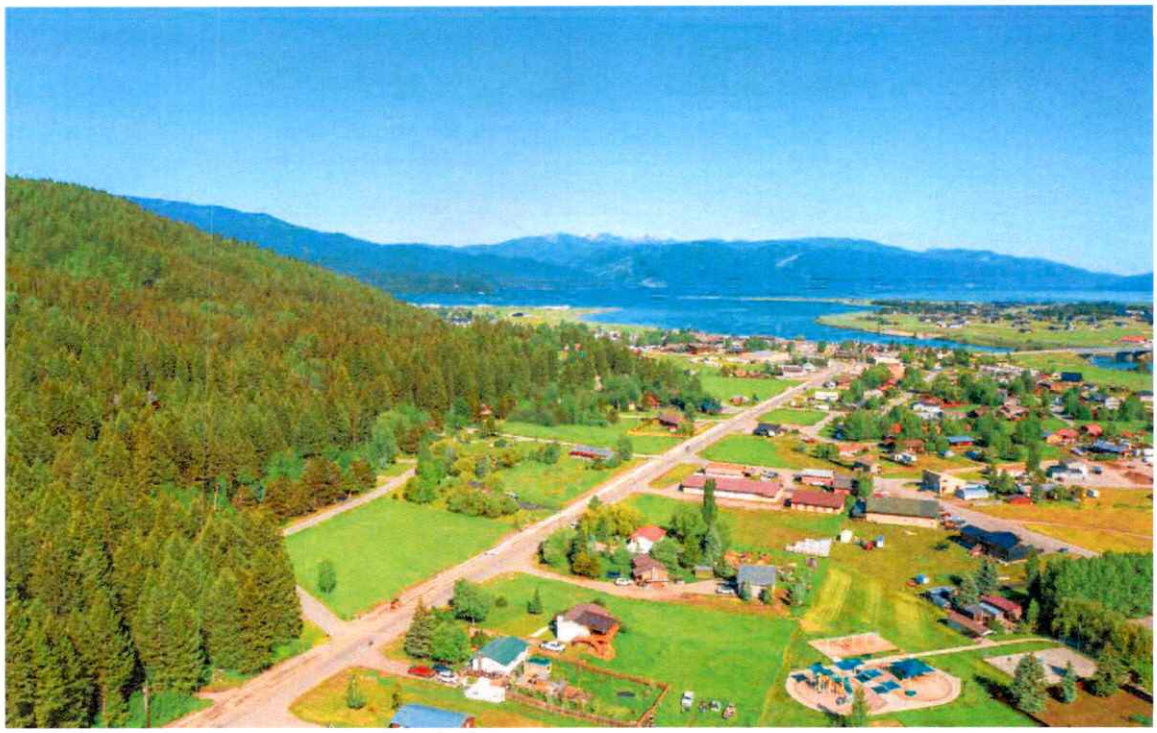

# MASTER PLAN REPORT
# LAKEVIEW OUTPOST ADDITION

JUNE 2025

SUNRISE ENGINEERING

**MASTER PLAN REPORT**

*LAKEVIEW OUTPOST ADDITION*

JUNE 2025


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# 1.0 Statement of Purpose and Land Uses

The Lakeview Outpost addition encompasses an approximate area of 0.93 acres. The property is located on the North side of HWY 89, roughly 200 feet to the west of the of the Star Lane and HWY 89 intersection.


**Figure 1: Lakeview Outpost Development Location**

The purpose of this development is to be platted as a townhome development with general common areas and limited common areas. There are six planned units on this property, each unit consists of a single "townhome" style unit and the underlying land.

Unit 1 consists of an existing two story apartment building. The building has six apartment units, three on each floor for a total square footage of 4800 square feet (sf).

Units 2-4 are proposed to be live/work units. These two story units are 1,800 sf (900 per floor). They will be constructed to have a commercial space on the main level and living quarters on the second floor for the unit owner.

Units 5 and 6 are proposed commercial units. The units will consist of two individual two story buildings, connected by a staircase. Each unit will have two 1,500 sf business suites.

Limited Common Elements (LCE's) and General Common Elements (GCE's) are assigned to the units as shown on the plat map. Each unit will have ownership of the limited common element specific to each unit as shown on the plat. General common elements will be provided for all units within the development. **Figure 1.2** (Figures Section) shows an advance plat for the proposed addition.

## 2.0 Development Schedule

Unit 1 has already been developed as an existing apartment building. This was completed in the fall of 2024. Units 2-4 are proposed to be developed in the summer of 2026. Units 5-6 are proposed to begin construction in summer 2031.

## 3.0 Lots and Zoning

The Current Zoning for the property is Mixed Residential Commercial. The proposed usage will be consistent with the current zoning. The proposed development will be processed as a Planned Unit Development due to the minimum lot sizes for the zones. The proposed lots will be used for townhome style units. Limited Common Elements are assigned as parking paces for each lot and a General Common Element as the driveway and other open areas for utilities.

## 4.0 Suitability of Soils

The primary soil in the proposed Lakeview Outpost Addition is classified by the USDA Natural Resources Conservation Service (NRCS) as Hobacker gravelly loam (Hc). The NRCS Soils Map is attached in the Figures Section as **Figure 4.1.** This soil profile includes the following:

0-9 inches: gravelly loam

9 to 23 inches: very gravelly loam

23 to 30 inches: very gravelly sandy loam

30 to 60 inches: very gravelly loamy sand

The soil is "somewhat excessively drained" with a depth to water table of more than 80 inches. The soil has low risk of ponding and is in the hydrologic soil group B. The 1976 Soil Survey of Star Valley states this soil has slow runoff and slight erosion hazard. The permeability is between 6 to 20 inches per hour. The report further identifies this soil as being used for urban development.

The development will include water and sewer service extensions. These facilities will be placed from two to seven feet deep and will be in the portion of the soil profile containing up to 30% coarse fragments greater than three inches. Consequently, all buried water and sewer pipes will require imported bedding and shading. The native soils will be suitable for trench backfill above the shaded pipe. Boulders greater than 12 inches should be excluded from the lower levels of backfill closest to the shading. Screening of this material for bedding is possible, however the remains may not contain adequate "fines" for a suitable trench backfill.

The native Hc soil is classified as A-1 or A-2 under the AASHTO classification system and will be suitable for road subgrade, building foundation and other construction designed to support surface loads. It is non-plastic with low shrink-swell potential and low risk of frost action. The larger course fragments will hinder fine grading operations.

Based on the review of the Hc soil, the native soils are suitable for the proposed development and the urban construction likely to occur on the lot.

## 5.0 Compatibility with Adjacent Land Uses

The proposed development will be adjacent to land currently zoned C-Commercial and MRC-Mixed Residential and Commercial. The current MRC zoning is consistent with the current uses of land in the surrounding area. Growth in residential uses is expected in Alpine and this area where space is available.

## 6.0 Housing

Alpine is one of the fastest growing areas in Lincoln County. This is due to the attraction of commuters due to its proximity of Jackson and the natural amenities offered by the mountains and surrounding area. The need for housing in alpine is evidenced by recent construction of apartment buildings including the apartment building on Boardwalk Drive. Other apartment buildings have been proposed in the Alpine area as well. Snake River Junction was master planned for mixed residential/commercial use, but the area slated for that development is now an RV park. Five of the lots zoned MRC land within Alpine Meadows are proposed to be employee housing for St. John's Medical Center because of the ongoing housing shortage in the Jackson area.

## 7.0 Planned Water System

Alpine's water system has grown from a system serving only on the south side of Snake River to a system that serves both sides of the river. The system has two storage tanks on the south side of the river and after acquisition of the North-Star utility system the Town now has a well and tank on the north side of the river. The facilities were combined and linked via a 12" pipeline hung on the WYDOT bridge crossing the Snake River in about 2012. The following descriptions have been developed utilizing information from the 2008 Star Valley Regional Master plan and combined with current data to provide an overview of the system. Additionally, information was taken from data obtained from the Town in the currently ongoing WWDC Master Plan report.

### 7.1 Water Users

In 2008 Alpine had 379 residential connections (single family dwellings and apartments) and 34 commercial connections. North-Star Utilities had a handful of residential customers. As of April 2025, the total connections are about 638 with most growth occurring in residential connections. Typically, water use is analyzed in terms of equivalent residential units (ERUs) where the water used by each connection is compared to that of an average house. For the purposes of this study, the existing connections were grouped into 2 categories. **Table 7.1** summarizes the connections.

**Table 7.0.1: Connections and ERU's**

| TABLE 7.1.1 - CONNECTIONS AND EQUIVALENT RESIDENTIAL UNITS (ERUS) | Existing Connections | Existing ERU's per Unit | Total Existing ERU's |
|---|---|---|---|
| Residential Dwellings | 617 | 1 | 617 |
| Small Commercial | 15 | 1 | 15 |
| Large Commercial | 6 | 4 | 24 |
| Institutional | 0 | .25 | 0 |
| **Total:** | **638** | | **656** |

## 7.2 Water Use

Water meter data taken from the past five years were analyzed for to estimate the total water use per connection within the system. The average water use for each ERU was recorded as approximately 360 Gallons Per Day (gpd). Judging from SCADA data, the maximum daily demand has maintained around 4 times the average daily demand. **Table 7.2.1** summarizes the water use for the years of 2020-2025.

**Table 7.2: 2020-2025 Alpine Water Use**

| | Alpine Water Use | |
|---|---|---|
| | (gpd) | (gpd/ERU) |
| Average Daily Demand | 759,000 | 1,157 |
| Maximum Daily Demand | 1,800,000 | 2,744 |

From **Table 7.2** the maximum daily demand in the City of Alpine Water System is given as 2,744 gpd/ERU. The addition of six ERU's would increase the demand by roughly 16,644 gpd at the maximum daily demand, which is equated to roughly 12 GPM. This demand was incorporated into the AquaTwin model and analyzed in Section 7.7.

## 7.3 Water Sources

The Alpine water system has six water sources: Alpine Well No. 1, Alpine Well No. 2, Alpine Well No. 3, Excel Development No. 1, Flying Saddle Well No. 1, and Flying Saddle Well No. 2.

### 7.3.1 ALPINE WELL NO. 1

Alpine Well No. 1 is located on Forest Service property just off the Greys River Road southeast of the Town. The well is cased to a total depth of 275 feet. Depth to the first water bearing formation is 60 feet. The well has a 50 hp submersible pump set at 175 feet and produces approximately 350 gpm. A 2006 investigation showed Well No. 1 is capable of a sustained pumping rate of 750 gpm during peak-use periods. To meet this peak rate the well would need to be outfitted with a larger pump and may require a water right appropriation increase. Operation of Well No. 1 is alternated with Well No. 2 to enhance the life of the pumps.

### 7.3.2 ALPINE WELL NO. 2

Alpine Well No. 2 is located 172 feet east of Well No 1. The well is 243 feet deep and is cased to a depth of 147 feet. At the time of drilling, static water depth was 85 feet. The well has a 50 hp submersible pump set at 156 feet and produces approximately 350 gpm. The 2006 investigation showed Well No. 2 can produce 600 gpm, but sustained pumping could cause air entrainment problems due to water cascading into the well through perforations above the pumping water level. Additionally, the well would need to be outfitted with a larger pump and water right appropriation increase to meet the higher 600-gpm pumping rate.

### 7.3.3 ALPINE DISTRICT WELL NO. 3

Well No. 3 is located near Wells No. 1 and 2. Well No. 3 was drilled in 2009 as part of a Wyoming Water Development Study. This well was placed in service sometime shortly after the study. this well has an Exisitng capacity of 450 gpm.

### 7.3.4 Excel Development No. 1

Excel Development No. 1 is located along the southwest edge of Alpine Lakes Subdivision Lot 1 approximately 175 feet southwest of US Highway 26. The well is 142 feet deep. The well is cased to a depth of 42 feet, screened from 42 feet to 102 feet, and cased from 102 feet to 142 feet. At the time of drilling, static water depth was 26 feet. A pump test revealed the well can produce upwards of 2,500 gpm. The well is currently outfitted to produce 500 gpm. To meet a higher peak rate the well would need to be outfitted with a larger pump and may require a water right appropriation increase.

### 7.3.5 Flying Saddle Well No. 1

Flying Saddle Well No. 1 was constructed as part of the North-Star Utility system but was not fully developed and is currently not in use. The well is located approximately 100 feet south of the Flying Saddle Lodge and south of Highway 89/26. The well is 260 feet deep and is cased to a depth of 120 feet. Static water level reportedly varies between 40 and 80 feet

depending on the water depth in Palisades Reservoir. A pump test at drilling showed the well has a production capacity of about 70 gpm.

### 7.3.6 Flying Saddle Well No. 2

Flying Saddle Well No. 2 was drilled as part of the North-Star Utility system. It is located on Lot 1 of the Flying Saddle Subdivision adjacent to the Flying Saddle Lodge/Restaurant building and approximately 100 feet northwest of Flying Saddle Well No. 1. The well is 160 feet deep and is cased to a depth of 100 feet. The remaining 60 feet of depth are screened. Static water level reportedly varies between 40 and 80 feet depending on the water depth in Palisades Reservoir. The well has a 20 hp submersible pump set at 95 feet and produces approximately 180 gpm.

### 7.3.7 Water Source Summary

A summary of the Town's water sources is shown below.

**Table 7.3.1: Alpine Water Sources**

| | Existing Capacity (gpm) | Potential Capacity (gpm) |
|---|---|---|
| Alpine Well No. 1 | 450 | 750 |
| Alpine Well No. 2 | 450 | 600 |
| Alpine Well No. 3 | 450 | 650 |
| Flying Saddle Well No. 1 | 70[1] | 305 |
| Flying Saddle Well No. 2 | 180[1] | 310 |
| Excel Development No. 1 | 500[2] | 2000 |
| Total | 1,350 | 4,615 |

[1] These wells are not currently in service

[2] This well is currently not connected to this part of the Town water system.

The Flying Saddle wells have been disconnected from the system by closed valves. Their production was not included in the existing capacity total (**Table 7.3.1** above). Additionally, the Excell Development No. 1 Well serves the Targhee Place, Alpine Lakes, and Timberview Apartments developments. It is not connected to the town system. The well is located in the Alpine Lakes development. For this reason, the Excell Development No. 1 Well was not included in the existing capacity total.

The Wyoming Department of Environmental Quality Rules and Regulations (WDEQ, 2023) regulations for public water sources were updated in 2023 and also reference the Ten State Standards. Applicable rules for the Town of Alpine Water System are referenced below.

1. ***Groundwater source development shall include two wells that are each capable of supplying the average daily demand with the largest well out of service, (WDEQ, 2023, p. 12-22).***

**Table 7.3.2** Summarizes the Water Source Capacity compared to the average daily demand on the system.

**Table 7.3.2 Water Source Capacity Compared to Average Day Demand**

| | | |
|---|---|---|
| Alpine Well #1 Capacity | 648,000 gpd | 450 gpm |
| +Alpine Well #2 Capacity | 648,000 gpd | 450 gpm |
| Alpine Well #3 Capacity (largest well, not included) | ~~648,000 gpd~~ | ~~450 gpm~~ |
| -Average Daily Demand (2050) | 759,000 gpd | 527 gpm |
| **Excess Capacity =** | **537,000 gpd** | **372 gpm** |

The town currently has multiple well sources. The Flying Saddle well production and Excell Development #1 Well production were not included as they are not currently connected to the main water system. From the above table, the town currently has an excess source capacity of 645,000 gpd. This equates to 557 ERU's (based on 1,157 gpd/ERU average daily demand).

2. *Groundwater source development shall include one well and finished water storage that together equal twice the maximum daily demand (WDEQ, 2023, p. 12-22).*

**Table 7.3.3** Summarizes the well and storage capacity compared to the twice the systems maximum daily demand.

**Table 7.3.3:**

| | |
|---|---|
| Well Capacity | 1,944,000 GPD |
| (+) Storage Capacity | 1,290,000 Gallons |
| (-) 2x Maximum Daily Demand | 2x 1,800,000 GPD |
| **Capacity Deficit** | **-36,600 gpd** |

Based on this analysis the town currently has a capacity Deficit of 36,600 gallons per day, or approximately 13 ERU's (based on 2744 gpd/ERU Max Daily Demand). This deficit could be managed by connection to another well source or by providing additional storage. Connecting the Excell Development No. 1 Well to the system, for example, would provide an additional 720,000 GPD of capacity (262 ERU's) and satisfy this requirement.

## 7.4 Water Rights

The Town of Alpine has municipal water rights for Alpine Wells No. 1, and No. 2 in the amounts of 350 gpm and 375 gpm. A summary of these and the Town's other water rights is shown below.

**Table 7.4: Alpine Water Rights**

| Permit | Source | Priority | Amount | Comments |
|---|---|---|---|---|
| U.W 39163 | Alpine Well No. 1 | 07/20/1977 | 200 gpm (0.445 cfs) | |
| U.W. 78067 | Alpine Well No. 1 | 12/27/1985 | 100 gpm (0.222 cfs) | Enlarged Alpine No. 1 |
| U.W. 98662 | Alpine Well No. 1 | 03/27/1995 | 50 gpm (0.111 cfs) | Enlarged Alpine No. 1 |
| U.W. 77717 | Alpine Well No. 2 | 06/23/1988 | 375 gpm (0.836 cfs) | |
| U.W. 101241 | Flying Saddle Well No. 1 | 12/12/1995 | 55 gpm (0.12 cfs) | |
| U.W. 178318 | Flying Saddle Well No. 1 | 09/12/2006 | 50 gpm (0.11 cfs) | Enlargement |
| U.W. 182139 | Flying Saddle Well No. 1 | 06/12/2007 | 200 gpm (0.45 cfs) | Enlargement |
| U.W. 101242 | Flying Saddle Well No. 2 | 12/12/1995 | 60 gpm (0.13 cfs) | |
| U.W 178319 | Flying Saddle Well No. 2 | 09/12/2006 | 50 gpm (0.11 cfs) | Enlargement |
| U.W. 182140 | Flying Saddle Well No. 2 | 06/12/2007 | 200 gpm (0.45 cfs) | Enlargement |
| U.W. 206257 | Excel Development No. 1 | 09/16/2016 | 500 gpm (1.11 cfs) | |

## 7.5 WATER STORAGE

The Alpine System after combining with North-Star Alpine has three storage tanks. One tank is a 250,000 gallon tank, another is a 500,000 gallon tank and the third is a 540,000 gallon tank.

### 7.5.1 ALPINE 250,000 GALLON TANK

Alpine's 250,000 gallon reinforced concrete cylindrical storage tank is located south of Town on the hillside. The property that the tank rests on is Forest Service property. The tank was constructed in 1996 and is in good condition. The tank is partially buried to protect it from freezing. The 250,000 gallon tank is at a higher elevation than the 500,000 gallon tank and feeds the upper pressure zone of the system. Water is delivered to this tank from the 500,000 gallon tank by a booster pump through a 6 inch diameter line. The booster pump is located just west of the wells on Greys River Road. The line is enlarged to an 8 inch line before dumping into the tank. The booster pump can feed the upper pressure zone and move water to the tank at the same time.

### 7.5.2 ALPINE 500,000 GALLON TANK

Alpine's 500,000 gallon concrete reinforced cylindrical storage tank is also located on Forest Service property on the hillside east of the 250,000 gallon tank. This partially buried tank was constructed in 1996 and is in good condition. Water is delivered to this tank from the wells through an 8-inch line. Water from this tank is gravity feed into the lower pressure zone of

the system through a 10-inch line. Water from the 500,000 gallon tank is also delivered to the 250,000 gallon tank through a 6-inch line that passes through a booster pump.

### 7.5.3 Former North Star Utility Tank

North Star Utility had one storage tank when acquired by Alpine. The 540,000 gallon cylindrical shaped steel tank is located on the hillside northeast of the Flying Saddle Development on Forest Service property (See **Figure 7.7** in the figures section). The tank was completed in 2007 and is in good condition. The tank stands completely above ground level and according to the system operator, Richard Sifton, the tank was susceptible to freezing during its first winter of operation in 2007-2008. Measures have been taken to minimize this possibility in the future. Water from the tank is gravity fed to the distribution system.

**Table 7.5: Water Storage Summary**

| | Volume (gallons) | Type | Year Constructed |
|---|---|---|---|
| Alpine Tank | 250,000 | Concrete, Cylindrical | 1996 |
| Alpine Tank | 500,000 | Concrete, Cylindrical | 1996 |
| North-Star Tank | 540,000 | Steel, Cylindrical | 2007 |
| **Total** | **1,290,000** | | |

## 7.6 Service Connections

Each unit is anticipated to receive a 5/8" x 3/4" meter with 1" service line with dual check backflow prevention.

The default hazard classification as identified in Section 14 (i) (i) (B) of the Water Quality Rules and Regulations Chapter 12 will be followed; however, backflow prevention device will be determined upon development of the lot. If a reduced pressure principle device is required, the device must have certification by one of the following third parties:

- American Society of Sanitary Engineers (ASSE)
- International Association of Plumbing/Mechanical officials (IAPMO)
- Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California (USC-FCCCHR)

## 7.7 Water Service Connections to the Lakeview Outpost Addition

The townhome units are proposed to connect to the existing 6-inch waterline alongside HWY 89. A new waterline will connect to the 6-inch line at the southeast corner of the development and serve Units 1, 5 and 6. The meters for these units will be located just before the connection to the individual buildings. Another connection to the existing line will be located at the southwest corner of the

development. This waterline will follow the east side of the lot to serve units 2 through 4. Meters for units 2 through 4 are located on the east side of the units in the open space.

The proposed new connections to Lakeview Outpost Addition were modeled using a GIS based network analysis software (AquaTwin). **Figure 7.7** (figures section) illustrates the connection point of the Subdivision to the existing 6" waterline. The subdivision has a pressure of about 93 psi which will be adequate to supply the long service lines running to lots 1 and 2. No additional fire hydrants are proposed at this time, the nearest fire hydrant is located on the East Side of Star Lane, approximately 450 feet from the project location.

The modeling results (**Figure 7.8**) show that at Node J-126 near the Lakeview Outpost Addition the available fire flow is 2,651 gallons per minute while maintaining 20 psi in the remainder of the system. The model results also show that the 6-inch line will be able to deliver peak day demands at pressures over 90 psi (**Figure 7.8**) to the Proposed Development.

### 7.8 Summary

The Alpine water system will be able to meet the demands of the new Lakeview Outpost Addition both in terms of peak daily demand and required fire demands.

## 8.0 Planned Wastewater System

The proposed Development will include six mixed-use townhome units.

WDEQ Chapter 25, Section 5. Establishes design flows for given facilities summarized below in **Table 8.1** and **8.2** below

**Table 8.1 WDEQ Residential Design Flow Rates**

**Table 1. Residential Design Flow Rates per Bedroom (gallons per day, gpd)[1]**

| | |
|---|---|
| 1 bedroom | 150 |
| 2 bedrooms | 280 |
| 3 bedrooms | 390 |
| 4 bedrooms | 470 |
| 5 bedrooms | 550 |
| 6 bedrooms | 630 |

[1]An unfinished basement is considered two (2) additional bedrooms.

[2]The design flow shall be increased by eighty (80) gpd for each additional bedroom over six (6).

**Table 8.2: WDEQ Non-Residential Wastewater Flow Rates**

**Table 2. Non-Residential Wastewater Design Flow Rates[1]**

| Facility | Unit | Flow (gallons/unit/day) |
|---|---|---|
| Airports | person | 4 |
| Apartment | bedroom | 120 |
| Automobile Service Station | vehicle served | 10 |
| Bars | seat | 20 |
| Bathhouses and swimming pools | person | 10 |
| Campgrounds (w/ toilets only) | person | 25 |
| Campgrounds (w/shower facility) | person | 45 |
| Church | person | 4 |
| Country Club | member | 25 |
| Day School, Office Building, Retail Store, Warehouse (no showers) | person | 15 |
| Hospital | bed | 250 |
| Industrial Building (sanitary waste only) | employee | 20 |
| Laundry (self-service) | machine | 450 |
| Mobile Home | bedroom | see table 1 |
| Motel, Hotel, Resort | bedroom | 140 |
| Recreational Vehicle | each | 100 |
| Rest Home, Care Facility, Boarding School | bed | 100 |
| Restaurant | meal | 10 |
| Restaurant ( kitchen waste only) | meal | 6 |
| Theater | seat | 3 |

[1]Values shown in the above table are the typical flow rates from *Wastewater Engineering Treatment and Reuse*. Metcalf and Eddy. 2003.

The usage of Unit 1 is best defined as an apartment building. With a total of 12 bedrooms (6 units * 2 bedrooms per apartment unit). Unit 1 will have a flow of 240 gpd per each 2 bedroom apartment.

Units 2-4 will have a 2 bedroom "apartment" above each unit as well as commercial space (Retail store or equivalent) on the main floor. It is anticipated that each commercial unit will have an anticipated visitation of 10-20 person(s). Each unit will have a flow of 240 gpd (2 Br "apartment") plus an anticipated flow of 300 gpd from the commercial section of each unit.

Units 5 and 6 will have two office buildings per unit. Wastewater flows for an office building are determined by the persons in the building. A 1500 square foot office building could accommodate 10-15 persons and will have an anticipated flow of 225 gpd per office building.

**Table 8.2: Wastewater Flow Rates**

| Unit # | Type of Units | WW flows (Gallons/unit/day) | Total Flow (GPD) |
|---|---|---|---|
| 1 | 2 Bedroom Apartments (240 gpd/2 bed apartment) (6 apartments) | 280 | 1,680 |
| 2-4 | 2-Bed Live/Work Units (240 gpd/ apartment + 15 gpd/customer) | (240+300)=540 | 1,620 |
| 5-6 | Office Building (15 gpd/Person) | 225 | 900 |
| | | Total Flow | 4,200 |

The addition of these units will increase the daily flows by 4,200 GPD. The peak flow rate can be calculated as two times the average flow (12-hours) at 5.9 gpm. This flow rate is well below the 480 gpm capacity of the existing 8" sewer line. These flows will add to other downstream flows from the neighboring users but it is anticipated that the Town of alpine will have no difficulties with these additional flows.

The flows will ultimately reach the Town of Alpine WWTP on the south side of the Snake River. An existing 8" sewer main is located at the north edge of the property. All sewers are proposed to be 4" connections to the existing sewer line. Standard sewer connection details are shown in **Figure 8.1** (figures section). Lot owners will be responsible for proper installation and materials for sewer connections as approved by the Town of Alpine. The proposed addition will not require a sewer line extension. Units 1 through 4 will be able to connect directly to the existing sewer line via a new service saddle on the existing mainline. Units 5 and 6 will be connected to the existing sewer main by a shared 6" service line across the driveway and common area to connect to the sewer main via a 6" service saddle. Anticipated water and sewer connections are shown in **Figure 8.2.**

# 9.0 Points of Access and Traffic Volumes

This review of traffic impacts caused by the proposed development of the Lakeview Outpost Addition is based in part on data from the Wyoming Department of Transportation. It is intended to quantify daily trips from the development and the magnitude of those trips compared to existing traffic counts and roadway capacity guidelines. The road of primary interest is Main Street.

## 9.1 Background

The Lakeview Outpost Development is located in the central portion of Alpine. It is located alongside US HWY 89 just west of the intersection of HWY 89 and Star Lane. The area is proposed to develop

six townhome style lots for residential or commercial uses. **Figure 9.1** (figures section) shows the project area and illustrates the lot layout.

## 9.2 Current Traffic Counts

WYDOT Maintains Traffic Counts for US 89 South of Etna, which is the closest traffic count site on HWY 89 to the project location. Average monthly traffic levels were received from the WYDOT database for January traffic level and July levels for 2024. In January the Monthly average was 4,806 while in July it reached 8,808 vehicles per day (vpd). The peak hour PM traffic recorded for January was 624 and the peak hour traffic for July was 907 vpd . Peak Hour AM was lower at 561 and 664 for January and July respectively. We can see from these traffic trends that the traffic count is nearly doubled in the summer with the maximum peak hour values happening in the afternoon. Table 9.3.2 shows the 2024 WYDOT Traffic Count Data For US HWY 89 South of Etna.

**Table 9.2 WYDOT 2019 Traffic Count Data For US HWY 89 South of Etna**

| WYDOT Traffic Count Data HWY 89 South of Etna | | |
|---|---|---|
| | Jan-24 | Jul-24 |
| | | |
| Average Daily Traffic | | |
| MADT | 4806 | 8808 |
| AM Peak Hour | 561 | 664 |
| PM Peak Hour | 624 | 907 |

## 9.3 Projected Development Traffic

The development will be built out in two phases. The first phase includes units 2-4 and is anticipated to begin construction in 2026 and be completed within 2026. Upon completion, residences are expected to be immediately occupied. Units 5 and 6 are proposed to be developed in 2031. Table 9.3.1 contains an estimate of occupied units.

**Table 9.3.1 Projected Occupied Units**

| Projected Additional Occupied Dwelling Units | |
|---|---|
| 2026 | 3 |
| 2028 | 3 |
| 2030 | 3 |
| 2032 | 5 |

The traffic out of the development and onto HWY 89 is projected to include four AM trips and six PM trips for residences and is projected to increase traffic on HWY 89 according to the following Table 9.3.3.trips are also doubled in the summer months to reflect traffic patterns observed

**Table 9.3.2 Projected Development Traffic**

| Projected Additional Traffic Onto HWY 89 | | | |
|---|---|---|---|
| Estimated Total Trips Generated By Development | AM Trips/Day<br>PM Trips/Day | 6 *Per Dwelling Unit*<br>8 *Per Dwelling Unit* | |
| | | Total Projected Trips (Cars +Trucks) | |
| | Year | Jan | July |
| | 2028 | 12 | 24 |
| | 2030 | 12 | 24 |
| | 2032 | 20 | 40 |
| | | | |
| Projected % Increase over 2022 MADT Levels | 2028 | 0.2% | 0.3% |
| | 2030 | 0.2% | 0.3% |
| | 2032 | 0.4% | 0.5% |

## 9.4 Capacity, Sight Distance, Stopping Distance and Access Spacing

### 9.4.1 HWY 89:

The Development at buildout will increase traffic on HWY 89 over present levels by adding about 0.5% more trips over 2024 levels. Fill in on existing lots and developments within the surrounding area will also add traffic volume, diluting the effect the development may have.

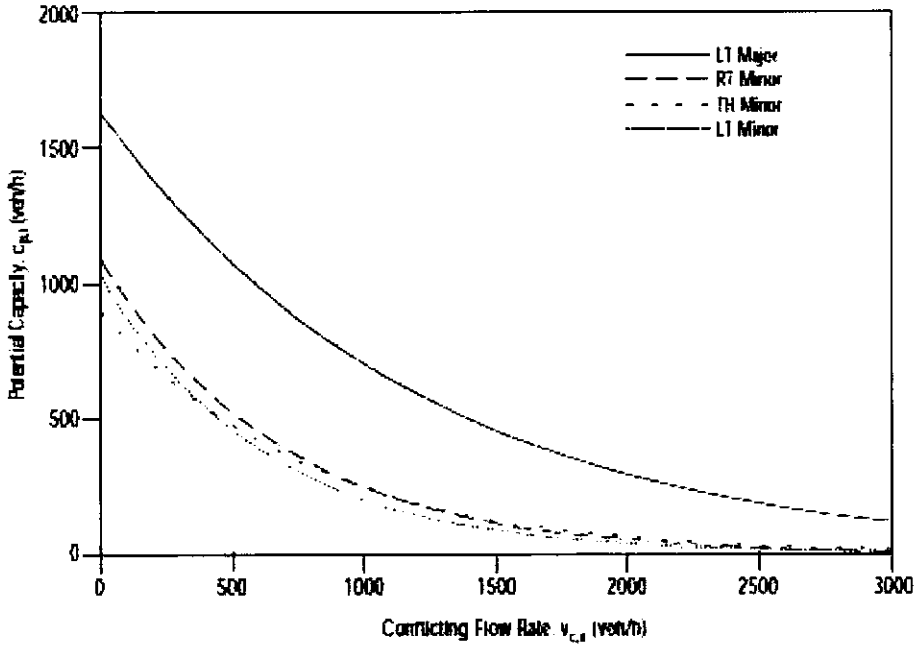
The following "Table 3-1 ADT Volumes below which MUTCD Signal Warrants Cannot be Met" is taken from the WYDOT Traffic Studies Manual. The values in the table indicate there will be no need for signalization or additional traffic measures at the intersections the development will use to enter HWY 89.

**Table 3-1 ADT Volumes below which MUTCD Signal Warrants Cannot be Met**

| | Number of Lanes for Moving Traffic on Each Approach | | Vehicles Per Hour on Major Street (Total of Both Approaches) | | Equivalent ADT | | Vehicles Per Hour on Higher Volume Minor Street Approach (One Direction Only) | | Equivalent ADT | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Major St. | Minor St. | 100% | 70% | 100% | 70% | 100% | 70% | 100% | 70% |
| Warrant 1 Condition A | 1 | 1 | 500 | 350 | 4,000 | 2,800 | 150 | 105 | 2,400 | 1,680 |
| | 2 or more | 1 | 600 | 420 | 4,800 | 3,360 | 150 | 105 | 2,400 | 1,680 |
| | 2 or more | 2 or more | 600 | 420 | 4,800 | 3,360 | 200 | 140 | 3,200 | 2,240 |
| | 1 | 2 or more | 500 | 350 | 4,000 | 2,800 | 200 | 140 | 3,200 | 2,240 |
| | | | | | | | | | | |
| Warrant 1 Condition B | 1 | 1 | 750 | 525 | 6,000 | 4,200 | 75 | 53 | 1,200 | 848 |
| | 2 or more | 1 | 900 | 630 | 7,200 | 5,040 | 75 | 53 | 1,200 | 848 |
| | 2 or more | 2 or more | 900 | 630 | 7,200 | 5,040 | 100 | 70 | 1,600 | 1,120 |
| | 1 | 2 or more | 750 | 525 | 6,000 | 4,200 | 100 | 70 | 1,600 | 1,120 |
| | | | | | | | | | | |
| Combination of Warrants 1A & 1B | 1 | 1 | 600 | 420 | 4,800 | 3,360 | 120 | 84 | 1,920 | 1,344 |
| | 2 or more | 1 | 720 | 504 | 5,760 | 4,032 | 120 | 84 | 1,920 | 1,344 |
| | 2 or more | 2 or more | 720 | 504 | 5,760 | 4,032 | 160 | 112 | 2,560 | 1,792 |
| | 1 | 2 or more | 600 | 420 | 4,800 | 3,360 | 160 | 112 | 2,560 | 1,792 |

The following graph Exhibit 17-7 from the Highway Capacity Manual indicates the number of minor street turn movements that can be accomplished when turning onto a two-lane major street (HWY 89). As shown by the exhibit, even with much higher traffic volumes on HWY 89, there is still ample capacity for the traffic volumes generated by the proposed development at the HWY 89 access.

EXHIBIT 17-7. POTENTIAL CAPACITY FOR FOUR-LANE STREETS



### 9.4.2 Development Entrance/Exit:

The shared driveway can access directly onto HWY 89. This driveway is looped around units 5 and 6 and can be served from either direction. The looped access provides emergency ingress and egress to the lots. the shared driveway will not cause any issues with circulation.

#### 9.4.2.1 Sight Distance

The Project access on HWY 89 occurs in a 35 MPH zone. This section of HWY 89 before and after the intersection are level with no obstructions in either direction.

The sight distances are over 1,000 feet and compare favorably with the WYDOT Traffic Studies Manual Table 6-2 which calls for 335 feet for a crossover or right turn maneuver and 390 feet for a left turn maneuver.

#### 9.4.2.2 Stopping Sight Distance

The stopping sight distance recommended by the WYDOT Traffic Studies Manual for this 35-mph section of roadway is 390 feet (WYDOT Table 6-3). This section of the roadway offers good visibility in terms of vertical curvature. During dry conditions stopping sight distance meets Table 6-3 at this location.

### 9.5 Conclusions

In summary, the proposed project will be accessible via HWY 89. It will slightly increase traffic on HWY 89, however the impact will be minimal and diluted by other developments within the Town. No further improvements are recommended at this time.

## 10.0 Vehicular Circulation Plan

Vehicles within the development will enter and exit the subdivision directly onto HWY 89. The looping driveway will allow simultaneous entry and exit of the subdivision. Parking for individual lots are located as shown on the advance plat (**Figure 1.1**). The Proposed Lakeview Outpost Addition accesses directly to HWY 89.

## 11.0 Planned Storm Water Management

As described in the soils report the soils within the Development tend to be well drained offering the ability to manage storm water on-site.

The existing site is currently a gravel lot with two existing buildings. The ground slopes from the west to the east. The overall elevation change over the site is approximately 4 feet.

## 11.1 Design

The Town of Alpine requires that "water be managed without damage to surrounding properties". A common design standard is the 10-year, 24-hour storm. Storm runoff calculations were performed using the SCS Method using the Urban Hydrology for Small Watersheds (TR-55) manual created by the United States Department of Agriculture (USDA). The USDA-NRCS soil classification of the site is Hydrogeologic Soil Group "A" which is a well draining soil and results in a lower curve number. Precipitation/Frequency Data was found based on the National Oceanic and Atmospheric Administration (NOAA) Atlas 2 Volume II for Wyoming. **Table 11.1.1** below shows the estimated precipitation values for a given frequency and duration for the project site.

**Table 11.1: Precipitation Values (in) for Given Frequency and Duration**

| Duration | Return Interval | | | | | |
|---|---|---|---|---|---|---|
| (min) | 2-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr |
| 5 | 0.12 | 0.21 | 0.23 | 0.29 | 0.33 | 0.36 |
| 10 | 0.19 | 0.32 | 0.36 | 0.45 | 0.52 | 0.55 |
| 15 | 0.24 | 0.41 | 0.46 | 0.57 | 0.66 | 0.70 |
| 30 | 0.34 | 0.57 | 0.63 | 0.79 | 0.91 | 0.97 |
| 60 | 0.42 | 0.72 | 0.80 | 1.00 | 1.15 | 1.23 |
| 120 | 0.49 | 0.79 | 0.90 | 1.10 | 1.26 | 1.37 |
| 180 | 0.55 | 0.85 | 0.99 | 1.19 | 1.36 | 1.50 |
| 360 | 0.70 | 1.00 | 1.20 | 1.40 | 1.60 | 1.80 |
| 720 | 0.85 | 1.20 | 1.40 | 1.70 | 2.00 | 2.20 |
| **1440** | 1.00 | 1.40 | 1.60 | 2.00 | 2.40 | 2.60 |

When evaluating a site for stormwater management, the expected runoff was identified to help in determining how much stormwater will need to be retained on site. We analyzed the site Pre-Development as well as post-development based on the proposed site plan accounting for building footprint and parking areas. The results can be found in the following sections.

## 11.2 Pre-Development

After evaluating the existing grade, the site was analyzed as one basin. The total site area that will contribute to stormwater runoff is 0.98 acres. The anticipated runoff during the 10-year, 24-hour storm in the pre-developed state is expected to be a runoff volume of 1742-cubic feet using the SCS Method as presented in the TR-55 Manual. A summary of the runoff can be seen below in **Table 11.2.1.** According to the TR-55 Manual, the site has three areas; open space with good condition grass with a curve number of 58, existing buildings assigned a curve number of 98 and the gravel drive assigned a curve number of 85. The existing site plane slopes to the southwest to direct the runoff in sheet flow to the southwest across the site.

**Table 11.2.1** provides the total area of the drainage basin, areas of the various features and the corresponding curve numbers.

**Table 11.2.1 Pre-Development Drainage Basin Summary**

| AREA # | DESCRIPTION | SF | ACRES | CN |
|---|---|---|---|---|
| 1 | Existing Buildings | 5,732.00 | 0.13 | 98 |
| 2 | Grass | 20,500.00 | 0.47 | 61 |
| 3 | Gravel Driveway | 14,250.00 | 0.33 | 85 |
| | **TOTAL** | **40,482.00** | **0.93** | **75** |

**Table 11.2.2** shows the estimated pre development runoff conditions.

**Table 11.2.2 Pre-Development Runoff**

| LAKEVIEW OUTPOST ADDITION PRE-DEVELOPMENT TOTAL | | | | | |
|---|---|---|---|---|---|
| **Storm Event (24-Hour)** | **Sr (Retention)** | **P (in)*** | **Qd (in)** | **Qd (ft)** | **Storage Volume ($ft^3$)** |
| 100-year | 1.76 | 2.60 | 1.259 | 0.105 | 4246 |
| 50-year | 1.76 | 2.40 | 1.099 | 0.092 | 3709 |
| 25-year | 1.76 | 2.00 | 0.795 | 0.066 | 2682 |
| **10-year** | **1.76** | **1.60** | **0.516** | **0.043** | **1742** |
| 5-year | 1.76 | 1.40 | 0.390 | 0.032 | 1315 |
| 2-year | 1.76 | 1.00 | 0.174 | 0.014 | 586 |

## 11.3 Post-Development

The slopes in each individual lot will flow toward the northeast corner of each lot. Drainage swales will be used to split the flows equally between the four lots. Grading on the future homes and construction will channel flow away from the buildings toward the southeast corner of the lot.

Drainage areas were calculated based on the footprint of the proposed and existing buildings, impervious paved areas and the landscaped areas.

**Table 11.3.1** provides the total area of the drainage basins, areas of the various features and the corresponding curve numbers.

**Table 11.3.1: Post Development Drainage Basin Summary**

| AREA # | DESCRIPTION | SF | ACRES | CN |
|---|---|---|---|---|
| 1 | Townhome Buildings | 8,276.40 | 0.19 | 98 |
| 2 | Grass/Landscaping | 7,205.00 | 0.17 | 61 |
| 3 | Paved Driveway | 25,000.00 | 0.57 | 98 |
| | **TOTAL** | **40,482.00** | **0.93** | **91** |

**Table 11.3.2** shows the estimated runoff post development conditions.

**Table 11.3.2: Post Development Lot Runoff**

| LAKEVIEW OUTPOST ADDITION POST-DEVELOPMENT TOTAL | | | | | |
|---|---|---|---|---|---|
| **Storm Event (24-Hour)** | **Sr (Retention)** | **P (in)*** | **Qd (in)** | **Qd (ft)** | **Runoff Volume ($ft^3$)** |
| 100-year | 0.94 | 2.60 | 1.73 | 0.14 | 5,824 |
| 50-year | 0.94 | 2.40 | 1.55 | 0.13 | 5,209 |
| 25-year | 0.94 | 2.00 | 1.19 | 0.10 | 4,003 |
| **10-year** | **0.94** | **1.60** | **0.85** | **0.07** | **2,843** |
| 5-year | 0.94 | 1.40 | 0.68 | 0.06 | 2,289 |
| 2-year | 0.94 | 1.00 | 0.38 | 0.03 | 1,261 |

*From NOAA Atlas 2

Comparing the 10-year volumes between **Tables 11.3.1 and 11.3.2** shows that one can expect about 1101 cubic feet of runoff difference as the lot is developed. The hydrograph shows this water will arrive at the points of concentration at a peak rate of about 96.15 gallons per minute or 0.21 cfs. The site will direct flows to a retention basin on the southwest portion of the site.

This volume of stormwater will be managed by the retention basin as shown on **Figure 11.3** (figures section). the retention basin will be 10 feet wide by 12 feet in length. The retention basin will have a grassy bottom and sides with a 4:1 slope to a depth of 12 to 20 inches. Installations in this soil type infiltrate more than 20 inches per hour. With a total area needed of about 120 square feet, the basin will meet peak flows by infiltrating up to 30 gpm.

The perimeter and sides of the constructed retention basin can be graded as lawn or grasses and shrubs. Flow from the road, each driveway and roof areas will be directed to the detention area. In addition, on the perimeter of the duplexes grassy areas will serve to buffer runoff and capture flows. The bottom of the swales can also be vegetated; however, care should be taken to ensure the soil in the bottom is granular and well drained similar to the native sub-surface soil. Importation of a clayey soil could create undesirable results with the storm water not being able to infiltrate in a rapid manner. It has been shown at other sites within this type of alluvium that the soil is capable of rapidly absorbing water at an initial rate of one inch per minute slowing to 20 inches per hour.

This absorption rate over the period of the storm will allow the basins to absorb the volume of water over the 24 hour period.

### 11.4 Snow Storage

Snow Storage will be provided as shown on the Site Drainage Plan and the preliminary plat from **Figure 1.1**. The lot sizes will provide plenty of space for snow storage.

### 11.5 Conclusion

Based on the above calculations, the site will be able to manage the 10-yr, 24-hour stormwater provided about 120 square feet of drainage basins with native material in the bottom are provided. These swales should be about 12 to 20 inches deep over the bottom with side slopes of about 4:1.

## 12.0 Landscaping Plan

Anticipated landscaping for this development will include grassy areas as well as low water demand landscaping such as gravel ground treatments and shrubs. In addition, the retention basin area and areas between the buildings is proposed for landscaping and trees.

## 13.0 Planned Easements

Each Unit will have an exclusive use of the Limited Common Element (LCE) that is designated for each unit. The General Common Element (GCE) will be shared between all units, the GCE includes the Driveway areas. The water and sewer lines are located on the front and back of the lot. Water and sewer lines will be located in the LCE and GCE areas as shown on the Plat (**Figure 1.1**).

There are no proposed easements through this development for access to or extension of the Town of Alpine community trail system.

## 14.0 Planned Covenants and Deed Restrictions

A draft of the planned covenants is in process. A copy will be delivered under separate cover.

# Figures:

**Figure 1.1: Proposed Plat for Lakeview Outpost Addition**

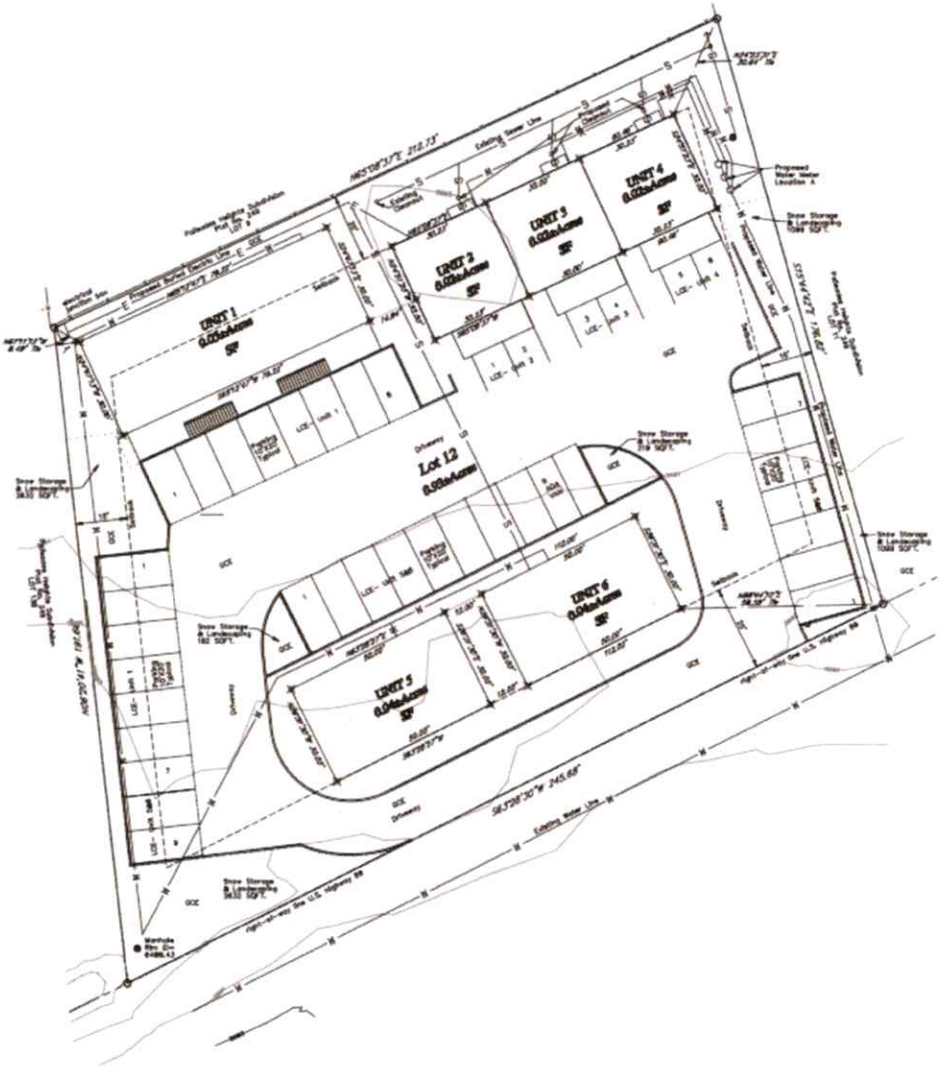


**Figure 4.1: NRCS Soils Map**

## Figure 7.7 Alpine Water Model

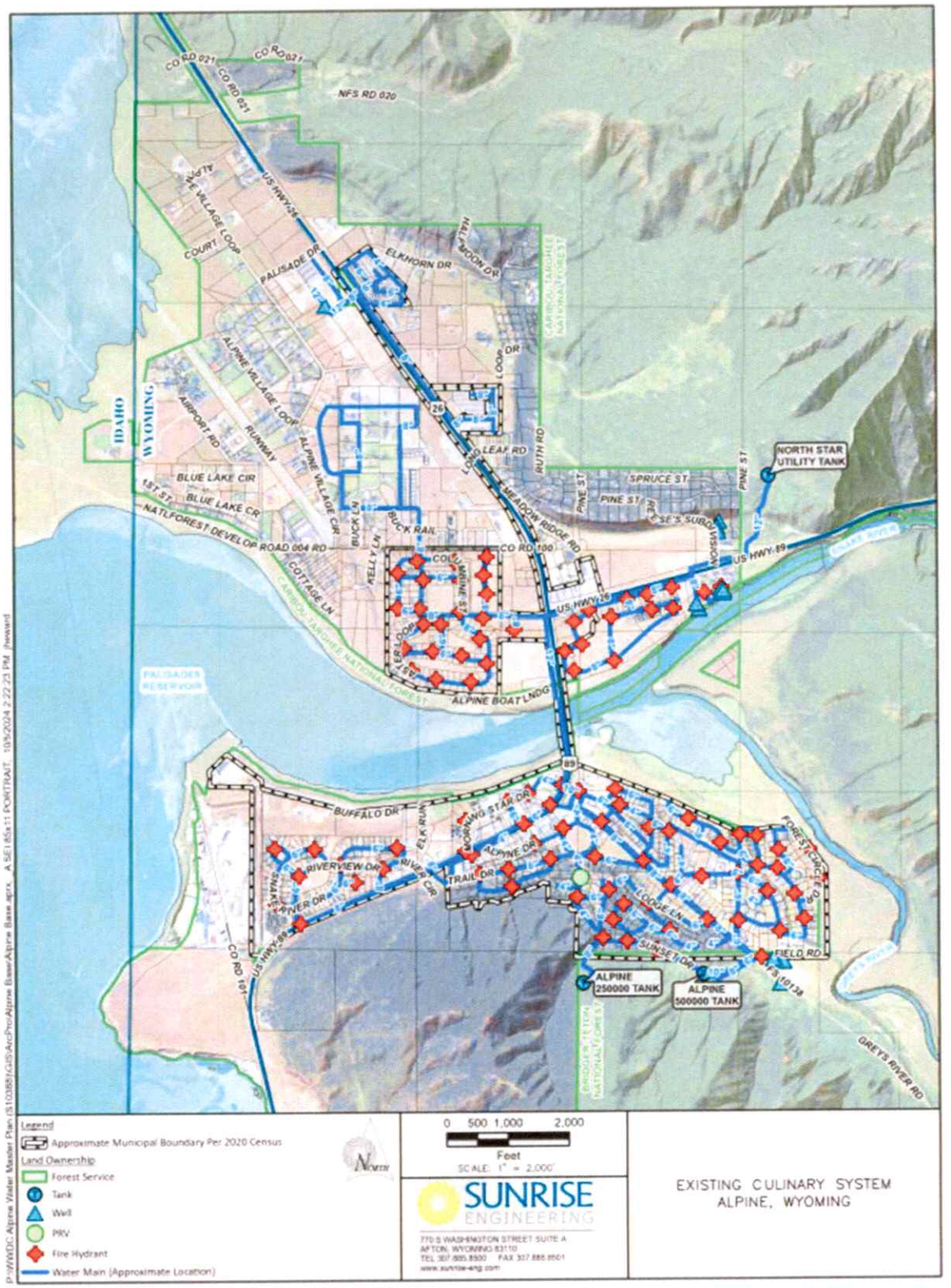


**Figure 7.8: Water Model Results**

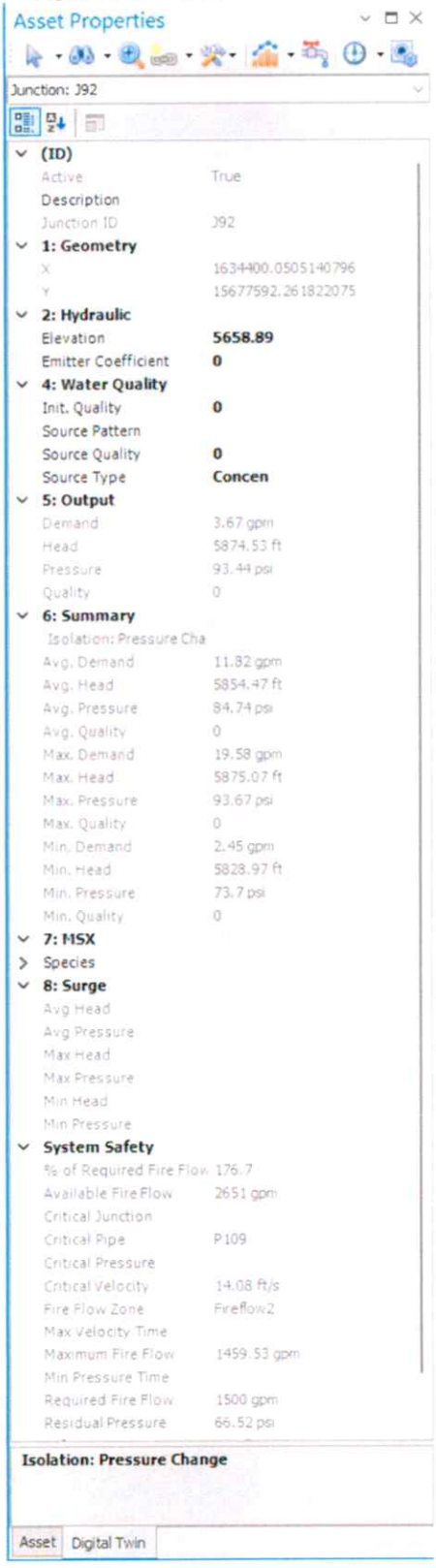
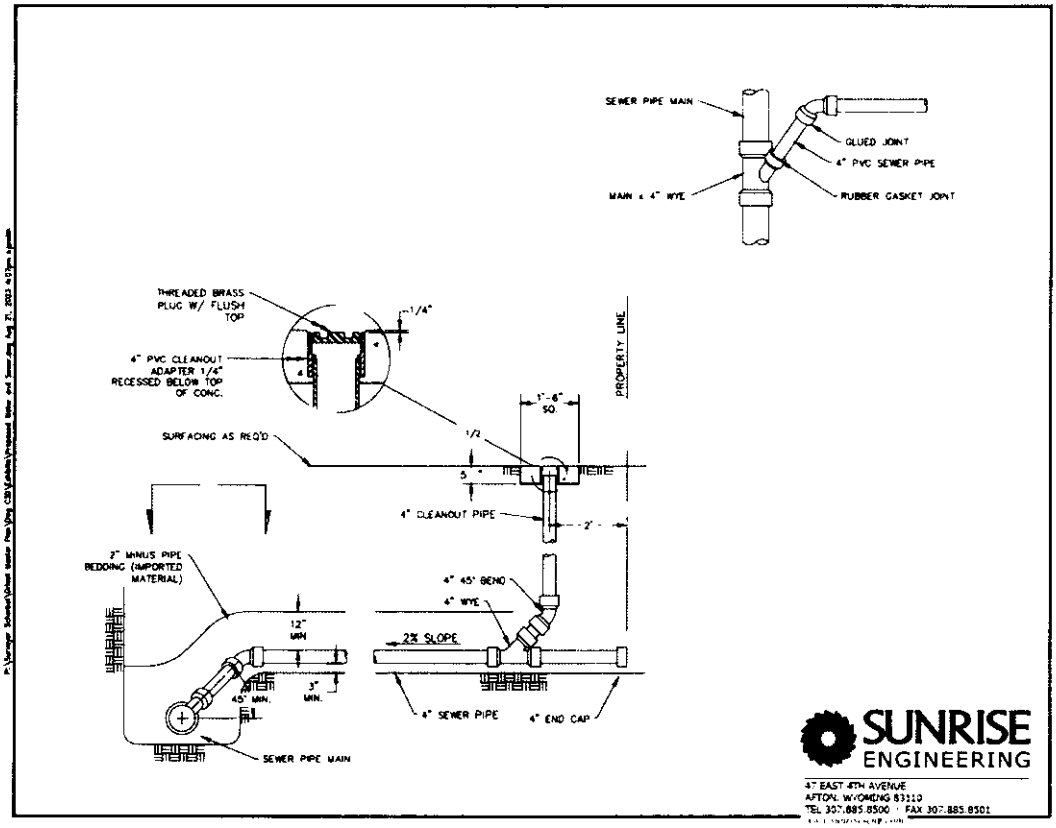


**Figure 8.1 Sewer Connection Details**



# Figures:

**Figure 1.1: Proposed Plat for Lakeview Outpost Addition**

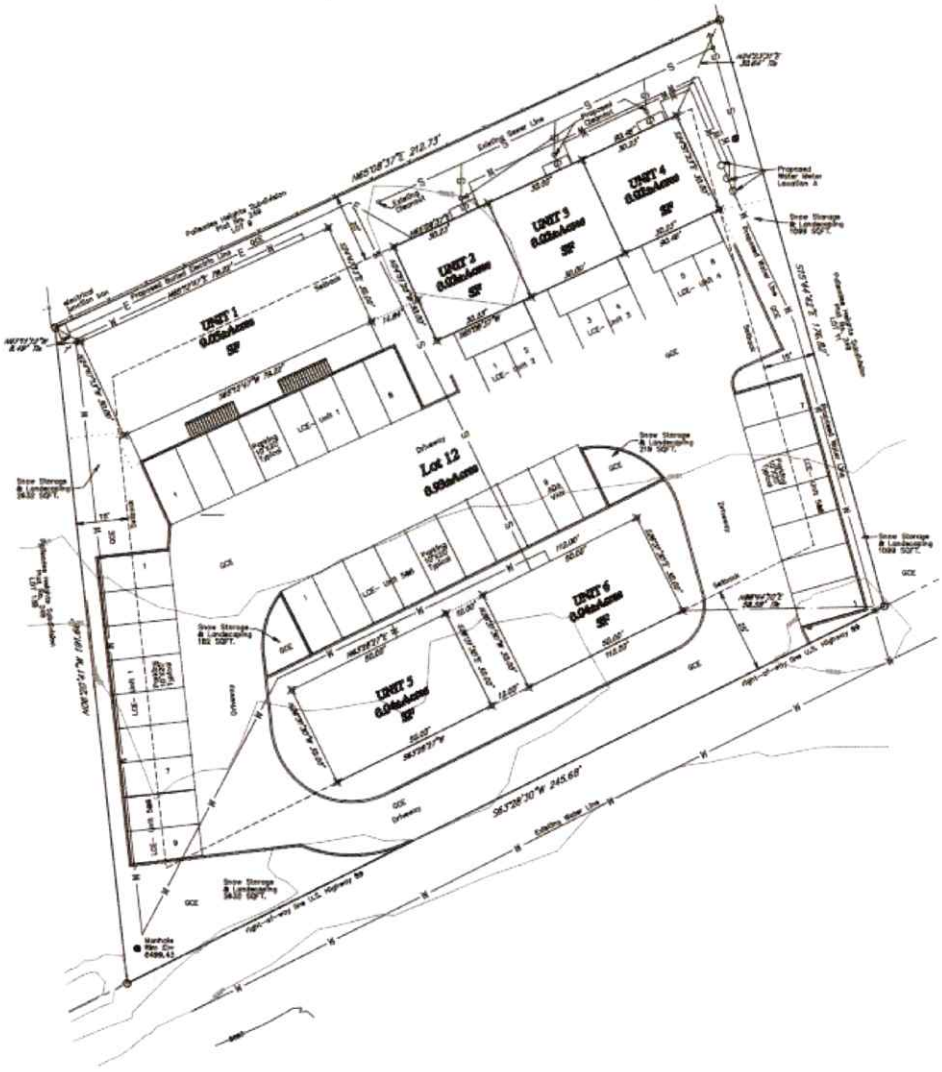
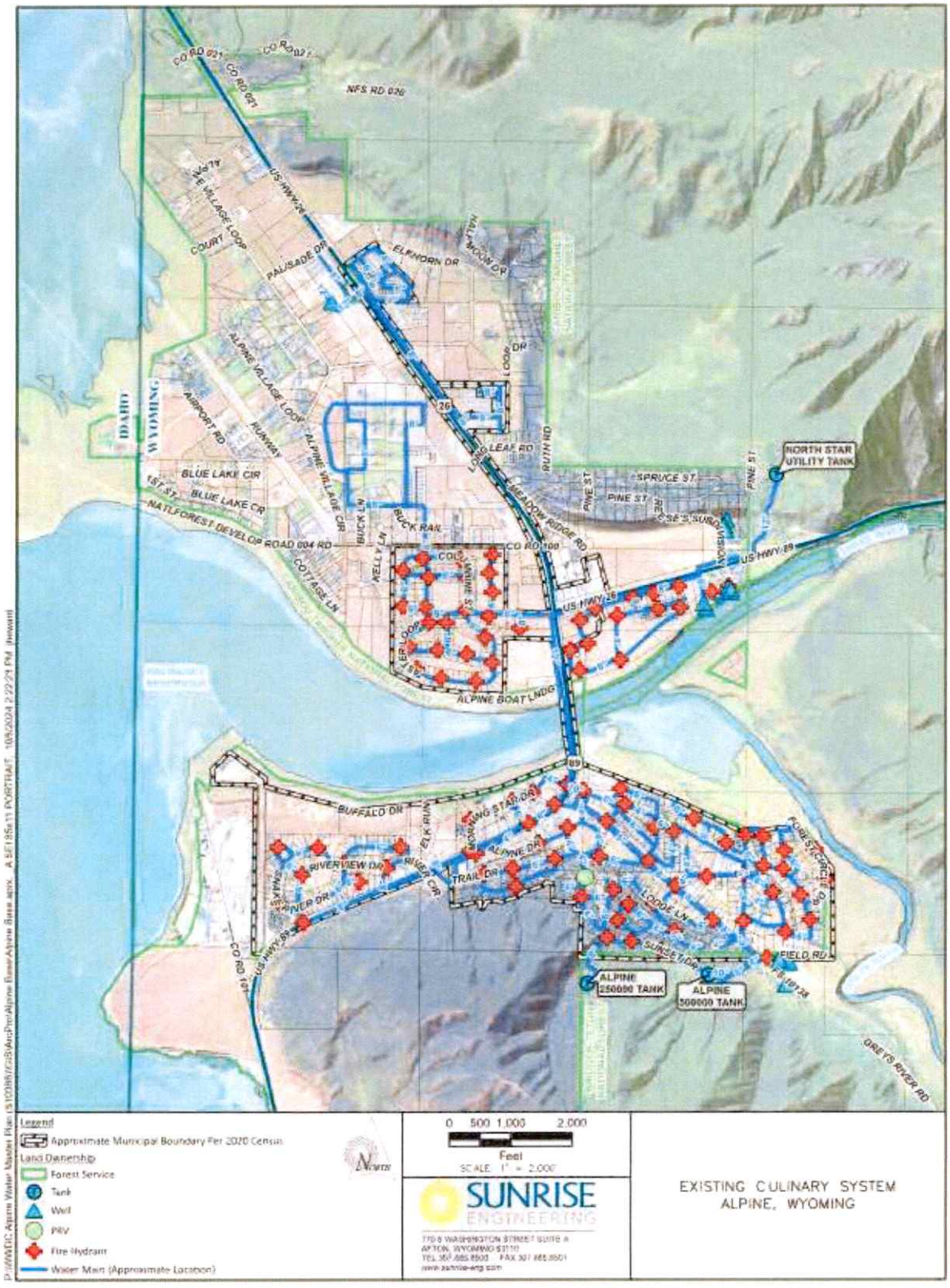


Figure 4.1: NRCS Soils Map

## Figure 7.7 Alpine Water Model



## Figure 7.8: Water Model Results

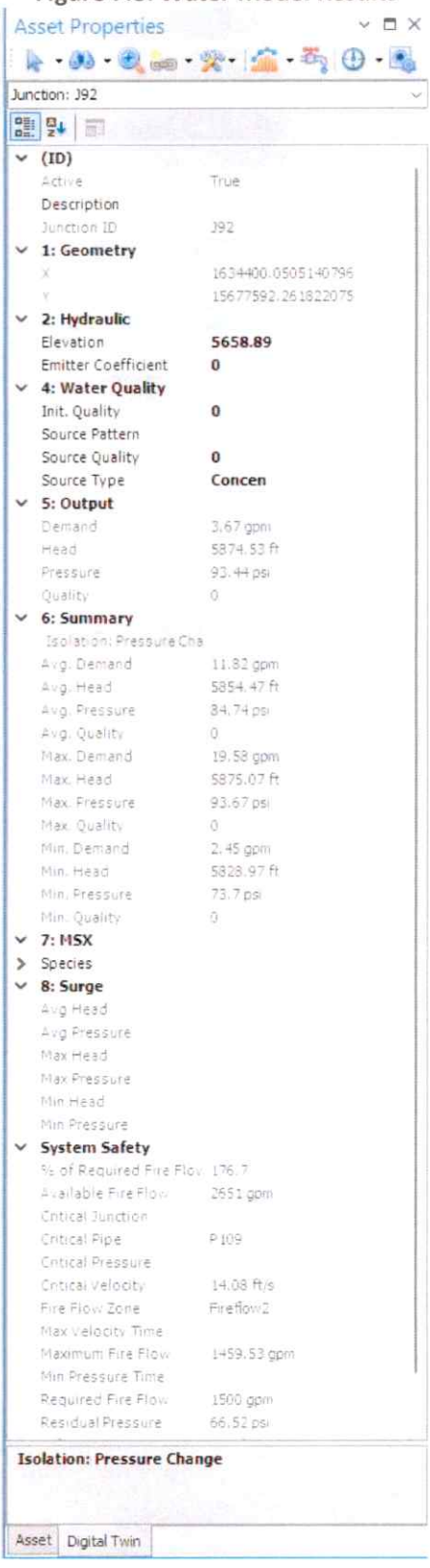
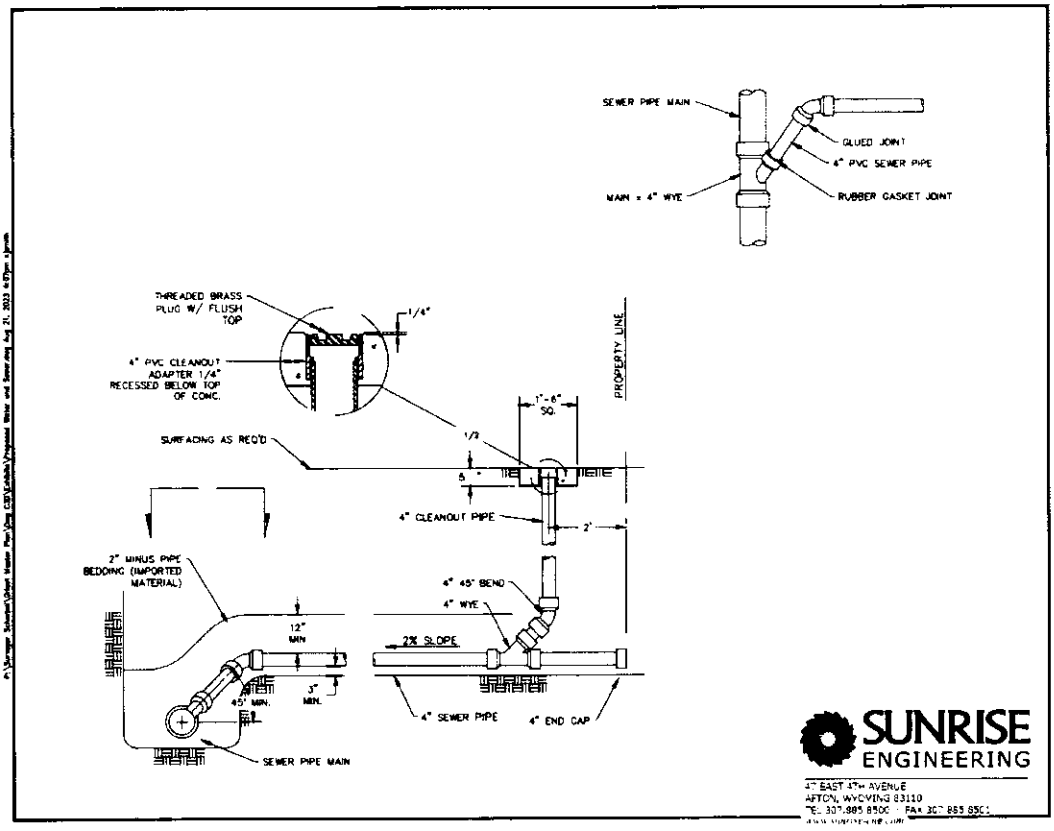


**Figure 8.1 Sewer Connection Details**



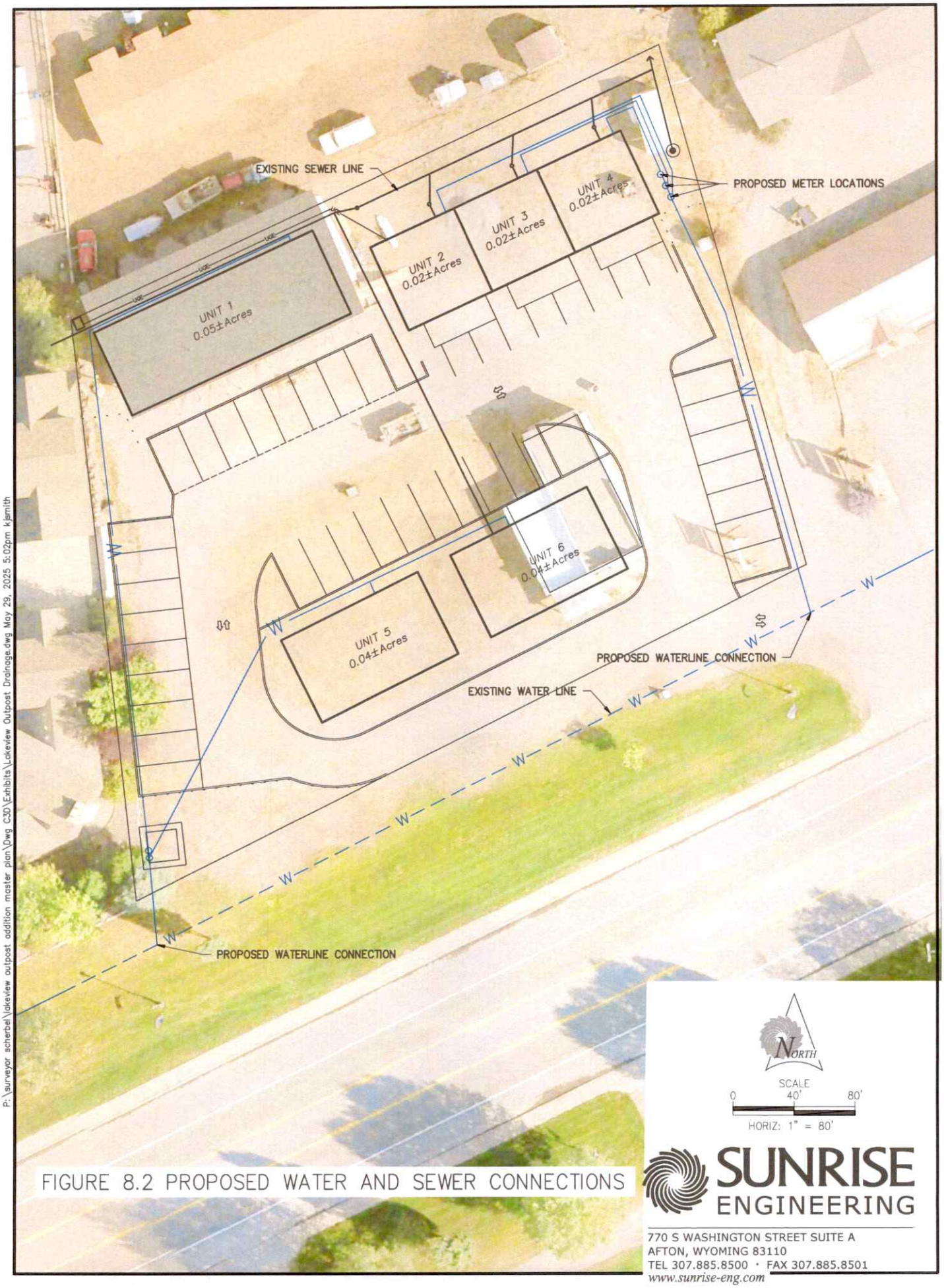



FIGURE 8.2 PROPOSED WATER AND SEWER CONNECTIONS

SUNRISE ENGINEERING
770 S WASHINGTON STREET SUITE A
AFTON, WYOMING 83110
TEL 307.885.8500 · FAX 307.885.8501
www.sunrise-eng.com


FIGURE 9.1 LOT LAYOUT AND VEHICLE CIRCULATION

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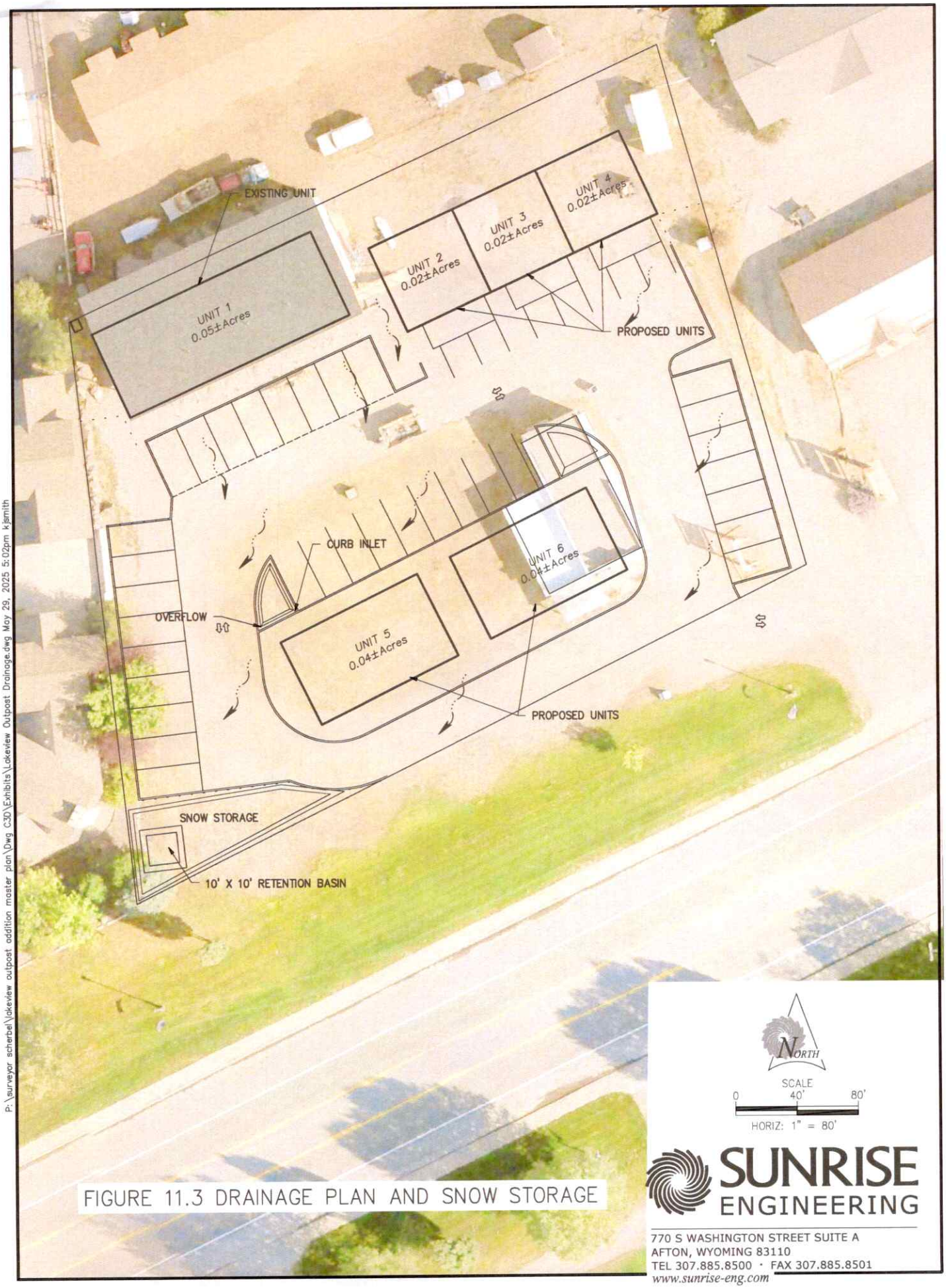


FIGURE 11.3 DRAINAGE PLAN AND SNOW STORAGE

NORTH

SCALE
0 40' 80'
HORIZ: 1" = 80'

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