# ELK MEADOWS SPECIAL SERVICE DISTRICT CULINARY WATER SYSTEM MASTER PLAN

Elk Meadows Special Service District
PO Box 1796
Beaver, Utah 84713

*March 2020*

**PREPARED BY:**
Sunrise Engineering, Inc.

SUNRISE ENGINEERING

# ELK MEADOWS SPECIAL SERVICE DISTRICT

# CULINARY WATER SYSTEM MASTER PLAN

***March 2020***

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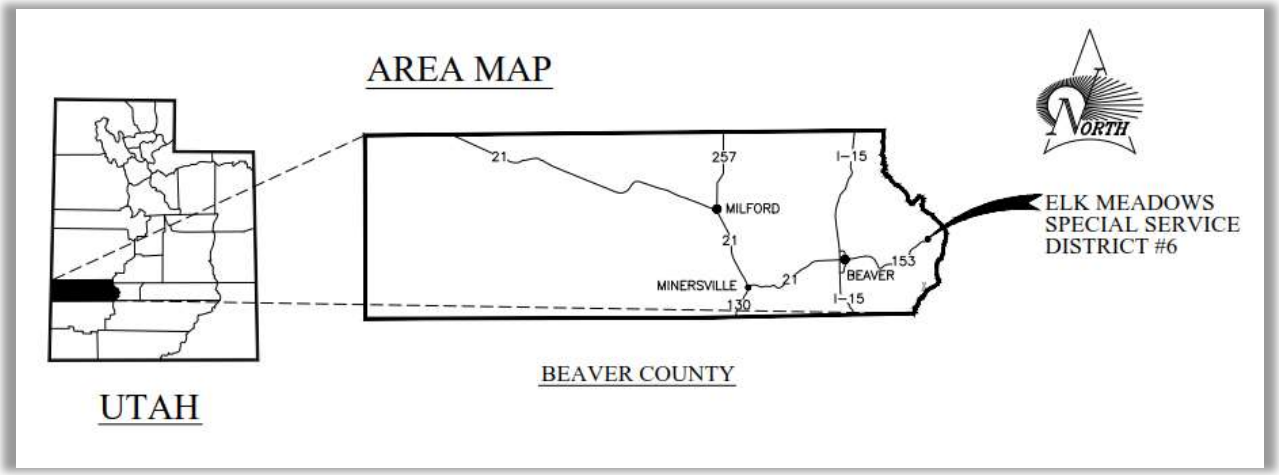
# 1.0 INTRODUCTION

Elk Meadows Special Service District (EMSSD) was created to service the area surrounding Eagle Point Resort which is located 18 miles east of Beaver, Utah.

This Water System Master Plan is based on a five-point analysis of EMSSD's culinary water system, which includes water right, source capacity, treatment, storage capacity, and distribution in accordance with the State of Utah Rules Governing Public Drinking Water Systems *(Rules)*. This Plan analyzes each aspect of the water system and identifies any deficiencies found in each of these areas. An accompanying hydraulic water model has been created with this Master Plan in order to analyze the capacity of the existing distribution system. A Capital Improvements Plan has also been included in this Water System Master Plan, which addresses the recommended improvements. The Capital Improvements Plan includes an Engineer's Opinion of Probable Costs for the recommended improvements, along with a recommended timeline for implementation.

**Figure 1.1: Area Map of Elk Meadows Special Service District**



# 2.0 POPULATION ANALYSIS AND PROJECTED GROWTH

An essential element in the development of a Culinary Water Master Plan is the projection of the system growth rate. The population growth rate gives the planner a glimpse of future demands that may need to be accommodated by the culinary water system. Population growth data is provided in the Division of Water Rights Website. Table 2.1.1 contains the recorded population of Elk Meadows from 2015 to 2018.

**Table 2.1.1: Historic Elk Meadows Population**

| Year | Census Population | Growth Rate |
|---|---|---|
| 2015 | 290 | - |
| 2016 | 290 | 0% |
| 2017 | 300 | 3% |
| 2018 | 305 | 2% |
| **Average Annual Growth Rate** | | **1.70%** |
| **Growth Rate Used for Planning** | | **3.00%** |

Considering that the District serves Eagle Point Resort, which has plans for future growth, the population projection to be used for this Master Plan will be 3.0% annual growth over the planning period.

## 2.1 LENGTH OF PLANNING PERIOD

The planning period for this Water System Master Plan will be 20 years, beginning in the fall of 2019 and running through 2039. EMSSD should review and update this Water System Master Plan every 5-10 years depending on growth.

## 2.2 CULINARY WATER CONNECTIONS

### *2.2.1 Existing Culinary Water Connections and ERCs*

According to Utah Division of Water Rights data, there were 62 total connections in the Special Service District's water system in 2018. This includes 57 domestic connections, 4 commercial connections, and 1 institutional connection. According to EMSSD staff, approximately 22 of the 57 listed domestic connections actually serve 140 condo units. This makes a total of 35 residential units and 140 residential condos.

In this plan, reference will be made to Equivalent Residential Connections (ERCs). One ERC is defined as the amount of culinary water required by an average residential connection. In accordance with the Division of Drinking Water standards, an average residential connection is expected to use 400 gallons per day for indoor use, or approximately 12,000 gallons per month. Because an ERC relates to the amount of water required for the average residential connection, use of this term allows commercial, industrial, or other large water users to be equated to residential connections. ERCs are factored into calculations for impact fees, user rates, and other analyses as required for design, planning, or other district purposes.

According to EMSSD, outdoor watering is not allowed in the service district boundaries. Water usage calculations for EMSSD will only take into account indoor water usage.

For this report, it will be assumed that each residential unit connection uses an average of 400 gallons per day, or one ERC, which is the standard set forth for year-round residential use by the Utah Administrative Rules. The usage for each residential – condo connection was determined to be approximately 0.41 ac-ft per year which is 90% of the state standards for a residential connection. The residential – condo connections will therefore be assigned an ERC value of 0.9. Commercial connections within EMSSD do have meters and the reported usage for each connection is equivalent to 16 ERCs. Institutional connections have meters as well and reported average usage equates to one ERC. Table 2.2.1 shows the number of connections for each category along with its associated ERC value.

**Table 2.2.1: ERC Equivalent per Connection Category**

| Current ERCs | | | |
|---|---|---|---|
| **Category** | **Connections** | **ERC/ Connection** | **Total ERCs** |
| Residential - Units | 35 | 1.0 | 35 |
| Residential - Condos | 140 | 0.9 | 126 |
| Commercial | 4 | 16.0 | 64 |
| Institutional | 1 | 1.0 | 1 |
| | | **Total** | **226** |

### *2.2.2 Projected Culinary Water Connections and ERCs*

The number of culinary water ERCs expected at the end of the planning period can be calculated using the compound interest formula and inserting the projected growth rate, the existing number of culinary water ERCs, and the 20 year planning period for culinary water improvements.

The projected number of ERCs for the 20-year planning period is calculated using the compound interest formula as follows: F = Connections x $(1 + \text{rate})^{20\ \text{years}}$ where F is the projected number of connections and the rate of growth is 3.0% per year.

**Total Residential ERCs: F = 226 ERCs x $(1 + 0.03)^{20}$ = 408 ERCs**

# 3.0 WATER RIGHT ANALYSIS

## 3.1 EXISTING WATER RIGHT

The water rights that are owned or leased by EMSSD for culinary water use are listed below in Table 3.1.1.

**Table 3.1.1: EMSSD Water Right Summary**

| EMSSD Water Rights | | | |
|---|---|---|---|
| **Water Right #** | **Ownership** | **Priority** | **Quantity (ac-ft/yr)** |
| 77-1732 | Mt. Holly Homeowners Association | 1940 | 34.993 |
| 77-1813 | Elk Meadows Special Service District | 1903 | 21.1573 |
| 77-1814 | Elk Meadows Special Service District | 1890 | 13.3627 |
| 77-1815 | Elk Meadows Special Service District | 1890 | 15.6638 |
| 77-1816 | Elk Meadows Special Service District | 1940 | 29.6548 |
| 77-1817 | Elk Meadows Special Service District | 1890 | 20.6331 |
| 77-1728 | Mt. Holly Homeowners Association | 1970 | 35 |
| 77-1792 | Elk Meadows Special Service District | 1870 | 17.2732 |
| 77-2003 | Elk Meadows Special Service District | 1870 | 60 |
| 77-1928 | Elk Meadows Special Service District | 1870 | 3 |
| 77-1768 | Utah SITLA | 1870 | 36.18 |
| 77-503 | Puffer Lake | 1870 | 150 |
| | | | |
| **Total** | | | **436.92** |

Table 3.1.1 represents a cursory review of the water rights on record with the Utah Division of Water Rights. EMSSD currently owns approximately 437 ac-ft of water rights. Some of the water right listed above was brought into the district for special developments. A more detailed water rights analysis and report can be performed and provided at the request of EMSSD.

## 3.2 EXISTING REQUIRED WATER RIGHT

Existing required water right is determined based on the number of ERCs in the system of each connection type. The *Rules* state that a community should have adequate water right to supply each residential culinary connection with a minimum of 400 gallons per day for indoor water use. Since EMSSD currently does not allow outdoor watering, calculations for outdoor water use will not be made.

In addition to the residential, commercial, and Institutional required water right, there is an agreement with Eagle Point Resort to provide 20 acre feet of water for Eagle Point's snowmaking pond from water right that is proved to EMSSD. It should be noted that as part of this agreement, EMSSD will only supply water to the snowmaking pond during low usage times when the tanks are at full capacity. Since this is the case, the snowmaking pond will not affect the required source and storage capacities.

Based on the values listed above, the existing required water right is calculated as shown below.

**Existing Required Water Right:**

**Residential Use:**

Unit

$$35 \text{ ERCs} \times \frac{400 \text{ gal}}{\text{ERC day}} \times \frac{365 \text{ day}}{1 \text{ year}} \times \frac{1 \text{ ac-ft}}{325{,}851 \text{ gal}} = 15.68 \text{ ac-ft}$$

Condo

$$126 \text{ ERCs} \times \frac{400 \text{ gal}}{\text{ERC day}} \times \frac{365 \text{ day}}{1 \text{ year}} \times \frac{1 \text{ ac-ft}}{325{,}851 \text{ gal}} = 56.46 \text{ ac-ft}$$

**Commercial Use:**

Indoor

$$64 \text{ ERCs} \times \frac{400 \text{ gal}}{\text{ERC day}} \times \frac{365 \text{ day}}{1 \text{ year}} \times \frac{1 \text{ ac-ft}}{325{,}851 \text{ gal}} = 28.68 \text{ ac-ft}$$

**Institutional Use:**

Indoor

$$1 \text{ ERCs} \times \frac{400 \text{ gal}}{\text{ERC day}} \times \frac{365 \text{ day}}{1 \text{ year}} \times \frac{1 \text{ ac-ft}}{325{,}851 \text{ gal}} = 0.45 \text{ ac-ft}$$

**Water Sales:**

Elk Meadows Snowmaking Pond: $20 \text{ ac-ft} = 20.00 \text{ ac-ft}$

| | |
|---|---|
| **Total Existing Required Water Right** | **121.26 ac-ft** |
| **Total Existing Water Right** | **436.92 ac-ft** |
| **Estimated Existing Water Right Surplus** | **315.66 ac-ft** |

EMSSD currently has a water right **surplus** of 316 ac-ft.

## 3.3 20-YEAR PROJECTED REQUIRED WATER RIGHT

The projected required water right is calculated using the total projected ERCs for each category at the end of the 20-year planning period. As noted above, it will be assumed that EMSSD continues to ban outdoor watering throughout the planning period.

The 20-year projected water right requirement is calculated as follows:

**Projected Required Water Right - 20 Yrs**

**Residential Use:**

Unit

63 ERCs x (400 gal / ERC day) x (365 day / 1 year) x (1 ac-ft / 325,851 gal) = 28.23 ac-ft

Condo

228 ERCs x (400 gal / ERC day) x (365 day / 1 year) x (1 ac-ft / 325,851 gal) = 102.16 ac-ft

**Commercial Use:**

Indoor

116 ERCs x (400 gal / ERC day) x (365 day / 1 year) x (1 ac-ft / 325,851 gal) = 51.79 ac-ft

**Institutional Use**

Indoor

2 ERCs x (400 gal / ERC day) x (365 day / 1 year) x (1 ac-ft / 325,851 gal) = 0.90 ac-ft

**Water Sales:**

Elk Meadows Snowmaking Pond 20 ac-ft = 20.00 ac-ft

| | | |
|---|---|---|
| **Total Projected Required Water Right** | **203.07** | **ac-ft** |
| **Total Existing Water Right** | **436.92** | **ac-ft** |
| **Estimated Projected Water Right Surplus** | **233.85** | **ac-ft** |

EMSSD has a 20-year projected water right **surplus** of 234 gpm in accordance with the *Rules*.

## 3.4 40-YEAR PROJECTED REQUIRED WATER RIGHT

There are several developments serviced by EMSSD that contain planned lots that are currently vacant. Although these vacant lots do not have a water demand, they will be accounted for projected required water right because when these developments were planned, water rights to supply the development at full build-out were purchased and applied to EMSSD. Additionally, EMSSD anticipates that these properties will be developed in the next 40 years. The projected required water right will be calculated using all existing and planned residential units regardless of them being occupied or not. Table 3.2 calculates all planned residential units with the EMSSD service area.

**Table 3.2 Existing and Planned Residential Units**

| Existing & Planned Residential Development Totals | |
|---|---|
| **Development Name** | **Number of Units** |
| Grizzly Ridge | 166 |
| All Existing Condos | 141 |
| Elk Meadows Estates | 22 |
| Pinnicle Subdivision | 40 |
| Miscellaneous Vacant Lots | 8 |
| Aspen Crest | 27 |
| | |
| **Total** | **404** |

As noted in Table 3.2, there are currently 404 planned residential units in the EMSSD service area. Each residential unit has been assigned a value of one ERC. It should also be noted that the existing residential units and the condo units make up a portion of the 404 planned residential units.

Elk Meadows currently leases water right from Puffer Lake and SITLA in water rights 77-503 and 77-1768 respectively. EMSSD may use this water right to service future development. These water rights could serve up to 413 ERCs, so 413 ERCs will be added to the 40-year required water right projection. The 404 units previously approved and committed for along with the 413 ERCs associated with the Puffer Lake and the SITLA water rights total 817 residential units. These ERCs are accounted for in the calculation below and are dispersed between the residential units and the condo units in the residential category.

The Commercial and Institutional projected required water right will be calculated by projecting the current number of ERCs by the 3% annual growth rate used in this master plan. It is assumed that the EMSSD will continue the ban on outdoor watering. The state allows a 40-year water right projection in order to help communities protect their water rights.

Based on the information above and the total number of ERCs, the projected required water right for the 40-year planning period is calculated as follows:

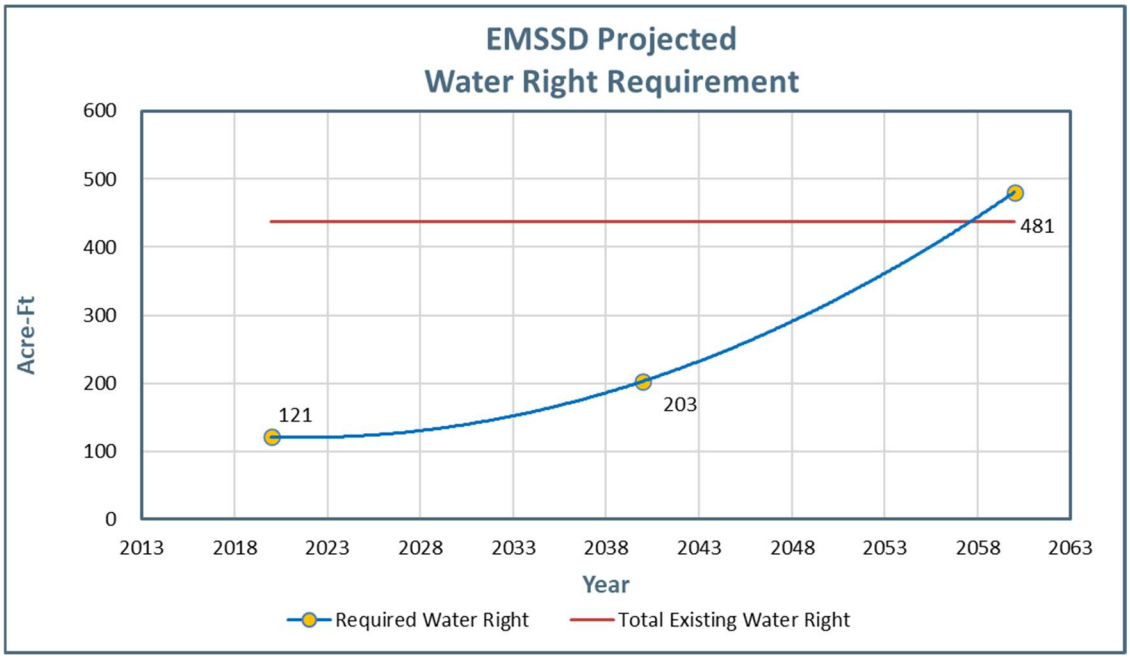
**Projected Required Water Right - 40 Years**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Residential Use:** | | | | | | | | | | |
| Unit | | | | | | | | | | |
| | 227 | ERCs | x | 400 gal / ERC day | x | 365 day / 1 year | x | 1 ac-ft / 325,851 gal | = | 101.71 ac-ft |
| Condo | | | | | | | | | | |
| | 590 | ERCs | x | 400 gal / ERC day | x | 365 day / 1 year | x | 1 ac-ft / 325,851 gal | = | 264.35 ac-ft |
| **Commercial Use:** | | | | | | | | | | |
| Indoor | | | | | | | | | | |
| | 209 | ERCs | x | 400 gal / ERC day | x | 365 day / 1 year | x | 1 ac-ft / 325,851 gal | = | 93.64 ac-ft |
| **Institutional Use** | | | | | | | | | | |
| Indoor | | | | | | | | | | |
| | 3 | ERCs | x | 400 gal / ERC day | x | 365 day / 1 year | x | 1 ac-ft / 325,851 gal | = | 1.34 ac-ft |
| **Water Sales:** | | | | | | | | | | |
| Elk Meadows Snowmaking Pond | | | | | | | | 20 ac-ft | = | 20.00 ac-ft |

| | | |
|---|---|---|
| **Total Projected Required Water Right** | **481.05** | **ac-ft** |
| **Total Existing Water Right** | **436.92** | **ac-ft** |
| **Estimated Projected Water Right Deficit:** | **(44.13)** | **ac-ft** |

EMSSD has a projected water right **deficit** of 44 ac-ft at the end of the 40-year planning period. Figure 3.2.1 illustrates the required culinary water rights through the 40-year planning period compared to the current water rights that are owned by EMSSD.

**Figure 3.2.1: EMSSD 40-Year Projection of Required Water Rights**




## 3.5 RECOMMENDED WATER RIGHT ACTIONS

EMSSD currently has a surplus of 316 ac-ft of water rights based on current system conditions. It is projected that the Service district will have a **deficit** of 44 ac-ft of water rights at the end of the 40-year planning period. It is recommended that EMSSD require all new developments that have not previously provided to obtain necessary water rights to meet the impact the development would bring.

# 4.0 SOURCE CAPACITY ANALYSIS

## 4.1 EXISTING SOURCE CAPACITY

EMSSD's culinary water system is primarily supplied by three springs: Forest Service Spring, Puffer Lake Upper Spring, and Puffer Lake Middle Spring. The Forest Service Spring is located nearly a mile northeast of the tanks and produces as little as 5 gpm in during the winter and up to 100 gpm during the summer months. The Puffer lake Upper and Middle Springs are pumped about one mile to the tanks. The current pumping capacity is approximately 45 gpm, although the springs themselves produce more. In general, these springs produce less in the winter and more water in the summer. The winter months are also the months with the highest reported demand. In order to plan for the worst-case scenario, the lower spring production values will be used. The total source capacity for EMSSD used in this water master plan is therefore 50 gpm.

## 4.2 EXISTING REQUIRED SOURCE CAPACITY

Existing source capacity requirements are categorized as indoor use. The *Rules* state that a community should have an adequate water source capacity to supply a peak demand of 800 gallons per day per ERC for indoor use.

Based on the information above, the existing required source capacity is calculated as follows:

**Existing Required Source Capacity:**

**Residential Use:**

Unit

35 ERCs x (800 gpd / ERC) x (1 day / 24 hr) x (1 hr / 60 min.) = 19.44 gpm

Condo

126 ERCs x (800 gpd / ERC) x (1 day / 24 hr) x (1 hr / 60 min.) = 70.00 gpm

**Commercial Use:**

Indoor

64 ERCs x (800 gpd / ERC) x (1 day / 24 hr) x (1 hr / 60 min.) = 35.56 gpm

**Institutional Use:**

Indoor

1 ERCs x (800 gpd / ERC) x (1 day / 24 hr) x (1 hr / 60 min) = 0.56 gpm

**Total Existing Required Source Capacity = 125.56 gpm**

**Total Existing Source Capacity = 50.00 gpm**

**Estimated Existing Source Capacity Deficit = -75.56 gpm**

The calculations show that EMSSD currently has a source capacity ***deficit*** of 76 gpm in accordance with the *Rules*.

## 4.3 PROJECTED REQUIRED SOURCE CAPACITY

The projected required source capacity is calculated using the total projected ERCs for each category at the end of the 20-year planning period. As noted above, it will be assumed that EMSSD continues to ban outdoor watering throughout the planning period.

The 20-year projected source capacity requirement is calculated as follows:

**Projected Required Source Capacity - 20 Yrs**

**Residential Use:**

Unit

63 ERCs x (800 gpd / ERC) x (1 day / 24 hr) x (1 hr / 60 min.) = 35.00 gpm

Condo

228 ERCs x (800 gpd / ERC) x (1 day / 24 hr) x (1 hr / 60 min.) = 126.67 gpm

**Commercial Use:**

Indoor

116 ERCs x (800 gpd / ERC) x (1 day / 24 hr) x (1 hr / 60 min.) = 64.22 gpm

**Institutional Use:**

Indoor

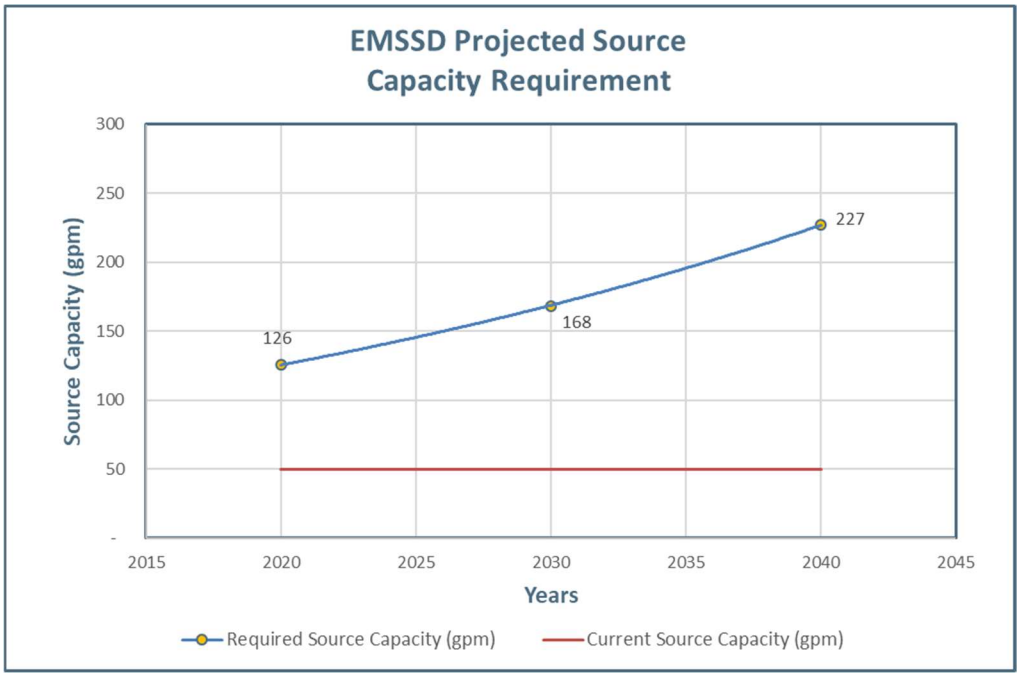
2 ERCs x (800 gpd / ERC) x (1 day / 24 hr) x (1 hr / 60 min) = 1.11 gpm

| | |
|---|---|
| **Total Projected Required Source Capacity** | **227.00 gpm** |
| **Total Existing Source Capacity =** | **50.00 gpm** |
| **Estimated Projected Source Capacity Deficit** | **-177.00 gpm** |

EMSSD has a 20-year projected source capacity ***deficit*** of 177 gpm in accordance with the *Rules*.

EMSSD projected source capacity requirement over the 20-year study period is shown below in Figure 4.3.1.

**Figure 4.3.1: Projected Source Capacity Requirement**




## 4.4 RECOMMENDED SOURCE CAPACITY IMPROVEMENTS

EMSSD has a current source capacity deficit of 76 gpm, and a projected deficit of 177 gpm in 20 years. EMSSD staff have observed that the system struggles to keep up with the demand during holiday weekends during ski season.

It is recommended that EMSSD replace the Puffer Lake Spring line with a larger diameter pipe and improve the spring booster station to enable EMSSD to deliver the full spring yield to the tanks. EMSSD should also develop the Puffer Lake Lower Spring and tie-in all three Puffer Lake Springs to the booster station. EMSSD staff have estimated that improvements to the Puffer Lake Spring system could increase yield to 85 gpm.

It is also recommended that EMSSD re-develop the Triple Chair Spring to culinary standards. It is estimated that the spring produces approximately 20 gpm. A booster station would also need to be constructed to deliver water to the tanks. A portion of the spring line could be combined with the Puffer Lake Spring line to reach the tanks.

Incorporating the recommended improvements could increase to source capacity for the system to as much as 110 gpm as shown in Table 4.4. It is understood that the current required source capacity is higher than the 110 gpm source capacity even after the proposed improvements. It is recommended that adding water storage in addition to water source will provide an extra buffer during high demand weekends.

If additional source capacity is needed beyond the mentioned improvements, it may be necessary to locate and develop a well. Prior to developing a well, it is recommended that a well siting study be performed by a hydrogeologist. Other options would be to explore the Puffer Lake Spring area for opportunities to capture more spring water. EMSSD should focus on improving the existing springs

before drilling a well given the significant cost and difficult hydrogeological conditions in the area for well drilling.

**Table 4.4. Source Capacity with Recommended Improvements**

| EMSSD Source Capacity with Recommended Improvements | |
|---|---|
| Source | Minimum Flow (gpm) |
| Forest Service Spring | 5 |
| Puffer Lake Upper Spring* | 35 |
| Puffer Lake Middle Spring* | 35 |
| Puffer Lake Lower Spring* | 15 |
| Triple Chair Spring* | 20 |
| **Total Potential Source Capacity:** | **110** |
| *Estimated flow after improvements | |

# 5.0 STORAGE CAPACITY ANALYSIS

## 5.1 EXISTING STORAGE CAPACITY

EMSSD currently has two storage tanks, with a combined storage volume of 300,000 gallons. The water storage tank capacities are shown in table 5.1.1.

**Table 5.1.1: EMSSD Storage Tank Capacities**

| Structure | Material | Capacity (Gal) |
|---|---|---|
| Square Tank | Concrete | 75,000 |
| Round Tank | Concrete | 225,000 |
| **Total Storage Capacity** | | **300,000** |

## 5.2 EXISTING REQUIRED STORAGE CAPACITY

Water storage capacity requirements are separated into three categories, which are indoor, outdoor, and fire protection. The *Rules* require a minimum storage capacity of 400 gallons per day per ERC for indoor use.

EMSSD currently has a ban on outdoor watering in the service area. Storage requirements for outdoor watering will not be considered in this Master Plan.

Based on discussions with EMSSD, it is understood that the minimum required fire flow for the system is 1,500 gpm. As such, the minimum recommended fire flow used in this Master Plan is 1,500 gpm for a duration of two hours.

The current required storage capacity is calculated below according to the guidelines listed above.

**Existing Required Storage Capacity:**

**Residential Use:**

Unit

35 ERCs x $\frac{400 \text{ gal.}}{\text{ERC}}$ = 14,000 gal.

Condo

126 ERCs x $\frac{400 \text{ gal.}}{\text{ERC}}$ = 50,400 gal.

**Commercial Use:**

Indoor

64 ERCs x $\frac{400 \text{ gal.}}{\text{ERC}}$ = 25,600 gal.

**Institutional Use:**

Indoor

1 ERCs x $\frac{400 \text{ gal}}{\text{ERC}}$ = 400 gal.

**Fire Protection:**

$1500 \frac{\text{gal.}}{\text{min}} \times 2 \text{ hr.} \times \frac{60 \text{ min.}}{\text{hr}}$ = 180,000 gal.

| | |
|---|---|
| **Total Current Required Storage Capacity** | **270,400 gal.** |
| **Total Existing Storage Capacity** | **300,000 gal.** |
| **Estimated Existing Storage Capacity Surplus** | **29,600 gal.** |

EMSSD has an existing storage capacity surplus of 29,600 gallons according to the requirements set forth by the *Rules*.

## 5.3 PROJECTED REQUIRED STORAGE CAPACITY

The projected required storage capacity is calculated using the total projected ERCs for each category at the end of the 20-year planning period. As noted above, it will be assumed that EMSSD will continue to ban outdoor watering through the planning period.

Based on the information above and the total number of ERCs, the projected storage capacity requirement for the 20-year planning period is calculated as follows:

**Projected Required Storage Capacity - 20 Yrs**

**Residential Use:**

Unit

63 ERCs x 400 gal. / ERC = 25,200 gal.

Condo

228 ERCs x 400 gal. / ERC = 91,200 gal.

**Commercial Use:**

Indoor

116 ERCs x 400 gal. / ERC = 46,236 gal.

**Istitutional Use:**

Indoor

2 ERCs x 400 gal / ERC = 800 gal.

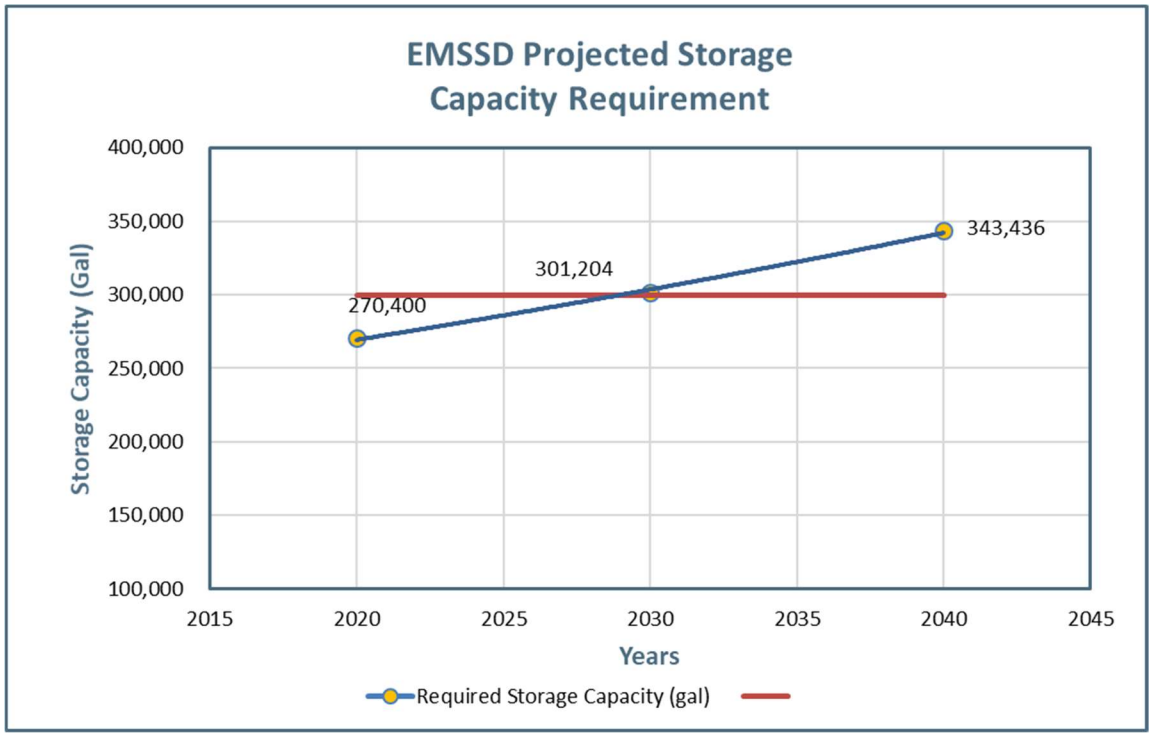
**Fire Protection:**

1500 gal. / min x 2 hr. x 60 min. / hr = 180,000 gal.

| | |
|---|---|
| **Total Projected Required Storage Capacity** | **343,436 gal.** |
| **Total Existing Storage Capacity** | **300,000 gal.** |
| **Estimated Projected Storage Capacity Deficit** | **(43,436) gal.** |

EMSSD has a projected storage capacity **deficit** of 43,436 gallons at the end of the 20-year planning period, according to the requirements set forth by the *Rules*. The projected required storage capacity is illustrated in Figure 5.3.1.

**Figure 5.3.1: Projected Storage Capacity Requirement**




## 5.4 RECOMMENDED STORAGE CAPACITY IMPROVEMENTS

In addition to alleviating the 43,000 gallon deficit shown above, it is recommended that additional storage be provided to help with the source shortage as identified in section 4.4 above. Due to the difficulty of finding adequate source supply, we recommend that additional storage be provided to help provide water during short term, high demand periods such as holiday weekends. It is recommended that a 250,000 gallon tank be constructed to provide for the storage capacity deficit as well as the strain on the source capacity requirements.

# 6.0 WATER TREATMENT REQUIREMENTS

## 6.1 GENERAL SYSTEM OVERVIEW

The State of Utah, in accordance with the National Safe Drinking Water Act, has adopted “primary” regulations for the protection of public health, and “secondary” regulations related to taste and aesthetics. These regulations are incorporated into the *Rules*.

EMSSD currently chlorinates their incoming spring water.

## 6.2 RECOMMENDED IMPROVEMENTS

EMSSD currently meets all of the requirements set forth in the *Rules* regarding culinary water treatment.

# 7.0 DISTRIBUTION SYSTEM ANALYSIS

The EMSSD distribution system has been analyzed for compliance with the *Rules.* The analysis was performed based on a review of the existing system's physical attributes and topography, along with the outputs from the hydraulic model that has been created for EMSSD's system.

## 7.1 COMPUTER MODEL OF THE DISTRIBUTION SYSTEM

The existing EMSSD culinary water distribution system was modeled using $H_2O$ Net*,* a water system modeling program. The hydraulic model was created using existing maps and as-built drawings of the system. This model also includes the West Village water line which is planned to be constructed in the near future. The features on the model include sources, tanks, and pressure reducing valves. In this model, the various demands are spread throughout the entire system to represent various scenarios, including average day conditions, peak instantaneous demand, and peak day demand under fire flow conditions. During the fire flow analysis, the program calculates the maximum design fire flow that can be obtained at each of the nodes on the system without causing the residual pressure at any of the other nodes on the system to fall below 20 psi, which is the minimum pressure allowed by the *Rules*.

The existing system map and the model output data for the existing system under the current average day conditions is provided in Exhibit 1 for reference.

The model is also used to analyze the projected system demands based on the projected growth rate, and to determine what impacts these projected demands may have on the system. For the purposes of this Master Plan, the system is analyzed through the end of the 20-year planning period. The impacts to the distribution system from projected growth will be heavily dependent on where the actual growth will occur on the system and what types of users are connecting to the system. Any distribution system analysis beyond the 20-year planning would be speculative at best. As noted previously, this Master Plan should be updated on a regular basis, and the hydraulic model should be maintained and updated continually as new growth occurs, in order to maintain an awareness of the remaining distribution system capacity.

## 7.2 SYSTEM ANALYSIS

### *7.2.1 Minimum Pressures and Demands*

The *Rules* require that distribution systems equipped with fire hydrants shall be designed to ensure that a minimum of 20 psi exists at all points within the system when needed fire flows are imposed on the system during peak day demand flows. For systems constructed after January 2007, the minimum dynamic pressure under peak day demand is 40 psi, and the minimum dynamic pressure under peak instantaneous demand is 30 psi. The Utah Division of Drinking Water encourages existing systems to meet the new rule requirements whenever possible. It is typically recommended that distribution system pressures should be maintained between 40 and 90 psi during normal system operations. Due to the steep topography of the area, static pressures reaching up to 155 psi are generally accepted in the District.

**Average Day Demand**

According the *Rules,* the required storage capacity on a system should represent the quantity of water required by the system during an average day. The average day demand that is used in the hydraulic

model is calculated by dividing the current required storage capacity, minus the required fire storage, across a 24-hour (1,440 minute) period. The resulting average day demand that is used in the hydraulic model for the current system is 63 gpm.

**Peak Day Demand**

Because EMSSD has fire hydrants in its distribution system, the peak day demand with an imposed fire flow is used in the computer model. According to the *Rules,* the peak day demand is the anticipated water demand on the day of highest water consumption. This is also the same value used to estimate the required source capacity for the system. The current required source capacity for the system was estimated to be 68 gpm. The 20-year projected peak day demand of 126 gpm will be used for analyzing the system under future peak day demand conditions.

**Peak Instantaneous Demand**

The peak instantaneous demand represents the point of maximum usage on the system, which for EMSSD is generally holiday weekends during the ski season. The current system peak instantaneous demand that will be applied is 251 gpm, and the 20-year projected peak instantaneous demand is 337 gpm.

### *7.2.2 System Pressures*

#### 7.2.2.1 Current Pressures

EMSSD has eight pressure zones. The pressures in the system under peak instantaneous demand range from 39-155 psi.

Existing average day pressures in the system are shown in Exhibit 1. Dynamic pressures under current peak instantaneous demand are shown in Exhibit 2.

#### 7.2.2.2 Projected Pressures

The system pressures under the 20-year projected peak instantaneous demands range from approximately 39-155 psi.

### *7.2.3 Hydrants & Fire Flow*

The *Rules* require all fire hydrants to be supplied from 8-inch diameter or larger lines unless it can be demonstrated through the use of computer modeling that a smaller line will meet minimum fire flow requirements without dropping any other node in the system below 20 psi. For this Master Plan, the required fire flow for EMSSD is 1,500 gpm.

The available fire flow in the system under projected peak day demands ranges from 858 gpm on the high ends of the system to approximately 3,779 gpm in the upper part of the system, with most of the system falling between 1,500-3,000 gpm. It should be noted that there are only three nodes that have an available fire flow of less than 1,500 gpm, and these are located in areas of the system having smaller diameter pipe.

Fire flow results from the hydraulic model under current peak day demands are shown in Exhibit 3 for the existing system.

### *7.2.4 Pipes & Loops*

The EMSSD culinary water distribution system includes pipe sizes ranging from 4-inch up to 10-inch, as shown in Exhibit 1. The majority of the system meets fire flow requirements partially due to the significant elevation change in the system and appropriate pipe diameters, despite having little pipe looping. Plans for the Aspen Crest Subdivision include a section of 8" pipe that will connect to Elk Meadows Drive which will increase fire flow in this area as a result of creating a system loop.

## 7.3 RECOMMENDED DISTRIBUTION SYSTEM IMPROVEMENTS

The area north of Hyrum Lee Drive does not meet fire flow requirements having an available fire flow of 855-1,265 gpm. It is recommended that that the lines in this area are upgraded with larger diameter lines to increase fire flow. The $H_2O$ Net model was used to determine which lines would need to be replaced to provide the required fire flow. See Exhibit 4. There is approximately 1,850 feet of 4-inch pipeline that is recommended to be replaced with 8-inch pipe in the area north of Hyrum Lee Drive. Appendix A provides an Engineer's Opinion of Probable Cost (EOPC) to replace the lines.

# 8.0 CAPITAL IMPROVEMENTS PLAN

## 8.1 SUMMARY OF RECOMMENDED IMPROVEMENTS

The recommended improvements to EMSSD's culinary system have been summarized herein.

***Source*** – It is recommended that EMSSD immediately begin to evaluate potential solutions for source improvements. It has been observed that on peak usage days, the system demand nearly exceeds the available source capacity. Potential solutions to increase system source are as follows:

- Develop Triple Chair Spring to culinary standards. To connect to the existing culinary system, a booster station could be added with a line to feed the tanks.
- Develop the Puffer Lake Lower Spring and tie in to existing Puffer Lake Spring line.
- Improve the booster station and spring pipeline from the Puffer Lake Springs to allow full spring yield delivery to the tanks.

**Storage –** It is recommended that EMSSD construct a new 250,000 gallon tank to service the EMSSD system. The tank may be constructed adjacent to the existing tanks or in a location lower in elevation to lower pumping costs. Increasing storage capacity will improve EMSSD's ability to provide water during short term, high demand situations.

***SCADA System*** – EMSSD does not currently have an integrated SCADA system that provides system component status, alarm notifications, tracking and recording of system parameters, or remote-control capabilities. It is recommended that the community construct an integrated SCADA system with instrumentation that would provide the following capabilities and data:

- Tank levels, with low level alarm
- Well pump status, with fault status tracking and alarms
- Booster station status, with fault status tracking and alarms
- Flow meter output, with continuous tracking of real time flows and totalized flows
- Spring hatch intrusion alarms
- Chlorinator system alarms

**Residential Meters –** It is recommended that EMSSD install radio read meters on all connections within the service area. Having meter data will help EMSSD staff have more accurate water usage data and may help determine the locations of potential water main leaks.

**Distribution System –** It is recommended that the system pipelines north of Hyrum Lee drive as described in Exhibit 4 be upgraded to provide the required fire flow to the hydrants in that part of the system. The project would consist of replacing 1,850 feet of 4-inch pipe with new AWWA C900 STR18 8-inch piping. This exhibit also portrays the proposed Aspen Crest Phase which will add pipe looping to the system.

Table 8.1 below shows the estimated costs of the recommended improvements. Complete Engineer's Opinions of Probable Costs for these improvements are provided in Appendix A.

**Table 8.1 Summary of Improvements**

| EMSSD - RECOMMENDED IMPROVEMENTS | |
|---|---|
| | |
| **IMPROVEMENT** | **EST. COST** |
| TRIPLE CHAIR SPRING IMPROVEMENTS | $117,835 |
| TRIPLE CHAIR SPRING SUPPLY LINE | $50,200 |
| TRIPLE CHAIR SPRING BOOSTER STATION | $180,000 |
| PUFFER LAKE SPRING BOOSTER STATION | $180,000 |
| PUFFER LAKE SPRING SUPPLY LINE | $281,500 |
| CONSTRUCT NEW 250,000 GAL CONCRETE STORAGE TANK | $470,000 |
| INTEGRATED SYSTEM WIDE SCADA SYSTEM | $75,000 |
| CONTINGENCY AND MOBILIZATION | $421,000 |
| RADIO READ METER INSTALLATION | $28,500 |
| UPGRADED LINES FOR FIRE FLOW | $150,263 |
| INCIDENTALS & PROFESSIONAL SERVICES | $440,860 |
| PRELIMINARY ENGINEERING REPORT (RD FUNDING ONLY) | $30,000 |
| | |
| **TOTAL** | **$2,425,157** |

## 8.2 RATE ANALYSIS

There are three primary funding agencies that typically fund municipal culinary water improvement projects in the State of Utah. These agencies include USDA Rural Development Services (USDA-RD), Division of Drinking Water - Drinking Water Board (DDW), and the Permanent Community Impact Board Fund (CIB). Each agency has its own criteria and precedent for authorization of limited grant funds. Since Elk Meadows is a second home community, these funding agencies will not likely offer grant funds. However, they may offer low interest loan funds to allocate to projects. The DDW and CIB typically offers loan terms of 1.5% - 2.5% over 20 – 30 years. The current typical USDA-RD loan conditions are 2.50% over 40 years.

EMSSD's current water rate structure includes a fee of $135 per quarter to be connected and a standby fee of $90 per quarter for property owners not connected to the system. There is a system obligation fee of $45 per quarter for other non-connected property owners. According to the Elk Meadows Special Service District 2019 Proposed Budget attached in Appendix C, the annual revenue for EMSSD water is $157,680. It is assumed that the annual expenses for EMSSD water closely matches the annual revenue of $157,680.

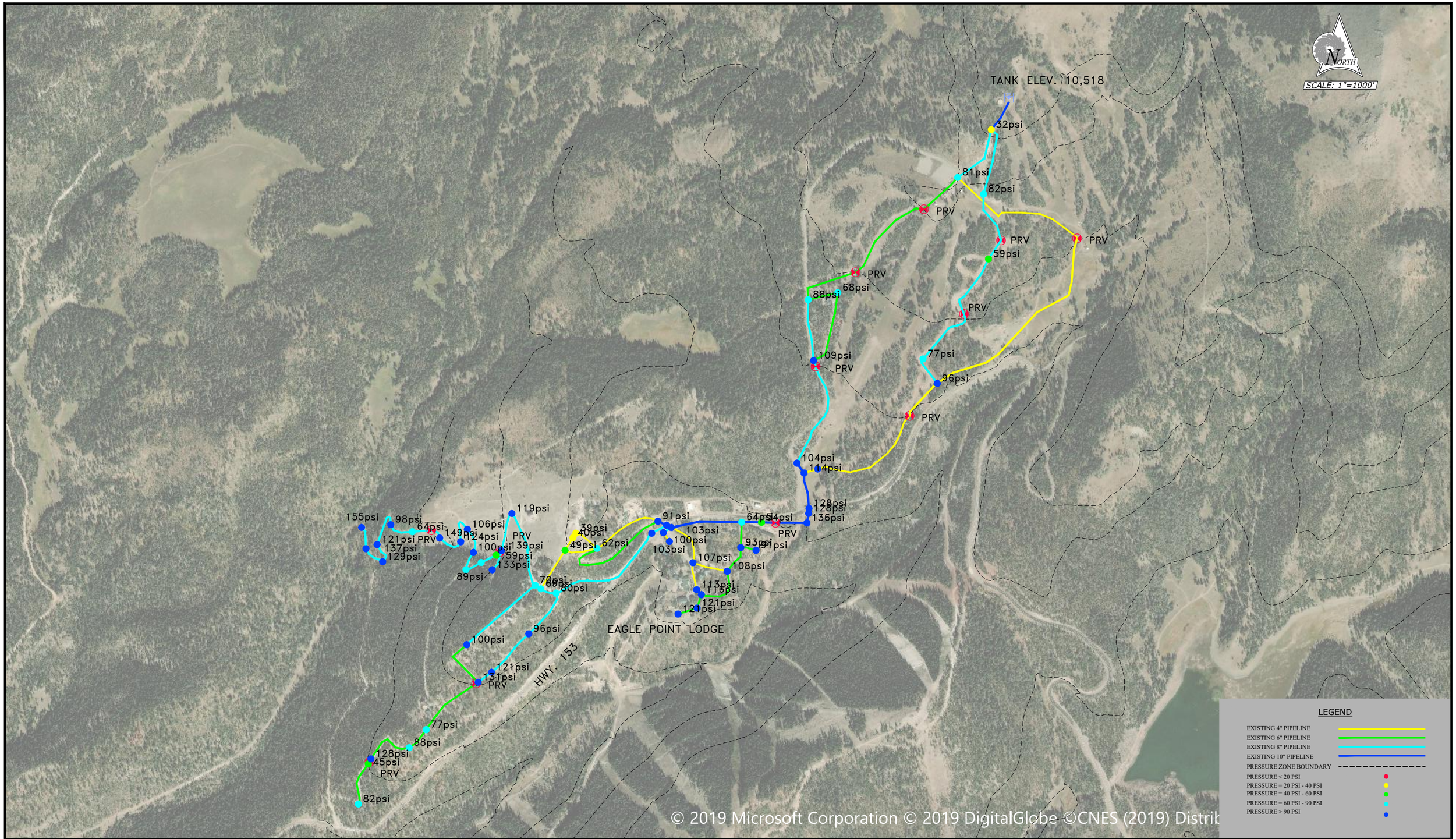
Conceptual financing plans have been prepared and included in Appendix B for four scenarios, to include typical stand-alone funding packages from each of the two funding agencies mentioned above, and a scenario representing a possible combined funding approach with a combination of funds from each entity. Based on the conceptual financing plans, the projected water rate required to cover the current estimated system costs (O&M plus existing debt service) and the projected new debt service for the recommended improvements is shown in Table 8.2. It is recommended that EMSSD proceed with the recommended improvements as soon as funding can be obtained.

**Table 8.2 Proposed Rate Schedule to Cover Recommended Improvements**

| Proposed Rates Based on Funding Type | | | | | |
|---|---|---|---|---|---|
| Fee Type | Current Rates (Quarterly) | Potential Rates (Quarterly) | | | |
| Funding Option | | USDA-RD + DDW | USDA-RD | DDW | CIB |
| Required Annual Revenue | $ 157,680.00 | 313,758.16 | $ 300,517.45 | $ 325,027.97 | 296,812.00 |
| Connected | $ 135.00 | $ 300.00 | $ 295.00 | $ 315.00 | $ 290.00 |
| Standby | $ 90.00 | $ 135.00 | $ 130.00 | $ 140.00 | $ 130.00 |
| System Obligation | $ 45.00 | $ 100.00 | $ 90.00 | $ 110.00 | $ 90.00 |

# EXHIBIT 1:

## *EXISTING SYSTEM – AVERAGE DAY DEMANDS*




# ELK MEADOWS SSD

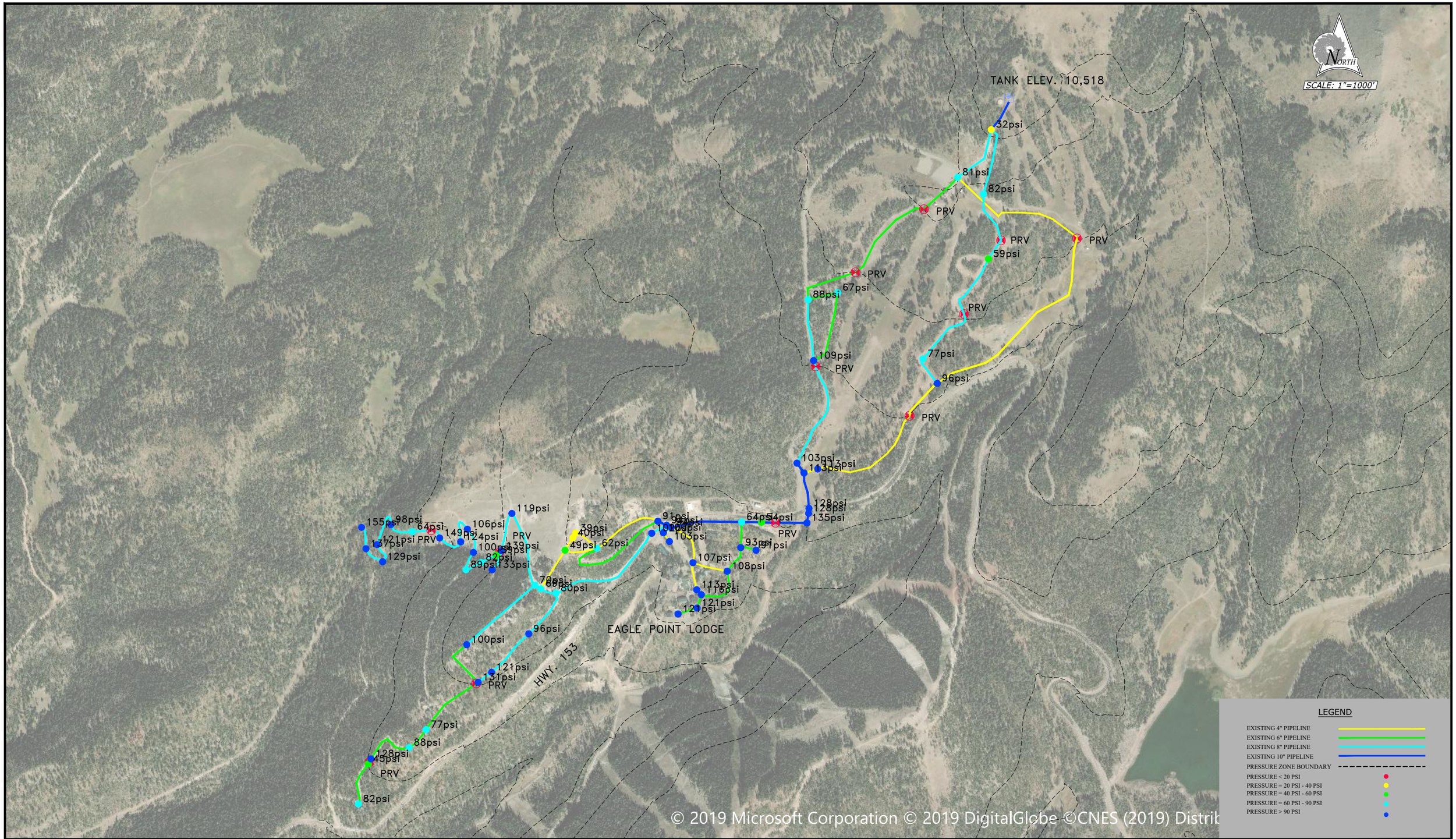
H20Net Model

Existing System Average Day Demand

SUNRISE ENGINEERING
25 EAST 500 NORTH
FILLMORE, UTAH 84631
TEL 435.743.6151 · FAX 435.743.7900
www.sunrise-eng.com

# EXHIBIT 2:

## *EXISTING SYSTEM – CURRENT PEAK INSTANTANEOUS DEMANDS*




# ELK MEADOWS SSD

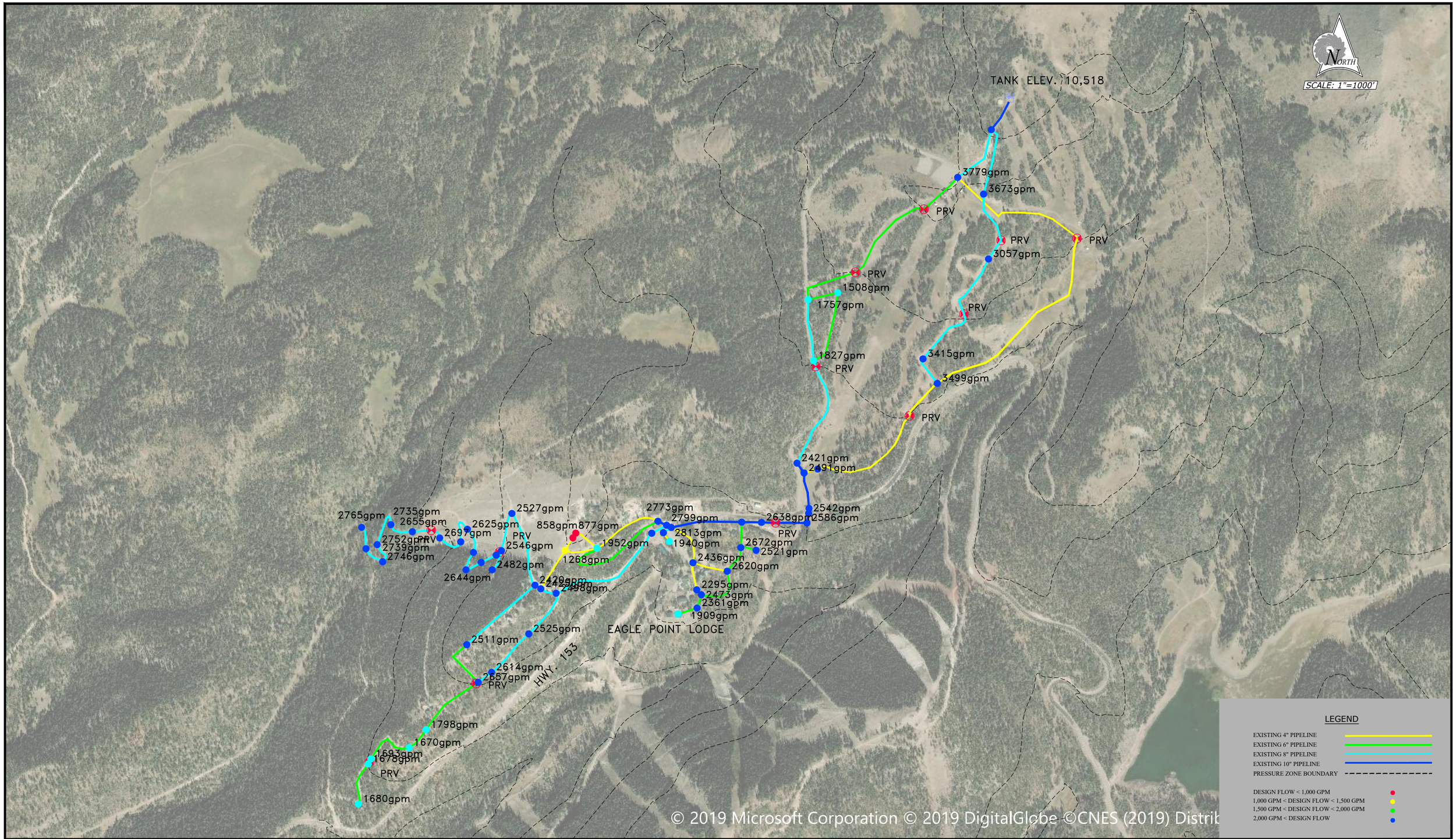
H20Net Model

Existing System Current Peak Instantaneous Demand

SUNRISE ENGINEERING
25 EAST 500 NORTH
FILLMORE, UTAH 84631
TEL 435.743.6151 · FAX 435.743.7900
www.sunrise-eng.com

# EXHIBIT 3:

## *AVAILABLE FIRE FLOW - CURRENT PEAK DAY DEMANDS*




# ELK MEADOWS SSD

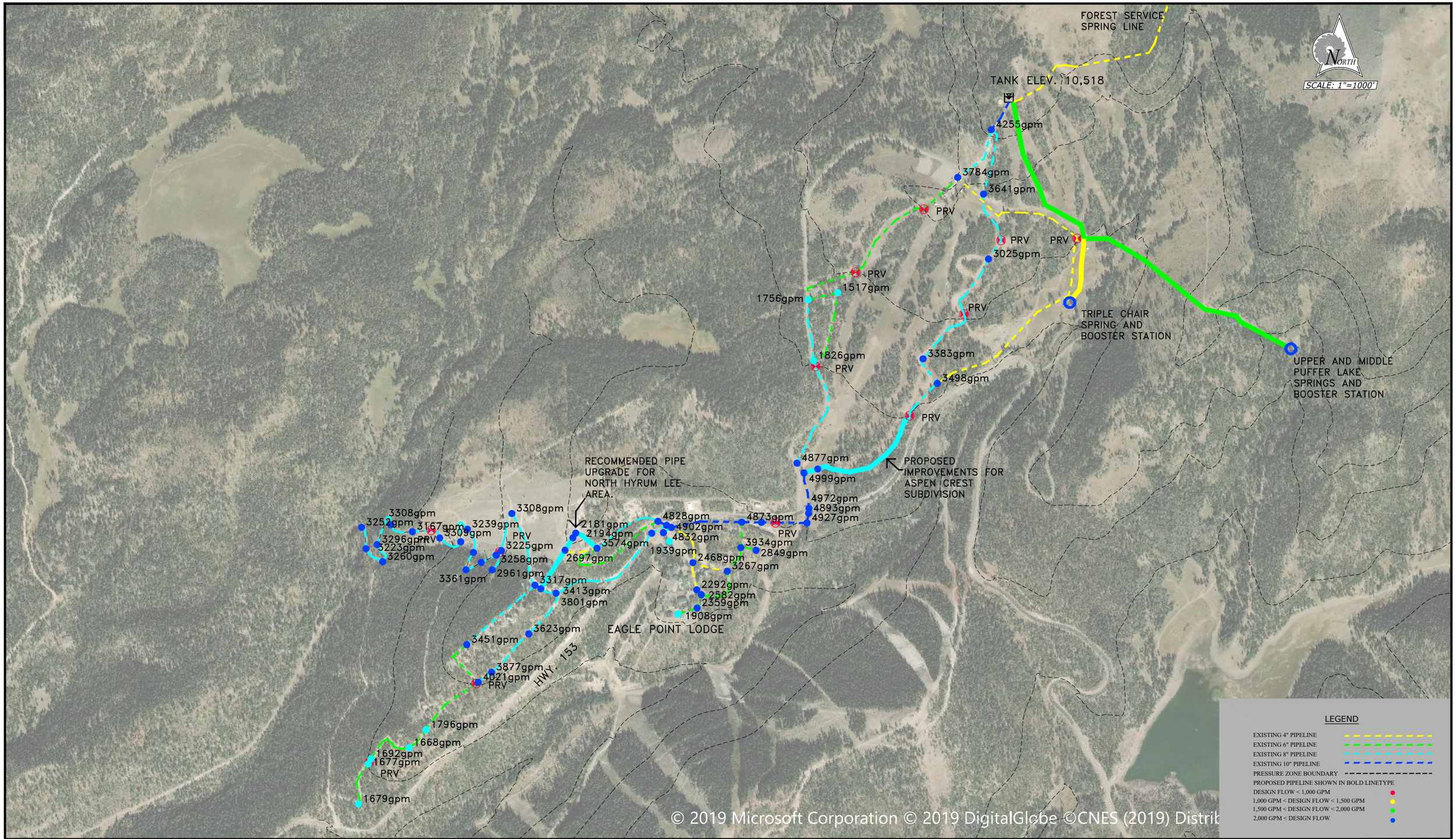
H20Net Model

Available Fire Flow
Current Peak Day Demands

SUNRISE ENGINEERING
25 EAST 500 NORTH
FILLMORE, UTAH 84631
TEL 435.743.6151 · FAX 435.743.7900
www.sunrise-eng.com

# EXHIBIT 4:

## *PROPOSED IMPROVEMENTS - 20 YR PROJECTED FIRE FLOW DEMANDS*




# ELK MEADOWS SSD

H20Net Model

Proposed Improvements
20 Yr Projected Fire Flow Demand

SUNRISE ENGINEERING
25 EAST 500 NORTH
FILLMORE, UTAH 84631
TEL 435.743.6151 · FAX 435.743.7900
www.sunrise-eng.com

# APPENDIX A:

## *ENGINEER'S OPINION OF PROBABLE COSTS*

**SUNRISE ENGINEERING, INC.**
CONSULTING ENGINEERS AND SURVEYORS

***Opinion of Probable Costs***

Project: EMSSD Culinary Water Improvements 2020
Recommended Improvements

By: AF
Date: Mar-20

**EMSSD CULINARY WATER SYSTEM - RECOMMENDED IMPROVEMENTS**

| ITEM NO. | ITEM | QUANTITY | UNIT | UNIT PRICE | TOTAL |
|---|---|---|---|---|---|
| 1 | MOBILIZATION (5%) | 1 | LS | $ 95,000.00 | **$ 95,000** |
| | **TRIPLE CHAIR SPRING IMPROVEMENTS** | | | | |
| 2 | Clear and Grub Spring Site | 1 | L.S. | $ 6,000.00 | $ 6,000 |
| 3 | Spring Exploration/Development | 25 | Hr. | $ 225.00 | $ 5,625 |
| 4 | Bentonite | 7 | Tons | $ 450.00 | $ 3,150 |
| 5 | (40 mil) Polyethylene Liner (Cut Off Wall) | 3,050 | Sq. Ft. | $ 4.00 | $ 12,200 |
| 6 | (40 mil) Polyethylene Liner (Surface Liner) | 9,050 | Sq. Ft. | $ 3.00 | $ 27,150 |
| 7 | 6" Collection Pipe and Fittings | 235 | Ln. Ft. | $ 75.00 | $ 17,625 |
| 8 | 8" Pipe & Fittings | 150 | Ln. Ft. | $ 30.00 | $ 4,500 |
| 9 | Import Pipe Bedding | 150 | Ln. Ft. | $ 2.50 | $ 375 |
| 10 | 8" Gate Valve | 2 | Each | $ 2,000.00 | $ 4,000 |
| 11 | 1.5" Drain Gravel | 175 | Cu. Yd. | $ 60.00 | $ 10,500 |
| 12 | Geotextile Fabric (Nonwoven) | 340 | Sq. Yd. | $ 14.00 | $ 4,760 |
| 13 | 1" Air Vent | 3 | Each | $ 500.00 | $ 1,500 |
| 14 | Spring Collection Box | 1 | Each | $ 12,000.00 | $ 12,000 |
| 15 | Rip Rap | 12 | Cu. Yds. | $ 50.00 | $ 600 |
| 16 | Reseed Spring Areas | 1 | L.S. | $ 2,000.00 | $ 2,000 |
| 17 | Stock Fence and Gates | 150 | Ln. Ft. | $ 15.00 | $ 2,250 |
| 18 | Drainage Channel | 450 | Ln. Ft. | $ 8.00 | $ 3,600 |
| | **Subtotal Spring Development** | | | | **$ 117,835** |
| | **TRIPLE CHAIR SPRING SUPPLY LINE** | | | | |
| 19 | 4" Culinary Water Line | 800 | Ln. Ft | $ 32.00 | $ 25,600 |
| 20 | Pipe Bedding | 800 | Ln. Ft | $ 2.50 | $ 2,000 |
| 21 | Solid Rock Excavation | 200 | Ln. Ft | $ 35.00 | $ 7,000 |
| 22 | 4" Gate Valve | 2 | Each | $1,800.00 | $ 3,600 |
| 23 | 2" Combination Air Valve | 2 | Each | $4,500.00 | $ 9,000 |
| 24 | Waterline Connection | 1 | Each | $3,000.00 | $ 3,000 |
| | **Subtotal Triple Chair Spring Supply Line** | | | | **$ 50,200** |
| | **TRIPLE CHAIR SPRING BOOSTER STATION** | | | | |
| 25 | Site Work and Grading | 1 | LS | $ 5,000.00 | $ 5,000 |
| 26 | Booster Station Concrete Building | 1 | LS | $ 65,000.00 | $ 65,000 |
| 27 | Booster Station Piping, Valves, and Fittings | 1 | LS | $ 30,000.00 | $ 30,000 |
| 28 | Electrical | 1 | LS | $ 35,000.00 | $ 35,000 |
| 29 | Pump System | 1 | Each | $ 45,000.00 | $ 45,000 |
| | **Subtotal Triple Chair Spring Booster Station** | | | | **$ 180,000** |
| | **PUFFER LAKE SPRING BOOSTER STATION** | | | | |
| 30 | Site Work and Grading | 1 | LS | $ 5,000.00 | $ 5,000 |
| 31 | Booster Station Concrete Building | 1 | LS | $ 65,000.00 | $ 65,000 |
| 32 | Booster Station Piping, Valves, and Fittings | 1 | LS | $ 30,000.00 | $ 30,000 |
| 33 | Electrical | 1 | LS | $ 35,000.00 | $ 35,000 |
| 34 | Pump System | 1 | Each | $ 45,000.00 | $ 45,000 |
| | **Subtotal Puffer Lake Spring Booster Station** | | | | **$ 180,000** |
| | **PUFFER LAKE SPRING SUPPLY LINE** | | | | |
| 35 | 6" Culinary Water Line | 4,600 | Ln. Ft | $ 35.00 | $ 161,000 |
| 36 | Imported Pipe Bedding | 4,600 | Ln. Ft | $ 2.50 | $ 11,500 |
| 37 | Solid Rock Excavation | 2,300 | Ln. Ft | $ 35.00 | $ 80,500 |
| 38 | 6" Gate Valve | 4 | Each | $3,000.00 | $ 12,000 |
| 39 | 2" Combination Air Valve Assembly | 3 | Each | $4,500.00 | $ 13,500 |
| 40 | Waterline Connection | 1 | Each | $3,000.00 | $ 3,000 |
| | **Subtotal Puffer Lake Spring Supply Line** | | | | **$ 281,500** |

| | | | | | |
|---|---|---|---|---|---|
| | **CONSTRUCT NEW 250,000 GAL CONCRETE STORAGE TANK** | | | | |
| | | | | | |
| 41 | Earthwork & Site Prep - 250k Gal Concrete Water Tank | 1 | LS | $ 50,000.00 | $ 50,000 |
| 42 | 250,000 Gal Concrete Water Tank | 1 | LS | $ 300,000.00 | $ 300,000 |
| 43 | Site Piping/Interconnect w/System | 1 | LS | $ 50,000.00 | $ 50,000 |
| 44 | Chain Link Fence & Gates | 1 | LS | $ 25,000.00 | $ 25,000 |
| 45 | Electrical & Instrumentation | 1 | LS | $ 20,000.00 | $ 20,000 |
| 46 | Land Purchase for Tank | 1 | LS | $ 25,000.00 | $ 25,000 |
| | | | | | |
| | **Subtotal 250,000 Concrete Water Tank** | | | | **$ 470,000** |
| | | | | | |
| | **INTEGRATED SYSTEM WIDE SCADA SYSTEM** | | | | |
| | | | | | |
| 47 | Instrumentatation & Control - Tanks | 1 | LS | $ 15,000.00 | $ 15,000 |
| 48 | Instrumentation & Control - Primary Well | 1 | LS | $ 15,000.00 | $ 15,000 |
| 49 | Instrumentation & Control - Booster Station | 1 | LS | $ 10,000.00 | $ 10,000 |
| 50 | Instrumentation & Control - Spring Site | 1 | LS | $ 10,000.00 | $ 10,000 |
| 51 | SCADA MTU/HMI | 1 | LS | $ 25,000.00 | $ 25,000 |
| | | | | | |
| | **Subtotal SCADA System** | | | | **$ 75,000** |
| | | | | | |
| | **RADIO READ METER INSTALLATION** | | | | |
| | | | | | |
| 52 | Radio Read Residential Meters | 57 | EA | $ 200.00 | $ 11,400 |
| 53 | Installation | 57 | EA | $ 300.00 | $ 17,100 |
| | | | | | |
| | **Subtotal Radio Read Meter Installation** | | | | **$ 28,500** |
| | | | | | |
| | **UPGRADED LINES FOR FIRE FLOW** | | | | |
| | | | | | |
| 54 | 8" Culinary Water Pipeline | 1,850 | Ln. Ft. | $ 38.00 | $ 70,300 |
| 55 | Imported Pipe Bedding | 1,850 | Ln. Ft. | $ 2.50 | $ 4,625 |
| 56 | Solid Rock Excavation | 463 | Ln. Ft. | $ 35.00 | $ 16,188 |
| 57 | 8" Gate Valve | 5 | EA | $ 3,200.00 | $ 16,000 |
| 58 | 2" Combination Air Valve Assembly | 1 | EA | $ 4,500.00 | $ 4,500 |
| 59 | Reconnect Exist Services | 3 | EA | $ 300.00 | $ 900 |
| 60 | UBC | 150 | CY | $ 25.00 | $ 3,750 |
| 61 | 3" HMA Trench Patch | 800 | SY | $ 30.00 | $ 24,000 |
| 62 | Connections to Existing Pipelines | 5 | EA | $ 2,000.00 | $ 10,000 |
| | | | | | |
| | **Subtotal Upgraded Lines for Fire Flow** | | | | **$ 150,263** |
| | | | | | |
| | **Construction Subtotal** | | | | **$ 1,628,298** |
| 63 | **Contingency** | 20% | Est. | $ 326,000 | $ 326,000 |
| | **Total Construction** | | | | **$ 1,954,298** |
| | | | | | |
| | **INCIDENTALS & PROFESSIONAL SERVICES** | | | | |
| | | | | | |
| 64 | Incidentals & Professional Services | | 20% | (of construction) | $ 390,860 |
| 64 | Environmental Assessment | 1 | EA | $ 50,000.00 | $ 50,000 |
| 65 | Preliminary Engineering Report (for RD Funding only) | 1 | EA | $ 30,000.00 | $ 30,000 |
| | | | | | |
| | **Incidentals & Professional Services Total** | | | | **$ 470,860** |
| | | | | | |
| | **TOTAL PROJECT COST** | | | | **$ 2,425,157** |

*In providing opinions of probable construction cost, the Client understands that the Engineer has no control over costs or the price of labor, equipment or materials., or over the Contractor's method of pricing, and that the opinion of probable construction cost provided herein is made on the basis of the Engineer's qualifications and experience. The Engineer makes no warranty, expressed or implied, as to the accuracy of such opinions compared to bid or actual costs.*

# APPENDIX B:

## *CONCEPTUAL FUNDING PLANS*

# EMSSD Water Improvements Project

## Proposed Funding Plan - RD + DDW

3/1/2020

| | | | | | |
|---|---|---|---|---|---|
| **Total Project Cost** | | | | **$** | **2,425,157.00** |
| **Proposed Funding:** | | | % of Project | | |
| Self Participation | | | 0% | | - |
| CDBG Grant | | | 0% | | - |
| Drinking Water Loan | | | 50% | | 1,212,578.50 |
| Drinking Water Grant | | | 0% | | - |
| USDA RD Loan | | | 50% | | 1,212,578.50 |
| USDA RD Grant | | | 0% | | - |
| | | | 100% | | |
| | **Total Project Funding** | | | **$** | **2,425,157.00** |
| **Annual Expenses: (Projected)** | | | | | |
| 2018-2019 Year (Budgeted) | | | | | 157,680.00 |
| Total Operation and Maintenance | | | | | 157,680.00 |
| **Existing Debt Service:** | | | | | |
| Debt Service | | | | | 8,000.00 |
| Total Existing Debt Service | | | | | 8,000.00 |
| **New Debt Service:** | | | | | |
| DDW Loan | 30 | 2.50% | 1,212,578.50 | | $57,934.12 |
| USDA RD Loan | 40 | 2.50% | 1,212,578.50 | | $48,304.55 |
| 10% Debt Reserve | | | | | $10,623.87 |
| Total Estimated New Debt Service | | | | | $116,862.53 |
| **Total Annual Income Required** | | | | | **$282,542.53** |
| **Annual Income:** | | | | | |
| Total Number of Active ERC's Billed | | | | | 340 |
| Total Annual Income Required | | | | | 282,542.53 |
| Total Annual Income Required w/ 1.25% debt service coverage | | | | | 313,758.16 |
| Average Monthly Water User Rate | | | | | **$76.90** Month |
| Average Quarterly Total Water User Rate | | | | | **$230.70** Qtr. |

# EMSSD Water Improvements Project

## Proposed Funding Plan - DDW

3/1/2020

| | | | | | |
|---|---|---|---|---|---|
| **Total Project Cost** | | | | **$** | **2,395,157.00** |
| **Proposed Funding:** | | | % of Project | | |
| Self Participation | | | 0% | | - |
| CDBG Grant | | | 0% | | - |
| Drinking Water Loan | | | 100% | | 2,395,157.00 |
| Drinking Water Grant | | | 0% | | - |
| CIB Loan | | | 0% | | - |
| CIB Grant | | | 0% | | - |
| USDA RD Loan | | | 0% | | - |
| USDA RD Grant | | | 0% | | - |
| | | | 100% | | |
| | | **Total Project Funding** | | **$** | **2,395,157.00** |
| **Annual Expenses: (Projected)** | | | | | |
| 2017-2018 Year Actual | | | | | 157,680.00 |
| | | Total Operation and Maintenance | | | 157,680.00 |
| **Existing Debt Service:** | | | | | |
| Debt Service | | | | | 8,000.00 |
| | | Total Existing Debt Service | | | 8,000.00 |
| **New Debt Service:** | | | | | |
| DDW Loan | 30 | 2.50% | 2,395,157.00 | | $114,434.93 |
| 10% Debt Reserve | | | | | $11,443.49 |
| | | Total Estimated New Debt Service | | | $125,878.38 |
| | | **Total Annual Income Required** | | | **$291,558.38** |
| **Annual Income:** | | | | | |
| Total Number of Active ERC's Billed | | | | | 340 |
| Total Annual Income Required | | | | | $291,558.38 |
| Total Annual Income Required w/ 1.25% debt service coverage | | | | | 325,027.97 |
| Average Monthly Water User Rate | | | | | **$79.66** Month |
| Average Quarterly Total Water User Rate | | | | | **$238.99** Qtr. |

# EMSSD Water Improvements Project

## Proposed Funding Plan - USDA-RD

3/1/2020

| | | | | |
|---|---|---|---|---|
| **Total Project Cost** | | | **$** | **2,425,157.00** |
| **Proposed Funding:** | | % of Project | | |
| Self Participation | | 0% | | - |
| CDBG Grant | | 0% | | - |
| Drinking Water Loan | | 0% | | - |
| Drinking Water Grant | | 0% | | - |
| CIB Loan | | 0% | | - |
| CIB Grant | | 0% | | - |
| USDA RD Loan | | 100% | | 2,425,157.00 |
| USDA RD Grant | | 0% | | - |
| | | 100% | | |
| | **Total Project Funding** | | **$** | **2,425,157.00** |

**Annual Expenses: (Projected)**

| | | | | |
|---|---|---|---|---|
| 2017-2018 Year Actual | | | | 157,680.00 |
| | Total Operation and Maintenance | | | 157,680.00 |
| **Existing Debt Service:** | | | | |
| Debt Service | | | | 8,000.00 |
| | Total Existing Debt Service | | | 8,000.00 |
| **New Debt Service:** | | | | |
| USDA RD Loan | 40 | 2.50% | 2,425,157.00 | $96,609.10 |
| 10% Debt Reserve | | | | $9,660.91 |
| | Total Estimated New Debt Service | | | $106,269.96 |
| | **Total Annual Income Required** | | | **$271,949.96** |

**Annual Income:**

| | | |
|---|---|---|
| Total Number of Active ERC's Billed | 340 | |
| Total Annual Income Required | $271,949.96 | |
| Total Annual Income Required w/ 1.25% debt service coverage | 300,517.45 | |
| Average Monthly Water User Rate | **$73.66** | Month |
| Average Quarterly Total Water User Rate | **$220.97** | Qtr. |

# EMSSD Water Improvements Project

## Proposed Funding Plan - CIB

3/1/2020

| | | | | | |
|---|---|---|---|---|---|
| **Total Project Cost** | | | | **$** | **2,395,157.00** |
| **Proposed Funding:** | | | % of Project | | |
| Self Participation | | | 0% | | - |
| CDBG Grant | | | 0% | | - |
| Drinking Water Loan | | | 0% | | - |
| Drinking Water Grant | | | 0% | | - |
| CIB Loan | | | 100% | | 2,395,157.00 |
| CIB Grant | | | 0% | | - |
| USDA RD Loan | | | 0% | | - |
| USDA RD Grant | | | 0% | | - |
| | | | 100% | | |
| | **Total Project Funding** | | | **$** | **2,395,157.00** |
| **Annual Expenses: (Projected)** | | | | | |
| 2017-2018 Year Actual | | | | | 157,680.00 |
| | Total Operation and Maintenance | | | | 157,680.00 |
| **Existing Debt Service:** | | | | | |
| Debt Service | | | | | 8,000.00 |
| | Total Existing Debt Service | | | | 8,000.00 |
| **New Debt Service:** | | | | | |
| CIB Loan | 30 | 1.50% | 2,395,157.00 | | $99,732.37 |
| 10% Debt Reserve | | | | | $9,973.24 |
| | Total Estimated New Debt Service | | | | $109,705.60 |
| | **Total Annual Income Required** | | | | **$267,385.60** |
| **Annual Income:** | | | | | |
| Total Number of Active ERC's Billed | | | | | 340 |
| Total Annual Income Required | | | | | $267,385.60 |
| Total Annual Income Required w/ 1.25% debt service coverage | | | | | 296,812.00 |
| Average Monthly Water User Rate | | | | | **$72.75** Month |
| Average Quarterly Total Water User Rate | | | | | **$218.24** Qtr. |

# APPENDIX C:

*EMSSD 2019 Proposed Budget*

**ELK MEADOWS SPECIAL SERVICE DISTRICT**
**2019 Proposed Budget**
**December 7, 2018**

| | | | |
|---|---|---|---|
| **REVENUES:** | | | |
| Water Charges | $ 157,680 | $ (21,600) | |
| Road Maintenance Charges | $ 144,680 | $ (24,820) | |
| Property Taxes - Fire Protection | $ 18,000 | | |
| Interest Income | $ 3,000 | | |
| Equipment Buy Back Program | $ 126,000 | | |
| Sundry Revenue | $ - | | |
| Contribution from fund balance | $ 66,239 | | |
| **TOTAL REVENUES & ASSESSMENTS** | $ 515,599 | | |
| **EXPENDITURES:** | | | |
| Salaries & Wages | $ 85,760 | | |
| Employee Benefits | $ 10,160 | | |
| FICA and Medicare | | 6560 | |
| Medical Insurance | | 3600 | |
| Depreciation | $ 84,000 | | |
| Travel, Meals, etc. | $ 2,000 | annual convention, other training | |
| Office Expense | $ 1,000 | | |
| Board Expense | $ 10,800 | | |
| Supplies & Maintenance | $ 107,000 | | |
| Equipment Rent | | $ 9,000 | backhoe |
| Equipment Parts & Repairs | | $ 12,000 | |
| Fuel | | $ 10,000 | |
| Road Maintenance Supplies | | $ 6,000 | |
| Water System Upgrade | | $ 20,000 | engineering |
| Mt. Holly Parking Area | | $ 50,000 | |
| Utilities | $ 6,000 | | |
| Accounting & Audit | $ 15,000 | | |
| Accounting | | $ 12,500 | |
| Audit | | $ 2,500 | |
| Attorney | $ 10,000 | | |
| Secretary | $ 4,800 | | |
| Other Professional Services | $ 1,000 | lab, other fees | |
| Insurance | $ 6,800 | | |
| Property and Casualty | | 5000 | |
| Workers Compensation | | 1800 | |
| Other Expenses | $ 5,000 | water stock assessments, other | |
| Fire Department Expenses | $ 37,279 | | |
| Fire Chief | | 6000 | |
| Employee Benefits | | 459 | FICA and Medicare |
| Insurance | | 1000 | building, equipment, workers comp |
| Supplies | | 500 | |
| Maintenance | | 500 | |
| Training | | 500 | |
| Utilities | | 13000 | electricity, telephone |
| Principal on Loan | | 14000 | |
| Interest on Loan | | 1320 | |
| Capital Expenditures | $ 129,000 | | equipment buy back program |
| Contribution to Fund Balance | | | |
| **TOTAL EXPENDITURES** | $ 515,599 | | |

Approved December 7, 2018

Dee Draney - Chairman

Dee Draney Chairman, EMSSD
12-7-18

**ELK MEADOWS SPECIAL SERVICE DISTRICT**
**2018 Budget Revision**
**December 7, 2018**

| | APPROVED 12/8/2017 | CHANGES 12/7/2018 | FINAL 12/7/2018 |
|---|---|---|---|
| REVENUES: | | | |
| Water Charges | $ 133,380 | $ 25,000 | $ 158,380 |
| Road Maintenance Charges | $ 112,040 | $ 33,000 | $ 145,040 |
| Property Taxes - Fire Prevention | $ 18,000 | $ - | $ 18,000 |
| Interest Earned | $ 2,400 | $ 2,000 | $ 4,400 |
| Equipment Buy Back Program | $ 128,000 | $ (2,000) | $ 126,000 |
| Other Revenue | $ - | $ 7,000 | $ 7,000 |
| Contribution From Fund Balance | $ 35,480 | $ (24,900) | $ 10,580 |
| TOTAL REVENUES & ASSESSMENTS | $ 429,300 | $ 40,100 | $ 469,400 |
| EXPENDITURES: | | | |
| Salaries & Wages | $ 73,000 | $ (3,000) | $ 70,000 |
| Employee Benefits | $ 5,600 | $ 3,000 | $ 8,600 |
| Depreciation | $ 84,000 | $ - | $ 84,000 |
| Travel | $ 2,000 | $ (500) | $ 1,500 |
| Office Expense | $ 1,000 | $ - | $ 1,000 |
| Supplies & Maintenance | $ 40,000 | $ 10,000 | $ 50,000 |
| Engineering | $ 10,000 | $ - | $ 10,000 |
| Utilities | $ 6,000 | $ - | $ 6,000 |
| Accounting & Audit | $ 15,000 | $ - | $ 15,000 |
| Attorney | $ 7,500 | $ 5,000 | $ 12,500 |
| Secretary | $ 4,000 | $ 500 | $ 4,500 |
| Other Professional Services | $ 1,000 | $ - | $ 1,000 |
| Insurance | $ 7,000 | $ (500) | $ 6,500 |
| Other Expenses | $ 5,000 | $ 1,000 | $ 6,000 |
| Fire Department Expenses | $ 24,000 | $ 3,000 | $ 27,000 |
| Loan Principal | $ 14,000 | $ 14,000 | $ 28,000 |
| Loan Interest | $ 2,200 | $ (400) | $ 1,800 |
| Capital Expenditures | $ - | $ - | $ - |
| Equipment Buy Back Program | $ 128,000 | $ 2,000 | $ 130,000 |
| Snowmobile | $ - | $ 6,000 | $ 6,000 |
| Contribution to Fund Balance | $ - | $ - | $ - |
| TOTAL EXPENDITURES | $ 429,300 | $ 40,100 | $ 469,400 |

Approved December 7, 2018

Dee Draney, Chairman

Dee Draney EMSSD Chairman

12/7/18