PLUMMER

MEMORANDUM

Project Name: **2022 Development Impact Review**

Project No: 4123-010-07

Date: August 30, 2022

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1 INTRODUCTION

The Town of Bayfield (Town) is anticipating ten separate developments within and adjacent to the existing water distribution area. Figure 1 (attached) shows the locations and anticipated Equivalent Unit (EU) loadings to the water system for each development and the major components of the water distribution system. Plummer has prepared this memo on behalf of the Town to summarize the predicted impacts to potable water pumping and storage capacity.

The most recent Water Master Plan (completed in 2018) included 1,266 EU's of loading to the water model and a Town Comprehensive Plan (completed in early 2018) predicted a more gradual growth rate than currently estimated. The 2018 Comprehensive Plan predicted a growth of approximately 440 EU's during the ten-year period between 2020 and 2030; while the anticipated developments are expected to add approximately 884 additional EU's over a similar period, which represents a 67% increase in water demand to the Town system.

The water model is set to simulate a maximum month daily demand for all existing customers, plus the added demands of the proposed developments. This demand level is the standard basis for tank sizing and evaluation of treatment and pumping capacities. The following sections discuss pumping and storage capacity, and the potential impact from the anticipated developments.

2 PUMPING CAPACITY

Water supply to the distribution system is pumped from the finished water tank at the treatment facility to a storage tank site on Tamarack Drive. Most of the Town service area is supplied water pressure which is based on the elevation of water in the Tamarack Tanks. A booster pump station located adjacent to these tanks conveys water uphill to the Highland Storage Tank which provides pressure for a second service area.

2.1 FINISHED WATER PUMPING

Pumping of treated water to distribution is provided by three existing pumps which can convey the full capacity of the treatment facility. While the treatment facility is sized to process up to 2.5 Million Gallons per Day (MGD), 0.75 MGD is dedicated to the La Plata Archuleta Water District (LAPLAWD) leaving the Town an allotted treatment capacity of 1.75 MGD. The additional demand from the proposed developments is predicted to lead to a maximum month daily demand of approximately 1.75

MGD for Town consumption. The combination of growth within the Town and LAPLAWD service areas may compel the Town to install the planned 1 MGD expansion to the treatment facility. It is recommended to monitor the build-out rate of the developments and move forward with expansion of both treatment and finished water pumping capacity when demand exceeds 80% of plant capacity; this demand level may be reached near the full build out of the anticipated developments.

2.2 HIGHLANDS TANK BOOSTER

The Highlands Tank Booster is a duplex pump system that conveys water from the Tamarack Tank site uphill to the Highlands Tank. These pumps have been in service for approximately 20 years. The installation was designed to convey 400 gallons per minute (gpm), although recent testing showed approximately 325 gpm. Under average usage, the booster pump typically runs once per day to refill the Highlands Tank; and Staff report that during peak water usage the pump may run twice per day. With the additional loading from potential developments, the pump may run up to 4 times per day to refill the existing tank. Due to the equipment age and loss of pumping capacity, pump replacement is recommended before the anticipated developments are constructed.

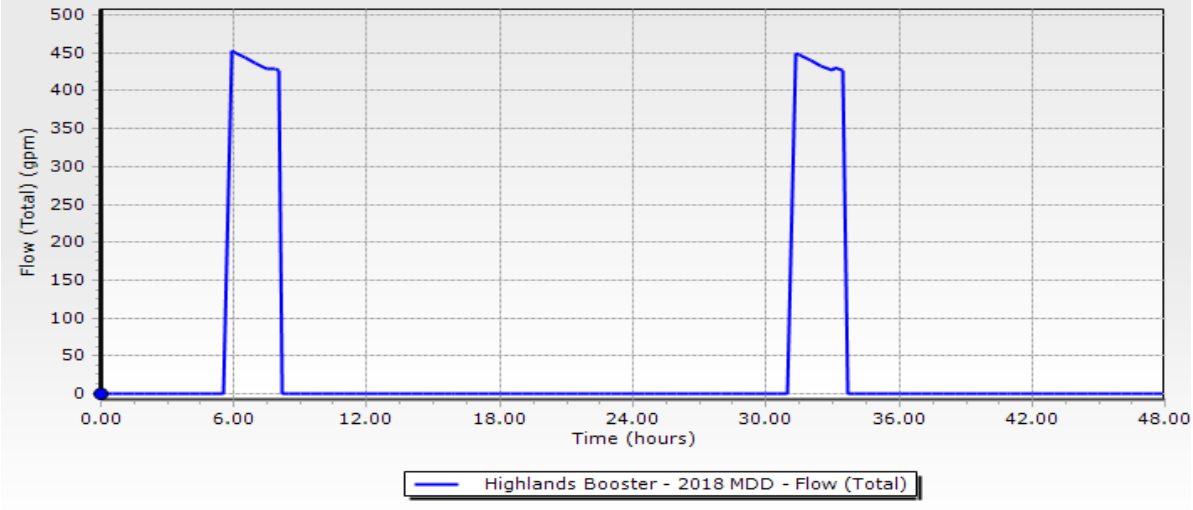

Figure 2-1. Highlands Booster Pump Existing Loading

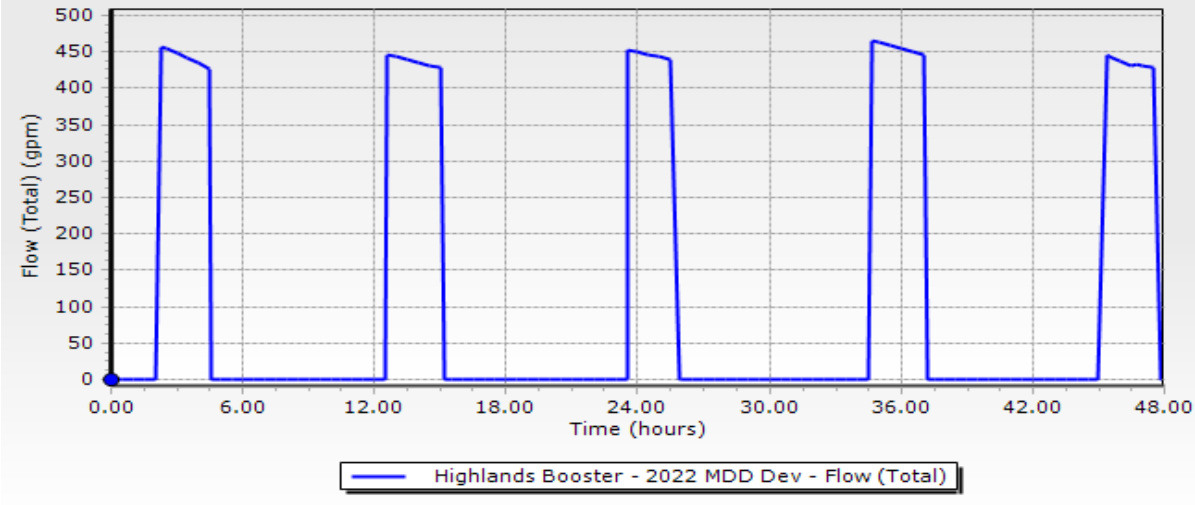

Figure 2-2. Highlands Booster Pump Future Loading

3 STORAGE CAPACITY

Bayfield has a total storage capacity of 1.75 Million Gallons (MG) split between two sites, providing pressure to different service elevations. The 2018 Master Plan noted a Town standard to maintain two days of storage capacity under maximum month demand conditions, although the State Health Department only requires one day of storage for average daily demands. Days of storage is determined by comparing customer usage to the available storage volume.

3.1 TAMARACK DRIVE TANK SITE

There are three existing ground level steel storage tanks at the Tamarack Drive Tank site. Two 0.25 MG and one 1.0 MG tanks operate at a shared water level and provide water pressure to most of the Town and LAPLAWD's service area. The smaller tanks were built in 1977 and 1989, and the larger tank in 2007; the two older tanks were most recently recoated in 2011. The tanks are filled by the pumps at the treatment facility. This tank site is space limited and cannot accommodate further expansion without demolishing one or both 0.25 MG tanks. The 1.0 MG tank has a 12-inch diameter pipe stubbed out to the east for a future connection that may work for connecting the Bayfield East Annexation service area.

In addition to the Tamarack Tank volume, there is also 0.5 MG of finished water storage at the WTP; most of which can be pumped into distribution as needed. The adjacent area to the proposed Bayfield East Annexation has land at a similar elevation to the Tamarack Tank site, and the Town may benefit from negotiating an easement (or ownership) for additional storage expansion. Table 3-1 presents the predicted average and maximum monthly demands to this service area, including demands from the anticipated developments.

Table 3-1. Predicted Future Tamarack Tank Service Area Water Demand

Loading Scenario	Water Demand (MGD)
Average Daily Demand	0.7
Maximum Month Daily Demand	1.5

At the predicted future loading, the existing tank capacity would satisfy State requirements but not meet the Town's 2-day storage standard. Assuming successful negotiation of land adjacent to the existing tank site, a future tank expansion could provide increased volume to maintain the 2-day standard. This would require an additional 1.5 MG of storage capacity, though the age of the 0.5MG tanks should be considered in planning a future tank expansion and the potential need for increased sizing. However, the 0.5 MG tanks were recoated in 2011 and remain in good condition, and were each drained and visually inspected in 2022.

3.2 HIGHLANDS TANK

The Highland's Tank is a partially buried concrete storage tank that provides 0.25 MG of storage. To maintain storage for a potential fire flow event (2 hours of 1,000 gpm flow requires 0.12 MG of water), this tank is operated to keep the level more than half full and can only provide 0.12 MG for normal usage with the remaining portion reserved for a possible fire event. Existing average conditions show approximately 1 day of storage in this tank, although staff report it may be less than 1 day during peak usage. The additional demand to the upper pressure zone is predicted to require this tank to refill up to 4 times per day. Table 3-2 presents the predicted average and maximum monthly demands to the Highlands Tank service area after buildout of the proposed developments; the volume comparison

shows 2 days of storage during future average conditions and 1 day during peak usage.

Table 3-2. Predicted Future Highland Tank Service Area Water Demand

Loading Scenario	Water Demand (MGD)
Average Daily Demand	0.12
Maximum Month Daily Demand	0.25

Additional storage capacity is recommended in this service area before significant growth occurs. To maintain the 2-day storage standard with predicted future demands, the distribution system will require an additional 0.25 MG of storage capacity.

4 SUMMARY

The addition of 844 household demands to the water system represents a potential 67% increase in water demand on the Town distribution system. Much of the growth (703 EU's) is expected to occur in the area served by the Tamarack Tank site, while 181 EU's are anticipated to be added to the Highlands Tank service area.

Table 4-1. Predicted Future Total Water Demand

Loading Scenario	Water Demand (MGD)
Average Daily Demand	0.83
Maximum Month Daily Demand	1.75

The Tamarack Tank service area currently serves approximately 1,153 EU's and the anticipated developments may add 703 for a total of 1,856 EU's. This represents a 60% increase in water demand for this service area. There is 1.5 MG of storage in this service area, which could continue to provide 2 days of storage during predicted average daily conditions, and 1 day under maximum month demands. Negotiation of adjacent land to enable future storage expansion at this elevation is recommended as part of the Bayfield East Annexation. To maintain the 2-day storage standard, an additional 1.5 MG of storage volume would be needed; this project would likely parallel the expansion of capacity at the water treatment facility or possibly be completed shortly before plant expansion. To strictly maintain the 2-days of storage, expansion would need to occur after approximately 400 additional EUs are added to this service area.

The Highlands Tank service area currently serves approximately 115 EU's and the developments may add 181 units for a future total of 294 EU's in this service area. This represents over a 150% increase in water demand. The pumps providing water to this area are aging and recent testing showed a notable reduction in capacity from the design conditions. Replacement pumps and additional storage capacity are recommended for the Highlands service area before the related developments begin significant buildout (approximately added 30 EUs). Construction of an additional 0.25 MG of water storage would provide 2-days of storage for future demands.

PINE VALLEY EVENT CENTER
MODELED AS 15 EUs

HIGHLANDS TANK SITE
(0.25 MG STORAGE)

TAMARACK TANK SITE
(1.5 MG STORAGE)

PLANNED DEVELOPMENT
MODELED AS 100 EUs

BAYFIELD WTP
(1.75 MGD CAPACITY
TO TOWN)

BAYFIELD EAST ANNEXATION
MODELED AS 519 EUs TOTAL
166 EUs ON HIGHLAND TANK
353 EUs ON TAMARACK TANKS

L-J RANCH DEVELOPMENT
MODELED AS 8 EUs

CINNAMON HEIGHTS
MODELED AS 30 EUs

PARKWAY ANNEXATION
MODELED AS 67.5 EUs

HAGA ANNEXATION
MODELED AS 145 EUs

ORCHARD PLANNED
UNIT DEVELOPMENT
MODELED AS 14 EUs

MARLIN TINY HOME VILLAGE
MODELED AS 7.5 EUs

MOSELL ANNEXATION
MODELED AS 81 EUs

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BAYFIELD
COLORADO | WATER & SANITATION

TOWN OF BAYFIELD
WATER DISTRIBUTION MODEL
2022 DEVELOPMENT REVIEW MAP

FIGURE No. 1