to 320 feet ASL, and static pressures range from approximately 48 to 100 pounds per square inch (PSI).

**Figure 1-1** provides an aerial layout of the existing water distribution components.

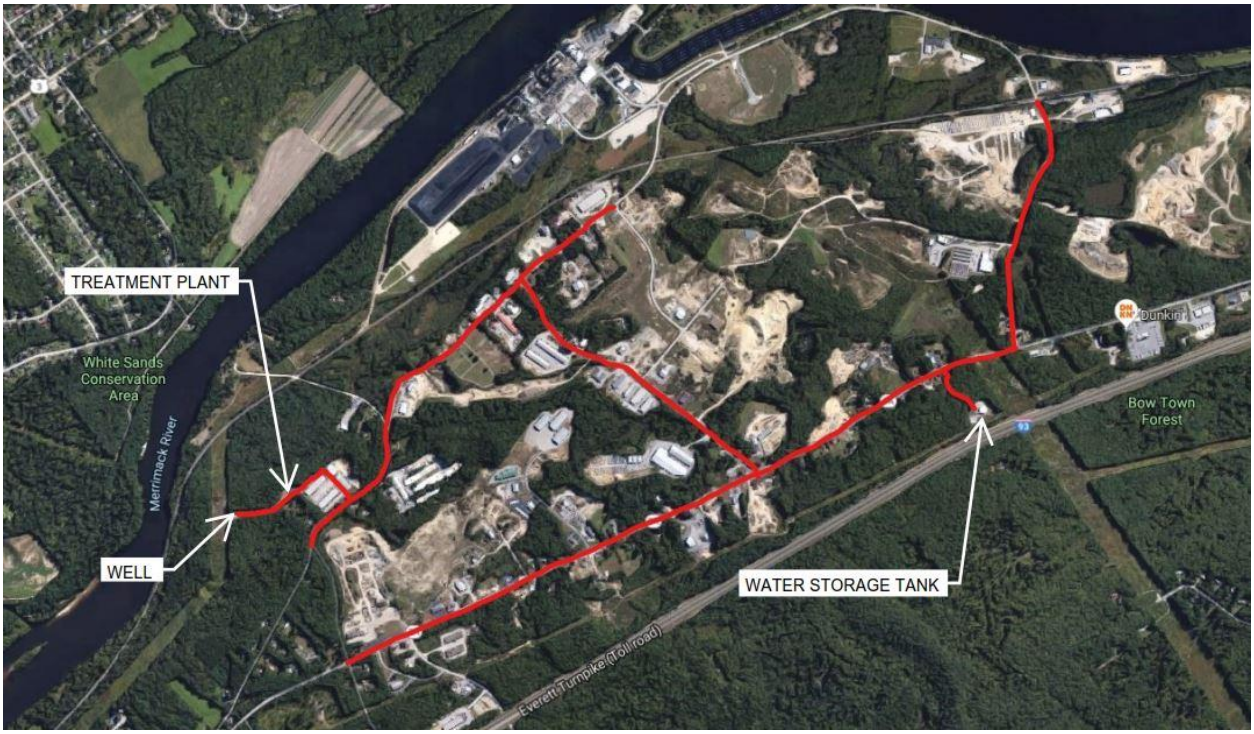



***Figure 1-1 Aerial View of the existing water distribution system.***

**Figure 1-2** provides a simplified schematic diagram of the existing municipal water system.

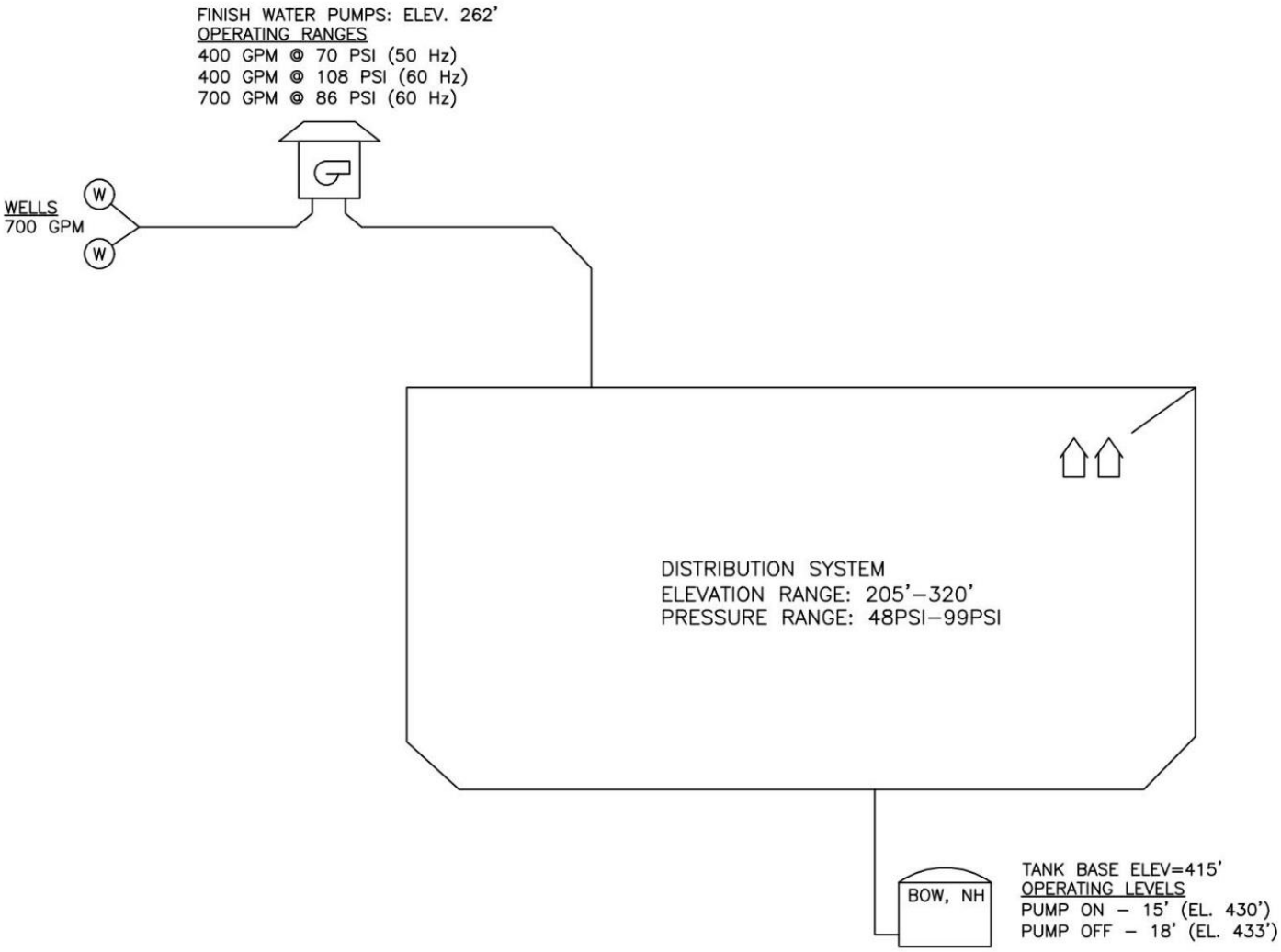



*Figure 1-2 Existing water distribution system schematic diagram.*

### 1.3 Hooksett Village Water System

The existing Hooksett Village municipal water supply source is comprised of four wells. The North well is located on Pine Street and operates at 78 to 102 psi and 350 gpm. The East well is located on Ardon Street and operates at 48 to 70 psi and 350 gpm. Two backup wells are located on Pinnacle Street and both operate at 70 to 76 psi and 350 gpm on alternating days. According to the Lewis Engineering assessment, the existing wells are capable of providing a practical and safe "Supply Capacity" of approximately 1.248 MGD.

The system pumps to two atmospheric storage tanks. The Thompson Corner Tank located on Lot 14-25 on Hooksett Road has a 200,000-gallon capacity, a base elevation of 395, and top elevation of 425 feet Above Sea Level. The West Quarry Tank located near the Pike Industries Quarry off of Hackett Hill Road has a 1,000,000-gallon capacity, a base elevation of 385, and a top elevation of 435 feet Above Sea Level.

The Hooksett Village system ends just north of the hydrant at Sullivan Tire on Route 3A. The existing water main is 8-inch diameter ductile iron pipe. The last hydrant has a static pressure of 82 psi and rated capacity of 1,318 gpm at 20 psi.

### 1.4 Existing Sewerage Facilities

Existing sewerage facilities in the Town of Bow are limited. The Town does not have a treatment plant. Northern areas of the Town direct wastewater to the City of Concord's collection system and treatment plant. Within the existing water service area, a sewer collection system has been designed and portions of the sewer have been installed with the intention of constructing pumping stations and force mains to direct wastewater to the North and the connection with the City of Concord.

The Town of Hooksett owns and operates a sewer collection system and treatment plant. The collection system extends to the last property prior to the Bow Town line, serving the I-93 Service Plaza. The sewer main is 8" diameter pipe and would require upgrades if Bow were to connect at that location. This is discussed in more detail below.

## 2.0 EXTENT OF THE PROPOSED WORK

The purpose of this report is to explore the feasibility and costs of extending the existing limits of the municipal water distribution system to provide potable water to the South Bow TIF district in Bow and to provide a supplemental source of water to the Hooksett Village Water Precinct. Sewer service is being evaluated for connection to the Town of Hooksett's existing collection system and treatment at the Town of Hooksett's wastewater treatment plan. Providing water and sewer service to the South Bow TIF District and the Business Development District is intended to:

- Support existing businesses and spur new development;
- Provide an incentive for property owners and developers to convert current land uses to help expand the Town's tax base;
- Work cooperatively with the Town of Hooksett to interconnect the two towns' respective water and sewer systems for the benefit of both towns;
- Improve safety and access to Route 3A and accommodate economic development along the Route 3A Corridor; and
- Improve the operation of the municipal water system by adding to the customer base and putting it on a path to self-sufficiency.

Likewise, for the Town of Hooksett and the Hooksett Village Water Precinct, the project is intended to provide a supplemental source of water to support growth within the Precinct's service area. The water interconnection provides resiliency to both systems in the event of contamination or temporary loss of service of the existing water supplies in either community. It also provides opportunities for growth for both systems without the time and cost associated with development and permitting of a new water source.

## 2.1 Water Extension Alternatives

The Town identified two alternatives to connect the Bow and Hooksett Village municipal water systems. These alternatives are briefly summarized as follows:

### *Alternative 1*

The alignment for Alternative 1 follows the existing right-of-way along Route 3A and is the most direct route for connecting the Bow municipal water system with the Hooksett Village Water system. The route is along NHDOT controlled right of way. An existing gas main is located within the corridor. The existing water main is located off the travel lanes on the eastern side of the right of way. It is assumed that the proposed waterline would follow a similar alignment along the eastern edge of the right of way. The alignment consists of 4,600 linear feet of 12" water main.

**Figure 2-1** provides an aerial layout of the proposed water extension

### *Alternative 2*

The alignment for Alternative 2 bisects town parcel 45-2-147, a 190 plus acre parcel that has been identified by the Town of Bow as a candidate for redevelopment sometime in the future. This alignment consists of 4,600 linear feet of 12" water main. This alternative would require coordination with the property owner and would most likely be tied to the development of the property.

**Figure 2-2** provides an aerial layout of the proposed water extension

## 2.2 Wastewater Disposal Alternatives

Two alternatives to send wastewater to the Town of Hooksett were investigated. A third alternative to send wastewater to Concord was also identified. After a brief review of this third alternative, it was determined to be significantly more expensive because it would require an additional pump station and long lengths of force main and gravity sewer to connect to the existing system in the North, and further investigation was stopped. The two alternatives that were investigated are briefly summarized as follows:

***Alternative 1*** would collect wastewater by gravity sewer to a low point along River Road. A pump station would send wastewater along the railroad corridor in a force main for a distance of approximately 10,500 feet to the Lilac Bridge in Hooksett and connection to the Hooksett sewer system.

**Figure 2-3** provides an aerial layout of the proposed water extension

***Alternative 2*** would collect wastewater by gravity sewer to the same low point on River Road. However, the forcemain would pump back to Route 3A

**Figure 2-4** provides an aerial layout of the proposed water extension.

## 3.0 PROPOSED WATER IMPROVEMENTS

The Bow Public Water System serves a combination of residential and commercial users through 47 water service connections. Water use data was provided by the Town of Bow for the year 2020 in Weekly total usage readings for the water system, and in Monthly water flow readings for each service connection. The data was analyzed as follows.

### 3.1 Town of Bow Instantaneous Peak Flow Determination

Weekly system flow data for the entire system from 2020 was used to calculate a Gallon per Minute Flow for each of the weeks for which data was recorded. The weekly gpm peak flows were reviewed and the highest value was determined. A peaking factor of 4 was then applied, as recommended by the NH rule Env-DW405, to determine an Instantaneous Peak Flow. A review of this data in comparison to Figure 4-3 of AWWA M22 serves as a reality check and finds that the data appears to be an accurate estimation of peak flow for the number of properties served. It is understood that the peaking factor provided is for smaller system, but it is being used in this case as no peaking factor information exists in the rules used by the State of NH for large systems, the Ten States Standards.

| | |
|---|---|
| Maximum Weekly Flow: | 853,895 gallons |
| Maximum Daily Flow: | 121,985 gpd |
| Maximum Flow: | 85 gpm |
| **Instantaneous Peaking Factor:** | **4 (unitless)** |

**Instantaneous Peak Flow for existing system (gpm): 340**

See attached **Table 3-1**

Detailed data and calculations are provided in the **"Bow Water System Expansion to the Bow Junction/Bow Mills Area 30% Basis of Design Report, Section 4"**

### 3.2 Town of Bow Existing Average and Maximum Daily Flow Determination

Weekly system flow data for the entire system from 2020 was also used to calculate the Average and Maximum Daily flow, and determine the system peaking factor to be used for future flow projections as follows.

Average Daily Flow: 40,515 (gpd)

Maximum Daily Flow: 121,985 (gpd)

**Peaking Factor 3**

See attached **Table 3-1**

Detailed data and calculations are provided in the **"Bow Water System Expansion to the Bow Junction/Bow Mills Area 30% Basis of Design Report, Section 4"**

### 3.3 Town of Bow Estimate of Existing and Proposed Water Demands

Monthly flow data for the existing 47 service connections from 2020 was used to back calculate a number of Equivalent Residential Units (ERUs) per Service connection, based on a flow rate of 300 gpd per ERU. It was determined the existing service connections represent the equivalent of 138 ERUs If we assign a value of 300 gpd to each ERU this equals 41,400 gallons per day.

Average Daily Flow Existing System (Recorded): 40,515 gpd

Average Daily Flow Existing System (Calculated using ERUs): 41,400 gpd

As the calculated and recorded Average Daily Flow are within 2 percent of each other, we can feel confident that the value of 300 gallons per day per ERU is a good basis for the design.

Future water uses have been projected for parcels that are within the existing municipal water system service areaand for parcels that would be serviced by the water extension to the South. The Town of Bow also has plans to expand the municipal water system to serve areas in the northern portions of the Town, known as Bow Mills and Bow Junction. The basis of design report for the expansion of the water system to the north identified 198 ERUs that could be connected, which represents a demand of 59,400 gpd.

Average Daily Flow Proposed Bow Junction (Calculated using ERUs) 59,400 gpd

Future demands include parcels within the South Bow TIF which would be serviced by a water extension to the Hooksett townline. These parcels represent an area of approximately 300 acres. The South Bow TIF is the South Bow Mixed Use District. Allowable uses and minimum lot size are documented in Article 18 of the Bow Zoning Ordinance.

Minimum lot size for the South Bow TIF is 3 acres. If we assume 10% of the 300 acres will be used for future roads to provide access and road frontage, then the maximum number of lots would be 90. Article 18 defines the development in this area as follows

A. To expand the Town's tax base and allow high value development in the southern part of the Town close to Route 3A and Interstate 89.
B. To permit the development of a walkable community with a mix of compatible residential, commercial, and industrial uses to help meet the demands of the current and future market.
C. To allow flexibility in development, and
D. To promote cooperation between the Town of Bow and Hooksett and encourage the sharing of municipal resources when feasible.

Based on these goals for the South Bow TIF we can make an assumption of water and wastewater use at each location. At this stage a conservative flow estimate for each property would be 1 ERU per property. As noted in **Section 3.3** above a flow of 300gpd per ERU was established.

| | |
|---|---|
| Average Daily Flow Proposed<br>South Bow TIF (Calculated using ERUs) | 27,000 gpd. |

## 3.4 Summary of Existing and Proposed Water Demands in Bow

| | | |
|---|---|---|
| 138 Existing ERUs | = | 41,400 (gpd) |
| 198 Proposed ERUs Bow Mills/Bow Junction Build out | = | 59,400 (gpd) |
| 90 Proposed ERUs South Bow TIF Build-out | = | 27,500 (gpd) |

| | | |
|---|---|---|
| Proposed Average Daily Flow: | = | 128,300 (gpd) |
| Maximum Daily Flow: | = | 384,900 (gpd) |

## 3.5 Future Growth

In 2000, the population of Bow was 7,138 according to US Census, NH Office of Energy and Planning. The population in Bow as of July 2018 is 7,938 with roughly 2,961 total housing units, according to NH Home Town Locator. The Town of Bow population census trends are summarized below in **Table 3-2**.

**Table 3-2 Town of Bow Population Trends**

| Year | Population | % Change | Land Area (sq. mi) | Pop. Density (per sq. mi) |
|---|---|---|---|---|
| 1990 | 5,500 | - | 28.03 | 196 |
| 2000 | 7,138 | 29.8% | - | 255 |
| 2010 | 7,519 | 5.3% | - | 268 |
| 2018 | 7,938 | 5.6% | - | 283 |

If 5% growth is assumed every 10 years for the next 30 years, then the projected future flows are as follows.

**2030**
Proposed Average Daily Flow = 134,715 gpd

Maximum Daily Flow = 404,145 gpd

**2040**
Proposed Average Daily Flow = 141,451 gpd

Maximum Daily Flow = 424,352 gpd

**2050**
Proposed Average Daily Flow = 148,524 gpd

Maximum Daily Flow = 445,570 gpd

## 3.6 Summary of Existing and Proposed Water Demands in Hooksett

Existing and future water use within the Hooksett Village Precinct's service area have been reported by the Precinct's consultant, Lewis Engineering. The report identifies a peak month usage of 867,608 gallons per day (July 2016), and an average daily demand for 2019 of 318,370 gallons per day. Projected average daily demand for year 2030 was estimated at 383,200 gallons per day +/- 10%. Projected peak demands for 2030 are estimated to be 896,402 gallons per day +/- 16%. This represents a 20% growth in Average Daily Flow and a 3% growth in Maximum Daily Flow. If this trend continues for the next 30 years future flows will be as follows.

**2019**

Proposed Average Daily Flow = 318,370 gpd

Maximum Daily Flow = 867,608 gpd

**2030**

Proposed Average Daily Flow = 382,200 gpd

Maximum Daily Flow = 896,402 gpd

**2040**

Proposed Average Daily Flow = 458,640 gpd

Maximum Daily Flow = 923,294 gpd

**2050**

Proposed Average Daily Flow = 550,368 gpd

Maximum Daily Flow = 950,993 gpd

### 3.7 Bow Water Source Yield

The water source for the Bow NH water system is a pair of gravel packed wells drilled near the Merrimack River. Each well has a yield of 700 gpm. The treatment system on River Road was designed to be flow matched to the well pumps.

As currently constructed, the system has the capability to pump 700 gpm, or approximately 1,000,800 gallons per day.

The projected Maximum Daily Flow for the Town of Bow in 2050 is still less than half of the total capacity of the Bow Water System. As such, substantial remaining capacity exists for sale of water to Hooksett through an interconnection.

Detailed information about the water source is provided in **Section 1.1.**

### 3.8 Hooksett Water Source Yield

The water source for the Hooksett Village Water Precinct is (4) large gravel pack wells, drilled in the 1980s and 2000s The wells have an approximate yield of 1,248 gpm or approximately 1,797,120 gallons per day.

The projected Maximum Daily Flow for the Town of Hooksett in 2050 is just over half of the total capacity of the Hooksett Village Water Precinct. As such, substantial remaining capacity exists for sale of water to Bow through an interconnection.

Detailed information about the water source is provided in **Section 1.2** above

### 3.9 Current Water Rates

The Town of Bow bills customers receive a monthly service charge based on the meter size, and a monthly consumption charge based on metered water use. The consumption charge is currently $5.65/1000 gallons.

The Hooksett Village Water Precinct also bills customers a flat service charge based on meter size and a consumption charge based on metered water use. The consumption charge is a sliding scale based on the total volume of water used each quarter. The first 10,000 gallons are charged at a rate of $4.35/1000 gallons, and the rate increases to as much as $7.50/1000 gallons for water usage over 500,000 gallons per quarter.

### 3.10 Proposed interconnection between Bow and Hooksett Waster Systems

An interconnection to the Town of Hooksett would provide redundancy to both public water systems. Water modeling of the Town of Bow water system shows a static water pressure of 82 psi at the interconnection point, which closely matches the static pressure of the Hooksett system at that point.

The interconnection should be constructed with parallel valves, water meters, and check valves, so that water can only flow from one system to another based on which set of valves is opened. In this way water will only flow in one direction at a time, Bow to Hooksett or Hooksett to Bow. If it is desired to allow water to flow in both directions, both valves could be opened at once, although this would not be the normal mode of operation.

If the Town of Bow chooses to pursue this interconnection, it is recommended that the Town of Bow establish an interlocal agreement with the Town of Hooksett to establish rates and capacity limits for water sales between the two entities. An interconnection will be a positive for both communities, allowing each community to have a backup source for water, allow Bow to have a new customer for their excess system capacity, and allow both Bow and Hooksett to plan for future system expansions without having to develop a new water source that would only be needed on peak days.

A draft interlocal agreement prepared for another water system is included as **Appendix A**

## 4.0 WATER FLOW REQUIREMENTS AND DESIGN CONCEPTS

### 4.1 Demand and Fire Flow

The existing Bow water system and proposed expansion were modeled using WaterCAD, with elevations determined using published LIDAR data for the Town of Bow. It was found that the expansion to the North would include some locations at significantly higher elevation than the existing system.

Base demands were estimated from historic data, as detailed in **Sections 3.1 and 3.2** above. As the number of ERUs in the existing and proposed water systems is similar, the same base peak demand loading was applied to the proposed section. Using this data the Bow system expanded to serve South Bow, was evaluated for pressures at peak demand, and for available fire flow when maintaining a minimum of 20 psi at all points in the system.

| | |
|---|---|
| Maximum Pressure in Proposed System: | 101 psi |
| Minimum Pressure in Proposed System: | 41 psi |

| | |
|---|---|
| Maximum Fire Flow Available in Proposed System | 5,000 gpm |
| Minimum Fire Flow Available in Proposed System | 1,474 gpm |

WaterCAD results for demand pressures are provided in **Table 4-1**.

WaterCAD results for available fire flow are provided in **Table 4-2**.

A map of the WaterCAD model is included as **Figure 4-1**

## 5.0 PROPOSED SEWER IMPROVEMENTS

### 5.1 Estimate of Proposed Sewer Demand

Traditionally in municipalities served by both water and sewer, sewer use is billed as a portion of metered water use, as metering individual sewer connections would be cumbersome and cost prohibitive. In **Section 3.3** above, an applicable number of ERUs were established for each of the Town areas, both those currently served, and those proposed to be served.

Flow per ERU is determined from Metcalf and Eddy per the guidance of the State of New Hampshire Wastewater Regulations. A typical residential unit family of four would have a wastewater flow of 70gpd per person, or 280gpd for the family.

Future demands include parcels within the South Bow TIF which would be serviced by a pump station and wastewater extension to the Hooksett town line. These parcels represent an area of approximately 300 acres. The South Bow TIF is the South Bow Mixed Use District. Allowable uses and minimum lot size are documented in Article 18 of the Bow Zoning Ordinance.

Minimum lot size for the South Bow TIF is 3 acres in size. If an assumed 10% of the 300 acres will be used for future roads to provide access and road frontage, then the maximum number of lots would be 90. Article 18 defines the development in this areas as follows:

A. To expand the Town's tax base and allow high value development in the southern part of the Town close to Route 3A and Interstate 89.
B. To permit the development of a walkable community with a mix of compatible residential, commercial, and industrial uses to help meet the demands of the current and future market.
C. To allow flexibility in development, and
D. To promote cooperation between the Town of Bow and Hooksett and encourage the sharing of municipal resources when feasible.

Based on these goals for the South Bow TIF we can make an assumption of water and wastewater use at each location. At this stage a conservative flow estimate for each property would be 1 ERU per property. In the Bow Basis of Design, a flow of 280 gpd per ERU was established.

| Average Daily Flow Proposed | |
|---|---|
| South Bow TIF (Calculated using ERU's) | 25,200 gpd. |

Future demands include parcels within the Bow Business Development District which would be serviced by a pump station and wastewater extension to the Hooksett town line. These parcels represent an area of approximately 260 acres. Allowable uses and minimum lot size are documented in Article 15 of the Bow Zoning Ordinance.

Minimum lot size for the Business Development District is 3 acres if it borders Route 3A, and 2 Acres if it borders a Town Road. If it is assumed that 10% of the land acres will be used for future roads to provide access and road frontage, and one quarter of the new lots will border Route 3A, then the maximum number of lots would be 110. Article 15 defines the development in this areas as follows:

A. To support environmentally acceptable commercial, industrial, recreational, and institutional uses in the district.
B. To encourage diversity in the community tax base through appropriate flexibility in land use and land use development.

C. To optimize financial return on public infrastructure investments and expenditures, including municipal sewer, municipal water supply, and public highways.
D. To minimize adverse traffic impacts on Route 3-A, future interstate highway interchanges, and surrounding local streets and roadway; and
E. To preserve valuable historical, cultural, and natural features within the District and to minimize adverse environmental impacts to water and air, while reducing light and noise pollution, flooding, clear cutting of vegetation, and the blocking of scenic views.

Based on these goals for the Business Development District we can make an assumption of water and wastewater use at each location. At this stage a conservative flow estimate for each property would be 1 ERU per property. A flow of 280 gpd per ERU was established based on the guidance provide in the NH Env-Wq 700.

Average Daily Flow Proposed
South Bow TIF (Calculated using ERUs) 30,800 gpd.

Summary

90 Proposed ERUs South Bow TIF Build-out = 25,500 (gpd)

110 Proposed ERUs Business Development District Build-out =30,800 (gpd)

Proposed Average Daily Flow: = 56,300 (gpd)

Maximum Daily Flow: = 168,900 (gpd)

### 5.2 Instantaneous Peak Flow Determination

Per the State of New Hampshire Wastewater Regulations a peaking factor of 6 shall be used for the average daily flow to determine the peak instantaneous flow for sewer main design:

Proposed Average Daily Flow: 56,300 gpd

Proposed Average Flow: 39 gpm

Instantaneous Peaking Factor: 6 (unitless)

**Instantaneous Peak Flow for existing system (gpm): 234**

### 5.3 Sewer Sizing

Env-Wq 704.03 © states that Seweage shall be designed to carry the peak hourly flow rate at full pipe capacity. The existing sewer to the Hooksett Town line is an 8" pipe. Assuming it is installed at a minimum slope of 0.004feet/foot per Env-Wq Table 704-1, Mannings Formula shows that the pipe will carry up to 387gpm. Assuming a peaking factor of 6, this equates to an Average Daily flow of 92,880 gpd.

Bows' proposed sewer flow of 56,300 gpd would use more than ½ of the existing Hooksett 8" gravity sewer capacity. As such we would not recommend connection to this sewer, and would instead recommend installing the new forcemain into Hookset and discharging into the structure on the western side of the Lilac Pedestrian Bridge.

When the Lilac Pedestrian Bridge was reconstructed in 2018, a new 14" HDPE Gravity Sewer was installed with a capacity of 1.37 MGD. At that time Hooksett's future peak flow was estimated at 0.865MGD. The projected future peak sewer flow from Bow is 0.169MGD, which would provide a remaining capacity of 1.20 MGD, or 0.335MGD more than the projected future peak. This is a large factor of safety and provides for future expansion of both Bow and Hooksett.

The forecemain shall be sized for a minimum velocity of 3 fps to keep solids entrained in the stream. The pump station shall be designed to pump the Instantaneous Peak flow, so a rate of 250gpm is assumed to overcome the peak flow calculated above of 234gpm. At that flow rate a 6"DR9 HDPE pipe will have a velocity of 3.85fps. A 6" DR9 forcemain can also be installed through directional boring, which will simplify install and reduce construction impact.

Gravity collection sewers in the newly served areas will be 8" minimum, with Manhole Structures placed every 300', and at every junction or change in direction.

### 5.4 Pump Station Sizing

The pump station is proposed to be a dual pump sewage pumping station. The pumps will be solids handling pumps capable of passing solids 3" or larger. Due to the volume of flow proposed to be serviced by this station, the station should be on standby power, with a dedicated generator and transfer switch. The pump station itself will be a precast pump station with a holding capacity of at least 1000 gallons to allow for 4 minute run time when the pumps operate.

## 6.0 OPINIONS OF PROBABLE CONSTRUCTION COST (OPCC)

***NOTE: In providing opinions of probable construction costs, the Client understands that DuBois & King, Inc. has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's methods of pricing, and that our Opinion of Probable Construction Costs are made on the basis of our professional judgment and experience. DuBois & King, Inc. makes no warranty, expressed or implied, that the bids or the negotiated costs of the Work will not vary from the Opinion of Probable Construction Cost provided herein.***

Early stage Opinions of Probable Construction cost were prepared based on the layouts and pipeline layouts established in preparing this feasibility study. Costs are based on historical bid tabulation data and past knowledge and experiences of DuBois and King staff.

| | |
|---|---|
| Water Alternative #1: | $1,638,000.00 |
| Water Alternative #2 | $1,045,800.00 |
| | |
| Sewer Alternative #1 | $5,442,885.00 |
| Sewer Alternative #2 | $3,016,160.00 |

Detailed OPCC data is provided in **Tables 6-1, 6-2, 6-3**, and **6-4**

## 7.0 CONCLUSIONS

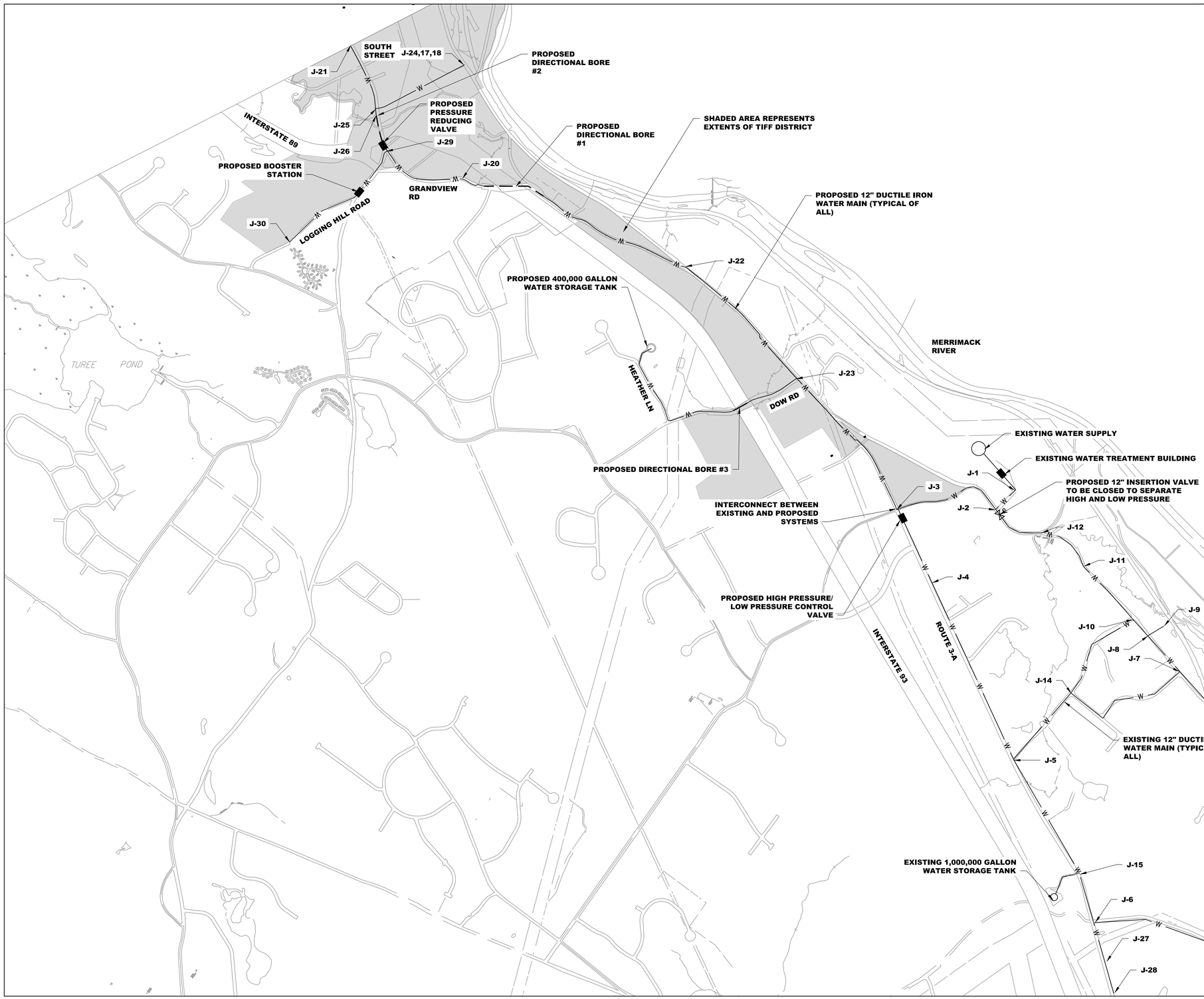
Based on a review of the above information, the following conclusions have been made.

1. The existing Bow Water Source and Treatment System are adequate to serve the proposed expansion of the Bow Water System to Bow Junction and South Bow.
2. The existing Water Source and Treatment System has additional capacity beyond the planned expansions in Bow, to serve the Village of Hooksett Water System.
3. The system hydraulics between the Town of Bow and Village of Hooksett water systems are similar enough at the interconnection point to allow for an interconnection with no pressure regulation at the connection point.
4. Expansion of Water and Sewer service to South Bow would be beneficial and help the area meet the goals established when the districts were formed.
5. Interconnection of the Bow and Hooksett water systems would be mutually beneficial to both systems, providing both an emergency water source, and the ability to expand without

development of a new water source. The interconnection should be constructed such that either party can sell to, or purchase water from, the other.

6. If Bow and Hooksett choose to pursue an interconnection, the first step should be development of an interlocal agreement similar to the example provided in this study, to establish the obligations of each party as they sell or purchase water from the other.

7. Sewer service for South Bow can be provided, but will be costly. The installation route along Route 3A will be more affordable, due to the coordination issues and long term lease issues present with installing the sewer main along the Railroad ROW.

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PROFESSIONAL SEAL

**NOT FOR CONSTRUCTION 30% DESIGN DRAWINGS**

| NO. | DATE | DESCRIPTION | BY | CK'D |
|---|---|---|---|---|
| | | | | |

TOWN OF BOW

10 GRANDVIEW ROAD
BOW
NEW HAMPSHIRE
03304

BOW/HOOKSETT

WATER/SEWER EXTENSION

FEASABILITY STUDY

SHEET TITLE

GENERAL PLAN FOR WATER SYSTEM EXTENSION

| DRAWN BY | DATE |
|---|---|
| TMV | JULY 2021 |
| CHECKED BY | D&K PROJECT # |
| NJS | 326184 |
| PROJ. ENG. | D&K ARCHIVE # |
| JAL | |

SHEET NUMBER

4-1

SHEET 1 OF 1

I:\2\226837 Bow Junction Bow Mills Preliminary Design Water System Expansion\Drawings\Civil\DWG\226837--WaterCAD.dwg 5/26/2021 12:54 PM

Bow NH
Bow Hooksett Water/Sewer Extension Feasability Study
Project Number: 326184
Table 3-1 Total System Water Use Data

| Date | Finish Water Meter Read (Mgal) | Weekly Finish Water Pumped (Mgal) | Daily Water Reading (gpd) | Flow (gpm) | Peak Flow (gpm) Using peaking factor of 4 |
|---|---|---|---|---|---|
| 3/27/2020 | 75.34 | | | | |
| 4/3/2020 | 75.51 | 0.16 | 23057 | 16 | 64 |
| 4/9/2020 | 75.74 | 0.23 | 33100 | 23 | 92 |
| 4/16/2020 | 75.91 | 0.18 | 25357 | 18 | 70 |
| 4/23/2020 | 76.07 | 0.15 | 21471 | 15 | 60 |
| 5/1/2020 | 76.32 | 0.25 | 35829 | 25 | 100 |
| 5/8/2020 | 76.53 | 0.22 | 31243 | 22 | 87 |
| 5/14/2020 | 76.79 | 0.26 | 36729 | 26 | 102 |
| 5/23/2020 | 76.96 | 0.17 | 24271 | 17 | 67 |
| 5/27/2020 | 77.82 | 0.85 | 121986 | 85 | 339 |
| 6/5/2020 | 78.66 | 0.85 | 120857 | 84 | 336 |
| 6/12/2020 | 79.42 | 0.76 | 108286 | 75 | 301 |
| 6/19/2020 | 80.22 | 0.81 | 115029 | 80 | 320 |
| 6/26/2020 | 80.70 | 0.47 | 67786 | 47 | 188 |
| 7/2/2020 | 81.19 | 0.49 | 70100 | 49 | 195 |
| 7/9/2020 | 81.43 | 0.24 | 34857 | 24 | 97 |
| 7/17/2020 | 82.16 | 0.73 | 104043 | 72 | 289 |
| 7/24/2020 | 82.67 | 0.51 | 72971 | 51 | 203 |
| 7/31/2020 | 83.06 | 0.38 | 54814 | 38 | 152 |
| 8/6/2020 | 83.31 | 0.25 | 35629 | 25 | 99 |
| 8/14/2020 | 83.80 | 0.49 | 70686 | 49 | 196 |
| 8/21/2020 | 84.18 | 0.38 | 54000 | 38 | 150 |
| 8/28/2020 | 84.59 | 0.41 | 58343 | 41 | 162 |
| 9/4/2020 | 84.91 | 0.32 | 46171 | 32 | 128 |
| 9/10/2020 | 85.14 | 0.23 | 32886 | 23 | 91 |
| 9/18/2020 | 85.38 | 0.24 | 34729 | 24 | 96 |

Bow NH
Bow Hooksett Water/Sewer Extension Feasability Study
Project Number: 326184
Table 3-1 Total System Water Use Data

| Date | Finish Water Meter Read (Mgal) | Weekly Finish Water Pumped (Mgal) | Daily Water Reading (gpd) | Flow (gpm) | Peak Flow (gpm) Using peaking factor of 4 |
|---|---|---|---|---|---|
| 9/25/2020 | 85.61 | 0.23 | 32543 | 23 | 90 |
| 10/2/2020 | 85.86 | 0.25 | 35943 | 25 | 100 |
| 10/9/2020 | 86.08 | 0.22 | 30914 | 21 | 86 |
| 10/16/2020 | 86.30 | 0.22 | 31171 | 22 | 87 |
| 10/23/2020 | 86.69 | 0.39 | 55343 | 38 | 154 |
| 10/29/2020 | 86.94 | 0.25 | 36214 | 25 | 101 |
| 11/6/2020 | 87.17 | 0.23 | 33257 | 23 | 92 |
| 11/13/2020 | 87.54 | 0.37 | 52386 | 36 | 146 |
| 11/20/2020 | 87.67 | 0.13 | 19129 | 13 | 53 |
| 11/27/2020 | 87.89 | 0.21 | 30614 | 21 | 85 |
| 12/4/2020 | 88.05 | 0.16 | 23143 | 16 | 64 |
| 12/11/2020 | 88.23 | 0.18 | 25486 | 18 | 71 |
| 12/18/2020 | 88.41 | 0.18 | 26157 | 18 | 73 |
| 12/23/2020 | 88.53 | 0.12 | 17486 | 12 | 49 |
| 12/29/2020 | 88.64 | 0.11 | 15229 | 11 | 42 |
| 1/7/2021 | 88.70 | 0.06 | 9257 | 6 | 26 |
| 1/15/2021 | 89.00 | 0.30 | 42200 | 29 | 117 |
| 1/22/2021 | 89.02 | 0.02 | 2400 | 2 | 7 |
| 1/29/2021 | 89.13 | 0.11 | 15700 | 11 | 44 |
| 2/5/2021 | 89.23 | 0.10 | 14771 | 10 | 41 |
| 2/12/2021 | 89.36 | 0.13 | 19043 | 13 | 53 |
| 2/19/2021 | 89.51 | 0.15 | 20871 | 14 | 58 |
| 2/26/2021 | 89.79 | 0.28 | 40657 | 28 | 113 |
| 3/5/2021 | 89.85 | 0.06 | 8714 | 6 | 24 |
| 3/12/2021 | 89.92 | 0.06 | 8714 | 6 | 24 |
| 3/18/2021 | 90.13 | 0.21 | 30586 | 21 | 85 |

Bow NH
Bow Hooksett Water/Sewer Extension Feasability Study
Project Number: 326184
Table 3-1 Total System Water Use Data

| Date | Finish Water Meter Read (Mgal) | Weekly Finish Water Pumped (Mgal) | Daily Water Reading (gpd) | Flow (gpm) | Peak Flow (gpm) Using peaking factor of 4 |
|---|---|---|---|---|---|
| 3/26/2021 | 90.26 | 0.14 | 19300 | 13 | 54 |
| 4/2/2021 | 90.49 | 0.22 | 31857 | 22 | 88 |
| 4/9/2021 | 90.70 | 0.21 | 30214 | 21 | 84 |
| 4/16/2021 | 90.94 | 0.24 | 34843 | 24 | 97 |
| Average Daily Water Reading (gallons) | | | 40,516 | | |
| Peak Daily Water Reading (gallons) | | | 121,986 | | |
| Peak Demand (gpm) | | | | 85 | |
| Maximum Instantaneous Flow (gpm) | | | | | 339 |
| Existing Nodes in WaterCAD Model | | | | | 14 |
| Flow per Node In Existing WaterCAD Model (gpm) | | | | | 24 |
| Existing ERU's | | | | | 138 |
| Proposed Bow Junction ERU's | | | | | 198 |
| Proposed Bow Junction Nodes in WaterCAD Model | | | | | 11 |
| Flow per Node in Proposed WaterCAD Model (gpm) | | | | | 44 |
| Proposed South Bow ERU's | | | | | 90 |
| Proposed Bow Junction Nodes in WaterCAD Model | | | | | 2 |
| Flow per Node in Proposed WaterCAD Model (gpm) | | | | | 110 |

Bow NH

Bow Hooksett Water/Sewer Extension Feasability Study

Project Number: 326184

Table 4-1 WaterCAD Demand Data

| ID | Label | Elevation (Feet) | Demand (gpm) | Hydraulic Grade (Feet) | Pressure (psi) |
|---|---|---|---|---|---|
| 32 | J-1 | 264 | 0 | 495.77 | 100 |
| 33 | J-2 | 264 | 24 | 495.26 | 100 |
| 34 | J-3 | 320 | 24 | 493.29 | 75 |
| 35 | J-4 | 274 | 24 | 469.08 | 84 |
| 36 | J-5 | 304 | 24 | 446.25 | 62 |
| 37 | J-6 | 329 | 24 | 430.25 | 44 |
| 38 | J-7 | 220 | 24 | 445.97 | 98 |
| 39 | J-8 | 220 | 24 | 445.96 | 98 |
| 40 | J-9 | 220 | 50 | 439.37 | 95 |
| 41 | J-10 | 226 | 24 | 445.96 | 95 |
| 42 | J-11 | 228 | 24 | 445.94 | 94 |
| 43 | J-12 | 216 | 24 | 445.94 | 99 |
| 51 | J-13 | 205 | 24 | 430.24 | 97 |
| 53 | J-14 | 246 | 24 | 446.02 | 87 |
| 64 | J-15 | 336 | 24 | 430.52 | 41 |
| 89 | J-16 | 262.47 | 0 | 496.4 | 101 |
| 101 | J-17 | 275 | 44 | 425.36 | 65 |
| 103 | J-18 | 230 | 44 | 425.36 | 85 |
| 108 | J-20 | 350 | 44 | 502.89 | 66 |
| 111 | J-21 | 275 | 44 | 425.46 | 65 |
| 113 | J-22 | 371.2 | 44 | 504.8 | 58 |
| 116 | J-23 | 336 | 44 | 506.16 | 74 |
| 169 | J-24 | 230 | 44 | 425.36 | 85 |
| 172 | J-25 | 275 | 44 | 425.47 | 65 |
| 178 | J-26 | 246 | 44 | 425.6 | 78 |
| 193 | J-27 | 260 | 110 | 429.7 | 73 |
| 195 | J-28 | 240 | 110 | 429.28 | 82 |
| 198 | J-29 | 300 | 44 | 501.92 | 87 |
| 201 | J-30 | 430 | 44 | 635.2 | 89 |
| Maximum Pressure (psi) | | | | | 101 |
| Minimum Pressure (psi) | | | | | 41 |

Bow NH
Bow Hooksett Water/Sewer Extension Feasability Study
Project Number: 326184
Table 4-2 WaterCAD Fire Flow Data

| Label | Fire Flow Iterations | Satisfies Fire Flow Constraints? | Fire Flow (Available) | Pressure (Residual Lower Limit) | Pressure (Calculated Residual) | Junction w/ Minimum Pressure (Zone) | Is Fire Flow Run Balanced? |
|---|---|---|---|---|---|---|---|
| J-1 | 3 | TRUE | 4,925 | 20 | 20 | J-16 | TRUE |
| J-2 | 3 | TRUE | 5,000 | 20 | 24 | J-1 | TRUE |
| J-3 | 3 | TRUE | 5,000 | 20 | 27 | J-22 | TRUE |
| J-4 | 3 | TRUE | 5,000 | 20 | 41 | J-22 | TRUE |
| J-5 | 3 | TRUE | 5,000 | 20 | 33 | J-15 | TRUE |
| J-6 | 4 | TRUE | 4,289 | 20 | 20 | J-15 | TRUE |
| J-7 | 4 | TRUE | 4,628 | 20 | 20 | J-9 | TRUE |
| J-8 | 6 | TRUE | 4,540 | 20 | 23 | J-9 | TRUE |
| J-10 | 6 | TRUE | 4,549 | 20 | 21 | J-11 | TRUE |
| J-11 | 4 | TRUE | 3,836 | 20 | 20 | J-12 | TRUE |
| J-12 | 4 | TRUE | 3,594 | 20 | 20 | J-11 | TRUE |
| J-13 | 13 | TRUE | 4,289 | 20 | 23 | J-6 | TRUE |
| J-14 | 4 | TRUE | 4,834 | 20 | 20 | J-11 | TRUE |
| J-15 | 2 | TRUE | 5,000 | 20 | 39 | J-6 | TRUE |
| J-16 | 4 | TRUE | 4,712 | 20 | 20 | J-1 | TRUE |
| J-17 | 4 | TRUE | 1,698 | 20 | 25 | J-20 | TRUE |
| J-18 | 7 | TRUE | 1,698 | 20 | 46 | J-20 | TRUE |
| J-20 | 4 | TRUE | 1,698 | 20 | 20 | J-22 | TRUE |
| J-21 | 4 | TRUE | 1,698 | 20 | 32 | J-20 | TRUE |
| J-22 | 4 | TRUE | 2,126 | 20 | 20 | J-20 | TRUE |
| J-23 | 2 | TRUE | 3,998 | 20 | 36 | J-22 | TRUE |
| J-24 | 7 | TRUE | 1,698 | 20 | 48 | J-20 | TRUE |
| J-25 | 6 | TRUE | 1,698 | 20 | 34 | J-20 | TRUE |
| J-26 | 8 | TRUE | 1,698 | 20 | 50 | J-20 | TRUE |
| J-27 | 12 | TRUE | 3,233 | 20 | 20 | J-28 | TRUE |
| J-28 | 2 | TRUE | 1,919 | 20 | 20 | J-6 | TRUE |

Bow NH

Bow Hooksett Water/Sewer Extension Feasability Study

Project Number: 326184

Table 4-2 WaterCAD Fire Flow Data

| Label | Fire Flow Iterations | Satisfies Fire Flow Constraints? | Fire Flow (Available) | Pressure (Residual Lower Limit) | Pressure (Calculated Residual) | Junction w/ Minimum Pressure (Zone) | Is Fire Flow Run Balanced? |
|---|---|---|---|---|---|---|---|
| J-29 | 6 | TRUE | 1,698 | 20 | 31 | J-20 | TRUE |
| J-30 | 18 | FALSE | 1,474 | 20 | 20 | J-20 | TRUE |
| Minimum Fire Flow (gpm) | | | 1474 | | | | |
| Maximum Fire Flow (gpm) | | | 5000 | | | | |

# Bow NH
# Bow Hooksett Water/Sewer Extension Feasability Study
# Project Number: 326184
# Table 6-1 Water Alternative 1 Costs

| | | | |
|---|---|---|---|
| Project: | Bow - Hooksett Feasibility Study<br>Alternative 1<br>Probable Cost Estimate | | |
| Calculated By: | TMV | Date: | |
| Checked By: | NJS | Date: | |

**NOTE:** In providing opinions of probable construction costs, the Client understands that DuBois & King, Inc. has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's methods of pricing, and that our Opinion of Probable Construction Costs are made on the basis of our professional judgment and experience. DuBois & King, Inc. makes no warranty, expressed or implied, that the bids or the negotiated costs of the Work will not vary from the Opinion of Probable Construction Cost provided herein.

**OPINION OF PROBABLE CONSTRUCTION COST**

| DESCRIPTION | UNIT | QUANTITY | UNIT PRICE | AMOUNT |
|---|---|---|---|---|
| Mobilization | LS | 1 | $ 75,000.00 | $ 75,000.00 |
| Traffic Control | LS | 1 | $ 100,000.00 | $ 100,000.00 |
| 12" Ductile Iron Water Main & Trench | LF | 4,700 | $ 150.00 | $ 705,000.00 |
| Service Connections | EA | 12 | $ 2,500.00 | $ 30,000.00 |
| 12" Gate Valve | EA | 5 | $ 6,000.00 | $ 30,000.00 |
| Hydrant With Tee and Valve | EA | 10 | $ 6,000.00 | $ 60,000.00 |
| Pavement Restoration | Tons | 500 | $ 150.00 | $ 75,000.00 |
| Ledge Removal | Allow | 1 | $ 25,000.00 | $ 25,000.00 |
| Culvert Crossing | EA | 2 | $ 10,000.00 | $ 20,000.00 |
| Interconnection with Hooksett (Building, Valves, Meters) | LS | 1 | $ 50,000.00 | $ 50,000.00 |
| | | | **Construction Subtotal** | **$ 1,170,000.00** |
| | | | **Construction Contingency (20%)** | **$ 234,000.00** |
| | | | **Engineering Costs (20%)** | **$ 234,000.00** |
| | | | **Alternative 1 Total:** | **$ 1,638,000.00** |

1) Pavement replacement number based on early stage alignment. Quantity subject to change as design develops.
2) Quantities are based on measurments and takeoffs of the feasability level design design where availible. In locations where the design has not yet been developed, quantities are based on mapping taekoffs using Google Earth.
3) Minimal quantitiy of ledge assumed due to proximity to gravel pit.

# Bow NH
# Bow Hooksett Water/Sewer Extension Feasability Study
# Project Number: 326184
# Table 6-2 Water Alternative 2 Costs

Project: Bow - Hooksett Feasibility Study
Alternative 2
Probable Cost Estimate

Calculated By: TMV Date:

Checked By: NJS Date:

**NOTE:** In providing opinions of probable construction costs, the Client understands that DuBois & King, Inc. has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's methods of pricing, and that our Opinion of Probable Construction Costs are made on the basis of our professional judgment and experience. DuBois & King, Inc. makes no warranty, expressed or implied, that the bids or the negotiated costs of the Work will not vary from the Opinion of Probable Construction Cost provided herein.

**OPINION OF PROBABLE CONSTRUCTION COST**

| DESCRIPTION | UNIT | QUANTITY | UNIT PRICE | AMOUNT |
|---|---|---|---|---|
| Mobilization | LS | 1 | $ 70,000.00 | $ 70,000.00 |
| Traffic Control | LS | 1 | $ 10,000.00 | $ 10,000.00 |
| 12" Ductile Iron Water Main & Trench | LF | 4,700 | $ 100.00 | $ 470,000.00 |
| Service Connections | EA | 3 | $ 2,500.00 | $ 7,500.00 |
| 12" Gate Valve | EA | 5 | $ 6,000.00 | $ 30,000.00 |
| Hydrant With Tee and Valve | EA | 12 | $ 6,000.00 | $ 72,000.00 |
| Pavement Restoration | Tons | 150 | $ 150.00 | $ 22,500.00 |
| Ledge Removal | Allow | 1 | $ 10,000.00 | $ 10,000.00 |
| Easement through lot 147 (Legal fees only) | LS | 1 | $ 5,000.00 | $ 5,000.00 |
| Interconnection with Hooksett (Building, Valves, Meters) | LS | 1 | $ 50,000.00 | $ 50,000.00 |
| | | | **Construction Subtotal** | **$ 747,000.00** |
| | | | **Construction Contingency (20%)** | **$ 149,400.00** |
| | | | **Engineering Costs (20%)** | **$ 149,400.00** |
| | | | **Alternative 2 Total:** | **$ 1,045,800.00** |

1) Pavement replacement number based on early stage alignment. Quantity subject to change as design develops.
2) Quantities are based on measurments and takeoffs of the feasability level design design where availible. In locations where the design has not yet been developed, quantities are based on mapping taekoffs using Google Earth.
3) Minimal quantitiy of ledge assumed due to proximity to gravel pit.

Bow NH
Bow Hooksett Water/Sewer Extension Feasability Study
Project Number: 326184
Table 6-4 Sewer Alternative 1 Costs

Project: Bow - Hooksett Feasibility Study
Sewer Run 2
Probable Cost Estimate

Calculated By: TMV Date:

Checked By: NJS Date:

**NOTE:** In providing opinions of probable construction costs, the Client understands that DuBois & King, Inc. has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's methods of pricing, and that our Opinion of Probable Construction Costs are made on the basis of our professional judgment and experience. DuBois & King, Inc. makes no warranty, expressed or implied, that the bids or the negotiated costs of the Work will not vary from the Opinion of Probable Construction Cost provided herein.

**OPINION OF PROBABLE CONSTRUCTION COST**

| DESCRIPTION | UNIT | QUANTITY | UNIT PRICE | AMOUNT |
|---|---|---|---|---|
| Mobilization | LS | 1 | $ 150,000.00 | $ 150,000.00 |
| Traffic Control | LS | 1 | $ 50,000.00 | $ 50,000.00 |
| 6" PVC Forcemain | LF | 10,545 | $ 75.00 | $ 790,875.00 |
| 12" PVC Sewer Main & Trench | LF | 5,280 | $ 130.00 | $ 686,400.00 |
| Sewer Service Connections | EA | 5 | $ 3,000.00 | $ 15,000.00 |
| 4" Cleanout | EA | 5 | $ 500.00 | $ 2,500.00 |
| 4' Precast Sewer Manholes | EA | 18 | $ 6,000.00 | $ 108,000.00 |
| Connection to Existing Sewer System | LS | 1 | $ 5,000.00 | $ 5,000.00 |
| Pavement Restoration | Tons | 200 | $ 150.00 | $ 30,000.00 |
| Ledge Removal | Allow | 1 | $ 100,000.00 | $ 100,000.00 |
| Sewer Pump Station | LS | 1 | $ 450,000.00 | $ 450,000.00 |
| Forcemain Easment (Lease Fee for 30 Years) | LS | 1 | $ 1,500,000.00 | $ 1,500,000.00 |
| Pump Station Easement | LS | 1 | $ - | $ - |
| | | | **Construction Subtotal** | **$ 3,887,775.00** |
| | | | **Construction Contingency (20%)** | **$ 777,555.00** |
| | | | **Engineering Costs (20%)** | **$ 777,555.00** |
| | | | **Sewer 2 Total:** | **$ 5,442,885.00** |

1) Pavement replacement number based on early stage alignment. Quantity subject to change as design develops.
2) Quantities are based on measurments and takeoffs of the feasability level design design where availible. In locations where the design has not yet been developed, quantities are based on mapping taekoffs using Google Earth.
3) An assumed amount of gravity sewer is carried in the costs to accomodate extending service into the center of the South Bow and Business Districts.

# Bow NH
# Bow Hooksett Water/Sewer Extension Feasability Study
# Project Number: 326184
# Table 6-4 Sewer Alternative 2 Costs

Project: Bow - Hooksett Feasibility Study
Sewer Run 2
Probable Cost Estimate

Calculated By: TMV Date:

Checked By: NJS Date: 8/1/2019

**NOTE:** In providing opinions of probable construction costs, the Client understands that DuBois & King, Inc. has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's methods of pricing, and that our Opinion of Probable Construction Costs are made on the basis of our professional judgment and experience. DuBois & King, Inc. makes no warranty, expressed or implied, that the bids or the negotiated costs of the Work will not vary from the Opinion of Probable Construction Cost provided herein.

**OPINION OF PROBABLE CONSTRUCTION COST**

| DESCRIPTION | UNIT | QUANTITY | UNIT PRICE | AMOUNT |
|---|---|---|---|---|
| Mobilization | LS | 1 | $ 80,000.00 | $ 80,000.00 |
| Traffic Control | LS | 1 | $ 100,000.00 | $ 100,000.00 |
| 6" PVC Forcemain | LF | 7,200 | $ 75.00 | $ 540,000.00 |
| 12" PVC Sewer Main & Trench | LF | 5,280 | $ 130.00 | $ 686,400.00 |
| Sewer Service Connections | EA | 5 | $ 3,000.00 | $ 15,000.00 |
| 4" Cleanout | EA | 5 | $ 500.00 | $ 2,500.00 |
| 4' Precast Sewer Manholes | EA | 18 | $ 6,000.00 | $ 108,000.00 |
| Connection to Existing Sewer System | LS | 1 | $ 5,000.00 | $ 5,000.00 |
| Pavement Restoration | Tons | 750 | $ 150.00 | $ 112,500.00 |
| Ledge Removal | Allow | 1 | $ 55,000.00 | $ 55,000.00 |
| Sewer Pump Station | LS | 1 | $ 450,000.00 | $ 450,000.00 |
| Pump Station Easement | LS | 1 | $ - | $ - |
| | | | **Construction Subtotal** | **$ 2,154,400.00** |
| | | | **Construction Contingency (20%)** | **$ 430,880.00** |
| | | | **Engineering Costs (20%)** | **$ 430,880.00** |
| | | | **Sewer 2 Total:** | **$ 3,016,160.00** |

1) Pavement replacement number based on early stage alignment. Quantity subject to change as design develops.
2) Quantities are based on measurments and takeoffs of the feasability level design design where availible. In locations where the design has not yet been developed, quantities are based on mapping taekoffs using Google Earth.
3) An assumed amount of gravity sewer is carried in the costs to accomodate extending service into the center of the South Bow and Business Districts.

Appendix A

Example Interlocal Agreement for Water System

# DERRY WHOLESALE WATER AGREEMENT

Agreement made and entered into this 26th day of March, 2013 ("Agreement"), by and between the MANCHESTER WATER WORKS ("MWW"), a duly established municipal water works, and the Town of Derry ("Derry"), a municipal association duly established and existing under New Hampshire Revised Statutes Annotated ("RSA") Chapter 31.

**Recitals**.

1. MWW and Derry have existing waterworks systems;

2. Derry desires to purchase from MWW certain volumes of water on a wholesale basis;

3. MWW has supplied water to Derry under a Wholesale Water Contract dated May 27, 1998 amended June 29, 2005, and due to expire May 27, 2013, which contract each party wishes to terminate; and

4. MWW and Derry have determined to enter into this legally binding Agreement to establish the conditions for wholesale supply of water.

NOW THEREFORE, in consideration of the mutual promises and covenants herein set forth, and in order to secure the services described below, the parties hereto, each binding itself, its respective representatives, successors, and assigns, agree as follows:

## ARTICLE 1. SHORT TITLE, DEFINITIONS AND INTERPRETATIONS

Section 101. Short Title. This Agreement may be referred to as the "Derry Wholesale Water Agreement".

Section 102. Meanings and Construction.

102.1. Definitions. For all purposes of this Agreement, including any amendments, the terms shall have the meanings set forth below.

102.1.1. "Anniversary Date" means the day and month on which the Agreement was signed in each year.

102.1.2. "Average Daily Flow" means the total volume of water measured in gallons or cubic feet at a metering station or stations during any two consecutive monthly billing periods divided by the actual number of days in the billing period.

102.1.3. "Maximum Daily Flow" means the highest total volume of water measured in gallons or cubic feet at all metering stations over any consecutive twenty-four (24) hour period.

102.1.4. "MSDC" means the Merrimack Source Development Charge which is a capital charge for contribution for the development of new water sources to maintain and extend service in circumstances of growing demand.

102.1.5. "NHPUC" means the Public Utilities Commission of the State of New Hampshire.

102.1.6. "Period" means any length of time.

102.1.7. "Person" means any individual, firm, company, association, society, corporation, political subdivision, fire district, or group.

102.1.8. "Tariff" means the Rules and Regulations of MWW as approved by the NHPUC.

102.1.9. "Waterworks" means facilities for collection, storage, supply, distribution, treatment, pumping, metering, or transmission of water.

102.1.10 "Water" means potable water.

Section 103. Construction. This Agreement, except where the context clearly indicates otherwise, shall be construed as follows:

103.1 Definitions include both singular and plural;

103.2 Pronouns include both singular and plural and include both genders.

Section 104. Governing Law. This Agreement shall be governed by the laws of the State of New Hampshire.

**ARTICLE 2. TERMS OF SUPPLY**

Section 201. Obligations of Derry. Derry agrees to the following obligations and limitations made in return for MWW's agreement to permit connection and supply of water into Derry's waterworks.

201.1. Limitation of Rights. Nothing in this Agreement is intended as a grant by MWW of any exclusive right or privilege. In any period in which Derry receives water pursuant to this Agreement, Derry shall comply in all respects with MWW's Tariff, except as otherwise specified herein.

201.2. Charges and Fees. Derry shall make timely payment of all charges described in this Agreement in accordance with Sections 305, 306 and 307 below.

201.3 Quantity of Water. Derry shall limits its usage of MWW's waterworks to the following:

Average Daily Flow 2.9 MGD

Maximum Daily Flow 4.0 MGD

MWW shall have no responsibility to supply water in excess of these stated amounts.

201.4 Right to Receive Water Not Assignable. Derry may not assign its contract right to the quantities of water specified in paragraph 201.3 above to another party without the express written consent of MWW. If Derry makes such an assignment of rights without consent, this Agreement shall be null and void. Derry may only use or distribute water purchased from MWW pursuant to this Agreement within the Derry jurisdictional limits as now or hereafter duly constituted, and may not directly or indirectly resell nor supply the water outside the limits of Derry without the express written consent of MWW. MWW acknowledges the existing water

supply agreements between Derry and Pennichuck Water Works dated November 1, 1983, December 21, 2000, August 5, 2008 and April 21, 2010 as amended.

201.5. Control of System Leaks and Wasteful Use. Derry shall operate and maintain its waterworks in accordance with customary engineering practices and with the guidelines set forth below.

201.5.1. Derry shall minimize any wasteful use of water within its service area.

201.5.2. In any period in which Derry receives water pursuant to this Agreement, Derry shall impose the same voluntary or mandatory restrictions on water use by its customers (e.g. sprinkling bans) as MWW shall impose on its customers within one week of such imposition by MWW. The imposition and removal of any restrictions shall be within the sole and exclusive discretion of MWW, but nothing in this Agreement shall prevent Derry from imposing its own restrictions which are more restrictive than those imposed by MWW.

201.6. Conformance of Law. Derry shall comply and shall ensure that its customers and any private water systems connected to Derry waterworks comply with all applicable laws of the United States and of the State of New Hampshire, including but not limited to all rules and regulations of the New Hampshire Department of Environmental Services, and all rules and regulations of the NHPUC,. If, after (60) days written notice from MWW of a known violation, Derry fails to comply or to make prompt, substantial or reasonable efforts to comply within such time with this Section 201 MWW may discontinue all services to Derry until such time as Derry demonstrates its compliance.

201.7. Quality of Water. MWW shall make all reasonable effort and shall maintain and operate the supply system so as to supply water meeting the drinking water quality criteria established from time to time by the United States Environmental Protection Agency and the State of New Hampshire. Department of Environmental Services.

Section 202. Obligations of MWW. MWW agrees to the following obligations and limitations in return for the timely payment by Derry of the charges specified in this Agreement.

202.1. Metering Point. MWW shall supply water to Derry on New Hampshire Route 28 at the Londonderry-Derry town line subject to the limitations contained herein. Additional metering points may be added by mutual agreement and subject to the provisions of this Agreement.

202.2 Measurement of Flows. The measurement of water delivered to Derry shall be undertaken by MWW. Such flow measurements shall be made by one or more metering devices placed at locations selected by MWW.

202.3. Construction of Connection. Any and all connections between MWW's waterworks and Derry's waterworks, including modifications or upgrades which may be necessary to effectuate the Derry Wholesale Water Construction Contract and this Agreement, including but not limited to meter vaults and metering devices, shall be designed by MWW, or after notification to Derry constructed by any subcontractors as MWW shall choose to employ subject to the requirements of MWW's municipal procurement code, such decision to be made by MWW. The cost of all construction undertaken to construct, modify or upgrade the connection of MWW's waterworks to Derry's waterworks, including the purchase of metering devices and appurtenances, shall be paid by Derry. The necessity of and selection of all materials and equipment and the location thereof shall be within the sole discretion of MWW.

202.4. Ownership of Connection Facilities. MWW shall own all pipes laid from its presently existing waterworks to within ten (10) feet of the downstream outside wall of the metering vault and it shall own the metering device. All other waterworks, piping, valves and vaults constructed to make the connection necessary to effectuate this Agreement shall be the property of Derry and shall be maintained by Derry in a manner satisfactory to MWW.

202.5. Maintenance of Metering Devices.

202.5.1. Any and all metering devices installed pursuant to this Agreement shall be inspected and calibrated in the manner provided by regulations of the NHPUC. A copy of any inspection and calibration reports shall be filed at MWW's offices and shall be available for examination by Derry at the offices of MWW during normal business hours.

202.5.2. Derry may request MWW to test and certify as to the accuracy of any metering device at any time. If the metering device reads within specifications accepted by the NHPUC, the cost of such tests shall be borne by Derry. If the average error over different test rates is greater than that allowed by the NHPUC, the cost of the tests shall be paid by MWW.

202.5.3. In the case of missing or inaccurate flow records, due to faulty metering device operation or other circumstances, an estimate of flow shall be made by MWW based on past records for a comparable period. The estimates shall be used by MWW to calculate the payments due from Derry. Such payments shall be subject to the provisions of Sections 303, 304, 305, 306 and 307 hereof below.

202.6 Record, Accounts and Audits. MWW shall maintain records of all financial transactions with Derry, and these records shall be available for inspection by Derry or any customer of Derry at the office of MWW during normal business hours. Said records shall be available for inspection by other parties only upon presentation to MWW of a written authorization from Derry. The financial statements of MWW shall be available for inspection by Derry within a reasonable time after it has been accepted by the MWW's Board of Water Commissioners.

Section 203. Responsibility for System Operation and Maintenance. MWW assumes no responsibility for operation and maintenance of waterworks constructed and owned by Derry including those described in Sections 202.3 and 202.4 hereof. MWW's sole duty hereunder

shall be to supply water up to the maximum amounts specified in Section 201.3 at the locations specified in Section 202.1 subject to the terms and conditions contained herein.

Section 204. Limitation of Liability.

204.1 Liability for Non-Negligent Acts. If MWW shall be unable to supply some or all of the water demanded by Derry under this Agreement for any reason other than MWW's own negligence, MWW shall not be liable to Derry by any damages arising out of such failure to supply water. Derry hereby waives any rights it might have to any damages against MWW, however Derry reserves the right to seek damages against any party, other than MWW, for injuries suffered by Derry, including joining with MWW in any action it might bring against other parties.

204.2 Impairment of Supply. Existing customers of MWW have first right to any water supplied by MWW, and this Agreement shall not impair the supply of water to them. If MWW is unable to supply both its other customers and Derry with water for any reason other than the negligence of MWW, Derry cannot compel MWW to supply it with water, nor shall it be entitled to any damages from MWW as a result of MWW's failure to supply it with water. MWW shall not make such demand upon Derry until it has made reasonable attempts to seek reductions in demand from its existing customers unless the cause of such impairment is isolated to Derry's supply from MWW. In addition, MWW cannot be compelled to furnish Derry with water if MWW's waterworks or the source upon which MWW is dependent for its supply of water is impaired, and Derry shall be entitled to no damages from MWW as a result of MWW's failure to supply it with water. MWW shall be the sole judge as to whether the water available to it is adequate to supply both Derry and MWW's other customers and whether MWW's water-works or source of supply is impaired. MWW's decision shall be final and binding on Derry. Notwithstanding the foregoing, if MWW reduces the amount of water which it supplies to Derry pursuant to this Section 204.2, such reduction shall be proportional to reductions made to each

other wholesale customer of MWW, based on the average amount of water received by each wholesale customer during the ninety (90) days preceding such reduction from MWW, however Derry reserves the right to seek damages from parties other than MWW for injuries suffered from the impairment of supply to Derry.

204.3 Liability for Accident. Neither MWW nor Derry shall be liable in damages or otherwise for failure to perform any obligation under this Agreement, which failure is occasioned by or in consequence of any act of God, act of public enemy, wars, blockades, insurrections, riots, epidemics, landslides, lightning, earthquakes, drought, fires, storms, floods, winter freeze, washouts, vandalism, arrests and restraints of rulers and peoples, civil disturbances, labor strikes, power failures, explosions, breakage or accident to machinery or lines of pipe, failure or want of water supply, the binding order of any court or governmental authority which has been resisted in good faith by all reasonable legal means, and any other cause, whether of the kind herein enumerated or otherwise, not within the control of such party and which act, omission or circumstances such party is unable to prevent or overcome by the exercise of reasonable care.

204.4 Liability Resulting from Negligence. Neither Derry nor MWW shall be relieved of liability for loss resulting from its negligence, intentional actions, or its failure to use due diligence to remedy the situation and remove the cause in an adequate manner and with all reasonable dispatch, nor shall such causes or contingencies affecting performance relieve Derry from its obligations to make payments of amounts then due with respect to water theretofore supplied.

204.5 Derry's Liability for Capital Expenditures and for Water Supplied. Nothing herein shall be construed as relieving Derry under any circumstances from its duty to pay for capital expenditures made by MWW pursuant to Section 202.3 hereof or for water supplied pursuant to this Agreement.

Section 205. Indemnification and Insurance. Derry shall exonerate, indemnify and save harmless MWW from all claims and demands for injuries to persons, loss of life, damage to property or other losses arising out of or connected with the performance of this Agreement in Derry, New Hampshire, which MWW is legally bound to pay excepting, however, such claims and demands as shall result from negligence on the part of MWW. The phrase "claims and demands" shall include, but shall not be limited to, damages, judgments, settlements, costs and defense of legal actions, claims or proceedings and appeal therefrom. Derry shall maintain liability insurance in the amount of $1,000,000 bodily injury and property damage (each occurrence), together with a $1,000,000 umbrella policy. Derry agrees to furnish certificate(s) of the above-mentioned insurance to the City of Manchester within fourteen (14) days from the date of this agreement and, with respect to the renewals of the current insurance policies, at least thirty (30) days in advance of each renewal date. Such certificates shall name the City of Manchester and the Manchester Water Works as an additional insured (except Workers Compensation) and shall state that in the event of cancellation or material change, written notice shall be given to the City of Manchester, Manchester Water Works, 281 Lincoln Street, Manchester, New Hampshire, 03103, at least thirty (30) days in advance of such cancellation or change. For its part, MWW agrees to and does exonerate, indemnify and save harmless Derry from all claims or demands for injuries to persons, loss of life, damage to property or other losses arising out of or connected with the performance of this Agreement to the extent such claims and demands resulted from the negligence or fault of MWW. MWW shall provide Derry with a Certificate of Coverage as evidence that MWW and the City of Manchester meet the statutory requirement for municipalities maintaining a Self-Insured Program.

Section 206. Notices. All notices and other writings sent pursuant to this Agreement shall be addressed to the Director of MWW at:

Manchester Water Works
Attention: Director
281 Lincoln Street
Manchester, NH 03103

and to Derry at:

Derry Department of Public Works
Attention: Director
14 Manning Street
Derry, NH 03038

or at such other address as is indicated by written notice to the other party.

**ARTICLE 3. PAYMENTS FOR SERVICES**

Section 301. Basis for Payments. Derry shall pay MWW for each hundred cubic feet of water supplied to Derry at the locations stated in Section 202.1 hereof at the rate specified in Section 302 and 304 and subject to the Merrimack Source Development Charge (MSDC) specified in Section 303 hereof. Payment shall be made in accordance with the provisions of Sections 305, 306 and 307 hereof. The volume of water supplied to Derry shall be determined by means of one or more metering devices which shall meet all the requirements of Federal and State law, and which shall be owned, installed and maintained by MWW at one or more locations selected by it in its discretion.

Section 302. Rates.

302.1 Rate Per 100 Cubic Feet. The rate charged for water supplied to Derry shall be $0.988 per hundred cubic feet ($1,320.86 per million gallons).

302.2 Service Charge. The rate shall be in accordance with the MWW rate schedule as approved by the Board of Water Commissioners and based upon the size of the meter or meters required by Derry.

302.3 Adjustments in Rate. The rate established in Section 302.1 and 302.2 shall be adjusted each time a new permanent rate for MWW's customers living outside the City of Manchester is approved. The rate charged under this Agreement shall be increased by the same percentage as the metered water rates to customers residing outside the City of Manchester are increased and shall be the same as all other wholesale customers seeking the same level of service. Such increases in the rate charged under the Agreement shall be effective as of the same date on which the increase in rates charged to customers residing outside the City of Manchester is effective.

Section 303. MSDC. Derry may purchase additional MSDC "Capacity" above the limits as specified in section 201.3 Quantity of Water. Said future purchase of "Capacity" will be calculated by multiplying, the requested "Capacity" less the previous limit as specified in section 201.3, times the MSDC rate in effect at the time of the request. DSection 304. Emergency Use. Should Derry require water from MWW in excess of the limits specified in Section 201.3, and MWW in its absolute discretion agrees to supply such water to Derry, Derry shall pay two (2) times the rate specified in Section 302.1 for each gallon in excess of the Average Daily Flow specified in Section 201.3 which Derry consumes. Nothing in this section, however, shall be construed as giving Derry a right to any water in excess of the limits specified in Section 201.3. MWW shall have sole and exclusive discretion as to the determination of the availability of water in excess of the amount stated in Section 201.3, and the determination of the length of any prolonged emergency use in excess of the amounts stated in Section 201.3.

Section 305. Billing Cycle. MWW shall bill Derry on a monthly basis in arrears for amounts due under Section 302. Payment on bills shall be due upon presentation.

Section 306. Delinquent Bills. Bills remaining unpaid for thirty (30) days or longer from the billing date shall be subject to one and one-half (1 1/2) percent interest per month on the unpaid balance from the original due date. If bills or payments to be made pursuant to this

agreement remain unpaid for thirty (30) days or longer after the due date, MWW may issue a notice of intent to discontinue service to Derry and to the NHPUC. If the bill remains unpaid for five (5) days or longer after the date of the notice of intent to discontinue service described above, all supply of water by MWW to Derry shall cease and said supply shall not be renewed until all outstanding bills are paid in full at the office of MWW. In lieu of such discontinuance, MWW may require Derry to post a deposit and make payments more frequently than at monthly intervals.

Section 307. Charge for Resumption of Service. If MWW ceases to supply water to Derry pursuant to Section 201.6 or Section 306 above, MWW may impose a reasonable charge for resumption of said supply of water equal to 5% of the unpaid balance.

Section 308. Expansion and/or Upgrading of MWW. In all cases, MWW shall be the sole judge as to all improvements, additions or expansions to its waterworks, provided that the undertaking of such improvements, additions or expansions does not impair the ability of MWW to provide water to Derry pursuant to this Agreement.

Section 309. Capital Expenditures. Derry shall pay for any capital expenditures made by MWW which MWW reasonably believes are necessary or advisable in order to provide or continue services to Derry under this Agreement as opposed to capital improvement benefiting customers other than Derry, even though such expenditures are made outside the boundaries of Derry; provided, however, that MWW shall give written notice to Derry of any such capital expenditure at least six months prior to Derry's budget approval date. Said notice shall include a brief description of the purpose of the capital expenditure, its total costs and Derry's pro rata share of the total costs. Derry shall have sixty (60) days from the date of said notice in which to commit itself to pay or to refuse to pay its pro rata share of the capital expenditure as stated in said notice. A refusal by Derry to pay its pro rata share of the capital expenditure as stated in said notice must be made in writing in accordance with Section 206 hereof. Failure by Derry to

notify MWW in writing within sixty (60) days after the date of said notice that Derry refuses to pay its pro rata share of the capital expenditure as stated in said notice shall constitute a commitment by Derry to pay said pro rata share. If Derry has failed to properly notify MWW and refuses to pay its pro rata share of the capital expenditure, this Agreement shall terminate at the end of the quarter in which such refusal shall be made in accordance with Section 407 hereof.

**ARTICLE 4. ASSIGNMENT, AMENDMENT AND TERMINATION**

Section 401. Amendment. The provisions, terms and conditions of this Agreement may be modified only by written amendments, executed with the same formality as this Agreement.

Section 402. Assignment. No assignment by Derry of its rights or duties under this Agreement shall be binding on MWW, unless MWW consents to such an assignment in writing.

Section 403. Waiver. Failure of either party hereto to exercise any right hereunder shall not be deemed a waiver of such party to exercise at some future time said rights or another right it may have hereunder.

Section 404. Date Effective, Supersession and Duration. This Agreement shall be effective as of the date of execution first written above. This Agreement shall supersede and replace all prior Agreements between the parties with respect to the subject matter hereto, including the Derry Wholesale Water Agreement of May 27, 1998, which shall be considered terminated and have no further force or effect from the date of execution of this Agreement. This Agreement shall be in full force and effect and shall be exclusive and binding on the parties for twenty-five (25) years from the date of execution first written above, as long as Derry is in compliance with its obligations hereunder or has taken the necessary measures to remedy any items in default after notice from MWW.

Section 405. Termination. Either party may terminate this Agreement prior to the time specified in Section 404 by giving written notice to the other party at least twelve (12) months prior to the Anniversary Date. Termination of this Agreement by Derry under this Section 405

shall not relieve Derry of its obligation to pay MWW for any services rendered, capital expenditures made pursuant to this Agreement prior to the date of termination or the MSDC charge specified in Section 303 for the year in which the agreement is terminated. In the event that MWW terminates this agreement pursuant to this section, Derry shall be entitled to reimbursement of its pro-rata share of capital expenditures less any depreciation using the straight line method of depreciation (or a mutually agreed upon method) made by Derry for MWW's Water works.

Section 406. Breach. Either party may terminate this Agreement prior to the time specified in Section 404 if the other party has violated any of the covenants undertaken herein, or any of the duties imposed upon it by this Agreement; provided that the party seeking to terminate for such cause shall give the offending party sixty (60) days written notice, specifying the particulars of the violation claimed; and if at the end of such time the party so notified has not removed the cause of complaint, or remedied or used prompt, reasonable and substantial efforts to come into compliance with its obligations during such time the purported violation, then the termination of this Agreement shall be deemed complete for the year in which the agreement is terminated. In the event that MWW terminates this agreement pursuant to this section, Derry shall be entitled to reimbursement of its pro-rata share of capital expenditures less any depreciation using the straight line method of depreciation (or a mutually agreed upon method) made by Derry for MWW's Waterworks.

Section 407. Termination Pursuant to Section 309. If this Agreement is terminated pursuant to Section 309 hereof by Derry's refusal to pay its pro rata share of a capital expenditure, Derry shall not be relieved of its obligation to pay MWW for any services rendered or capital expenditures made pursuant to this Agreement prior to its termination, other than those capital expenditures for which Derry refused to pay pursuant to Section 309.

**ARTICLE 5. MISCELLANEOUS PROVISIONS**

Section 501. Status of Former Agreements. This Agreement supersedes all former or currently existing contracts for water services between MWW and Derry and constitutes the entire contract between MWW and Derry.

Section 502. Severability. If any clause or provision of this Agreement or application thereof shall be held unlawful or invalid, no other clause or provision or its application shall be affected, and this Agreement shall be construed and enforced as if such unlawful or invalid clause or provision had not been contained herein.

Section 503. Exercise of Judgment. Where MWW is directly or implicitly authorized to exercise its judgment under this Agreement, its judgment shall be valid unless clearly unreasonable.

Section 504. Status of Legal Representatives, Successors, and Assigns. The benefits and burdens of this Agreement shall inure to and be binding upon the respective legal successors to the parties hereto.

Section 505. Third Parties. MWW assumes no responsibility for any facility not included in its waterworks, and in the event that a facility of a third party shall be involved in the furnishing of service to, or the receipt of service from Derry, Derry shall look solely to such third party for any such services. Derry assumes sole responsibility for compliance with this Agreement by all third party users or customers of its waterworks. MWW shall deal directly with Derry which shall, in turn, make certain that all users and customers comply with this Agreement and with all applicable rules and regulations.

Section 506. Disputes, Arbitration. Disputes, including but not limited to those related to supply of water, connection facilities, operation and maintenance, impairment of supply, and charges and payment, shall be submitted to binding arbitration under the statutory provisions of New Hampshire Revised Statutes Annotated Chapter 542. MWW and Derry shall submit disputes to arbitration through the American Arbitration Association or other mutually acceptable

arbitration service. In the event that MWW and Derry can not agree on an arbitration service other than the American Arbitration Association, then arbitration shall proceed through the American Arbitration Association.

IN WITNESS WHEREOF, this Agreement is executed in multiple counterparts each of which shall be deemed an original this 26th day of March, 2013.

In the Presence of:

Witness

Witness

Witness

Witness

Witness

Witness

Witness

TOWN OF DERRY
By its Councilors

MANCHESTER WATER WORKS
By its Director

Witness