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Preliminary Engineering Report for Grass Valley Sewer

Humboldt County

June 2022

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EXECUTIVE SUMMARY

This Preliminary Engineering Report (PER) has been prepared at the request of Humboldt County to address the elevated nitrate levels in Grass Valley's groundwater aquifer. This PER describes the cause and extent of the elevated nitrate levels and provides recommendations to alleviate this issue. Developed properties in Grass Valley are dependent on individual septic systems for wastewater disposal.

The focus area for this project is Gold Country Estates and Star City Subdivisions, the more densely populated areas in Grass Valley. As the report developed, information was collected to support the inclusion of residential and commercial areas to the east and south of the subdivisions. The density of septic systems has been determined to be a direct contributor to the exceedance of nitrates found in drinking water from wells. The load of nitrates on the aquifer continues to increase while groundwater levels are "in a state of depletion." Previous studies have been completed regarding the degradation of groundwater quality and have each determined that wastewater disposal is necessary to alleviate the strain on the aquifer. Monitoring wells in the area have been routinely sampled by the county and others since the early 1990's, and the results of these samples have indicated levels of nitrates exceeding the maximum allowable contaminant level set forth by federal regulation. Excess levels of nitrates in drinking water can have harmful human health effects, especially in pregnant women and in infants.

The project area experienced robust growth in the late 1980's to 1990's related to the increased gold mining activity in the region, otherwise, the growth rate has been gradual. A national interest in battery powered vehicles resulting in a demand for lithium could lead to development of a significant lithium mining resource in northern Humboldt County. Like the gold mining boom, lithium mining may result in a similar increase of residential developments in the Grass Valley area. Additionally, there is interest in constructing a salmon farm in the area that aims to raise up to 50,000 metric tons of Atlantic salmon annually. The load of nitrates on the groundwater aquifer is stressed under existing developments and additional parcel developments will exacerbate the issue. The Grass Valley community has been notified of the effort to combat nitrate loading in the groundwater, and some residents have expressed important concerns regarding the cost to address the nitrate issue. There is a concerted effort by the county to obtain loans with principal forgiveness and grants to begin the septic to sewer conversion process.

One no-action alternative and three action alternatives for wastewater treatment are presented in this report as potential solutions for the attenuation of nitrates in groundwater. The treatment alternatives all include a preliminary wastewater collection system that is common to each alternative to facilitate a fair cost comparison. The three action alternatives are as follows: connect to the City of Winnemucca's sewer and treatment system, construct a county operated mechanical wastewater treatment facility, or construct a county operated wastewater treatment pond system. The cost of the collection system is estimated at roughly $20 million and is included in the cost of each action alternative. The estimated costs are as follows:

- Alternative 1 – Connect to Winnemucca Sewer System: $28.7 million capital and connection fee cost; $769,300 annual operations and maintenance (O&M) costs
- Alternative 2 – Mechanical Treatment Facility: $27.8 million capital cost; $353,700 annual O&M costs
- Alternative 3 – Treatment Ponds: $23.2 million capital cost; $341,700 annual O&M cost
- Alternative 4 – Do Nothing: No costs are required; however, a cost to human health and the environment will occur as residential and community wells become further contaminated

The concluding recommendation of this report is to construct a Humboldt County owned and operated mechanical treatment facility to alleviate the elevated nitrate issues and support the opportunity of development in the area.

The PER is required by the Nevada Department of Environmental Protection (NDEP) as a precursor to obtaining grants or loans from their agency. This PER follows the general guidelines set forth in the NDEP Guidance on Rural Utility Service (RUS) Bulletin 1780-2, "Preliminary Engineering Reports for the Water and Waste Disposal Program".

1.0 PROJECT PLANNING

1.1 INTRODUCTION

This preliminary engineering report (PER) has been developed to consider the conversion of individual septic systems to a community wastewater collection and treatment system to reduce negative impacts to groundwater quality. The groundwater in Grass Valley, Nevada, adjacent to the City of Winnemucca, has been sampled for over two decades to monitor exceedances of maximum contaminant levels in groundwater constituents. Community water systems and individual wells in the area rely on the groundwater aquifer as the resource for drinking water. This report presents solutions to improve groundwater quality issues caused by the hundreds of septic absorption fields in the Grass Valley, Humboldt County area.

1.2 LOCATION

The project planning area includes a portion of Grass Valley, Humboldt County Nevada, located west of the Sonoma Mountain Range, southeast of the Humboldt River and Interstate 80, and southwest of the City of Winnemucca. The project area includes the rural subdivisions known as Star City Properties and Gold Country Estates. It also includes Grass Valley Elementary School, church parcels, a few commercial parcels, and adjacent residential parcels. Moreover, commercial and residential parcels north of the Winnemucca Municipal Airport are within the project area. All developed properties in Grass Valley are dependent on individual septic systems for wastewater disposal.

Community water systems serve the Star City and Gold Country subdivisions. Star City's water system is owned and operated by Humboldt County, while the water system servicing Gold Country is privately owned and operated. The remaining parcels in the project area rely on individual wells for their drinking water source.

The approximate vicinity of the project location is shown on Figure 1. A more detailed map outlining the project area is shown in Figure 2.

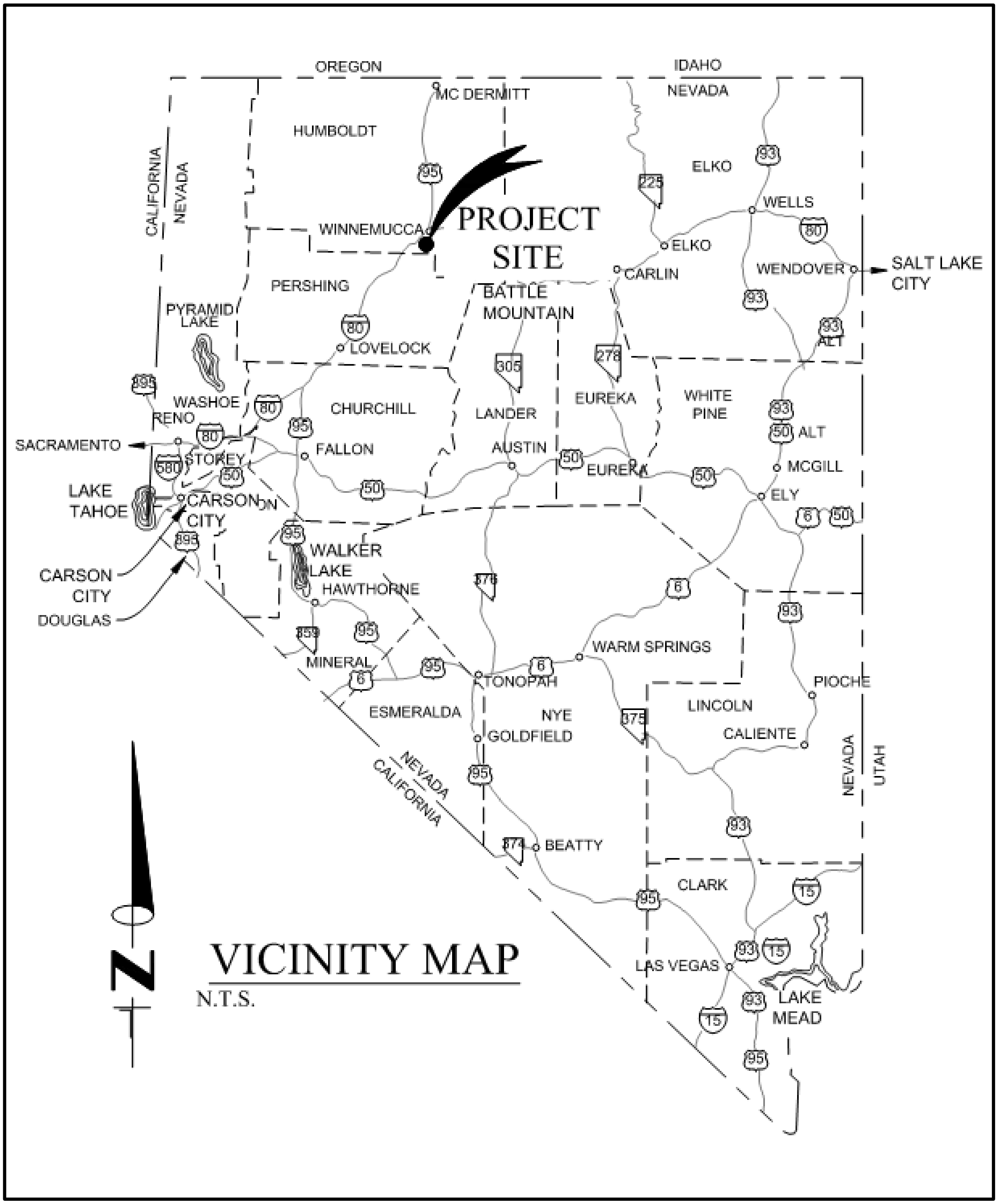


Figure 1: Vicinity Map

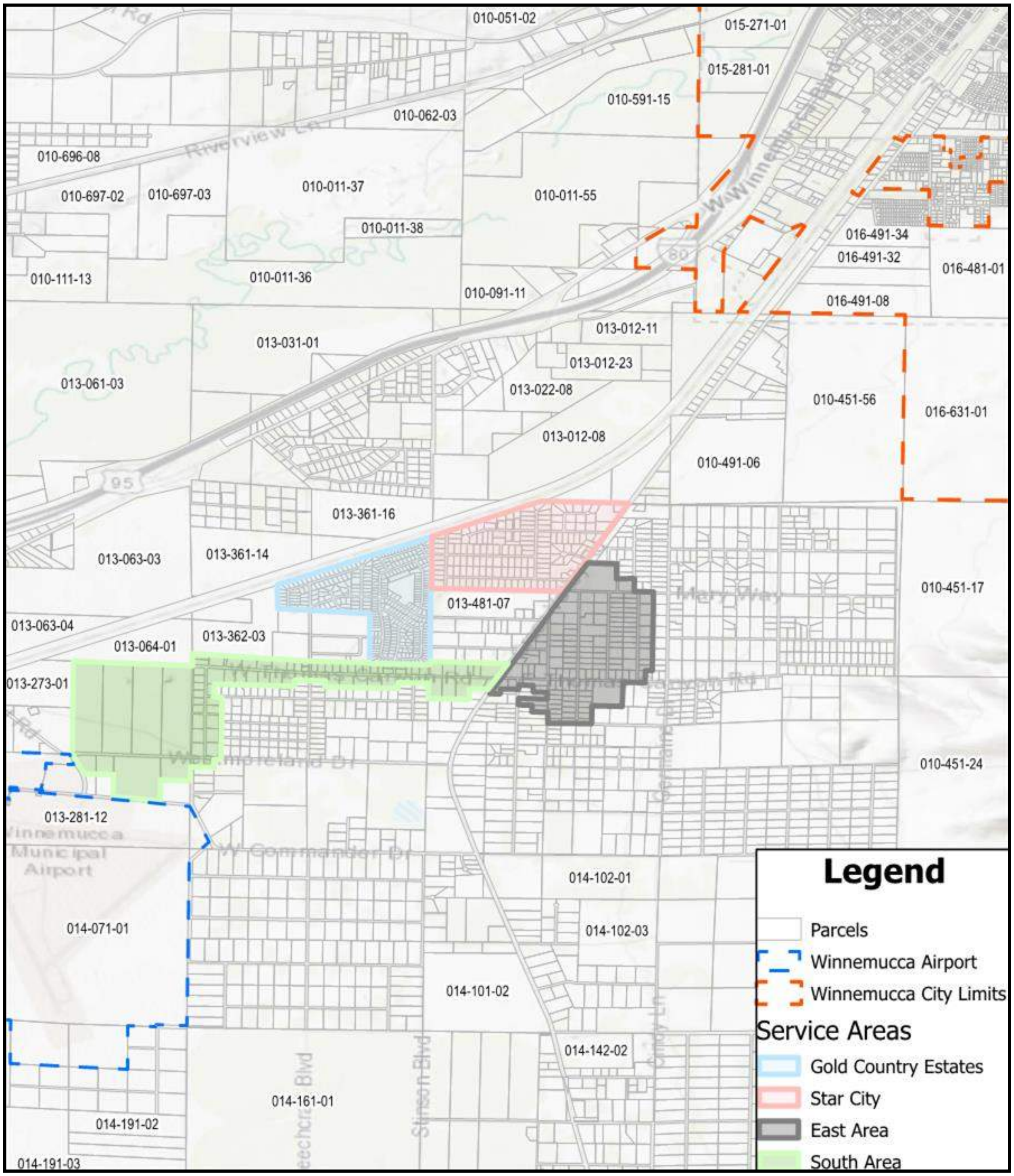


Figure 2: Project Area Map

1.3 ENVIRONMENTAL RESOURCES PRESENT

This section provides a brief overview of environmental resources discovered to be present in the area and corresponding mitigation methods as determined in the Environmental Assessment, attached in Appendix H.

1.3.1 Land Use

Existing land uses within the proposed project area include residential, urban, and commercial activities. Parcels within the proposed project area are owned by the County and various private parties. There are no unique lands, forest lands, national natural landmarks, wilderness areas, national monuments, or national parks or trails located within the proposed project area, or area of interest. There are no wild and scenic rivers in Nevada. The Nevada Natural Landmarks Map and Nevada Wilderness Areas Map are included in Appendix A of the Environmental Assessment. Proposed improvements are largely within existing rights-of-way and minimal environmental impacts are anticipated.

1.3.2 Geologic Setting

Grass Valley is in the Black Rock Desert-Humboldt subregion of the Great Basin and has a complex geological makeup due to millions of years of movements and uplift in the earth's crust. The National Resource Conservation Service (NRCS) shows three major soil types in the project area; there are not anticipated effects on soil type, profile, or qualities. Seismicity in the area is projected to be low and no impacts are anticipated. The project involves surface level disturbances and should have no effect on geologic resources. Temporary soil disturbance related to construction will be minimized using standard soil erosion best management practices (BMPs). Any proposed improvements are anticipated to have no permanent effect on geology, or seismic conditions in the area.

1.3.3 Water Quality

The project area is within the Nevada Division of Water Resources (NDWR) Hydrographic Groundwater Basin 71, Grass Valley. The NDWR designated the Grass Valley Groundwater Basin as being in a state of depletion, as expressed in the *Humboldt County Master Plan* published in 2012, extracts attached in Appendix A. Proposed improvements will have a positive effect on water quality through the reduction of groundwater contaminants. Temporary impacts on water quality may occur during project construction, however, BMPs would be followed to control and minimize potential pollution to storm water.

1.3.4 Floodplains

The flood zones for the project area have been mapped by the Federal Emergency Management Agency (FEMA) and the entire project area lies outside of the FEMA designated flood zone. No impacts to floodplains are anticipated and no mitigation is necessary.

1.3.5 Biological Resources

Wildlife may be impacted by disturbances due to construction activity; however, this proposed action is not anticipated to trigger existing authorities, regulations, or laws that the Nevada Department of Wildlife (NDOW) oversees. It is not anticipated that migratory birds will be affected by construction since the construction will take place on ground level, and at existing disturbed areas. Should any migratory birds be identified in the project area, or any impacts to migratory birds be anticipated, additional conservation measures will be evaluated. Disturbed areas will be returned to pre-construction conditions. It is not anticipated that any threatened, endangered, or candidate species will be affected by construction since there is no critical habitat in the project area. Should any critical, endangered, or candidate species be identified in the project area, or any impacts be anticipated, additional conservation measures will be evaluated. Some mitigation may be required to prevent the spread of invasive weeds during and after construction of the proposed project.

1.3.6 Wetlands

The National Wetlands Inventory (NWI) was consulted, and mapping obtained for the proposed project area. No wetlands were identified within in the project area, therefore, no environmental impacts related to Wetlands are anticipated.

1.3.7 Air Quality

Improvements in the area may temporarily impact air quality by soil disturbance and equipment emissions during construction phase. During that time, the construction will disturb a maximum of approximately 144 total acres, much of which is previously disturbed. It is likely that more than 5 acres will be disturbed at any one-time during construction, so a surface area disturbance permit should be obtained from the NDEP Bureau of Air Pollution Control (BAPC). Mitigation will be necessary to combat temporary air quality impacts, it is anticipated that air quality impacts will subside with the completion of construction.

1.3.8 Cultural and Historical Resources

There are no recorded cultural or historical resources present within Grass Valley, therefore, no mitigation is anticipated to be necessary. Should any previously unidentified resources be discovered during construction of a project, all work shall cease, and the County shall consult with an archeologist to determine the appropriate course of action before resuming construction.

1.3.9 Socio-Economic Impact

Improvements to the water quality in the area will benefit the entire community and will not have disproportionately high or adverse human health or environmental effects to minority or low-income populations. No mitigation is expected to be required. Any improvements are expected to have a beneficial effect on socio-economic conditions for area residents regardless of socio-economic group.

1.3.10 Noise

Anticipated noise will be related to temporary construction activities which are not expected to cause long term noise problems. To reduce temporary impacts of project construction noise, mitigation and BMPs may be necessary.

1.4 POPULATION TRENDS

1.4.1 Base Population

The U.S. Census and Nevada State Demographer provide population data for Humboldt County in its entirety but does not provide population data for the Grass Valley area specifically. According to the Nevada State Demographer there were 17,202 residents in Humboldt County in 2021 with an average household size of 2.56 persons. Based on the number of develop lots within the project area, Star City has a potential population of 356 people, while Gold Country's potential population is 858 people. Furthermore, within the project area's eastern extent there are potentially 328 people and another 92 people northeast of the airport. The total estimated population within the project area is 1,634 people.

1.4.2 Historical Growth and Future Growth Rate

The Nevada State Demographer has published historical county population and future growth estimates ranging from 2000 to 2039. Utilizing the county population trend data provided by the Nevada State Demographer and applying it to the project area for the past 20 years, there would have been a fluctuation in population eventually resulting in a net increase of 7.5 percent from 2000 to 2020, refer to Table 1.

Table 1: Population Estimates April 2000 to July 2020

Year	Project Area Population	Percent Change
2000	1539	
2001	1552	0.8%
2002	1566	0.9%
2003	1580	0.9%
2004	1602	1.4%
2005	1660	3.6%
2006	1704	2.6%
2007	1733	1.7%
2008	1729	-0.2%
2009	1698	-1.8%
2010	1763	0.4%
2011	1645	-6.7%
2012	1669	1.5%
2013	1676	0.4%
2014	1669	-0.4%
2015	1637	-1.9%
2016	1618	-1.2%
2017	1630	0.7%
2018	1631	0.1%
2019	1640	0.5%
2020	1634	-0.3%

Determined from Nevada State Demographer, see data in Appendix G.

Population estimates for Humboldt County are available for the 20-year planning period of 2020 through 2040 and have been used to project future populations. Growth rates for Humboldt County were developed by the Nevada State Demographer and the Grass Valley project area is estimated to grow at the same rate. Population projections are illustrated below in Figure 3.

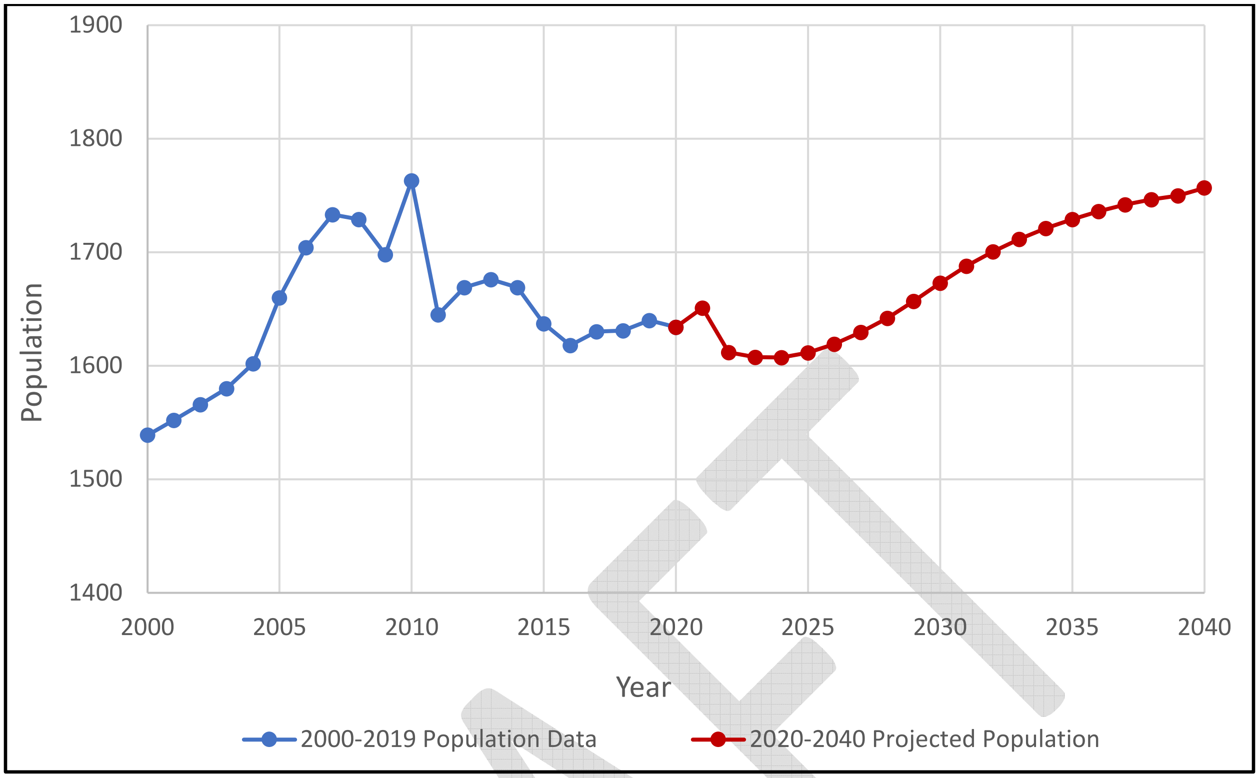


Figure 3: Historical and Future Population Trend

1.4.3 Occupancy Statistics

According to the 2020 Census Bureau estimates, the median household income (MHI) for Humboldt County is $66,123 and 66.2 percent of the population accounts for the workforce. The construction and extraction industry account for the bulk of employment in the county followed by office and administrative support and sales or sales related occupations, respectively. There is no distinctive data for the MHI or occupations of Grass Valley residents.

1.5 COMMUNITY ENGAGEMENT

The Humboldt County Board of Commissioners have approved funding for various studies of nitrates in groundwater in the Grass Valley area for more than 30-years. The studies each delineate actions that can be implemented to prevent further increases to nitrate levels in the groundwater. The studies have been presented to the commission and were available to the public.

In 2015, the *Community Source Water Protection Plan* was created by representatives from various local and state government agencies, including public water systems in Humboldt County. Their research concluded that septic systems were the most prevalent source of potential groundwater contaminants. Increasing levels of nitrates is the primary groundwater contaminant of concern. A Water Quality Summit was held in March of 2016 to provide education to the public regarding groundwater protection.

The efforts of this report have been a topic of discussion during Humboldt County Commissioners meetings. This preliminary engineering report was discussed in the August 23, 2021, meeting with a focus on the progress of the report and its findings. On January 24, 2022, the efforts of this study were discussed again before the commission, including the estimated costs of potential projects to convert the septic systems to a wastewater collection and treatment system. One point of discussion centered on drinking water treatment rather than wastewater treatment as a potential way to reduce the cost of the project. However, it was noted that drinking water treatment alone would only provide appropriate water quality for properties connected to the community water systems, while most properties in Grass Valley that are served by individual wells would still be subject to increasing groundwater contamination. Ultimately, the commission reaffirmed that groundwater resources need to be protected from further contamination.

2.0 EXISTING FACILITIES

2.1 LOCATION MAP

The northerly portion of the Grass Valley project area (Star City and Gold Country subdivisions), the nearest point of potential connection to city sewer, and the city's treatment facility are shown below in Figure 4. The project area is approximately two miles to the southwest along Grass Valley Road to the nearest point of potential connection to Winnemucca's existing sewer main. The City of Winnemucca's treatment facility is approximately 3.5 miles northwest of the project area and is separated from the project area by multiple channels of the Humboldt River, Interstate 80, and a railroad corridor. Individual privately owned septic systems are the means of wastewater treatment in Grass Valley.

Figure 4: Existing Facilities

2.2 SYSTEM HISTORY

Grass Valley residents and few businesses currently only have access to self-owned and maintained septic systems for wastewater treatment. The area is under the jurisdiction of the county which does not own or operate a treatment facility. Based on information gathered from aerial images found on Google Earth, some of the original developed properties and associated septic systems are 40 years old or older which exceeds the typical industry standard lifespan of septic systems of 20 to 30 years. The capacities of the septic systems themselves do not have known constraints; however, the substantial number of septic systems operating in the area are increasing contamination of the aquifer.

The nearest treatment facility is owned and operated by the City of Winnemucca. The treatment facility was newly constructed in 2017 approximately 3.5 miles northwest of the project area. The treatment facility was relocated to be outside of the flood zone boundary and to increase the available capacity to support growth and development within the city's boundary. Additionally, within the city boundaries is a wastewater collection system. The nearest pipe of the collection system is located two miles northeast of the project area. A review of the city's collection pipe sizes indicates some pipe diameters would be too small and restrictive to convey significant wastewater flows from neighboring Grass Valley. Otherwise, there are no known component failures or a history of regulation violations in either the city's collection and treatment systems nor in the Grass Valley individual septic systems.

2.3 CONDITION OF EXISTING FACILITES

The septic systems operating in Grass Valley are currently fundamentally functional and capable of collecting waste in the tanks and dispersing effluent through individual leach fields. There are presently no known failures of the septic systems in the area; however, the age of some systems being near 40 years increases the likelihood of failure. A septic system's longevity is increased when proper maintenance guidelines are followed yet most homeowners tend to neglect septic maintenance due to cost or other constraints. The required capacity of a septic system is governed by state or county standards and typically correlates to the number of bedrooms contained in a house. There are no known violations of these standards. The minimum capacity for a septic tank required for at least a three-bedroom residence is 1,000 gallons; a six-bedroom residence requires a capacity of 1,500 gallons plus an additional 150 gallons for each additional bedroom. The energy consumption for operating most septic systems is typically negligible with a gravity-based design. Should a septic pump be required, the energy use would be minimal.

Within four miles of the project area, the City of Winnemucca completed construction of a new wastewater treatment facility in August 2017. The new facility, situated above the floodplain, provides an increased operating capacity of 1.5 million gallons per day (MGD) and more effective means of treatment compared to the city's previous treatment ponds. The segment of the collection system in Winnemucca that could be affected by Grass Valley's implementation of a sewer collection system is known to be in good working condition and suitable for continued use; however, it is anticipated that pipe capacity upgrades to the collection system will be necessary. The treatment facility is less than 5 years old and has adequate treatment and disposal capabilities. According to the city manager/engineer, there are approximately 650,000 gallons/day (GPD) available capacity in the treatment plant; however, the capacity is held in reserve for use by future development within the city.

2.4 FINANCIAL STATUS OF ANY EXISTING FACILITIES

Humboldt County has no sanitary sewer operations and associated financial obligation in the Grass Valley area. Individual property owners bear the costs related to operation and maintenance of their septic systems. The cost of installing a new septic system is typically included in the home building cost and is therefore funded by the homeowner. This cost can range from $3,000 to $15,000 depending on the material of the tank and leach field pipes as well as the operating design of the system. Maintenance is suggested to be performed once every three to five years and can cost an average of $250 to $500. If the cost of installing the system was included in a builder's loan, that debt may be associated with the remaining mortgage balance. The initial expense and maintenance costs are the only expected costs for the resident, there are no monthly usage maintenance fees.

The construction of the existing city operated treatment facility was funded by grants and loans. The U.S. Department of Agriculture (USDA), Rural Development, provided $18.1 million in loans and $2.3 million in a grant funded by the Rural Utility Service Water and Environmental Programs. The city provided $8 million of the funding; the loans will be repaid through service and connection fees.

2.5 WATER/ENERGY/WASTE AUDITS

Audits of septic system wastewater and energy consumption are not conducted, the amount of water going into a house from a well and the amount of wastewater going into a septic system are not metered; therefore, the efficiency of the existing system is unknown.

3.0 NEED FOR PROJECT

3.1 HEALTH, SANITATION, AND SECURITY

The impacts to public health and groundwater quality caused by elevated nitrate levels are the primary and secondary reasons respectively for this PER, as well as many previous studies. In 1995 Humboldt County began a domestic well groundwater monitoring program after water samples in Grass Valley showed elevated levels of constituents in the groundwater. There are seven monitoring wells in or near the project area. The three newest monitoring wells were constructed after the Nevada Division of Environmental Protection (NDEP) determined the initial monitoring wells were constructed such that water samples could only be collected below the static groundwater level thus inaccurately characterizing the quality of water at the groundwater table interface. Extracts are attached from the *Well Completion Report* in Appendix F. The monitoring well locations shown below (Figure 5) are from the best information available.

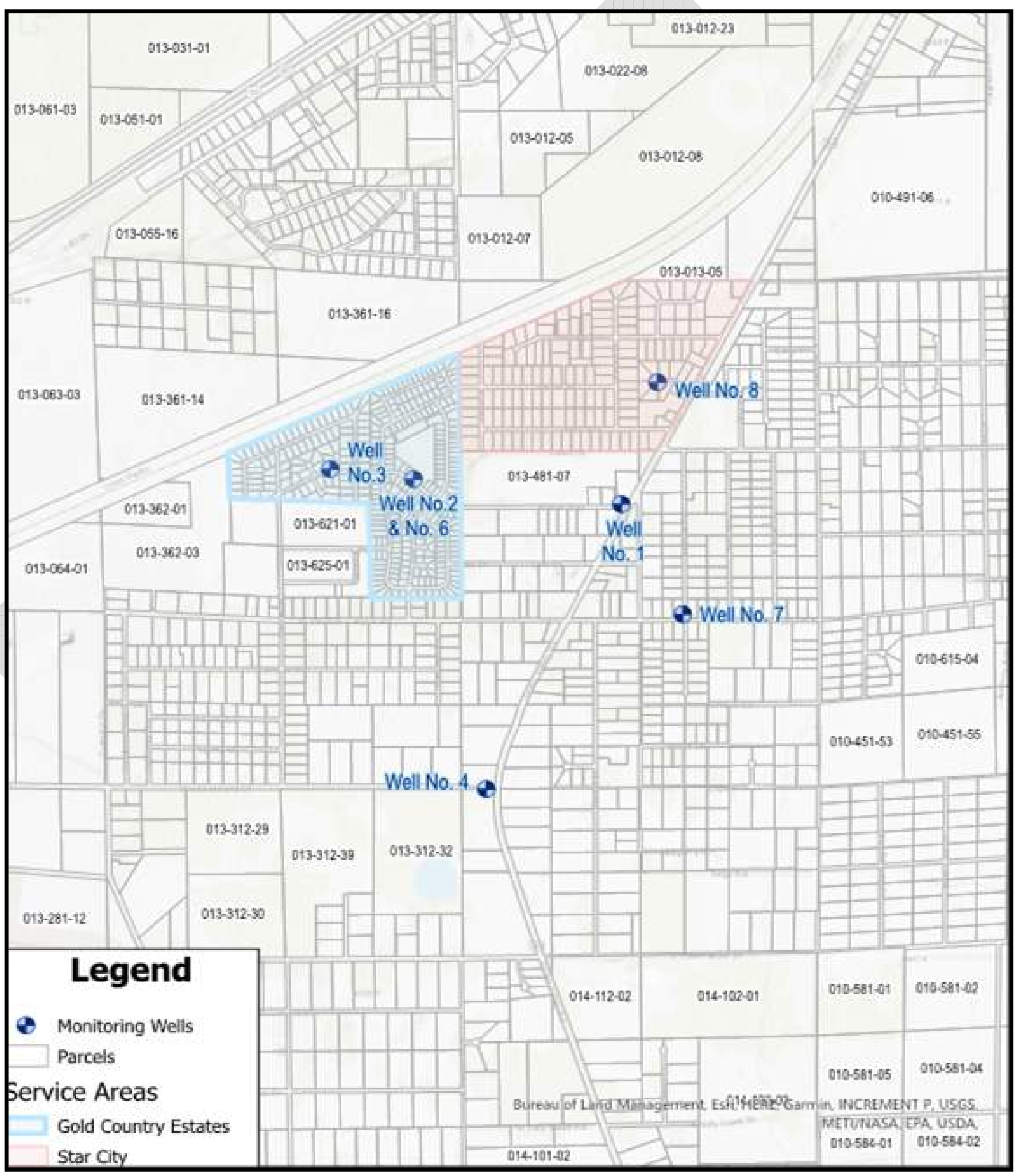


Figure 5: Monitoring Well Locations

The high density of septic systems operating in the project area is a direct contributor to the high nitrate and total dissolved solid (TDS) levels recorded in water samples. The federal maximum contaminant level (MCL) for nitrates in groundwater is 10 milligrams/liter (mg/L). Nitrate levels exceeding 10 mg/L can be linked to a variety of side effects including a lack of oxygen in the blood circulatory system with infants and pregnant women being the most at risk. The extent and severity of possible side effects will differ for each person affected. Water samples taken from Grass Valley have shown multiple instances of exceeding the nitrate MCL as shown in Figure 6.

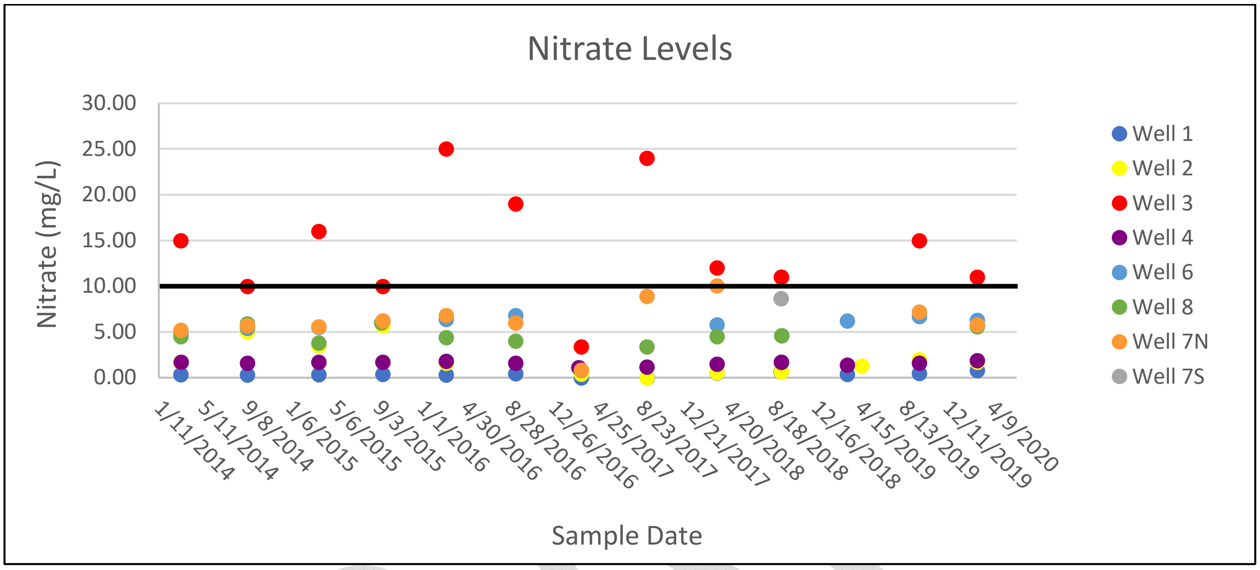


Figure 6: Nitrate Sample Levels

In February of 2022, the *Gold Country Water Company Nitrate Mitigation Assessment PER* was completed by One Water Consulting. The report focused on the water quality of production wells that serve the Gold Country Subdivision with specific documentation given to nitrate concentration levels and methods of mitigation. The PER concluded that nitrate levels in Production Wells 1 and 2 have increased over time. Production Well 1 had a recorded nitrate MCL exceedance of 10 mg/L in 2011 and Well 2 recorded an increase in nitrate levels from 1.7 mg/L in April of 2017 to 9.0 mg/L in July of 2021. The location of these wells are shown below in Figure 7.

Figure 7: Gold Country Production Well Locations

Although the elevated nitrate levels are the main concern regarding public health, the elevated TDS levels are worth noting. The MCL for TDS is 1,000 mg/L, typically an exceedance results in a poor aesthetic quality for drinking water. The TDS level results from water samples are shown in Figure 8.

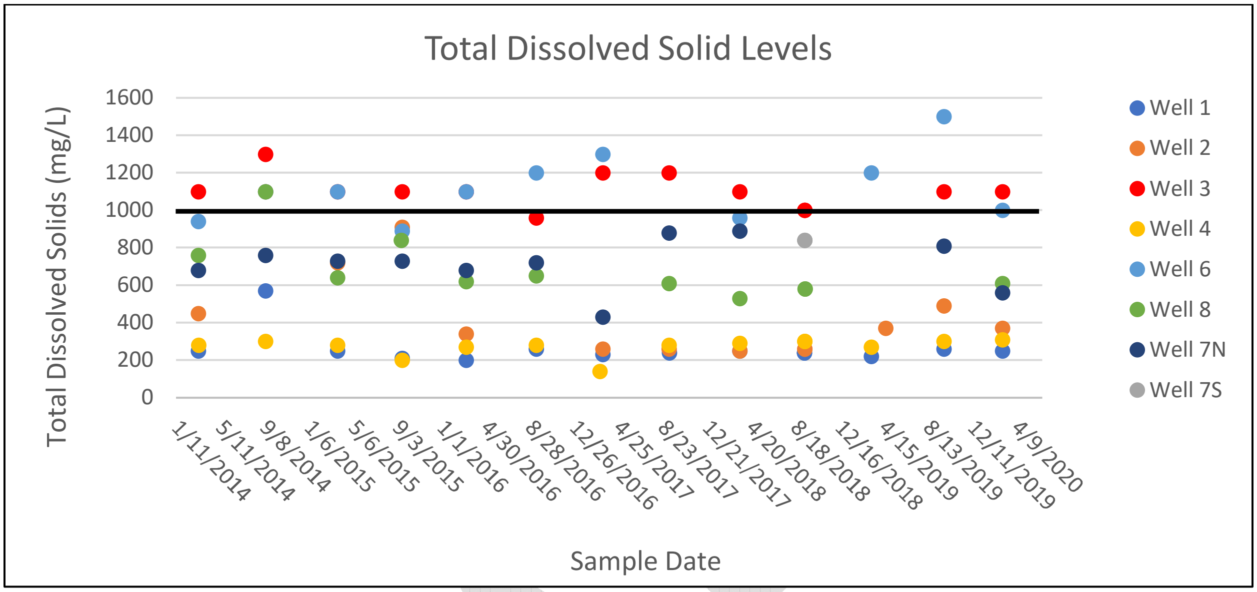


Figure 8: TDS Sample Levels

Attached in Appendix C are extracts from a *Groundwater Assessment Study* which show the results of water samples in relation to well locations and sample counts. The attached figures show additional areas south of the planning area, nearing the Humboldt-Pershing County line with instances of nitrate level exceedances. If nitrate exceedances in the groundwater continue, mitigation of wastewater from septic systems will be required in the future to prevent an impact to public health and water quality in those areas.

3.2 AGING INFRASTRUCTURE

As the age of individual septic systems continues to increase, there will be an increase of system failures particularly when property owners neglect maintenance. Failures include:

- Inappropriate design or poor maintenance.
- Absorption field installed at sites with inadequate or inappropriate soils, excessive drain slopes.
- Failure to pump the septic tank generally at least every three to five years, resulting in solids in the tank to migrate into the drain field, clog the system and discharge excessive nitrates in the water.
- Cracked or leaky septic tank.

These conditions typically result in discharge of water with high concentrations of contaminants discharging into the ground. A septic system failure could go undetected depending on its severity and the difficulty of inspecting for small failures. The septic systems in the project area are located on private property which would require the landowner’s consent to dig up the septic tank or leach field to inspect for failures.

3.3 REASONABLE GROWTH

Based on historical Google Earth aerial imagery, the Grass Valley area experienced an approximate development of 40 lots over a period of nine years, from 2006 to 2015, an estimated growth rate of 4.5 lots per year. The subdivisions of Star City and Gold Country Estates are the most densely populated areas in Grass Valley and have experienced major development, nearly reaching its fully developed state by 2006.

The earliest aerial imagery with a clear visual of the project area subdivisions is from 1994, which shows approximately 272 lots were developed at that time. The next clear aerial imagery is from 2006 and shows that approximately 171 additional lots were developed during that 12-year period, an average of 14.25 lots per year. Although aerial imagery is not available for earlier than 1994, it may be possible that most of the development took place within a few years and coincided with the increase in gold mining activity of the late 1980's and early 1990's.

The pending development of lithium mining and salmon farming in northern Humboldt County may have a similar effect on demand for residential housing. The large undeveloped parcels in Grass Valley are expected to be subdivided into smaller residential lots, specifically areas adjacent to Star City Subdivision and Gold Country Estates.

There is space available for approximately an additional 485 lots within the areas adjacent to the existing subdivisions. By applying the development rate experienced during the gold industry boom to the potential lithium mining boom, approximately 285 lots could be developed over the 20-year period. At an average of 2.56 persons per household, 285 lots would result in a population increase of approximately 730 persons.

However, if the average development rate of 4.5 lots per year that was experienced from 2006 to 2015, continues to trend over the next 20-years, then approximately 90 lots could be developed with an approximate population increase of 230 persons. The project should be sized to accommodate the equivalent of 200 or more future residential lots.

4.0 ALTERNATIVES CONSIDERED

The following subsections outline the alternatives presented for wastewater treatment solutions to improve the groundwater quality in Grass Valley. There are four alternatives being considered to address the issues discussed in this report: three action alternatives and one no-action alternative. A general description and preliminary cost estimate are provided for each action alternative in the sections that follow. The three action alternatives include construction of a sanitary sewer collection system, described in Section 4.1, that is common to all alternatives that require construction. The estimation of wastewater to be generated within the planning area is also discussed in Section 4.1 as it is common to all action alternatives.

The design criteria considered for each alternative is a combination of regulations from the NDEP Bureau of Water Pollution Control (BWPC), Standard Specifications for Public Works Construction, and standard engineering practices.

The four alternatives considered to address the elevated nitrate levels include:

1. Connect to City of Winnemucca sewer system
2. Construct a new wastewater treatment facility (WWTF)
3. Construct wastewater treatment ponds
4. Do nothing, take no action.

4.1 SANITARY SEWER COLLECTION SYSTEM

The collection system location was determined by selecting the highest density of septic systems in the Grass Valley area having elevated nitrate levels. The preliminary collection system layout follows existing streets and utilizes Google Earth surface elevations to maximize gravity flow to the extent possible. A detailed topographic map of the project area will be needed to prepare a final design, but for planning purposes Google Earth data is sufficient and shows the ground surface tends to undulate without any significant elevation drop across the project area. Due to the lack of abundant elevation drop across the site it is apparent that sloped gravity sewer mains will become too deep for continuous runs requiring the need for lift stations and pressurized force mains to convey the wastewater. Maximizing the flow of wastewater by gravity in the mains will result in energy cost and maintenance reductions associated with pumping.

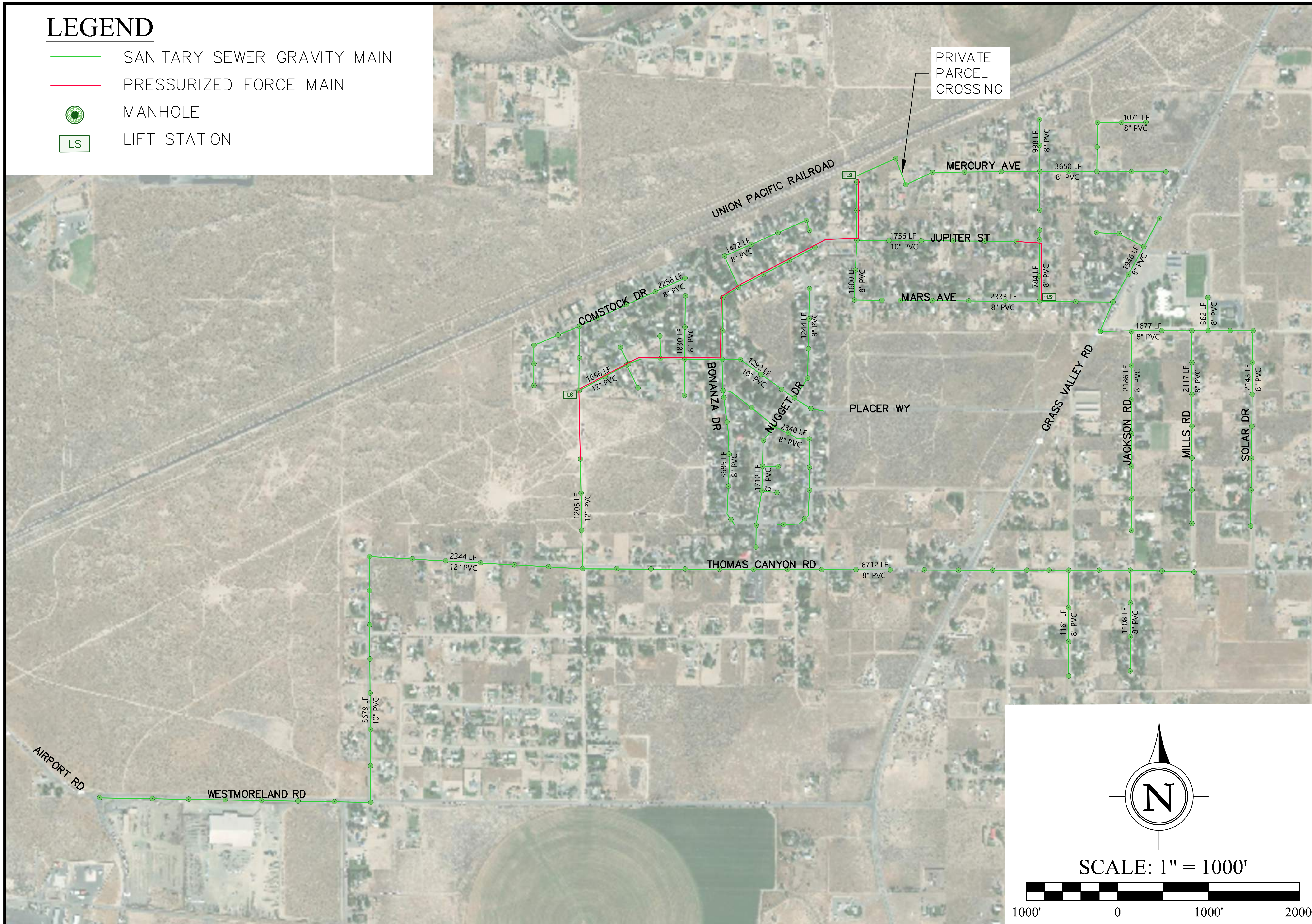
Preliminarily, it is estimated that three lift stations with corresponding sections of force main will be required within the planning area. The lift stations and force main will be in the same location for each alternative with the only distinguishing difference being the direction in which the lift stations pump the wastewater. Connecting to the city sewer would utilize the lift stations to pump the wastewater in a northeastern direction to reach the city connection point. Constructing either the mechanical treatment facility or treatment ponds would utilize the lift stations to pump the wastewater in a southwestern direction to reach the treatment facility. The collection system is shown detailed in Figure 9.

Most sewer main installations will take place in neighborhood street right-of-way and its associated public utility easements; however, there instances where the improvements will lie within the Union Pacific Railroad (UPRR) and Nevada Department of Transportation (NDOT) right-of-way. NDOT right-of-way includes Grass Valley Road (SR 294) and the intersection of Airport Road (SR 796) and Westmoreland Road. The collection system design also includes an instance of crossing a private parcel in its lot line public utility easement to maintain gravity flow, thus avoiding an additional lift station. The parcel crossing, UPRR, and NDOT roadways are shown in Figure 9. The county or its designated representative will need to apply for encroachment permits and work with the private parcel owner to gain approval for construction in those areas. A storm water discharge permit will be required during construction.

It is uncertain at this preliminary design stage if additional room for construction of lift stations, and consequently easements, will be required. Final design of this project will include survey of the area to determine accurate ground elevations which will result in adjustments to the preliminary sewer main layout shown for the gravity flow mains. As-built water system details must also be obtained for the Star City and Gold County subdivisions to ensure sewer mains are placed a minimum of 10 feet away from water mains.

The planning area is located outside of the 100-year flood zone and based on well logs from the area, the depth of construction, 18-feet maximum, should not approach the depth of the water table at 45 to 80 feet deep. The anticipated construction issue related to the collection system is the work required to connect private residences to the sewer main. Septic tanks are commonly placed in the back of residential lots and access may be difficult to backyards depending on the circumstances at each residence. Following the connection to the collection system, the existing septic tanks will be abandoned in place by filling them with earth. Minimal environmental impacts are expected as a result from the collection system construction and connection of existing residential and commercial properties since construction will almost entirely be within existing street and property disturbance areas. There are no known historical sites in the area.

The collection system construction is the first step in the process of sustainability considerations. Collecting wastewater and treating it will provide opportunities as reuse water for nearby agricultural activities. A reuse water system is not part of the scope of this report but should be considered in other phases of a master sewer plan for the Grass Valley area if the initial phase of the sewer system is constructed. Constructing the sewer collection system will increase the opportunity for the airport commercial and industrial parcels to develop bringing an economic boost for the region. The current use of septic systems only in the area severely limits potential commercial users from developing their businesses in Grass Valley.



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GRASS VALLEY PER

HUMBOLDT COUNTY NEVADA

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The volume of the wastewater generated in the planning area, common to all alternatives, was estimated by multiplying lot counts by design volumes that were extrapolated from various wastewater utility sources. The number of developed lots in the planning area was estimated based on aerial imagery and zoning descriptions for those included lots were gathered from the Humboldt County Assessor's data. The design values used for this report are shown in Table 2, categorized by zoning descriptions.

Table 2: Wastewater Flow Design Values

Zoning Description	Design Volume	Unit of Measure
Residential Unit	300	gpd (gallons per day)
Public Facility	2600	gpd/acre
Neighborhood Communcial/Rural District	2600	gpd/acre
General Commerical	780	gpd/acre
Airport/Industrial District	457	gpd/acre

Table 3 presents the normal strength wastewater estimated to be generated in the planning area based on the design volumes presented in Table 2. The average flow design values are calculated by multiplying the corresponding number of units and design volumes. The non-residential properties presented in Table 3 do not include the full property area in the volume calculations because large portions of those properties consist of parking, landscaping, laydown areas, and so forth which do not contribute to wastewater flows. Moreover, the non-residential properties will generate peak wastewater flows at opposite times of residential properties. By refining the contributing areas and considering the offset peak flows times of existing non-residential properties, the estimation of wastewater volume generated in the project area should not be unnecessarily oversized.

Table 3: Estimated Wastewater Flows

Description	No. of Units		Vol / Unit		Average Flow (GPD)	
Residential Units	638	ERU	300	gpd	191,400	
General Commercial District	0.24	Acre	780	gpd/acre	187	
Public Facility	2.03	Acre	2600	gpd/acre	5,278	
Neighborhood Commercial/Rural District	0.18	Acre	2600	gpd/acre	468	
Public Facilities Airport/Industrial District	5.18	Acre	457	gpd/acre	2,367	
Additional Capacity In Equivalent Residential Units (ERU)	234	ERU	300	gpd	70,200	
				Estimated Avg. Day Volume	269,900	GPD
				Estimated Max. Day Volume[1]	404,851	GPD
				Estimated Peak Hour Flow[2]	469	GPM

[1]Maximum-day factor of 1.5 multiplied by average day volume to determine maximum day volume.
[2]Peak-hour factor of 2.5 multiplied by average day volume to determine peak hour flow.

An additional capacity of 234 ERU was included in the estimation of generated wastewater to account for approximately 67 undeveloped parcels and allow for additional growth and expansion in the area that would be connected to the proposed wastewater system.

The estimated average day volume generated by the planning area is 0.27 MGD with a potential maximum day volume of 0.405 MGD. The collection system and each treatment alternative considered must have the ability to manage the flow volumes for the preliminary design. Based on the calculated flow volumes, gravity sewer lines varying from 8, 10, 12, and 15-inch will be capable of sufficiently conveying the generated wastewater flows. An 8-inch force main will adequately convey the calculated wastewater flow for all sections of force main.

Data is not readily available for influent characterization; therefore, assumptions were made common to all alternatives with assigned values provided in Table 4. The five-day biochemical oxygen demand (BOD_5) determines the amount of oxygen required to break-down biodegradable organic materials and provides an effective gauge of treatment efficiency. Nitrate levels are the primary driver of this report and temperature is required to estimate nitrogen removal; therefore, total nitrogen and temperature assumptions were made.

Table 4: Influent Characterization Assumptions

Design Parameters	Influent Characterization
Total Nitrogen	40 mg/L
BOD_5	240 mg/L
Temperature	60 °F

4.2 ALTERNATIVE 1 – CONNECT TO CITY SEWER

This alternative includes construction of the collection system outlined in Section 4.1 and construction of additional sewer lines to convey wastewater from the project area to the City of Winnemucca's sewer system. The existing system currently treats effluent below the nitrate MCL of 10 mg/L. The nearest point to tie-in with city sewer is located at the intersection of Potato Place and Potato Road, approximately 2 miles northeast of Grass Valley. This alternative would require approximately 15,800 linear feet (LF) of additional force main to convey the wastewater from the planning area to the city sewer connection point. This alternative also proposes the construction of approximately 1,900 LF of 15-inch gravity sewer within the city boundary to accommodate the volume of flow from the Grass Valley project area and provide additional capacity for future expansion.

The operating capacity at Winnemucca's wastewater treatment facility is 1.5 MGD. The average daily flow treated during 2020 was recorded at 0.85 MGD leaving an available capacity of 0.65 MGD. The treatment facility potentially has the capacity to manage the estimated 0.27 MGD from the project area. The city's facility would remain below 75-percent of full capacity, allowing for some additional development in either Grass Valley or the city. The proposed point of tie-in and 15-inch sewer line are shown in Figure 10.

The force main conveying wastewater from the project area to the city connection point would run adjacent to Grass Valley Road and cross under the UPRR, requiring encroachment permits from both entities. An easement from a commercial property between NDOT and UPRR would also be required.

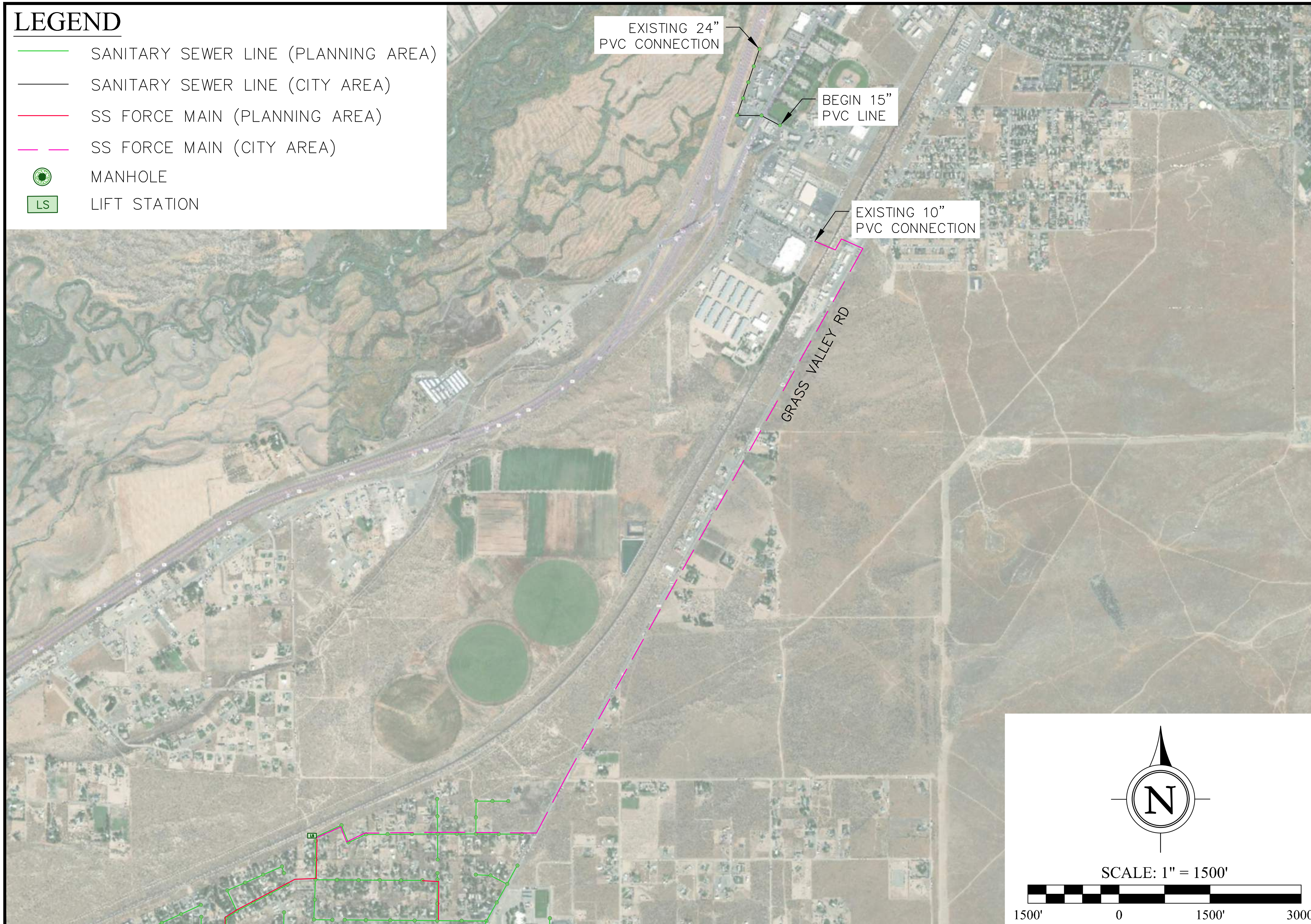
Preliminary costs associated with this alternative are shown in Table 5, and values are rounded to the nearest hundreds-place. According to the city manager/engineer, the current operating costs are approximately $0.007 per gallon which includes costs for treatment, personnel, maintenance, and so forth. The city manager/engineer estimated additional personnel at the cost of $80,000 per year would be required to manage the addition of the Grass Valley sewer collection system. City sewer connection fees would also be charged to Grass Valley customers at a rate of $3,500 per connection multiplied by a factor of 1.5 for a total $5,250 per connection (fee for connections outside city limits). None of the connection fees would benefit the county but would go to the city sewer fund. Additionally, the value in Table 5 given for the cost of short-lived asset maintenance and replacement is based on similar project costs.

Table 5: Engineer's Opinion of Probable Cost – Alternative 1

Project Component	Cost
Collection System Construction	$ 19,752,300
Lift Stations	$ 705,000
Non-Construction Costs & Connection Fees	$ 8,256,400
Total Project Cost	**$ 28,713,700**
Annual Operations and Maintenance	
Operating Costs	$ 678,900
Maintenance Personnel	$ 80,000
Short Lived Asset Maintenance/Replacement	$ 10,400
Total Annual Cost	**$ 769,300**

Construction of the project area collection system and connection to the city's sewer system supports Humboldt County's master plan goals to improve groundwater quality by reducing impacts from high nitrate levels. Furthermore, installing a sewer utility will increase opportunities for development of some airport industrial park parcels helping to provide an economic boost for the region as businesses develop.

This alternative does not provide as significant of a sustainability opportunity with the possible installation of a future reuse water system for irrigation. The city may not have ways to utilize the additional treated water from Grass Valley at nearby farms. The farmland totals about 350 acres adjacent to the city's treatment facility.



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4.3 ALTERNATIVE 2 – CONSTRUCT MECHANICAL TREATMENT FACILITY

Alternative 2 consists of the construction of the collection system outlined in Section 4.1, a mechanical treatment facility, and rapid infiltration basins (RIBs). This alternative includes approximately 2,400 LF of 15-inch gravity sewer main to convey wastewater from the collection system to the treatment facility site. The 15-inch sewer main is sized to accommodate future wastewater flows from adjacent areas as additional phases of the sewer project develop. The 15-inch main terminates into a wet well and lift station located at the WWTF. The lift station will pump the wastewater to the extended aeration mechanical treatment process that is expected to lower effluent nitrates to 10 mg/L or less. Following treatment, the effluent will be discharged into RIBs and infiltrated back into the ground. The additional sewer main, lift station, and preliminary treatment facility layout are shown in Figure 11. The treatment schematic is shown in Figure 12.

The construction of WWTF and RIBs in this alternative would have associated ground disturbance from the earthwork required and would be similar to the ground disturbances that exist in Grass Valley due to existing development. Construction is not anticipated to cause any unique direct or indirect environmental impacts. The proposed location of the treatment system is outside of the 100-year floodplain and according to well log data, the water table, at 45 to 55 feet deep, should not be an issue for construction. The scope of this report does not cover geotechnical investigation for the proposed RIB locations. However, the United States Department of Agriculture Soil Survey maps indicate the soils in the surrounding area include soil types that are favorable for infiltration.

The precise land requirement for the RIBs is heavily dependent on the infiltration rate of the soil at their final location. Percolation rate testing and soil samples are outside of the scope of this report; however, according to the NDEP, a typical RIB size for small to medium-sized systems is 0.5 to 5-acres per RIB. Final design for this project would include the necessary site soil testing and would yield an accurate RIB design size of individual basins and the required number of basins needed for total infiltration. As a minimum, two basins would be required for alternate operation and to allow mounded water to settle. Additionally, the RIB not being utilized can undergo routine maintenance. Since nearby well logs seem to indicate a depth to groundwater in the area of 45 to 55 feet deep, it may be necessary to have three or four infiltration basins to manage mounded water levels in the vadose zone.

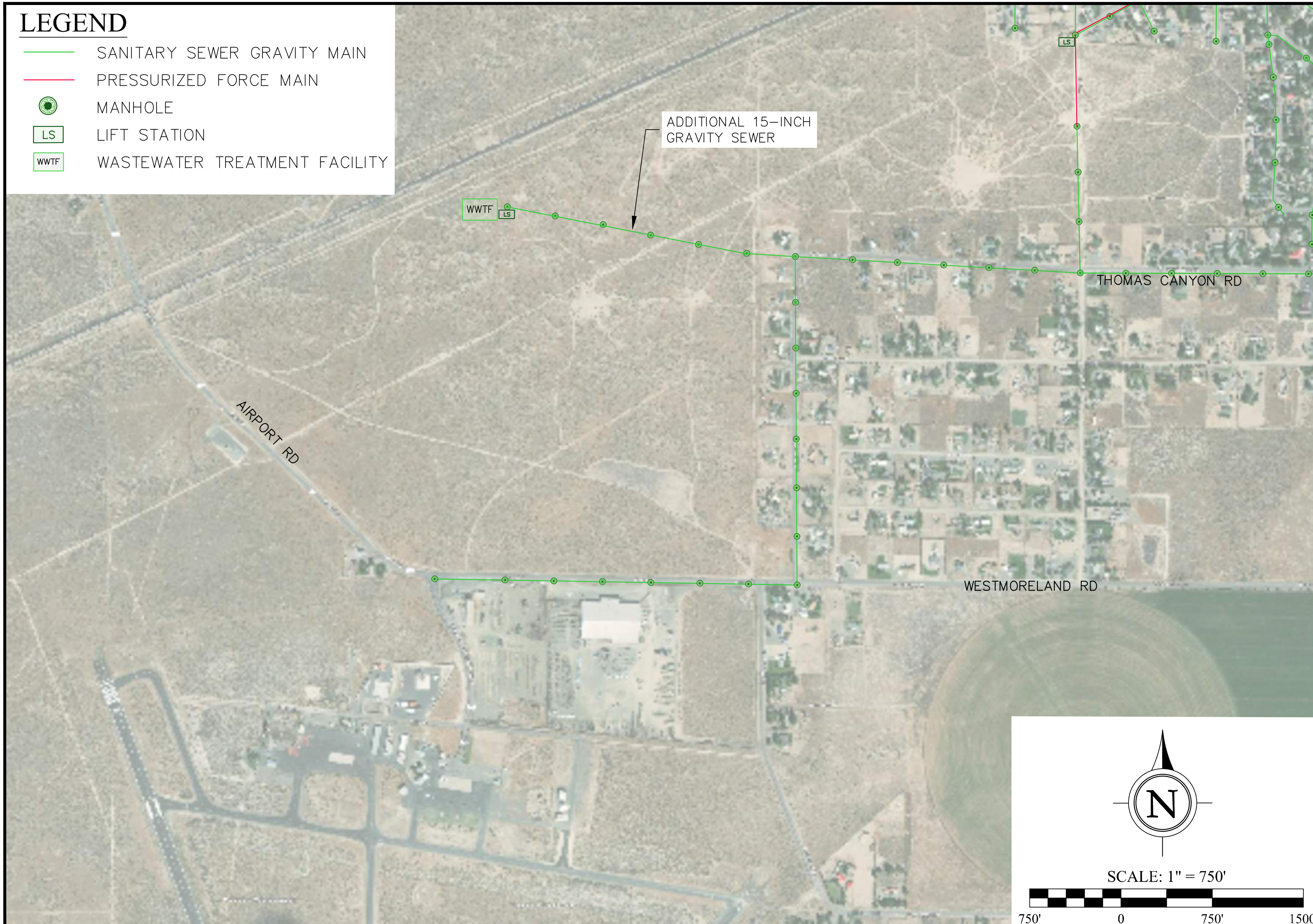
The county collection system and treatment plant will provide the greatest opportunity for sustainability considerations. Collecting wastewater and treating it will allow opportunities for reuse effluent water at nearby farms. Mechanical treatment is anticipated to produce reuse category B water which contains minimal fecal coliforms. A reuse water system is not part of the scope of this report but should be considered in other phases of the master sewer plan for the Grass Valley area if the initial phase of the sewer system is constructed. A reuse system has the potential to serve more than 1,300 acres of existing agricultural land in the Grass Valley area. If reuse water is utilized by the farmers, then a reduction in irrigation pumping will be achieved placing less burden upon limited groundwater resources.

Preliminary estimated costs associated with the construction and operation of Alternative 2 are shown in Table 6. Land purchase will be required for the location of the WWTF and RIBs. Figures are rounded to the nearest hundreds-place. Values for the cost of short-lived asset maintenance and replacement are based on similar project values.

Table 6: Engineer's Opinion of Probable Cost – Alternative 2

Project Component	Cost
WWTF Construction	$ 5,065,600
WWTF Electrical Systems	$ 788,300
Collection System Construction	$ 15,615,200
Lift Stations	$ 705,000
Non-Construction Costs	$ 5,622,100
Total Project Cost	**$ 27,796,200**
Annual Operations and Maintenance	
Salaries & Benefits	$ 142,000
Treatment	$ 38,000
Short Lived Asset Maintenance/Replacement	$ 10,400
Administrative & Support Services	$ 26,400
Energy Cost	$ 69,000
Sludge Hauling Equipment	$ 36,000
Sludge Disposal Fee	$ 30,000
Annual Discharge Permit Fee	$ 1,900
Total Annual Cost	**$ 353,700**

This wastewater management system would be held under ownership and operation of Humboldt County. Construction of the collection and mechanical treatment system to provide services to Grass Valley supports Humboldt County's master plan goals to alleviate negative water quality impacts on the aquifer and significantly promotes commercial development opportunities within the airport industrial park.



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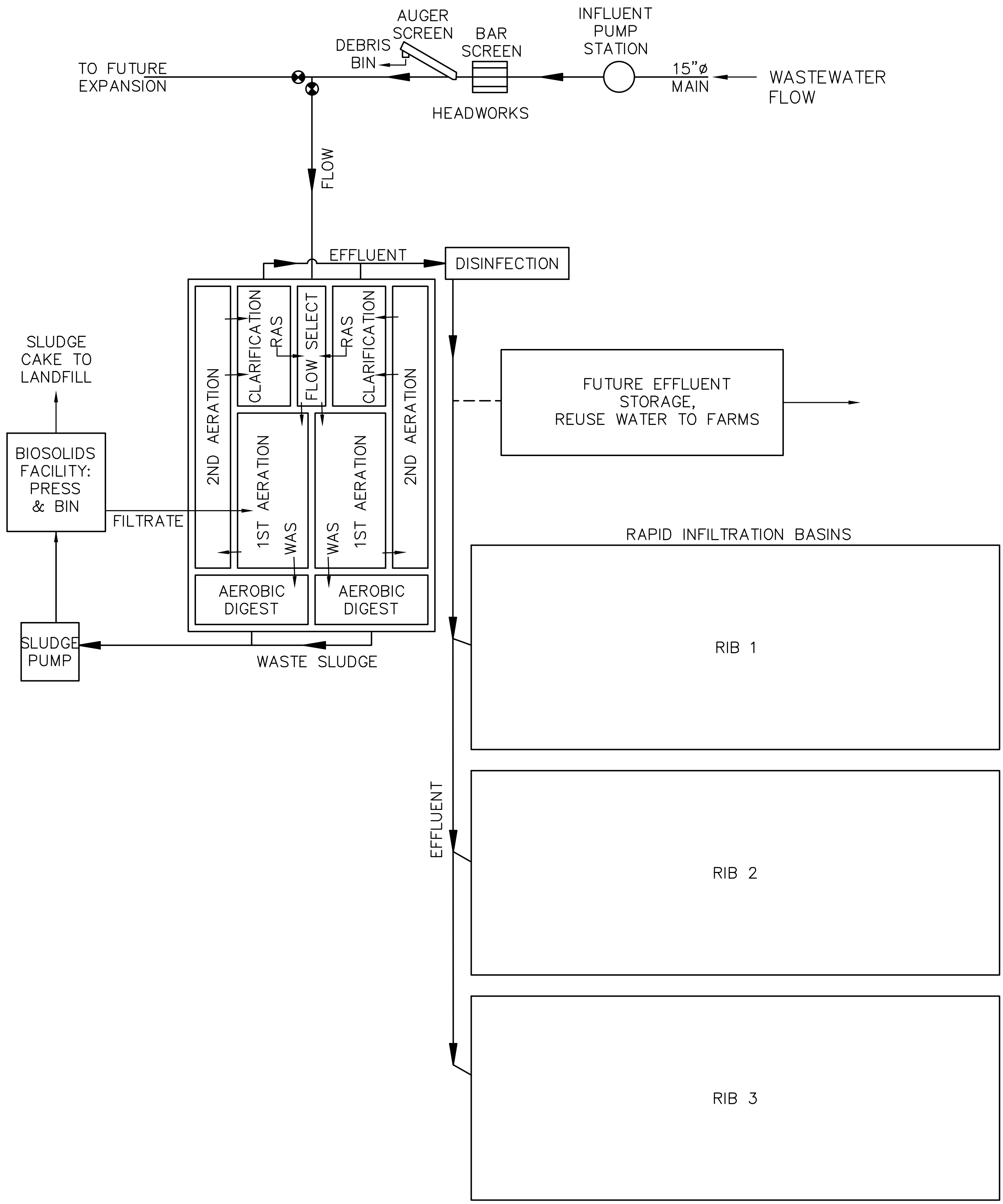

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MECHANICAL TREATMENT
EXTENDED AERATION

HUMBOLDT COUNTY NEVADA

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4.4 ALTERNATIVE 3 – CONSTRUCT WASTEWATER TREATMENT PONDS

This alternative includes construction of the collection system, three treatment ponds with mechanical aeration, and RIBs. This alternative would also require approximately 2,400 LF of additional 15-inch gravity main to convey the wastewater to an aerated-facultative pond, also known as a partial-mix pond. After the wastewater has been treated, it will be discharged into RIBs where it will be infiltrated back into the groundwater. The layout for this alternative is identical to Alternative 2 with the only difference between the two is the treatment process. The schematic layout is shown in Figure 13.

A geomembrane or clay liner is required for treatment ponds to prevent seepage of untreated wastewater into the groundwater thus avoiding unnecessary negative environmental impacts. A plan for leak detection and timely corrective actions will be in place and include the use of monitoring wells. If maintenance or repair of a pond is required, it will be taken offline and the second pond in the system will be utilized for treatment. Environmental impacts for this alternative mainly consist of the ground disturbance required for the construction of the treatment ponds and RIBs. Treatment ponds also tend to have a noticeable odor issue.

Like mechanical treatment, treatment ponds may be subject to an NDEP permit compliance point of an average total nitrogen level of 10 mg/L or less in the effluent. Preliminary calculation results estimate the total nitrogen expected in the pond effluent. The assumed influent parameters for the treatment ponds and computed effluent results are shown below in Table 7.

Table 7: Treatment Pond Assumptions

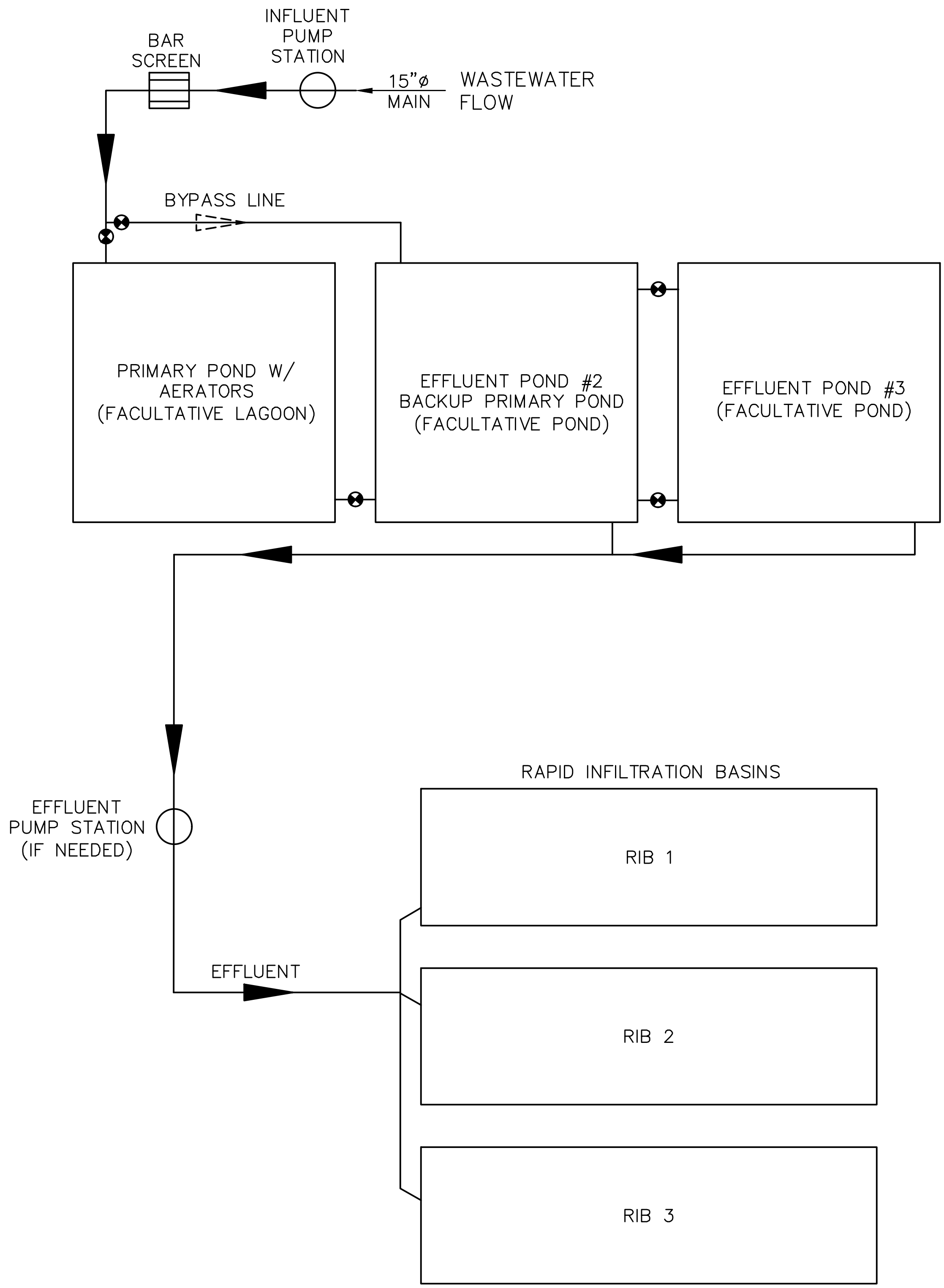
Assumed Influent Parameters	
Total Nitrogen Influent	40 mg/L
Detention Time	30 days
Temperature	60 °F
Alkalinity Influent	200 mg/L
Resultant Effluent	
Total Nitrogen	22 mg/L

Based on the assumed preliminary influent parameters, the treatment ponds would have a calculated total nitrogen in the effluent of 22 mg/L, a removal efficiency rate of 45 percent. Total nitrogen removal can be improved at various rates by the installation of mechanical aeration equipment. The impact of aeration was not included in the results listed in Table 7. A mechanical aerator can be selected during final design and an accurate nitrogen level in the effluent can be calculated at that time.

Land would need to be purchased or leased for the location of the treatment ponds and RIBs. Treatment pond sizing is dependent on the volume of influent it is required to manage for a prescribed detention time. The preliminary design of the treatment ponds for Grass Valley considered an average daily flow of 0.27 MGD and a detention time of 30 days. Based on that information, the estimated land required for the treatment ponds is 21 acres, 7-acres each.

Partial-mix ponds are simple to operate and are not maintenance intensive. Ponds typically do not require the same electrical demand as alternative treatment methods; however, this project will require mechanical aerators which can be energy intensive.

Like Alternative 2, RIBs will be necessary for treated effluent infiltration. The same RIB sizing and operating parameters apply to this option as noted in Alternative 2.



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TREATMENT PONDS

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The county collection system and treatment ponds may provide opportunity for sustainability considerations such as reuse water at nearby farms; however, the quality of effluent from treatment ponds may require controls that restrict human contact with the water due to increased amounts of fecal coliform. Chlorination can reduce the coliform in the water. The lower quality of reuse water and associated restrictions may not be considered appealing to potential users, and therefore, significantly reduce consumption opportunities.

Estimated costs for the construction and operation of the system are shown in Table 8, values are rounded to the nearest hundreds-place. The values provided were determined from previous similar projects and current industry costs.

Table 8: Engineer's Opinion of Probable Cost – Alternative 3

Project Component	Cost
Treatment Pond Construction	$ 2,219,300
Mechanical Aeration Equipment	$ 5,000
Collection System Construction	$ 15,615,200
Lift Stations	$ 705,000
Non-Construction Costs	$ 4,699,700
Total Project Cost	**$ 23,244,300**
Annual Operations and Maintenance	
Salaries & Benefits	$ 106,500
Short Lived Asset Maintenance/Replacement	$ 10,400
Administrative & Support Services	$ 26,400
Energy Cost	$ 69,000
Sludge Removal (accumulate for 10-15 yrs)	$ 127,500
Annual Discharge Permit Fee	$ 1,900
Total Annual Cost	**$ 341,700**

This wastewater system would be owned and operated by Humboldt County and would alleviate the strain on the groundwater aquifer from the density of operating septic systems. This alternative will require a larger area of ground disturbance, compared to Alternative's 1 and 2, for the treatment ponds and RIBs. By providing an alternate method of sewage handling, this alternative supports goals in Humboldt County to alleviate the contamination of the aquifer and promote development in the airport industrial area.

4.5 ALTERNATIVE 4 – NO ACTION ALTERNATIVE

Alternative 4, the No Action Alternative. Under this alternative, the residents of Grass Valley will continue using their septic systems to collect and dispose of wastewater. Action will not be taken to improve the groundwater quality or offset the elevated level of nitrates. This alternative will have a direct environmental impact as the quality of the groundwater aquifer continues degrade. A social impact is also possible with a potential for health issues for residents from the ongoing exposure to the elevated nitrate levels. This alternative has an initial cost of zero dollars but has potential to incur excessive future costs since the nitrate levels will need to be addressed eventually. Cost for construction of a collection system and/or treatment facility will increase as inflation increases and depending on the extent and severity of the residences' exposure to the groundwater nitrates, corresponding legal ramifications could be encountered. This alternative does not support Humboldt County's master plan to alleviate the harmful impacts of nitrates on the groundwater aquifer in Grass Valley nor does it encourage commercial growth in the airport industrial park.

5.0 SELECTION OF AN ALTERNATIVE

5.1 LIFE CYCLE COST ANALYSIS

A life cycle cost analysis quantifies the total cost of a project including the initial capital cost, the annual O&M cost, and the short-lived asset cost. All costs will be converted to present day dollars and the planning period will be considered as 20 years for simplicity; however, most components of the system will last for a much greater period. A discount rate of -0.5 percent was applied to the 20-year present worth, which rate was taken from Appendix C of the Office of Management and Budget (OMB) circular A-94. A cost based alternative comparison is shown in Table 9, values are rounded to the nearest hundreds-place.

Table 9: Cost Analysis Alternative Comparison

Alternative	Total Capital Cost	Annual O&M Cost	O&M NPV 20 Years at 0.5%	Total NPV
Alternative 1 – Connect to Winnemucca	$ 28,698,700	$ (769,300)	$ 16,993,600	$ 45,692,300
Alternative 2 – Mechanical Treatment Facility	$ 27,796,200	$ (353,700)	$ 7,813,100	$ 35,579,300
Alternative 3 – Wastewater Treatment Ponds	$ 23,229,300	$ (341,700)	$ 7,548,000	$ 30,777,300
Alternative 4 – No Action	$ -	$ -	$ -	$ -

Alternative 4, does not cost anything but does not address the significant health and environmental issues. Alternative 3 apparently is the most cost-effective solution based on net present value; however, it does not provide the best opportunity to manage additional volumes of wastewater from existing or new development. As the sewer system grows, treatment ponds become limited and would be replaced by mechanical treatment. The capital spent on the treatment pond construction, approximately $1.5 million, will be wasted when the ponds get replaced by mechanical treatment.

5.2 NON-MONETARY FACTORS

A non-monetary comparison of the previously presented alternatives is shown in Table 10. This evaluation considered seven varied factors, as detailed below. The evaluation followed an assigned ranking procedure where each alternative was ranked from one to four, best to worst, respectively. The alternative with the lowest cumulative score is considered the best non-monetary alternative of the factors considered.

The following factors and questions were considered to complete the non-monetary ranking.

1. Constructability – With what ease can the proposed alternative be constructed?
    a. What are potential constructability risks?
2. Flexibility – Is the proposed alternative flexible?
    a. Can the proposed process be easily adapted to changing factors such as influent characteristics and regulations?

3. Long-Term Feasibility – Is the proposed design suitable to meet community needs?
    a. Is the proposed design adaptable for growth and development?
4. Ease of Operation – Is the proposed alternative easy to operate?
    a. Will there be an improvement to existing operational challenges?
    b. Will it create operational challenges?
    c. Will there be an addition of significant operational burden or require a high level of staffing to operate effectively and safely?
5. Reliability – Is the proposed design dependable?
    a. Is the proposed technology well established with successful installations?
    b. Is the proposed design susceptible to operational restrictions?
    c. Does the county have control over the treatment aspect and its cost?
6. Environmental Impact – Will the proposed alternative pose a burden on the environment?
    a. Will the alternative easily meet permit requirements?
7. Land Requirement – How much land will be required for the proposed alternative?
    a. Is it a feasible and readily available amount?
8. Master Planning Emphasis – Does the alternative support goals expressed in the *Humboldt County Master Plan*?
    a. Will the alternative provide a solution to the elevated nitrate levels?
    b. Will the alternative encourage growth and development in Grass Valley?

Table 10: Non-Monetary Alternative Comparison

Alternative	Alternative 1 – Connect to City Sewer	Alternative 2 – Construct Mechanical Facility	Alternative 3 – Treatment Ponds	Alternative 4 – Do Nothing
Constructability	2	4	3	1
Flexibility	3	1	2	4
Long-Term Feasibility	3	1	2	4
Ease of Operation	2	4	3	1
Reliability	3	2	1	4
Environmental Impact	1	2	3	4
Land Requirement	2	3	4	1
Master Planning Emphasis	3	1	2	4
Overall Score	**19**	**18**	**20**	**23**

Although Alternatives 1, 2 and 3 have insignificant differences in non-monetary scores, Alternative 2 ended with a better score because it has greater flexibility to comply with regulations, long-term ability to grow and adapt with growth in Grass Valley, and best meets the goals of the *Humboldt County Master Plan* to help protect groundwater resources.

5.2.1 Health and Environmental Impacts

In December 2014 Farr West completed a groundwater nitrate assessment study and tested a total of 134 nitrate-nitrite unique well samples. The findings of these samples showed multiple MCL exceedances. The Federal and State MCL standard for nitrate levels in drinking water is 10 mg/L. Sample results indicate levels as high as 25 mg/L. Nitrates are a carcinogen and when excessive in drinking water pose an immediate threat to the public's health. The high density of septic systems currently operating in Grass Valley result in the release of inadequately treated wastewater through the leach fields. This water is then absorbed back into the groundwater supply with elevated levels of nitrates.

The wastewater influent assumptions previously provided in Section 4.1 offered the following estimated influent values: 40 mg/L of total nitrogen, 240 mg/L of BOD_5, and an average water temperature of 60 °F. Utilizing the provided assumptions for wastewater influent and a 30-day detention time for the treatment ponds, mechanical treatment is the more efficient method of treatment. Table 11 provides the estimated percentage of removed constituent as well as the remaining value expected to be present in the treated effluent.

Table 11: Treatment Method Comparison

Constituent	Mechanical Treatment		Treatment Ponds	
	Efficiency	Effluent (mg/L)	Efficiency	Effluent (mg/L)
Total Nitrogen	75%	10	45%	22
BOD_5	94%	15	65%	82

A longer detention period would increase the efficiency of the treatment ponds, but it would also result in a significant increase in the required size of the ponds. Mechanical treatment is the most effective way to reduce environmental impacts and protect human health. Mechanical treatment also provides better odor control compared to treatment ponds.

5.2.2 Sustainability Considerations

Alternative 1, Connect to the City Sewer, is not favorable to the city because connecting Grass Valley residents to the city system will take capacity in the sewer pipe and at the treatment facility. Taking capacity in the city's wastewater system will reduce the amount of future development the city has available. It is a less sustainable option and will prevent both the city and the county from significantly expanding sewer service.

The possibility for reuse of the treated water has been discussed with a potential for irrigation use at local farms. The customer base for this is not yet known nor is the cost to purchase the treated reuse water. The wastewater would have to be treated to a specific level of quality depending on the intended category of reuse which could incur additional costs with treatment chemicals. The availability of reclaimed water for irrigation use would be a valuable resource in Grass Valley. Alternative 2 provides the greatest opportunity to enable the reuse of water in the area.

5.2.3 Community Discussions

Some Grass Valley community members have expressed opposition to the county controlling the water in the area. Typical causes for opposition to the county creating a wastewater collection system are the costs that residents will incur and the personal loss of control over wastewater disposal. Some residents support a wastewater system to reduce impacts on groundwater quality. The majority of residents either are not aware of the groundwater issues or have not yet expressed an opinion regarding the project. Continuing to educate to the community on the risks of prolonged exposure to elevated nitrate levels in drinking water from area wells will be essential for individuals to gain an understanding of the benefit of utilizing a wastewater treatment system. An emphasis should also be placed on potential funding strategies to avoid putting the community in financial distress.

5.2.4 Permits

Section 4.1 delineates the right-of-way permits and easements required to construct the sewer collection system which is common to the three main alternatives. Alternatives 2 and 3 will both require a wastewater discharge permit from NDEP. Alternative 1, connecting to the city treatment facility, has a discharge permit in place. During construction NDEP will require a storm water discharge permit since more than one acre will be disturbed by construction. It is likely that more than 5 acres will be disturbed at any one time, so a surface area disturbance permit should be obtained from the NDEP Bureau of Air Pollution Control (BAPC) by the construction contractor.

5.3 RECOMMENDED ALTERNATIVE

Table 12 below indicates that Alternative 2, Construct Mechanical Treatment Facility, provides the most benefits to the residents of Grass Valley.

Table 12: Alternative Decision Matrix

Resident Benefit	Alternative 1 – Connect to City Sewer	Alternative 2 – Construct Mechanical Treatment Facility	Alternative 3 – Construct Treatment Ponds	Alternative 4 – Do Nothing
Capital Construction Cost			•	
Annual Operations Cost		•	•	
Treatment Efficiency	•	•		
Health and Environmental Impacts	•	•	•	
Sustainability Considerations		•		
Cost Preference				•
Master Plan Goal Support	•	•	•	

Alternatives 2 and 3 have similar O&M costs. Alternative 2 provides solutions to protect the public health and reduce environmental impacts by alleviating the load of nitrates on the groundwater aquifer. It also supports another goal outlined in Humboldt County's master plan to better enable commercial development opportunities within the airport industrial park. Alternative 2 provides higher quality effluent compared to treatment ponds enabling the potential for a reuse system in a future project phase. While Alternative 2 is more expensive compared to Alternative 3, the capital spent on the treatment pond construction, approximately $1.5 million, will be wasted when the ponds get replaced at a future date by mechanical treatment as expansion of the sewer system to existing homes or future development progresses.

6.0 PROPOSED PROJECT

The proposed project will include a sanitary sewer collection system delineated in Section 4.1 and a mechanical treatment facility with at least three rapid infiltration basins described in Section 4.3.

6.1 PRELIMINARY PROJECT DESIGN

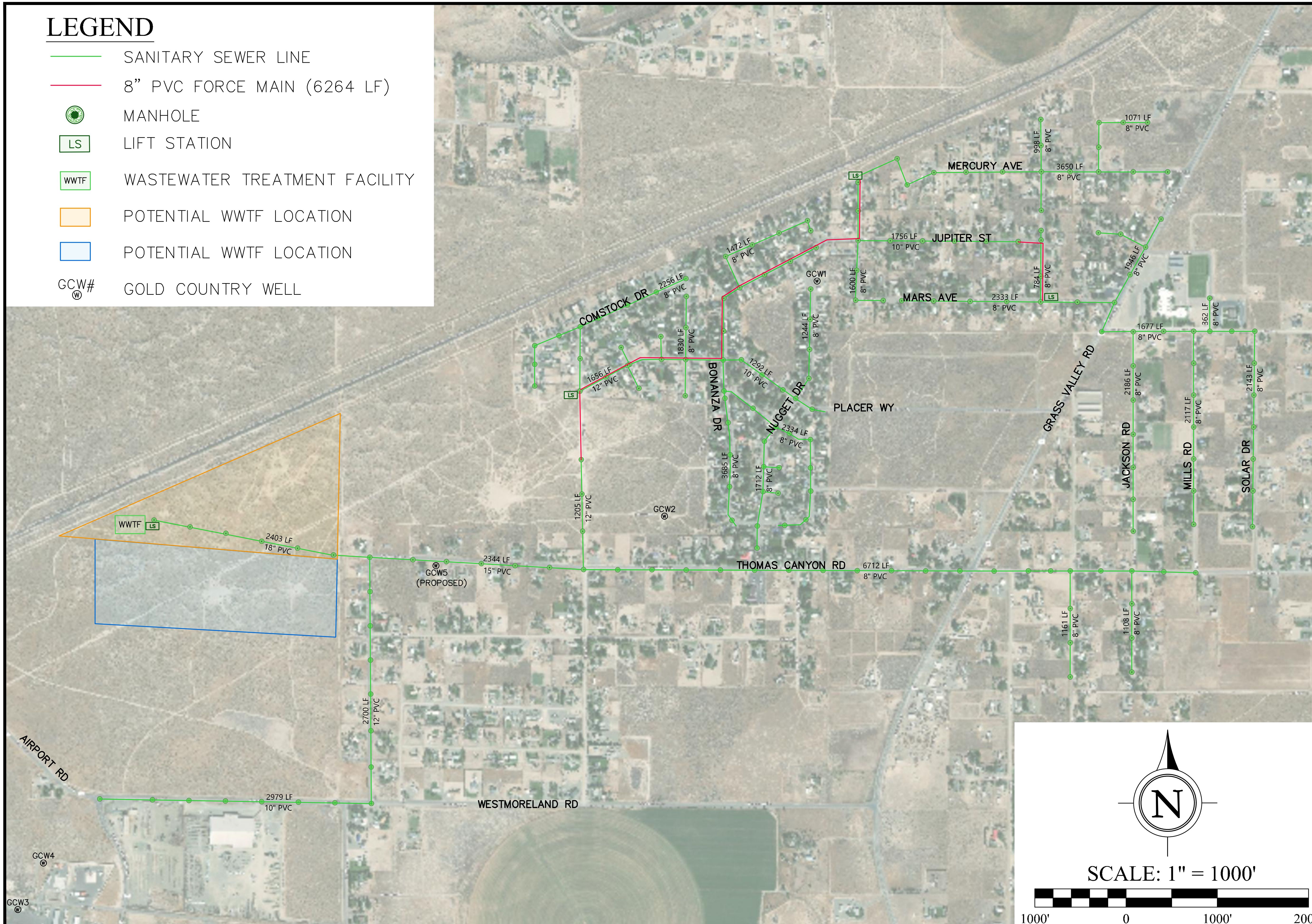
The sanitary sewer collection system will be installed and connected to existing residential and commercial properties. Preliminarily, there will be three lift stations incorporated in the construction of the collection system with an additional one at the WWTF site. The lift station at the WWTF is needed to pump wastewater from the terminus of the buried sewer collection pipe up to the treatment facility headworks.

The collection system design will consist of the following:

1. Gravity sewer mains, approximately 61,417 LF consisting of:
    a. Approximately 45,092 LF of 8” PVC SDR 35
    b. Approximately 6,026 LF of 10” PVC SDR 35
    c. Approximately 5,552 LF of 12” PVC SDR 35
    d. Approximately 2,344 LF of 15” PVC SDR 35
    e. Approximately 2,403 LF of 18” PVC SDR 35
2. Sewer laterals, approximately 645 connections
3. Force mains, approximately 6,264 LF of 8” PVC C900
4. Sewer manholes, approximately 188 consisting of:
    a. Approximately 184 Type 1-A 48” Manholes
    b. Approximately 4 Type III 48” Manholes
5. Based on preliminary elevation data, four lift stations consisting of the following:
    a. Lift Station 1:
        - Located in the vicinity of Saturn Street and Jupiter Street
        - Estimated maximum flow rate: 215 GPM
        - Wet well storage volume: 540 gal.
    b. Lift Station 2:
        - Located in the vicinity of the northern end of Venus Street
        - Estimated maximum flow rate: 331 GPM
        - Wet well storage volume: 825 gal.
    c. Lift Station 3:
        - Located in the vicinity of Stratus Street and Placer Way
        - Estimated maximum flow rate: 540 GPM
        - Wet well storage volume: 1,350 gal.
6. Abandonment and cleanout of approximately 645 existing septic tanks

The *Grass Valley Master Sewer Plan* (Master Sewer Plan) was created to aid the efforts of this PER to properly size and design the preliminary sewer collection and treatment system. The area designated as “Phase 1” of the Master Sewer Plan consists of the same project area of this preliminary engineering report as and utilizes the same design parameters and service connection counts as this report. The Master Sewer Plan effort provides the initial design process to determine potential wastewater volumes if the sewer system were expanded in additional phases throughout Grass Valley. The Master Sewer Plan helped to identify pipes that should be upsized to convey greater future volumes through the project area (Phase 1), potential densities and associated volumes of future development within the project area, and the initial volume of the WWTF at 0.405 MGD. Expandability of the WWTF has also been ascertained in the master plan.

The preliminary collection system design and proposed treatment facility location for the project area is shown in Figure 14.



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FG 14

The proposed method of treatment is an extended aeration basin with solids handling. Extended aeration provides biological treatment and removal of organic waste operating under aerobic conditions. This type of system has a small footprint relative to its treatment capabilities, involves a simple installation process, is easy to operate, and can manage odor levels when properly operated.

The treatment process will begin with debris removal by passing untreated effluent through a channel equipped with screens and an auger to remove non-fecal solids. The removed debris will be discharged into a dumpster for landfill disposal. Since the sewer collection system will be new, grit should not be a major issue. However, space will be provided downstream of the auger to allow the future installation of grit removal equipment if grit should become a problem.

After passing through screening one potential treatment sequence is as follows: flow enters an anoxic tank where the raw sewage is combined with returned activated sludge (RAS) from the clarifiers. This mixture then flows into the initial stage aeration basins where the air is sequenced on and off for a couple hour cycle. During peak organic loadings, air is adjusted and can activate the first stage aeration basins. Flow continues into the second stage aeration tanks. The aeration is sequenced on and off for a couple hour cycle between the two basins. The sequencing of the on/off air is opposite to the first stage aeration basins. The result of the plug flow process with sequential reactions provides nitrification/denitrification. The combination of cyclical aeration in the four basins creates aerobic conditions for biochemical oxygen demand and ammonia removal when aerating. When the air is off, the nitrate laden MLSS settles and becomes oxygen deprived, creating anoxic conditions for the nitrates to become the oxygen source and allow for denitrification to occur. The cyclical aeration process repeats several times as the liquid mass progresses through and onto the clarifier.

The flow then enters the clarifier where the biomass is settled and returned, RAS, to the anoxic tank. At regular intervals solids are wasted to an aerobic digester sludge tank. Supernatant is decanted back to the aeration process over a fixed level weir. A portion of the biomass or sludge is removed by pumping from the sludge tank, known as the waste activated sludge (WAS). The pump transfers the WAS to a sludge press building where solids will be pressed to remove excess fluids. The removed fluids will be returned to the treatment process and the remaining solid material, referred to as "sludge cake" will be deposited into a bin. The sludge cake is anticipated to be disposed in a landfill.

The clarified effluent passes through a disinfection system on its way to RIBs where the water is infiltrated back into the aquifer. The system will consist of three basins to support continuous discharge and drying cycles. The preliminary RIB sizes are calculated on an estimated infiltration rate of one foot per day (ft/day), based on information gathered from Natural Resources Conservation Service (NRCS) soil survey map data. Determining an accurate infiltration rate requires soil classification testing that is out of scope for this report; however, during final design, an accurate infiltration rate will be determined, and the RIB design refined. At the assumed infiltration rate of 1 ft/day, a 1.5-acre RIB would be capable of infiltrating the treated effluent.

The collection and treatment system design were determined in the Master Sewer Plan which considered the project area as Phase 1 out of the four phases. The type of treatment facility that was selected for the recommended alternative is best suited for expansion which will allow the sewer collection system to extend into existing and future areas of development.

Construction of the project may cause a temporary disruption of sewer service during connection of the existing septic systems to the collection system. Construction difficulties may also be encountered due to obstructions that exist through the pipe route to the building connection. Trench wall shoring will be required to minimize risks when the excavation depth exceeds OSHA standards, a widespread practice for sewer main installations. The project will require directional boring at three locations, all of which are

NDOT maintained roadways. There are not anticipated unique negative environmental impacts resulting from the construction of the project, rather it is expected the completion of the project will benefit the environmental by reducing negative impacts currently occurring.

6.2 PROJECT SCHEDULE

The preliminary project schedule presented in this section includes the acceptance of this PER, funding and land acquisitions, final design, and construction. The duration and completion dates for project tasks are shown in Table 13.

Table 13: Preliminary Project Schedule

Project Task	Duration	Completion Date
PER acceptance by SRF + USDA	4 months	October 2022
Funding Acquisition	1 month	November 2022
Rate Study	4 months	February 2023
Engineering Design	12 months	November 2023
Permitting + Land Acquisition/ Easements	12 months	November 2023
Solicit for Bids + Award	2.5 months	February 2024
Construction Procurement & Initiation	-	March 2024
WWTF Substantial Completion	10 months	December 2024
Collection System Substantial Completion	24 months	March 2026
Final Completion	1 month	April 2026
Start-up & Handover	1 month	April 2026
Total Project Time	**42 months**	**April 2026**

The table above represents a proposed project timeline and assumes the proposed collection system and treatment system will be constructed concurrently. The acquisition of required permits and land is to be completed during the design period and are subject to change as the final design progresses. The completion dates provided are preliminary and are to be refined as funding sources are secured and the project develops.

6.3 PERMIT REQUIREMENTS

Various permits will be required prior to the construction of the project and to begin operation of the WWTF. The following is a summary of presently identified permits:

- NDEP's BWPC Plan Approval – Complete plans and specifications must be submitted and approved by the BWPC. The approval evaluates whether the proposed project is compliant with NAC 445A, and other design guidance adopted in the code.
- Humboldt County Building Permit – This permit is issued by Humboldt County to ensure the project follows adopted building codes that apply to components of the treatment plant construction. This permit will require plan review, approval, and milestone building inspections to be completed by certified inspectors to ensure the construction meets building code requirements.
- Encroachment Permits – At least three instances of the collection system are within NDOT right-of-way, and one instance of the collection system will require a permit to complete work within the Union Pacific Railroad right-of-way.

- During construction NDEP-BWPC will require a storm water discharge permit since more than one acre will be disturbed by construction. Best Management Practices will be installed to mitigate runoff and the release of sediment into water courses.
- It is likely that more than 5 acres will be disturbed at any one time, so a surface area disturbance permit should be obtained from the NDEP Bureau of Air Pollution Control (BAPC) by the construction contractor.
- Discharge Permit – This permit is issued by the BWPC to ensure the RIBs will meet or exceed the standards for design, construction, operation, and maintenance.

In addition to the above permits, the project must also be reviewed by any funding agencies to ensure that the plans and specifications follow applicable funding requirements.

6.4 SUSTAINABILITY CONSIDERATIONS

6.4.1 Water and Energy Efficiency

Grass Valley is in a cold semi-arid climate with little rainfall throughout the year and various agricultural operations around the area that could benefit from the availability of an additional water resource. The use of reclaimed water for agricultural purposed is permitted if the water has received the treatment necessary to achieve the required water quality standard enforced by the NDEP. The County and community do not have the financial means to afford the additional cost for a reuse system without the aid of grants or other financial support; however, reuse water would be very beneficial in the area and an effort should be made to get a system in place.

6.4.2 Other

The simplicity of RIB operation requires less staff for routine operation and maintenance of the system which contributes to the sustainability of the selected alternative.

6.5 TOTAL PROJECT COST ESTIMATE (ENGINEER'S OPINION OF PROBABLE COST)

The following table is a preliminary cost estimate for the proposed project. The total project is expected to cost $27.8 million as shown in Table 14, the values given are rounded to the nearest hundredth.

Table 14: Engineer's Opinion of Probable Project Cost

Construction Items:	**Cost**	
Collection System	$	16,320,210
WWTF	$	5,853,900
Total	**$**	**22,174,100**
Non-Construction Items:		
Construction Contingency	$	2,543,800
Cultural Resources Inventory/Additional Environmental Studies	$	30,000
Legal, Engineering, Construction Program Management, Funds Administration	$	2,673,300
Land, Easements, Permits	$	375,000
Total	**$**	**5,622,100**
Total Project Cost	**$**	**27,796,200**

Construction and material cost estimates provided in this preliminary report are made based on the experience and qualifications of Farr West. The actual construction bid is expected to vary from the estimate provided here due to changing economic factors. Farr West has no control over costs of labor, materials, equipment, or services required to be furnished from others. As the design is finalized and the project is prepared for bids a more accurate estimate will be determined.

The cost estimates were determined with an approach considering recent, similar project costs and the current industry market. Budgetary quotes were provided from four treatment facility manufacturers, the information they provided was taken into consideration but taken as budgetary suggestions. Although the estimates provided here considered inflationary factors, the estimates are subject to change due to unknown market or economic factors that may occur at the time of construction. Costs are expected to increase rather than decrease. An itemized cost estimate for the collection system and treatment facility are shown in Tables 15 and 16, respectively.

Table 15: Engineer's Opinion of Collection System Cost

Line	Description	Quantity	Unit	Cost/Unit	Total Cost
1	Mobilization/Demobilization	1	LS	$ 700,000	$ 700,000
2	Temporary Traffic Control	1	LS	$ 350,000	$ 350,000
3	Best Management Practices	1	LS	$ 60,000	$ 60,000
4	8” PVC SDR-35 Pipe	45,092	LF	$ 125	$ 5,636,500
5	10” PVC SDR-35 Pipe	6,026	LF	$ 175	$ 1,054,550
6	12” PVC SDR-35 Pipe	5,552	LF	$ 195	$ 1,082,640
7	15” PVC SDR-35 Pipe	2,344	LF	$ 205	$ 480,520
8	18” PVC SDR-35 Pipe	2,403	LF	$ 215	$ 516,645
9	Pressure Force Main	6,264	LF	$ 160	$ 1,002,240
10	Type 1-A 48” Sewer Manhole	184	EA	$ 9,500	$ 1,748,000
11	Type III (Drop) 48” and 60” Sewer Manhole	4	EA	$ 13,500	$ 54,000
12	WW Lift Station	3	EA	$ 235,000	$ 705,000
13	Sewer Service Connection with Cleanout	645	EA	$ 3,500	$ 2,257,500
14	3” AC Patch Paving	56,670	SF	$ 4.50	$ 255,015
15	NDOT Jack and Bore	3	LS	$ 139,200	$ 417,600
16				**Total**	**$ 16,320,210**
17	**Non-Construction Items:**				
18	12 % Construction Contingency				$ 1,958,425
19	Cultural Resources Inventory/Additional Environmental Studies				$ 30,000
20	Legal, Engineering, Construction Program Management, Funds Administration				$ 1,795,223
21	Land, Easements, Permits				$ 375,000
22				**Total**	**$ 4,158,648**
23					
24				**Total Project Cost**	**$ 20,478,858**

Table 16: Engineer's Opinion of WWTF Cost

Line	Description	Quantity	Unit	Cost/Unit	Total Cost
1	Mobilization/Demobilization	1	LS	$ 290,000	$ 290,000
2	Rough Grading & Earthwork – RIBs	1	LS	$ 250,000	$ 250,000
3	Plant Site Work	1	LS	$ 27,000	$ 27,000
4	Concrete	1	LS	$ 65,000	$ 65,000
5	Auger in Vault	1	LS	$ 240,825	$ 240,825
6	Supply and Install 350,000-gallon WWTF with clarifier	1	LS	$ 2,795,000	$ 2,795,000
7	Supply and Install Chlorine Containment Unit 150-gallon Double Walled Storage Tank, Peristaltic Pumps, Chemical Tubing, Injectors, Saddle, Pipe, etc.	1	LS	$ 61,100	$ 61,100
8	Supply and Install Sludge Pump and Vault	1	LS	$ 90,025	$ 90,025
9	Building, Building Pad, Slab, Mechanical, Plumbing, Electrical	1	LS	$ 295,500	$ 295,500
10	Supply and Install Sludge Press and Polymer Pump	1	LS	$ 436,150	$ 436,150
11	Supply and Install Generator and ATS	1	LS	$ 133,900	$ 133,900
12	48” Type III Manhole, 48” Type 1-B Manhole (2), and Lift Pumps	1	LS	$ 235,000	$ 235,000
13	Stainless Steel Slide Gate	1	EA	$ 10,758	$ 10,758
14	8” Magnetic Meter	1	EA	$ 10,563	$ 10,563
15	2” Steel Ceramic Epoxy Lined Pipe	20	LF	$ 267	$ 5,330
16	Flow Control Valve Assembly	1	LS	$ 16,478	$ 16,478
17	Site Electrical	1	LS	$ 412,325	$ 412,325
18	NV Energy Service Extension	1	LS	$ 120,000	$ 120,000
19	Project SCADA	1	LS	$ 203,125	$ 203,125
20	Computer/Server/Software Allowance	1	LS	$ 36,400	$ 36,400
21	¾” Yard Hydrant	3	EA	$ 2,828	$ 8,483
22	Standard Cleanout	2	EA	$ 991	$ 1,983
23	Wells	1	EA	$ 71,500	$ 71,500
24	Best Management Practices	1	LS	$ 19,000	$ 19,000
25	3” Plantmix Bituminous Patch/Driveway Apron	3200	SF	$ 6	$ 18,462
26				**Construction Subtotal**	**$ 5,853,907**
27	**Non-Construction Items:**				
28	10 % Construction Contingency				$ 585,391
29	Legal, Engineering, Construction Program Management, Funds Administration				$ 878,086
30				**Non-Construction Subtotal**	**$ 1,463,477**
31					
32				**Total Project Cost**	**$ 7,317,384**

6.6 ANNUAL OPERATING BUDGET

6.6.1 Revenue

Revenue generated from monthly service fees and new construction connection fees would be used to pay for operating and maintenance costs, loan payments, and reserve accounts. Upon funding acquisition, a rate study would be completed to determine a realistic rate for residential and commercial service fees.

Residents of Grass Valley are accustomed to the costs associated with septic tank maintenance, which may require a few hundred dollars every year or two and will have concern over the affordability of monthly sewer service cost. Assuming the cost of septic maintenance is $750 every 3 years, the equivalent monthly fee would be $21. Within the county there is desire for keeping the residential service fee at a manageable rate, approximately $45 per month. The commercial service fee could consist of a base fee with additional charges per thousand gallons of wastewater generated; however, the amount of wastewater generated is unknown. Therefore, a preliminary assumption is made for the commercial rate to be charged at 2.5 times the residential rate, totaling $112.50 per month. An estimated annual revenue of $354,000 would be generated from monthly charges of $45 for residential and $112.50 for commercial services, resulting in a reserve of $300 per year. A rate of $45 per month would not be enough to cover the annual operation and maintenance cost, plus an annual loan payment, and reserve account payment. Therefore, for the purpose of this report, the residential service fee is proposed at $55 per month, while commercial is estimated at $137.50 per month resulting in an annual total of $432,600. Both estimated monthly fees are subject to adjustment depending upon the type of project funding that is available. The proposed monthly service fee would equate to $660 annually and may still be financially straining for residents.

A connection fee would be charged to new residential and commercial developments; however, the potential revenue the wastewater system could generate in connection fees is unknown since it cannot be determined how many new development connections would be made each year. The estimated connection fee for commercial or residential parcel could be $3,500 each based on the amount Winnemucca charges. If the sewer system is to be eventually extended to other counties, then a non-county residential rate should be considered. If 5 parcels a year are developed, annual connection fee revenue equates to $17,500.

6.6.2 Annual O&M Cost

The annual operating and maintenance cost estimates are based on similar operating systems and facilities and estimates from Humboldt County. An itemized list of the estimated annual costs is shown below in Table 17, values are rounded to the nearest hundreds-place. The administrative and support service cost includes associated costs for accounting and auditing fees, legal fees, insurance, and professional services.

Table 17: Annual Operating and Maintenance Costs

Operational Item	Cost
Salaries and Benefits	$ 142,000
Supplies and Chemicals	$ 38,000
Short Lived Asset Maintenance/Replacement	$ 10,400
Administrative and Support Services	$ 26,400
Energy Cost	$ 69,000
Sludge Hauling Equipment	$ 36,000
Sludge Disposal Fee	$ 30,000
Annual Discharge Permit Fee	$ 1,900
Total Annual Cost	**$ 353,700**

6.6.3 Debt Repayments

Funding through the State Revolving Fund (SRF) or the United States Department of Agriculture (USDA) are promising funding options for this project. Both funding sources offer interest rates below the prime lending rate, the difference being SRF has potential for principal forgiveness with a 20-year term while USDA offers a 40-year term. The three scenarios of funding considered for this project are as follows:

1. SRF principal forgiveness financing,
2. SRF complete cost financing, and
3. USDA complete cost financing.

The three options are shown in Tables 18, 19, and 20, respectively, with all values rounded to the nearest hundreds place. The values given in all scenarios are estimates and subject to change as funding is secured, the design is finalized, and a rate study is completed.

The operational budget anticipated for SRF principal forgiveness funding utilized the following assumptions:

- $1.1 million financed at a 2.275% interest rate with a 20-year term, approximately 96% of the project funded with principal forgiveness
- Reserve account, based on annual payment amount, allows for a 10-year cumulation of funds
- Residential service fees would be charged at $55 per month
- Commercial service fees are charged at 2.5 times the residential rate, $137.50 per month

Table 18: Operational Budget with SRF Principal Forgiveness Funding

Operational Item	Cost
Revenue Generated from Service Fees	$ 432,600
Annual Loan Payment	$ (69,500)
Annual Reserve Payment	$ (7,000)
Annual O&M Cost	$ (353,700)
Annual Balance of Funds	**$ 2,500**

This scenario requires 96% of the project to be funded with principal forgiveness to achieve a positive annual account balance of $2,500. The assumed service fee is greater than the county's target amount; however, it should not be a financially straining for either residential or commercial consumers.

For the next scenario, SRF complete cost financing, the anticipated annual budget with full SRF funding utilizes the following assumption:

- Cost of project, $27.8 million, funded at a 2.275% interest rate with a 20-year term
- Reserve account, based on annual payment amount, allows for a 10-year cumulation of funds
- Residential service fees would be charged at $55 per month
- Commercial service fees are charged at 2.5 times the residential rate, $137.50 per month

Table 19: Operational Budget with SRF Funding

Operational Item	Cost
Revenue Generated from Service Fees	$ 432,600
Annual Loan Payment	$ (1,737,600)
Annual Reserve Payment	$ (173,800)
Annual O&M Cost	$ (353,700)
Annual Balance of Funds	**$ (1,832,500)**

This scenario of funding would result in an annual deficit of $1.8 million for the County to construct, maintain, and operate the wastewater management system. The required residential service fee for the system to be financially solvent would is $287.96 per month and the commercial service base rate would be $719.90 per month. A commercial base rate at this amount would deter businesses from choosing to develop in the area. This SRF funding scenario is not financially reasonable for residential or commercial consumers.

For the last scenario, USDA complete cost financing, the anticipated annual budget with the full USDA funding utilizes the following assumptions:

- Cost of project, $27.8 million, funded at a 2.5% interest rate with 40-year term
- Reserve account, based on annual payment amount, allows for a 10-year cumulation of funds
- Residential service fees would be charged at $55 per month
- Commercial service base rate charged at 2.5 times the residential rate, $137.50 per month

Table 20: Operational Budget with USDA Funding

Operational Item	Cost
Revenue Generated from Service Fees	$ 432,600
Annual Loan Payment	$ (1,103,300)
Annual Reserve Payment	$ (110,300)
Annual O&M Cost	$ (353,700)
Annual Balance of Funds	**$ (1,134,700)**

Funding through the USDA with the assumptions provided result in an annual deficit of $1.1 million for the County to construct, maintain, and operate the wastewater management system. To generate the revenue required for the system to be financially solvent, the residential service fee would need to be at a rate of $199.26 per month and the commercial service base rate would be $498.14 per month. Such a high commercial rate would deter companies from bringing developments to the area. This funding scenario would also not be financially reasonable for residential or commercial consumers.

SRF funding with principal forgiveness is the favorable funding option for the county. This funding option will allow the county to complete the project and keep the residential service fee at a reasonable cost. SRF funding with principal forgiveness also results in the lowest commercial service base rate which will be more enticing for new commercial developments. A rate study should be completed during the final design of the project to determine the actual service fees at which point a more accurate operational budget will be created.

6.6.4 Reserves

The county may need to create a reserve account to meet funding requirements or to maintain financial best management practices. There are typically two types of reserves used in the operation of a wastewater utility, a restricted reserve, or an unrestricted reserve. A restricted reserve, the type of reserve assumed, is equal to one year of debt repayments for the term of the loan. An operating reserve or capital reserve with a minimum balance goal would be an unrestricted reserve and a recommendation for the balance goal would be made during the rate study. The annual reserve payment considered for this report assumed the reserve account could increase over a period of ten years. The reserve payment shown in tables 19 and 20 considers 100% of the project to be financed with low interest loans. The annual reserve payment amount would be decreased from the value shown assuming the county could secure grants or principal forgiveness.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the information presented in this report the following conclusions and recommendations are made for Humboldt County to consider to benefit the health and well-being of the public and to reduce the harmful impact to the Grass Valley groundwater aquifer:

- Nitrates are increasing in the aquifer impacting drinking water quality due to the cumulative discharge of wastewater through septic systems. If left unimpeded, nitrates are expected to be found consistently exceeding maximum contaminate levels in water quality samples.
- Continue to educate the public of the current and potential health risks of doing nothing.
- Grass Valley is an area that can accommodate both residential and commercial growth if wastewater infiltration from septic systems can be eliminated by implementing a new wastewater collection and treatment system.
- The highest density of septic systems is located in and around Gold County and Star City subdivisions. These subdivisions, the school, churches, and adjacent commercial property make up the project area. These areas were chosen to eliminate the most septic system relative to the size of the area and to provide enhanced opportunities for commercial development.
- There are no major negative environmental impacts expected with the construction of a new wastewater system in the project area.
- Pursue the project as outlined in Section 6 of this report. Communication with NDEP and pre-application to funding agencies should be completed as the proposed project will need advanced planning. If the full funding amount cannot be obtained, the project could potentially be divided into smaller phases to get the project started.
- Obtain funding in the form of grants or loans with principal forgiveness to make the project financially feasible.
- Topographic and property mapping of Grass Valley will enable a more accurate design and will likely result in the identification of additional items such as lift stations or easements that will be necessary to have a fully functional system.
- Funding from grants or principal forgiveness loans increases the potential to utilized treated effluent as a reuse water application.
- Obtain easements, land leases or purchases, and permits as required for construction.
- Install the wastewater collection and treatment system as soon as possible for the benefit and protection of the public's health and to reduce significant degradation to the groundwater aquifer.

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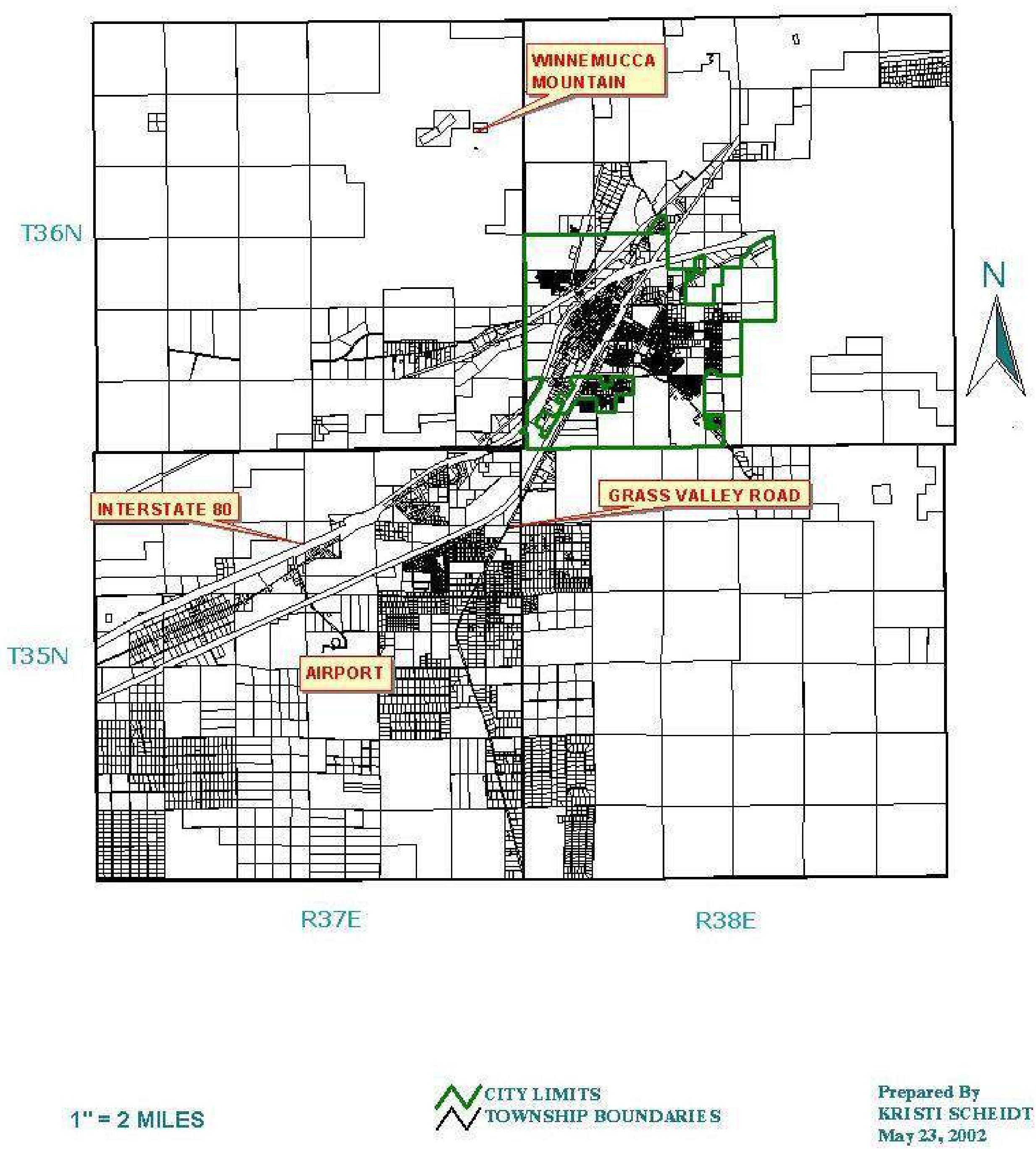
APPENDIX A – HUMBOLDT COUNTY MASTER PLAN EXTRACTS

Humboldt County Regional Master Plan

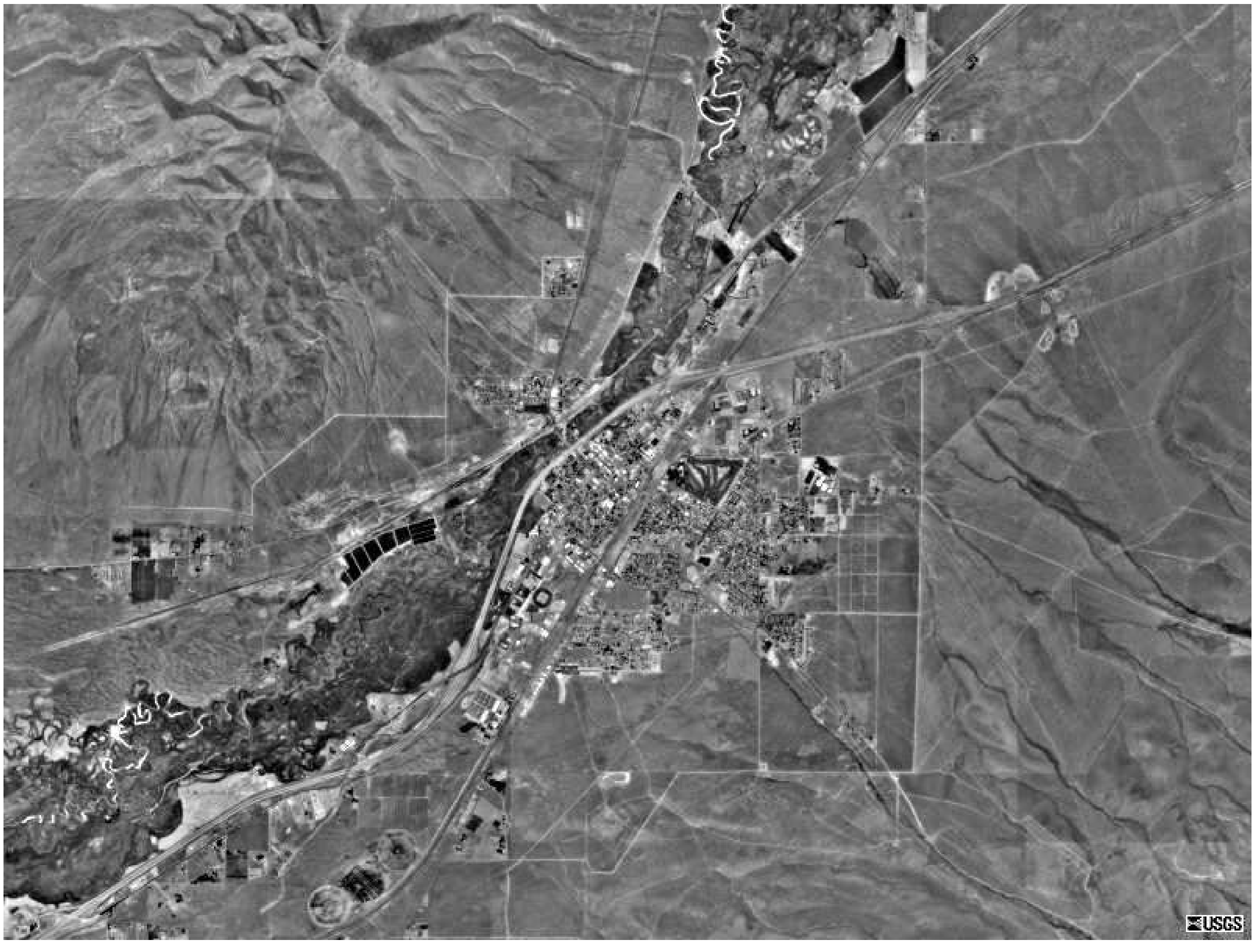
2012 Update

Humboldt County Master Plan Extracts Include: Pages 6-8; 39; 44

Land Use Study Area



Over the past 30 years, the urban pattern has become less compact while population density has declined. The less compact urban pattern of the built environment, most significantly in the Grass Valley area, has increased the cost of providing urban services and decreased the feasibility of extending water, sewer and roads to serve this area.



USGS Aerial Photo of Winnemucca, Nevada

Residential growth served by individual septic tanks in the Grass Valley area has increased water quality impacts on the aquifer. The Grass Valley groundwater basin (071) is one of three in Humboldt County, which has been designated as depleted by the Nevada Division of Water Resources.

The impacts of growth need to be reexamined and strategies developed to provide incentives to developers willing to provide urban services to redirect their activities to redevelopment areas, to increase density with infill along utility corridors and to reduce lot sizes. The strategies should provide for diversity in affordable housing choices, including apartments.

Existing commercial use is limited outside the city boundaries; however, there is a sufficient supply of commercially zoned acreage for current needs; ten percent of the vacant land within the city boundaries is designated commercial. The challenge for the community will be to direct commercial growth to areas inside the city in order to achieve its desired outcome of new commercial growth taking place largely inside the city, part in existing commercial areas and part in new areas. Innovative strategies including incentives, public-private partnerships and governmental cooperation are needed to achieve the future vision.

The absence of essential urban services, i.e., water and sewer, to designated industrial lands along with incompatible uses nearby makes much of this land undesirable for private investment without considerable public investment or innovative strategies designed to provide private developers with incentives for developing the required urban services. The community has the opportunity to achieve desired industrial growth at the edge of the city in selected areas compatible with adjacent uses and where urban services either exist or are likely to be provided.

There are 6.2 million acres in Humboldt County, of which a little more than 80 percent are under public ownership. Less than one percent of the land, 32,000 acres, is urban or developed land.

Wastewater Treatment Systems

The Winnemucca municipal sewer system serves approximately 9,000 customers plus the hotels, motels, RV parks and commercial businesses located within the City. The annual average sewage flow rate at the treatment facility is between 0.8 and 1.3 mgd. The sewage treatment plant capacity is 2.0 mgd and the collection system includes two large and three small pumping stations. The City is planning to replace one of its large pumping stations with a new gravity sewer interceptor through its downtown area. The treated effluent from the plant is placed into five rapid infiltration ponds where it percolates into the ground and evaporates into the air. The City is planning to upgrade its treatment plant headworks and is considering installation of a treated effluent discharge pipeline system with irrigation pivot systems.

Other community sewage treatment lagoon systems operating within Humboldt County are found in McDermitt, Paradise Valley and Orovada. Developed areas located outside of the above listed established service areas are served by individual sewage disposal systems (septic tanks).

In order to preserve public health and safety, high urban densities require public water and sewer services. Lower rural densities may be effectively serviced by private wells and septic systems. The Nevada Revised Statutes (NRS) require the State Board of Health to adopt regulations to control the use of individual systems for disposal of sewage in this state (NRS 444.650). Those regulations direct that "a minimum area of 1 acre (43,560 square feet), including streets and alleys or other public rights-of-way, lands or any portion thereof abutting on, running through or within a building site is required for the installation of an individual sewage disposal system on a lot served by a well. For a lot that is part of a tentative map that is approved before January 1, 2000, a minimum area of ¼ acre (10,890 square feet)…is required for the installation of an individual sewage disposal system on a lot served by a community water supply. For a lot that is part of a tentative map that is approved on or after January 1, 2000, a minimum area of ½ acre (21,780 square feet)...is required for the installation of an individual sewage disposal system on a lot served by a community water supply" (NAC 444.790).

The County currently monitors 8 wells in the Grass Valley area. The wells are monitored for nitrates, chloride and total dissolved solids.

The Grass Valley area is located in hydrographic basin 71 with an allowable septic density of 81 per square mile; the Winnemucca segment is located in hydrographic basin 70 with an allowable septic density of 74 per square mile, as established by the Nevada Division of Environmental Protection (2012).

Findings

- There are sufficient water resources for projected development.
- Waste water treatment for the City of Winnemucca is sufficient for current needs and projected growth.
- Existing Humboldt County Ordinances are more restrictive on lot size requirements for ISDS than Nevada Revised Statutes.
- Density of Individual Sewage Disposal Systems in Grass Valley may create a potential for groundwater contamination.
- There are sufficient, well-maintained solid waste disposal facilities for the majority of Humboldt County.
- Infrastructure and utilities for projected future expansion are needed.
- Legal access (rights-of-way and easements) is insufficient in many cases for development of private sections in the checkerboard and other areas.
- Educational facilities meet current and future projected needs.
- More rural recreational parks and facilities are needed to support growth in the unincorporated portion of the County.
- The events center is sufficient to meet current and future needs.
- The City and County lack facilities for cultural events.

Statement of Capital Facilities Goals and Policies

Goal: To provide all necessary facilities, utilities and services for all land uses within the urbanized area.

> **Policy:** Public utilities will be constructed to avoid significant adverse environmental impacts.
>
> **Policy:** Wastewater treatment systems will be operated and maintained in a manner that will not impair water quality in lakes, rivers, streams, wells and aquifers.
>
> **Policy:** Require water and sewer connections as a condition of approval for all parcel maps within the city service area regardless of the number of parcels.
>
> **Policy:** Solid waste will be collected and disposed in a manner that minimizes land, air and water pollution, and protects the public health.

APPENDIX B – PREVIOUSLY COMPLETED PER EXTRACTS

COPY

GRASS VALLEY

WATER AND SEWER FEASIBILITY REPORT

PREPARED FOR
HUMBOLDT COUNTY

DECEMBER, 1993

waterresource consulting engineers, inc.
RENO, NEVADA

1993 PER Extract Includes: Section 1: Pages 1-4; Section 3: Pages 6-7

SECTION 1.0
SUMMARY

1.1 INTRODUCTION

This Project Feasibility Report was prepared to give the reader a brief but thorough understanding of the water and sewer infrastructure requirements to provide these utilities in Grass Valley and their probable economic impact. It is not intended to be used as a detailed facilities planning study which presents detailed information and cost estimates, but rather as a preliminary guide and planning tool for the development of future projects.

1.2 PLANNING AREA AND GROWTH (Section 2.0)

Due to the large size of the Valley (Figure 2.1, Page 2-2), which is over 520 square miles and lies in Humboldt and Pershing Counties, a smaller planning area was developed (Figure 2.2, Page 2-3). This planning area encompasses the more densely populated areas such as Gold Country Estates and Star City. The last few years have shown a tremendous growth increase in Grass Valley averaging approximately 12.5 percent per year. Currently, the population within the planning area is estimated at 1,766 which is estimated to increase to 3,563 by the year 2012. The average persons per household is estimated to be 3.04. It is estimated that the present average day water demand in the planning area is 581,000 gallons per day and the wastewater produced is in the order of 349,000 gallons per day.

1.3 GROUNDWATER SOURCE OF SUPPLY (Section 3.0)

The planning area encompasses two hydrographic basins known as the Winnemucca Segment and Grass Valley. All of the groundwater in the planning area however, is either in the Grass Valley Basin or is directly from the Grass Valley Hydrographic Basin (Figure 3.1, Page 3-2). A significant portion of the groundwater in Grass Valley is derived from infiltration of tributary stream flows from the Sonoma Range and the East Range which are derived primarily from snowpack.

Existing water rights (Certificated and Permitted) in Grass Valley (42,600 acre-feet) far exceed the present estimated pumpage (10,000 acre-feet) and estimated safe yield of the aquifer (13,000 acre-feet). The majority of the groundwater is utilized for irrigation. The State of Nevada Division of Water Resources (DWR) is extremely concerned with the continued increase of individual domestic wells. They prefer the Community Water System concept which provides them the ability to more accurately account for groundwater pumpage, lessens the risk of groundwater contamination caused by the proliferation of individual domestic wells and provides the public with a relatively safe and reliable source of water.

The current water quality in the large municipal wells at Gold Country and Star City is very good and meets all of the current Federal Drinking Water Standards. It is estimated that there are 775 private domestic wells in Grass Valley. The State of Nevada Bureau of Health Protection Services conducted an informal study of 249 of these individual domestic wells. The results of the study indicated that although there are some localized problems with Nitrates, Total Dissolved Solids and Chlorides, the majority of the wells sampled were of good quality water with respect to the previously referenced constituents.

The State of Nevada Division of Environmental Protection (DEP) is very concerned with individual sewage disposal systems and the potential of groundwater contamination resulting from these systems. The Division of Environmental Protection is not approving any subdivision maps for Grass Valley until a groundwater study is performed. All of Grass Valley is presently served by individual sewage disposal systems. This report recommends that a groundwater monitoring program must be initiated.

1.4 WATER SYSTEM ALTERNATIVES (Section 4.0)

Two alternatives were investigated for providing water service to the Grass Valley planning area. The major difference between the alternatives was whether Grass Valley would provide the source of water (Alternative A) or the City of Winnemucca would provide the source (Alternative B). Table 1.1 (page 1-4) presents the cost comparison of the water alternatives. Both alternatives appear equally feasible and ultimately will cost in the order of $2.0 million to construct a core system with an additional $1.6 million initially to serve the outlying areas of the planning area.

1.5 SEWER SYSTEM ALTERNATIVES (Section 5.0)

As with the water alternatives, two sewer system alternatives were investigated for providing wastewater conveyance and disposal for the planning area. The primary difference between the alternatives was whether Grass Valley would construct and maintain their own treatment plant (Alternative C), or whether the wastewater effluent would be pumped to the City of Winnemucca to be disposed of at their treatment facility (Alternative D). Selection of an alternative for the sewer system is difficult at best because of the unknowns which surround acquiring land for a treatment facility for Alternative C and the uncertainty of the City of Winnemucca's ability or desire to accept Grass Valley sewage. Table 1.1 (page 1-4) presents a summary of the costs for the sewer alternatives. At best the initial capital cost to serve the core area is estimated to be in the order of $3.8 - $4.3 million. To serve all of the existing developments in the outlying areas of the planning area an additional $2.6 million cost is estimated.

1.6 FUNDING (Section 6.0)

Several sources of potential funding may exist, including a Community Development Block Grant, State Water Grant, Economic Development Agency, State Revolving Loan Fund, Farmers Home Administration Loan and Private Financing. Because of the large magnitude of the projects required, the funding will most likely require a combination of all feasible sources.

TABLE 1.1
COST SUMMARY

ALTERNATIVE		TOTAL COST $
Water	A, Phase I	1,970,810
	A, Phase II	1,626,250
	B, Phase I, Option I*	2,501,450
	B, Phase I, Option II	1,970,810
	B, Phase II	1,626,250
Sewer	C, Phase I **	3,791,700
	C, Phase II	2,566,000
	D, Phase I***	4,321,500
	D, Phase II	2,566,000

* Does not include cost for City of Winnemucca to deliver water
** Does not include cost for acquiring land for treatment facility
*** Does not include cost for City of Winnemucca to accept wastewater

The total per unit cost to deliver water is estimated to be $22.40 per month, per residential service for operation and maintenance plus $16.52 per month, per residential service to repay the loan to construct the capital improvements.

The cost per unit to convey the wastewater is approximately $16.90 per month, per unit for operation and maintenance plus $35.80 per month, per residential unit for loan repayment required to construct the capital improvements.

The loan repayment schedule assumed that the entire project was funded through a loan and no grant monies were included.

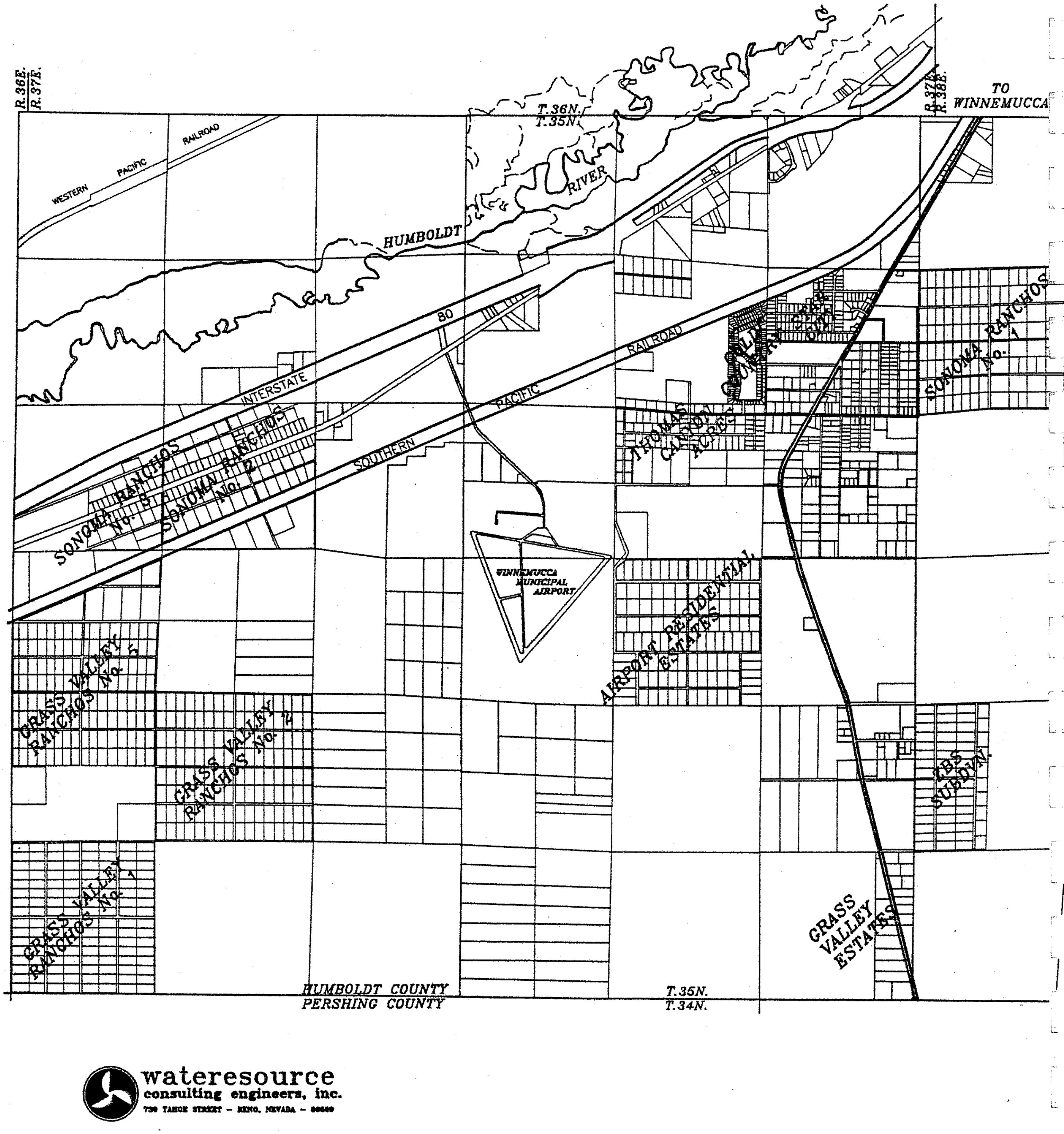


FIGURE 2.1 — GRASS VALLEY

(cm = 1

TABLE 3.2
SUMMARY GRASS VALLEY
DRINKING WATER AWARENESS PROJECT

45

Total Wells Sampled	249
Samples Exceeding 10 mg/l Nitrate	11
Samples Exceeding 1000 mg/l TDS	13
Samples Exceeding 500 mg/l TDS but less than 1000 mg/l	38
Samples Exceeding 400 mg/l Chloride	4
Samples Exceeding 250 mg/l Chloride But Less Than 400 mg/l	8
Number of Samples Exceeding TDS, Chloride and Nitrate	8

It appears from the results of the study that the majority of the domestic wells sampled in Grass Valley are producing excellent quality water with respect to TDS, Chlorides and Nitrates.

There are many unknown factors however when sampling from individual domestic wells such as well depth, presence or absence of a surface seal and location of the well with respect to septic system or other potential contamination sources. Because of these factors the Grass Valley Water Awareness Project is probably not an indicator of the overall quality of the groundwater; however, it does provide an initial concern for the groundwater quality and its relationship to individual sewage disposal systems.

Another indicator is the water quality of the larger domestic wells in Gold Country and Star City Subdivisions. These wells were presumably constructed to State standards since they are wells serving a public water system. In addition, they are relatively deep (greater than 300 ft) and because of the relatively large amount of water they continuously pump, undoubtedly provide representative samples of the groundwater. The water quality from the wells in both Star City and Gold Country meet all the Drinking Water Standards and are of good quality. Appendix B.3 contains the water quality results reported by the State of Nevada for the Gold Country and Star City wells.

Unfortunately, because the Gold Country and Star City wells are at the very end of the Grass Valley Hydrographic Basin, they would be the last to show contamination occurring upgradient in the aquifer. It is strongly recommended that a monitoring program be implemented throughout the Grass Valley Hydrographic Basin. A system of monitoring wells beginning at the southernmost portion of Grass Valley and proceeding northwestward towards the Humboldt River Valley Basin should be developed. Since Grass valley encompasses two counties, Humboldt and Pershing, it is recommended that both governmental entities cooperate in a shared groundwater monitoring program. It Is essential that development occurring in Pershing County be monitored closely because potential groundwater contamination occurring in Pershing County will eventually travel into Humboldt County. Existing suitable wells, in strategic locations, may be utilized as monitoring wells in Grass Valley thus saving the expense of drilling new monitoring wells. The wells should not only be monitored for water quality (Total Dissolved Solids, Chlorides, Nitrates, Arsenic) but also static water levels. A series of 10 to 20 monitoring wells should be developed and tested quarterly and semi-annually dependent on their locations. This would provide data throughout the groundwater aquifer for assessing the potential of contamination and water level declines and would be the initial step in developing a groundwater study for Grass Valley.

The above normal presence of TDS, Chlorides and Nitrates can be an indication that individual sewage disposal systems (ISDS), primarily septic tanks with leach fields, are producing a negative impact on the groundwater. All of Grass Valley is served by ISDS including Star City and Gold Country Estates. Current estimates indicate that there are approximately 851 septic systems within that portion of Grass Valley in Humboldt County including a large system at the Grass Valley School. It is further estimated that there are 253 septic tanks in the Pershing County portion of Grass Valley. This equates to a total of approximately 660,000 gallons per day of wastewater effluent disposed in the Grass Valley Hydrographic Basin aquifer.

TECHNICAL MEMORANDUM

GRASS VALLEY PHASE I
SEWER SYSTEM

PHASE I – REGIONAL
SYSTEM CONCEPT REVIEW

PREPARED FOR

HUMBOLDT COUNTY

November 30, 1999

1999 PER Extract Includes: Pages 1-11

waterresource
consulting engineers, inc.

GEORGE W. BALL JR., P.E.
PRESIDENT

730 TAHOE STREET • RENO, NEVADA 89509 • (702) 322-9443 • FAX (702) 322-9507

TECHNICAL MEMORANDUM

DATE: **November 30, 1999**

TO: **HUMBOLDT COUNTY**

ATTN: **John Milton, Chairman**

FROM: **George W. Ball, Jr., P.E.**

RE: **Grass Valley Phase I Sewer System**
Phase I – Regional System Concept Review

JOB NO.: **9304.30**

SECTION 1.0 – INTRODUCTION

The objective of Phase I of WATERESOURCE's March 3, 1999 proposal (see Appendix A) was to form a review committee consisting of Humboldt County, City of Winnemucca, Winnemucca Farms, Vista Ridge Development, Nevada Division of Environmental Protection and WATERESOURCE, as technical advisor, and review the various Grass Valley sewer system alternatives proposed in WATERESOURCE's January 1998 Report concerning the Phase I Sewer System Concept (see Figure 1, page 6). The goal of the committee's efforts was to ascertain if there is any future feasibility for integration of the four entities into a regional sewer system since it does not appear feasible to have four separate treatment facilities in the Winnemucca/Grass Valley area.

The Grass Valley wastewater effluent is a valuable water resource, as well as a potential water right for Humboldt County. Therefore, the Phase I Sewer System Concept is to treat the effluent that is presently going untreated into the groundwater aquifer and beneficially using it, thereby conserving other water resources such as the groundwater aquifer for higher uses, i.e. drinking water. The **PRIMARY** objective of sewering Grass Valley is to protect the drinking water resources of Grass Valley, as well as portions of the City of Winnemucca.

WATERESOURCE did not perform Task 2.0 of our March 3, 1999 proposal (see Appendix A), regarding a conference with the funding agencies. WATERESOURCE, together with the County, had two conferences with the City, Winnemucca Farms and the Vista Ridge Development parties to ascertain various issues related to the project feasibility. The principal issues that were discussed by all parties were: (1) is the Vista Ridge project viable; (2) does a regional wastewater facility have the potential to be adequately funded; and (3) will the construction of a joint wastewater treatment and disposal facility be in the best interests of Humboldt County? The result of the conferences, together with the declining Humboldt County mining activities, has suggested that entering into a Grass Valley Regional Sewer System project at this time is not in the best interest of Humboldt County.

One of the critical and very important aspects of this project, with regards to funding, is establishing the revenue base. Individual homeowners may need a County mandate to convince them to convert from an operational septic system to a regional sewer collection system requiring monthly operation and maintenance charges and possibly a connection fee. Hopefully, the deciding factor will be the potential effect of the septic system's discharge to the groundwater reservoir effecting the potability of domestic wells.

The Grass Valley project is listed on the Nevada State Revolving Loan Fund Project Priority List for fiscal year 2001, for a total of $10.650 million. This project priority list indicates a loan award date of April of 2001. WATERESOURCE recommends that Humboldt County continue to submit a project priority listing request for this project in the future.

SECTION 2.0 – SUMMARY

2.1 Background

2.1.1 Need for the Wastewater System

The requirement for a wastewater treatment and disposal system in Grass Valley is primarily driven by the density of development, particularly in Gold Country Estates and the adjacent Star City Development. In addition, as the Grass Valley groundwater monitoring program has demonstrated, the groundwater is experiencing a nitrate and total dissolved solids increase. It is the conclusion, at this point in time, that this results from the discharge of the individual septic disposal systems into the groundwater system. Therefore, the primary goal, as noted previously, is to protect the water resource for this area.

2.1.2 Wastewater System Concept

The collection system concept involves a septic tank effluent pumping (STEP) system to collect and convey the effluent from the Grass Valley area to the treatment/disposal facility. This concept was presented in the January 1997 Addendum to the December 1993 Water and Sewer Feasibility Report prepared for Humboldt County. The 1993 Feasibility Report presented a conventional gravity sewer collection system with pumping stations as required. The treatment alternatives that have been evaluated include:

a. Connection to the Winnemucca Farms' system,
b. Connection to the City of Winnemucca system,
c. A joint venture treatment facility with other entities, and
d. A stand-alone, County-only system.

2.1.3 Projected Wastewater Flows

a. 2000 = 0.40 mgd
b. 2005 = 0.50 mgd
c. 2010 = 0.55 mgd

2.1.4 Estimated Cost

a. Facility plan, including an environmental assessment - $70,000.00.
b. Collection system, including engineering and construction management - $7,930,000.00.
c. Treatment, including engineering and construction administration - $2,650,000.00.

Total = $10,650,000.00

2.2 Regional Wastewater System

2.2.1 Interested Entities

The entities involved in the discussions concerning a regional system in Grass Valley are: (a) Vista Ridge Development, (b) City of Winnemucca, (c) Winnemucca Farms, and (d) Humboldt County.

2.2.2 Future Interest in Grass Valley Wastewater Treatment and Disposal Facility

a. City of Winnemucca – They have no immediate interest in a regional wastewater system simply because their existing treatment facility is sized to accommodate their expansion into the near future and is appropriately permitted with an NDPES permit. However, at some future time, they would entertaln the potential of sewering the east side of the collection system by gravity to a proposed future Grass Valley wastewater treatment and disposal facility. This would accomplish two things for the City of Winnemucca: (1) eliminate the need to treat that portion of thelr existing demand In the existing City Wastewater Treatment Facillty, and (2) extend the life of the existing treatment facility.

b. Winnemucca Farms – Winnemucca Farms presently is managing their treatment and disposal needs with their new facility. However, in the future, they may have an Interest in conveying some of their treated effluent to a joint regional treatment facility for further treatment and disposal. Presently, Winnemucca Farms disposes their effluent through land application; however, winter conditions sometimes make this very difficult.

c. Vista Ridge has expressed an interest in pursuing a joint regional wastewater treatment and disposal facility with Humboldt County, as evidenced by the May 24, 1999 letter from First Federal Development, LLC (see Appendix B). The Vista Ridge Development's proposal is to construct a wastewater facility that will be sized, not only to manage their total development, but also incorporate the sewage collection system from the County's Grass Valley area. Disposal would include golf course irrigation in the summer and winter storage in holding ponds and rapid Infiltration basin.

SECTION 3.0 – BACKGROUND

3.1 Need for Wastewater Treatment and Disposal

Figure 1, page 6, presents the densest developed area to be sewered initially. The driving force for a sewer collection, treatment and disposal system in Grass Valley results from growth and the groundwater monitoring program, initiated by Humboldt County over four years ago. This monitoring program has continually sampled 17 sites for between 3 to 4 years. The results from these tests indicate increasing trends of nitrate in 14 of the 17 monitoring sites. The program strongly suggests that the increase in nitrates, as well as total dissolved solids in the groundwater system, results from the discharge of untreated septlc tank effluent to the groundwater system. Since this is the only water resource for the Grass Valley/ Winnemucca area, its protection and maintenance of an acceptable water quality is paramount. The Nevada Division of Environmental Protection also supports the development of a sewer collection, treatment and disposal system for the Grass Valley area, primarily because of the density of development in the northern portion of the valley in Humboldt County.

In addition, the County is desirous of removing septage disposal from their landfill and disposing of it in a wastewater treatment facility. The City of Winnemucca will not accept septage at their facility at this time.

3.2 County Commitment

Since the initiation and development of the December 1993 Grass Valley Water and Sewer Feasibility Report, prepared by WATERESOURCE for Humboldt County, the County has been steadfast in maintaining their support for developing a wastewater collection, treatment and disposal system in the Grass Valley area. It is presently estimated that the discharge from septic tank effluent into the groundwater system in the area delineated in Figure 1, page 6, is in the order of 350,000 – 380,000 gallons per day.

3.2.1 Collection System Concept

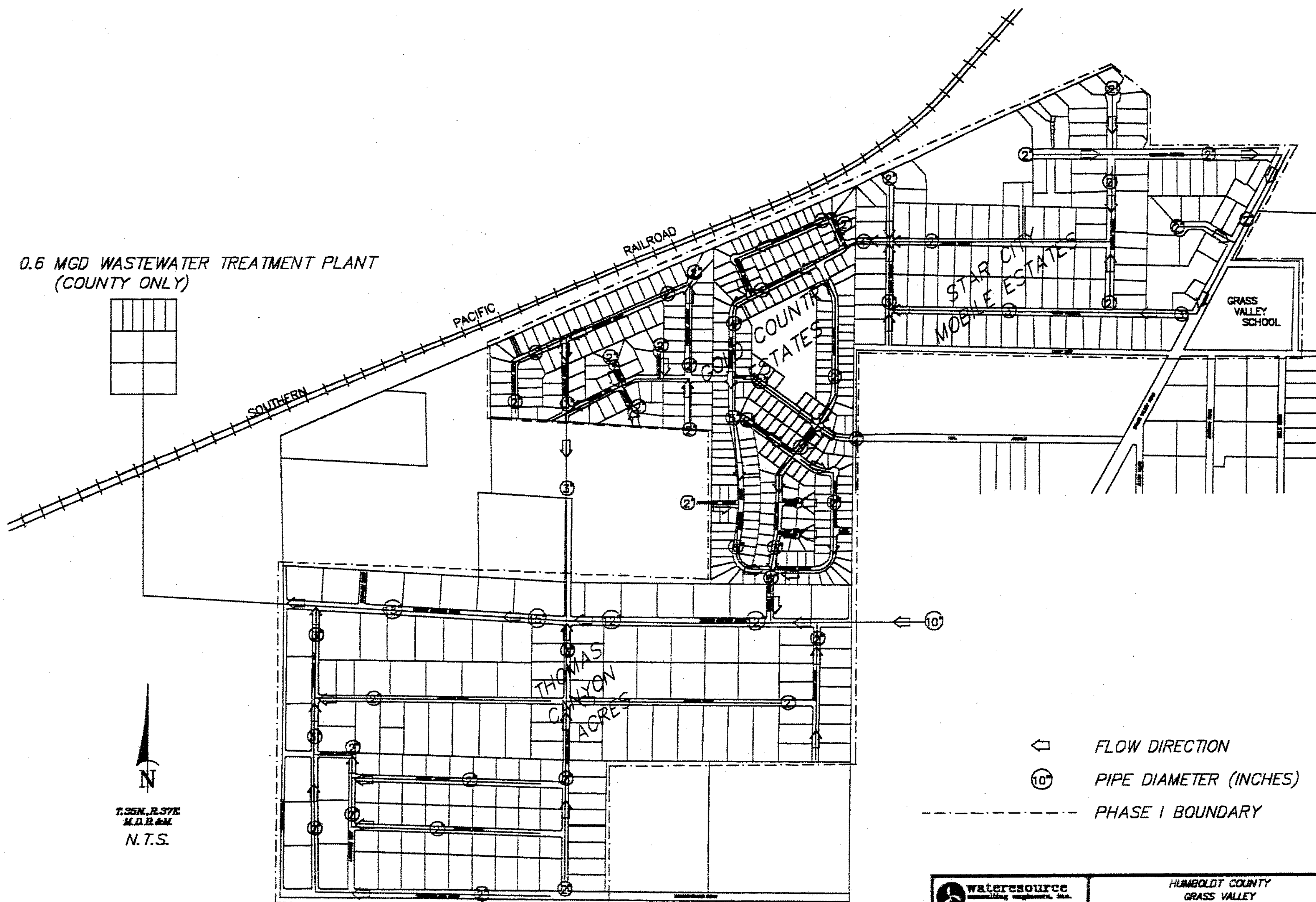
Figure 1, page 6, presents the collection system, utilizing the septic tank effluent pump (STEP) concept. This concept envisions each septic tank at individual residence and other facilities, having a small pump that discharges effluent from the septic tank through a pressurized service line to a small diameter pressure main that conveys the wastewater, along with other pumped septic tank effluent, to a central collection treatment and disposal facility.

3.2.2 Treatment Alternatives

The treatment alternatives that were evaluated include:

a. Connection to Winnemucca Farms and utilization of their existing treatment facility. Since Winnemucca Farms' treatment requirements is approaching their plant capacity, they will not have sufficient capacity to Integrate Grass Valley Into their system. In addition, the discharge of Grass Valley domestic wastewater into the Winnemucca Farms' treatment facility would change the characteristics of the wastewater they are presently treating by adding pathogens and viruses, as well as requiring a higher level of treatment, including disinfection and a higher level of operator certification.

b. Connection to the City of Winnemucca. This alternative appears to have some feasibility; however, the Grass Valley system is removed



HUMBOLDT COUNTY
GRASS VALLEY
REGIONAL SEWER SYSTEM CONCEPT

FIGURE 1
PHASE 1 SEWER SYSTEM CONCEPT

from the City of Winnemucca's collection system by approximately three miles. In addition, the existing collection system in the City of Winnemucca appears inadequate to convey the projected Grass Valley wastewater to the City's treatment facility. Therefore, this alternative would require expensive collection system reconstruction, including a new river and freeway crossing. In addition, adding the Grass Valley wastewater to the City's system would significantly reduce their available capacity for growth, requiring them to look at a future plant expansion at a much sooner planning horizon.

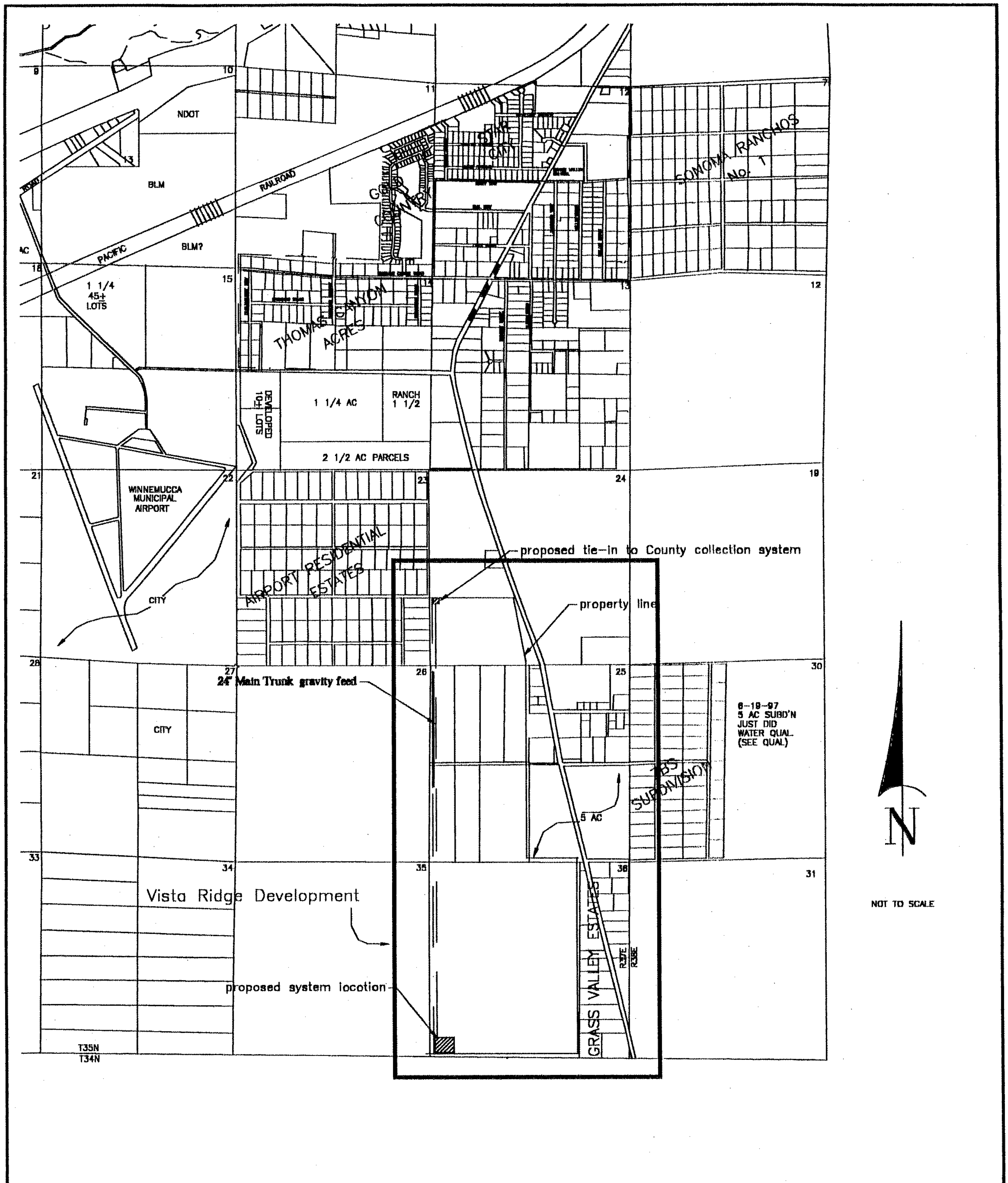
c. The Vista Ridge proposed development is presented in Figure 2, page 8. Their Interest in pursuing a Joint Wastewater Treatment Facility with the County is reflected in their letter to WATERESOURCE (Appendix B). However, subsequent discussions with them, by WATERESOURCE, suggested that the County is the key player, I.e. they would proceed with a regional facility if the County would participate. The issue involved in an inter-local agreement between Vista Ridge and the County have not been defined. In addition, WATERESOURCE has not heard of any interest from the developers in this project since June 1999. This, together with the decline in mining activity in the Winnemucca area, suggests the development is not feasible at this time.

d. The fourth alternative, County stand-along treatment facility for Grass Valley, was evaluated in the 1993 Feasibility Report which presented a conventional gravity collection system, and the January 1997 Addendum which evaluated a STEP system collection. The obvious disadvantage of a stand-alone facility is the capital cost outlay borne totally by the County, as well as a necessity for developing a rate base to support the system. In addition, the County would have to set up for the Grass Valley treatment system a total integrated wastewater collection treatment and disposal facility organization, along with the administrative and maintenance staff to administer and manage such a utility.

3.3 Previous Studles

3.3.1 Grass Valley Water and Sewer Feasibility Report, December 1993

This feasibility report was prepared to give Humboldt County an understanding of the water and sewer Infrastructure requirements to provide these utilities in Grass Valley and their probable economic impact. It served as a preliminary guide and planning tool for development of future projects.



waterresource consulting engineers, inc.

DATE	REVISIONS	BY

HUMBOLDT COUNTY
GRASS VALLEY
REGIONAL SEWER SYSTEM CONCEPT

FIGURE 2
VISTA RIDGE DEVELOPMENT

3.3.2 Grass Valley Water and Sewer Feasibility Report Addendum, January 1997

This report was prepared as an alternative sewer collection system based on emerging technology relating to a septic tank effluent pumping (STEP) system in comparison to a community gravity sewer collection system as presented in the 1993 Report. One of the main purposes of the report was to compare the cost of the gravity collection system and the STEP system.

3.3.3 Sewer Collection/Treatment System Phase I Concept and Funding Investigation/Evaluation, January 1998

The primary objective of this investigation was to evaluate the various funding avenues available to Humboldt County for purpose of constructing a sewer collection and treatment system in Grass Valley. In addition, the investigation further delineated the area for the initial phase of the sewer collection system.

SECTION 4.0 – REGIONAL WASTEWATER SYSTEM ISSUES

4.1 Interested Entities

4.1.1 Vista Ridge Development

In a conference (4/1/99) with the Vista Ridge Development, they presented a conceptual design for a 1.5 mgd treatment facility with an estimated cost of $2.7 million. The effluent from the treatment facility would be used for golf course irrigation and storage in the winter in 50 - 60 million gallon storage lagoons. They would also dispose of the effluent in the winter time in rapid infiltration basins. Their treatment concept envisioned filtration with disinfection with the effluent nitrate in the order of 0.5 mg/l and utilization of ultra-violet (UV) disinfection. The Vista Ridge Development indicated they will enter Into an agreement with the County to construct the treatment facility with sharlng of the capital and O & M costs.

Both the City and the County were interested in the Vista Ridge Development proposal since it would provide both water and wastewater service to the airport properties which would allow potential development of the airport's industrial development property. As noted previously herein, the project economic feasibility, at this point in time, does not appear to exist.

4.1.2 City of Winnemucca

Steve West, City Manager, has Indicated they have no requirements from the Division of Environmental Protection to upgrade their treatment technology or move their treatment facility. The City is very pleased with their aerated lagoons system because of its ease of operation. They are at 44% of their present deslgn capacity; however, they have limited land for disposal. West is concerned that adding Grass Valley will bring thelr treatment requirements up to near capacity. He also expressed concern that the river crossing may not be big enough to convey the total City of Winnemucca and Grass Valley flows to the treatment facility.

The City dld express an interest of sewering, in the future, the southeastern portion of the City to a future regional facility in Grass Valley. They felt that that in the future there would be a distinct advantage since they could gravity from the higher portions of the City to the Grass Valley treatment facility. NDEP indicated an interest in this alternative since it would unload the existing City's treatment facility and reduce the amount of water going to the rapid infiltration basins. The City indicated that if their sewage load started to Increase dramatically or their monitoring wells indicated some problems from their treatment process that this would accelerate the conversion of the southeastern portion of the City of Winnemucca to a Grass Valley system, if it existed.

4.1.3 WInnemucca Farms

Winnemucca Farms indicated that their plant Is operating efficiently. They would have some concern Integrating Grass Valley's wastewater into their facility, particularly with the change in characteristics of the wastewater. Presently, they are treating 350,000 to 400,000 gallons per day with a BOD ten times the municipal wastewater strength. Winnemucca Farms believes their plant would need expansion wlth the Grass Valley system integratlon into their plant. They also feel that taking their effluent to a regional facility would not have any great benefit to WInnemucca Farms. Winnemucca Farm's present plant and capacity Is sufficient for their needs for ten years into the future.

SECTION 5.0 – CONCLUSION

The need and participants to create a Regional Wastewater Treatment and DIsposal Facility in the Grass Valley area exists; however, the timing does not appear to be feasible, primarily due to the overall economy of Humboldt County at this time. Development of funding resources appears feasible particularly in a joint venture scenario

The need for a Grass Valley treatment and disposal facility is highlighted by the groundwater quality impact from septic tank effluent. Therefore, a wastewater treatment and disposal facility will be required in the future to manage the Grass Valley Wastewater and protect the groundwater resource.

cc: Janet Kubichek, Vice Chairman
Bob Cassinelli, Commissioner
Buster Dufurrena, Commissioner
Chuck Giordino, Commissioner
Bill Diest, County Administrator

APPENDIX C – GROUNDWATER ASSESSMENT STUDY EXTRACTS

Civil | Environmental | Electrical

FARR WEST
ENGINEERING

5442 Longley Lane, Suite A • Reno, Nevada 89511 • (775)851-4788

Nevada Division of Environmental Protection

Bureau of Water Pollution Control

Groundwater Nitrate Assessment Study

December 2014

Groundwater Assessment Study Extract Includes: Pages 18-20

6.3 Winnemucca Segment and Grass Valley

The Winnemucca Segment and Grass Valley 070/071 basins have historical nitrate sample data with MCL exceedances. The amount of unique wells sampled was greatest in the 1990s with 296 wells sampled; the 1980s had the second greatest with 126 unique wells and the 2000s had 106 unique wells sampled. This demonstrates that monitoring of nitrate contamination has recently been less extensive than previously. The nitrate interpolation tool showed 4 areas of nitrate exceedances in this study area. Additional sampling helped to confine the interpolation and confirm areas of high nitrate concentration.

The sample data in the Winnemucca and Grass Valley basins shows elevated nitrate concentration in developments that have homes on septic systems and domestic wells. Given that much of this area is not served public drinking water there are many shallow domestic wells available to collect water quality samples. The sampling completed in Winnemucca is a great example of how targeted sampling can improve the interpolation capabilities of the Nitrate Tool. Sampling was conducted to confirm and define the extent of nitrate contamination in September and October of 2014. 550 letters were sent out to well owners requesting permission to collect a water quality sample, map of letter distribution in Appendix C. A total of 134 nitrate-nitrite samples were collected at unique wells. Figure 5 shows the nitrate-nitrite samples collected as part of this project.

The sampling to the north on Jungo Rd. bounded the extent of the Nitrate Tool's original interpolation by identifying groundwater nitrate concentrations below the MCL. This is more consistent with the limited source of nitrogen loading occurring. Since the elevated nitrate concentrations in this area were not confirmed, the existing results from the "NDEP Original" database are questionable at this location. The exceedance values in the Bird and Davis Lane area were confirmed with the sampling. The Bird and Davis Lane subdivision and immediately to the northeast pose the highest risk to health problems from drinking water in these basins. Isotope sampling for $\delta^{18}O$ and $\delta^{15}N$ would need to be conducted to determine the source of nitrate contamination in this area because of the industrial, agricultural and domestic nitrogen sources.

Although many of the samples in the large subdivisions in Grass Valley, south Winnemucca on Highway 294, were collected in the 1980's and 1990's, there has not been a widespread increase in nitrate concentrations in this area based on the recent sampling event. The majority of these samples are still less than half the MCL. Figure 6 shows all the sample data available in this area. This subdivision should continue to be monitored but at this time does not pose an immediate health threat. Additional sampling in the southern most subdivision returned concentrations less than 2.5 mg/L.

It is recommended that any area identified as have a drinking water source exceeding the MCL be notified. The Bird and Davis Lane area should be considered the most immediate threat to public health. Many of the elevated nitrate concentrations in this area come from BSDW DMR wells that are monitored as part of the Winnemucca Farms production. Continual monitoring is strongly recommended at these monitor wells and a plan to deliver safe public drinking water should be considered. A community wastewater treatment facility can be considered to limit the nitrogen loading to this aquifer.

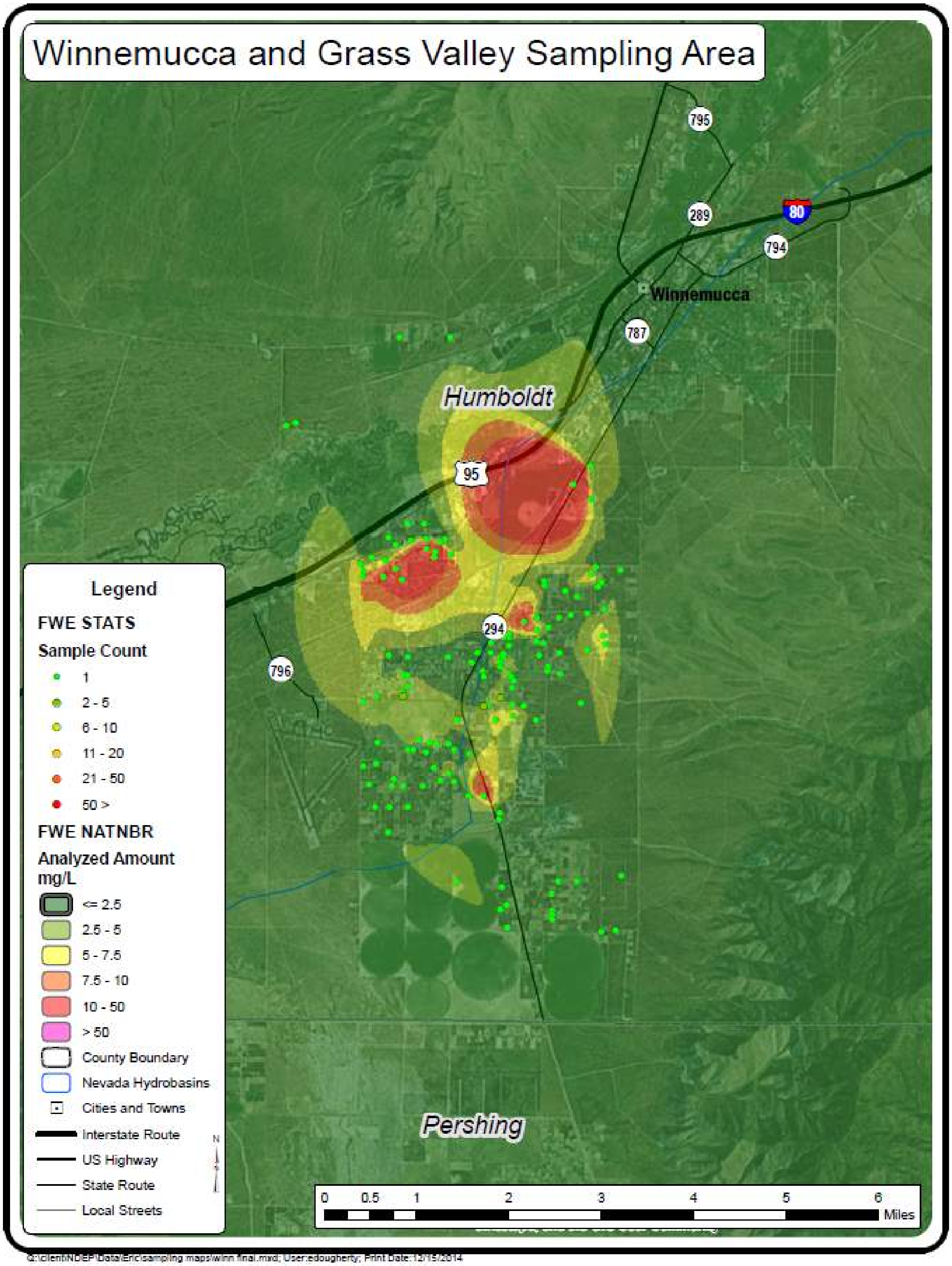


Figure 5 - Winnemucca Segment and Grass Valley Basins Map of Nitrate-Nitrite Samples

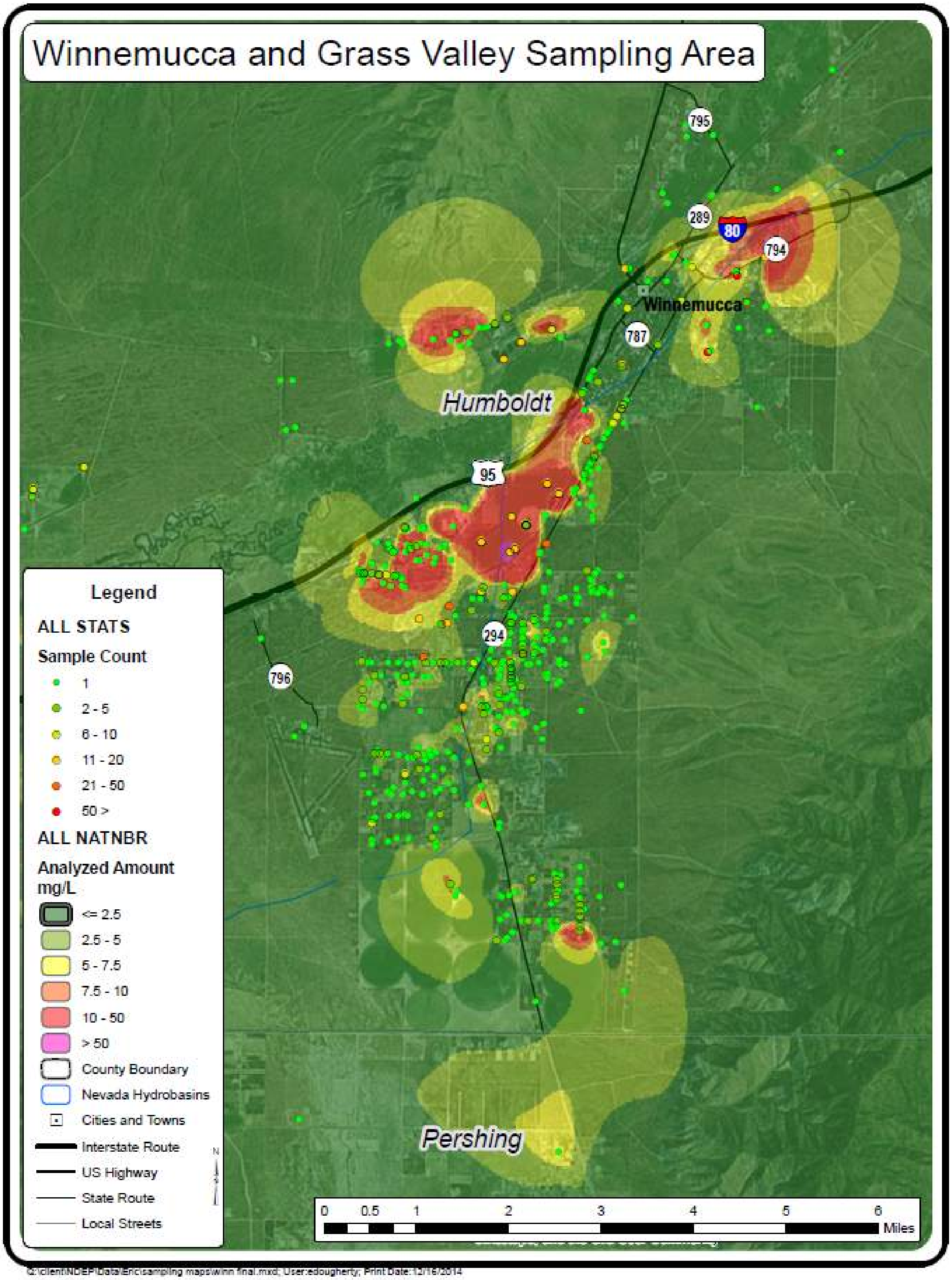
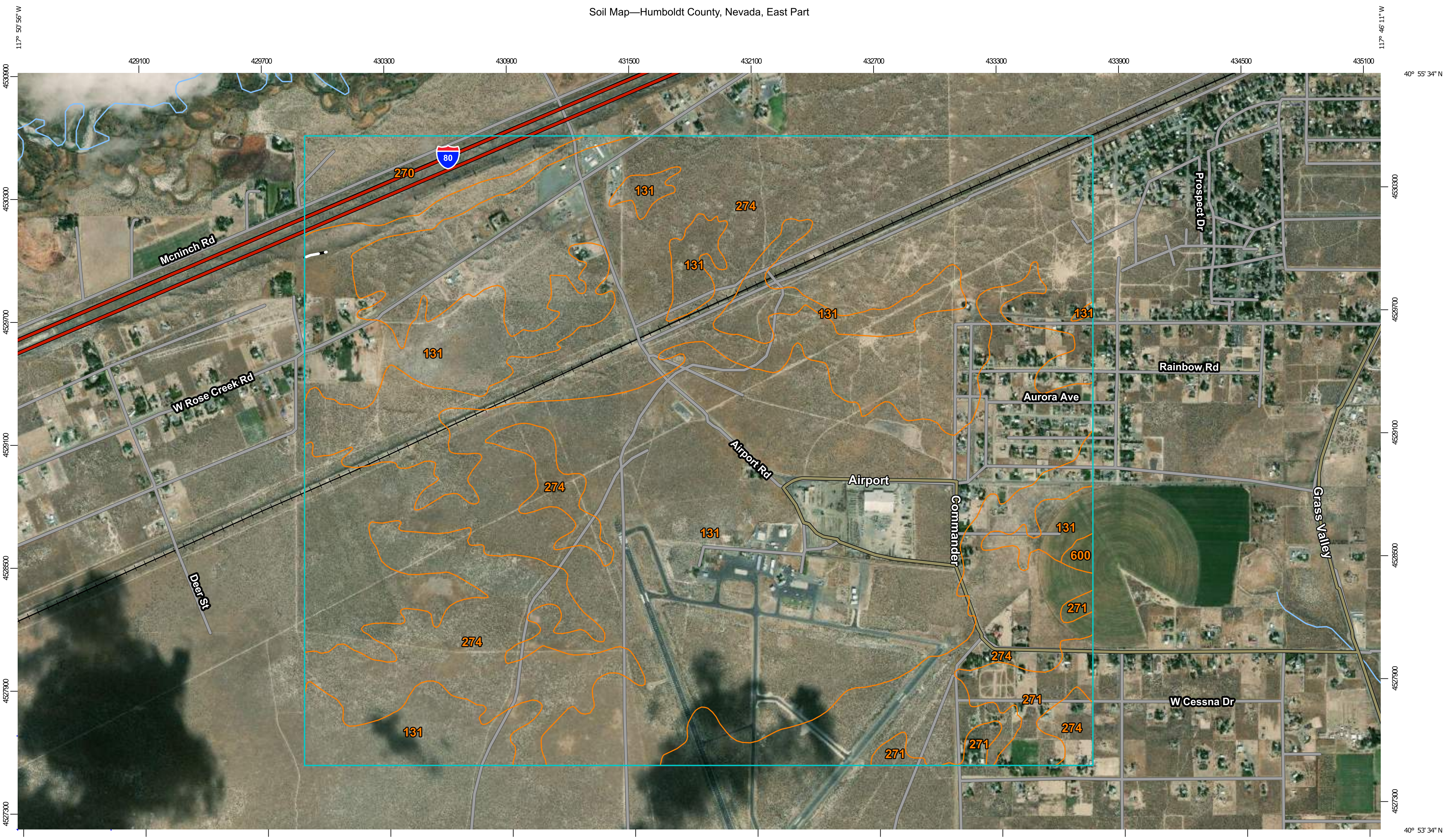


Figure 6 - Winnemucca Segment and Grass Valley Basins Map of All Nitrate Samples

APPENDIX D – NRCS SOILS MAP

Soil Map—Humboldt County, Nevada, East Part



Map Scale: 1:18,000 if printed on B landscape (17" x 11") sheet.

N

Meters: 0, 250, 500, 1000, 1500

Feet: 0, 500, 1000, 2000, 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Humboldt County, Nevada, East Part
Survey Area Data: Version 15, Sep 9, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 15, 2014—Oct 6, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
131	Benin silt loam 1/	1,450.0	49.3%
270	Goldrun fine sand, 2 to 15 percent slopes 1/	97.5	3.3%
271	Goldrun loamy fine sand, 0 to 2 percent slopes 1/	63.7	2.2%
274	Goldrun-Benin complex, 0 to 15 percent slopes 1/	1,326.8	45.1%
600	Valmy fine sandy loam, 0 to 2 percent slopes 1/	4.9	0.2%
Totals for Area of Interest		**2,942.9**	**100.0%**

APPENDIX E – TREATMENT FACILITY BUDGETARY ESTIMATE

AEROMOD®
Wastewater Process Solutions

Sequox® ClarAtor® SR Diffuser Access System

DOptimizer™

Specializing in Custom Designed Wastewater Treatment Facilities

Grass Valley, NV

WWTP Proposal

for

Farr West Engineering

March 9, 2022

Aero-Mod, Inc.
7927 U.S. Highway 24
Manhattan, KS 66502 USA
Ph: (785) 537-4995
www.aeromod.com

Phase 1 - 0.405 MGD

Aero-Mod, Inc.

EQUIPMENT AND SERVICES COST ESTIMATE

Project:	Grass Valley, NV Ph. 1	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English

EQUIPMENT SUPPLIED

AERATION EQUIPMENT

2	Aeration pd blower/sound enclosure package, 100 HP - 460 V, 3 ph	
4	SEQUOX aeration control butterfly valve, pneumatically-actuated	
2	SEQUOX aeration throttling butterfly valve, gear-operated	
2	SEQUOX aeration control butterfly valve, electrically-actuated	
2	Aeration flow conditioner/flow sensor/SS flanged pipe spool	
24	Wall mounted aeration assembly, Model WA-PF6-2	- First Stage Aeration Basins
16	Wall mounted aeration assembly, Model WA-PS4-2	- Second Stage Aeration Basins

BIO-P EQUIPMENT

1	Aeration control butterfly valve, pneumatically-actuated
2	Aeration throttling butterfly valve, gear-operated
4	Wall mounted aeration assembly, Model WAD-PS2-2

CLARIFIER & RAS EQUIPMENT

2	Aero-Mod Split-ClarAtor Clarifier System - 640 sf/each

DIGESTION, SLUDGE HOLDING & WAS EQUIPMENT

2	WAS airlift pump, Model AL-600
2	Aeration control butterfly valve, pneumatically-actuated
2	Aeration control butterfly valve, electrically-actuated
2	Aeration flow conditioner/flow sensor/SS flanged pipe spool
8	Wall mounted aeration assembly, Model WAD-PS2-2

ELECTRICAL & CONTROLS EQUIPMENT

1	SEQUOX Process Control Panel w/ Allen Bradley PLC, Model SQC-100 Series - 115 V
2	Blower control panel w/ Allen Bradley 6-pulse VFD - 460 V, 3 ph
2	Air compressor, 3.0 HP with 80 gallon tank & auto-drain - 460 V, 3 ph
1	Air compressor alternation panel - 460 V
1	Regenerative desiccant dryer mounted on 60 gal dry storage tank - 115 V wall outlet
1	D.O. Control System - probe analyzer & sunshield w/ rail-mounted sensor probes

ANCILLARY EQUIPMENT

280	Wall mounted walkway & handrail, LF
2	Wall mounted stop plates & frames 2 SS wall-mounted frames 2 Aluminum stop plates
LS	Spare Parts
LS	Interior tank installation materials - SS brackets, SS bolts, PVC wall inserts, pneumatic tubing, misc.

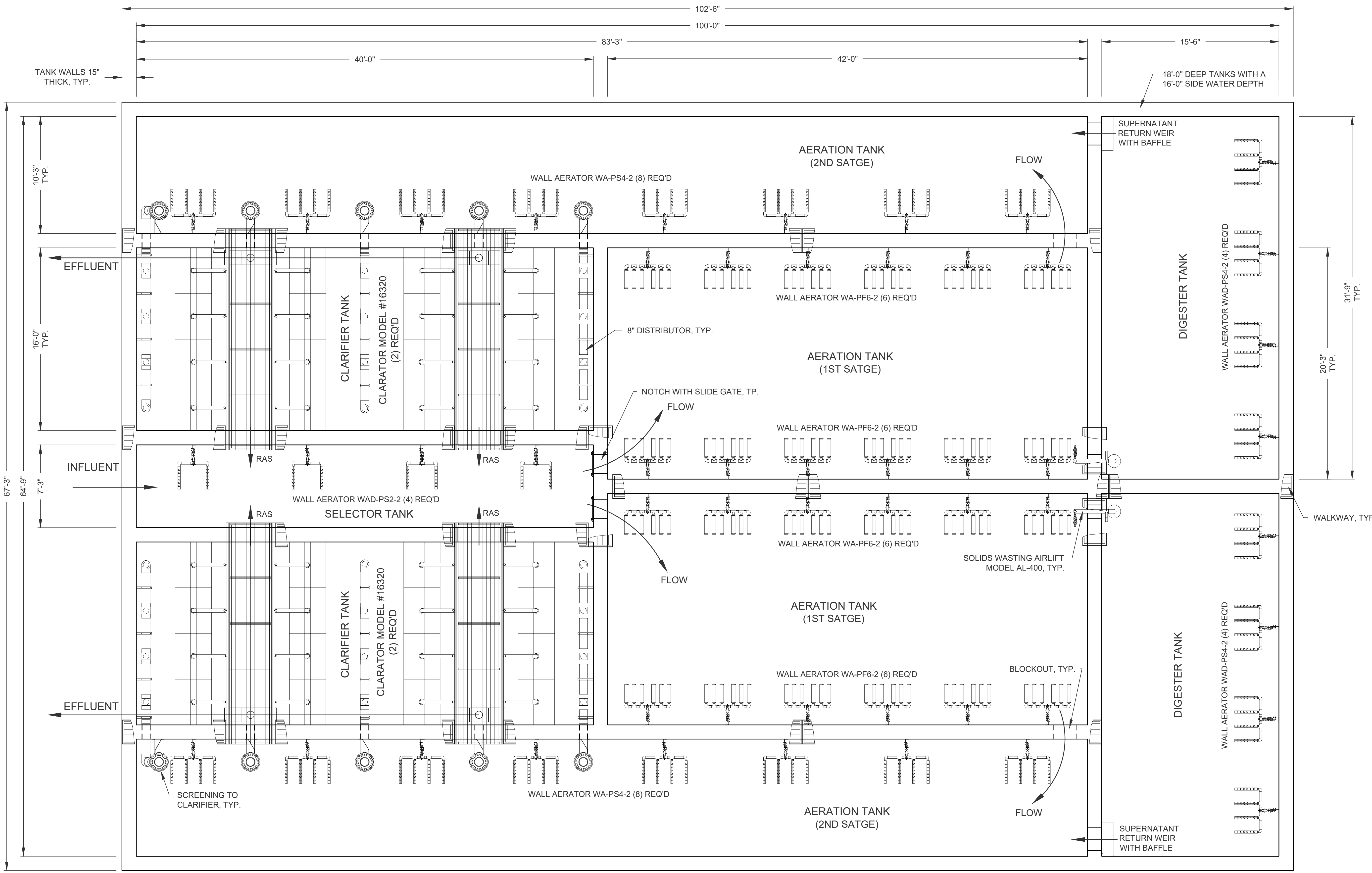
SERVICES

LS	Freight to jobsite
LS	Aero-Mod equipment dry inspection/equipment start-up & training, two (2) days
LS	Aero-Mod PLC startup & training, two (2) days
LS	Aero-Mod biological training, two (2) days
LS	Operator training school - 2 days at Aero-Mod facilities in Manhattan, KS

		===========
TOTAL EQUIPMENT COST		**$979,850**
EST'D INSTALLATION of Aero-Mod EQUIPMENT by Contractor *(Includes Interior Tank PVC Piping)*		$235,000
ESTIMATED CONCRETE TANK COST by Contractor		$941,000
Concrete for Tank Walls, cy	626	
Installed Concrete Cost, $/cy	$900	
Concrete for Tank Slab, cy	402	
Installed Concrete Cost, $/cy	$800	
Grout for Clarifier Bottom, cy	81	
Installed Concrete Cost, $/cy	$700	
		===========
ESTIMATED COST		**$2,155,850**

PLEASE NOTE THE FOLLOWING

1. Buildings, site work, and auxiliary equipment are not included within this estimate.
2. No RAS pump station and associated electrical requirements are required.
3. Yard piping is not required between each Aero-Mod tank.
4. All associated walkways & handrail for the clarifier and tankage are included in the above estimate.
5. This estimate is valid for 90 days from the above date.



Date: 03/09/22

Scale: NTS

Chk by:

Drawn by: JB

Title: GRASS VALLEY
PHASE 1 - 0.405 MGD
WASTE WATER TREATMENT PLANT

Aero - Mod, Inc.

7927 U.S. Highway 24
Manhattan, Kansas 66502

PHONE: (785) 537-4995

Aero-Mod, Inc.

ACTIVATED SLUDGE DESIGN CALCULATIONS

Project:	Grass Valley, NV Ph. 1	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English
Act. Sludge Process:	SEQUOX BNR		

DESIGN CONDITIONS & PARAMETERS

	Influent	Clarifier Effluent
Flow (Q), MGD	**0.405**	
BOD_5, mg/l	**240**	**15.0**
BOD_5, lbs/day	811	50.7
BOD_L, mg/l	351	
TSS, mg/l	**240**	**15.0**
TSS, lbs/day	811	50.7
Ammonia-N, mg/l	**40**	**3.0**
Ammonia-N, lbs/day	135.1	10.1
TN, mg/l (assumes rDON < 1.0 mg/l)		**10.0**
TN, lbs/day		33.8
Phosphorus-P, mg/l	**8.0**	**4.9**
Phosphorus-P, lbs/day	27.0	16.5
Net Alkalinity Loss, mg/l as $CaCO_3$		**(206)**

Aeration Basin	
Retention Time, hours	**24.0**
Aeration Tank Volume, Mgal	0.405
MCRT, days	**20.0**
Wastewater Temperature, ^{o}C	16
Aerobic Digester	
Volume, % of Aeration Tank	30.0
Maximum Solids Conc., mg/l	12,000
Maximum Solids Conc., %	1.20%
Digester Temperature, ^{o}C	16
Sludge Holding Tank	
Volume, % of Aeration Tank	0.0
Maximum Solids Conc., mg/l	25,000
Maximum Solids Conc., %	2.50%

PROJECTED OPERATING CONDITIONS - AERATION BASIN

Mixed Liquor Suspended Solids, mg/l		**3,277**
Excess MLSS due to Phos-P Uptake/Removal, mg/l	0	
Mixed Liquor Volatile Suspended Solids, %		72%
F/M Ratio, lbs BOD_5/lb MLVSS		0.10
F/M Ratio, lbs BOD_5/lb MLSS		0.07
Organic Loading, lbs BOD_5/1000 cf of tank/day		15.0
Oxygen Requirements (Carbonaceous), mg/l/hr		9.48
Oxygen Requirements (Nitrogenous), mg/l/hr		7.09
Solids Production, lbs/day		553
WAS - Solids Wasted per Day, lbs/day		503
WAS - Solids Wasted per Day, gal/day @	0.33%	18,396

PROJECTED OPERATING CONDITIONS - AEROBIC DIGESTER

Volatile Solids Loading in Digester, lbs VSS/1,000 cf of tank/day		22
Volatile Solids Reduction in Digester, %		29%
Solids Wasted from Digester, lbs/day		400
Mass Solids Yield in Process & Digester per Mass Influent BOD_5, %		56%
Volume Wasted from Digester, gallons/day		3,993
Digester Sludge Age, days		**30**
Air Required for Stabilization, scfm		149
Air Required for Mixing @	30 cfm/1000 cf	487

Aero-Mod, Inc.

AERATION DESIGN CALCULATIONS

Project:	Grass Valley, NV Ph. 1	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English
Diffuser Type Used:	Tubular EPDM Fine Bubble		

	Design	Peak		Design	Peak
Q, MGD	0.405	N/A	TKN_o, mg/l	50.0	N/A
BOD_o, mg/l	240	N/A	$TKN_{assimilation}$, mg/l	9.1	N/A
BOD_{rem}, mg/l	240	N/A	TKN_{rem}, mg/l	50.0	N/A
BOD_{rem}, lb/day	811	N/A	TKN_{rem}, lb/day	168.9	N/A
O_2 Requirement, lb O_2/lb BOD_{rem}	1.500		O_2 Requirement, lb O_2/lb TKN_{rem}	4.60	

AERATION REQUIREMENTS - FIRST STAGE	**Design**	**Peak**
Removal in First Stage	70%	70.0%
BOD_{oxy} - Oxygen Required for BOD [Q * BOD_{rem} * 8.34 * O_2 Req. / 24], lbs O_2/hr	35.5	N/A
TKN_{oxy} - Oxygen Required for TKN [Q * TKN_{rem} * 8.34 * O_2 Req. / 24], lbs O_2/hr	22.7	N/A
Actual Oxygenation Rate (AOR), lbs O_2/hr	**58.1**	**N/A**
Standard Oxygenation Rate (SOR), lbs O_2/hr	**164.7**	**N/A**

SOR = [(AOR * $C_{s,20}$) / (α * Θ^$^{(T-20)}$ * (Tau * Ω * β * $C_{s,20}$ - C_L))]

Where:

$C_{s,T,H}$	Actual Value of D.O. Saturation, mg/l	**9.08**	C_L	Residual D.O. Conc., mg/l	**2.0**
$C_{s,20}$	Steady State Value of D.O. Saturation, mg/l	9.08	T	Temperature of Water, °C	**20**
Tau	Oxygen Saturation Value ($C_{s,T,H}$/$C_{s,20}$)	1.000	F		
α	Alpha - Oxygen Transfer Correction Factor for Waste	0.60	Θ	Theta - Oxygen Transfer Coeff	1.024
β	Beta - Salinity-Surface Tension Correction Factor	0.95		Site Elevation, FASL	**4,390**
P_H	Atmospheric Pressure at Site Elevation, psi	12.51	Ω	Omega (P_H/P_s)	0.851

	Design	Peak
Air Requirement = [SOR / (Oxygen Density * TE% * Diffuser Depth) / 60], scfm	**581**	**N/A**

Where:

Oxygen Density, lbs O_2/cf	0.0175	Diffuser Depth Below Water Surface, ft	**15.0**
Transfer Efficiency per Foot of Submergence, %	**1.80%**		

	Design	Peak
Denitrification Credit = [Air Rqmt * (TKN_{oxy} / AOR) * 50% * ((TKN_o - TN_e) / TKN_o)], scfm	91	N/A

Where: TN_e = TKN_o / 2 (assumed when D.O. control is not used)

	Design	Peak
Total Aeration Required in Aeration Basin, scfm	**490**	**N/A**

Air Correction

icfm = scfm / [((T_{std} + 460) / (T_{air} + 460)) * ((P_H - (RH% * SVP_{Tair})) / (14.7 - ($RH\%_{std}$ * SVP_{std}))) * ((P_A / P_H)]

Where:

T_{std}, °F	68	T_{air}	Maximum Air Temperature, °F	**104**
$RH\%_{std}$	36%	RH%	Maximum Relative Humidity, %	**80%**
SVP_{std}, psi	0.34	SVP_{Tair}	Saturated Vapor Pressure of Air @ T_{air}, psi	1.058
		P_A	Actual Atmospheric Pressure after Blower Inlet, psi	12.31

Minimum Air Required for Mixing in First Stage Aeration Basin, cfm	272	Side Roll
Minimum Air Required for Mixing in Second & Third Stage Aeration Basin, cfm	273	Side Roll
Minimum Air Required for Operating Full Plant, cfm (mixing requirement for 24 hrs)	814	

		Design	Peak	Design	Peak
Aeration Pressure, in. H_2O				228	228
psi, std	(does not include blower inlet/outlet)			**8.2**	**8.2**
		scfm	scfm	icfm	icfm
Aeration Basin - Fine Bubble		490	0	665	0
Aeration Basin - Coarse Bubble		386	0	524	0
Aerobic Digester Tank	(sequenced aeration)	244	0	244	0
Bio-P / Selector Tank		46	0	46	0
Post Aeration Tank		0	0	0	0
Clarifier RAS Airlift Pumps & Skimmers		60	0	60	0
	Total Air Required	1,227		1,539	
	Total Air Available			**1,783**	

POWER REQUIREMENTS	Unit	Power	Power
Operating Power for Aeration Basin, HP	Blower	72.4	
Operating Power for Digester, HP	Blower	14.8	
Operating Power for Selector Tank, HP	Blower	2.8	
Operating Power for Post Aeration Tank, HP	Blower	0.0	
Operating Power for Clarifier, HP	Blower	3.7	
Operating Power for Pneumatic System, HP	Air Compr.	0.4	
Operating Power Required at Full Loading, HP		**94.1**	
Minimum Power Required to Operate Full Plant , HP		**48.1**	

Aero-Mod, Inc.

AERATION DESIGN CALCULATIONS

Project: Grass Valley, NV Ph. 1 — ***Date:*** 9-Mar-22
Engineer: Farr West Engineering — ***Units:*** English
Diffuser Type Used: Stainless Steel Coarse Bubble

AERATION REQUIREMENTS - SECOND & THIRD STAGE	**Design**	**Peak**
Removal in Second Stage	30%	30.0%
Oxygen Required for BOD [Q * BOD_{rem} * 8.34 * O_2 Req. / 24], lbs O_2/hr	15.2	N/A
Oxygen Required for TKN [Q * TKN_{rem} * 8.34 * O_2 Req. / 24], lbs O_2/hr	9.7	N/A
Actual Oxygenation Rate (AOR), lbs O_2/hr	**24.9**	**N/A**
Standard Oxygenation Rate (SOR), lbs O_2/hr	**56.5**	**N/A**

SOR = [(AOR * $C_{s,20}$) / (α * Θ^$^{(T-20)}$ * (Tau * Ω * β * $C_{s,20}$ - C_L))]

Where:

$C_{s,T,H}$	Actual Value of D.O. Saturation, mg/l	9.08	**C_L**	Residual D.O. Conc, mg/l	**2.0**
$C_{s,20}$	Steady State Value of D.O. Saturation, mg/l	9.08	**T**	Temperature of Water, °C	20
Tau	Oxygen Saturation Value ($C_{s,T,H}$/$C_{s,20}$)	1.000	**F**		
α	Alpha - Oxygen Transfer Correction Factor for Waste	0.75	Θ	Theta - Oxygen Transfer Coeffi	1.024
β	Beta - Salinity-Surface Tension Correction Factor	0.95		Site Elevation, FASL	**4,390**
P_H	Atmospheric Pressure at Site Elevation, psi/FASL	12.51	Ω	Omega (P_H/P_s)	0.851

	Design	**Peak**
Air Requirement = [SOR / (Oxygen Density * TE% * Diffuser Depth) / 60], scfm	**434**	**N/A**

Where:

Oxygen Density, lbs O_2/cf	0.0175	Diffuser Depth Below Water Surface, ft	**15.5**
Transfer Efficiency per Foot of Submergence, %	**0.80%**		

	Design	**Peak**
Denitrification Credit = [Air Rqmt * (TKN_{oxy} / AOR) * 50% * ((TKN_o - TN_e) / TKN_o)], scfm	47	N/A

Where: TN_e = TKN_o / 2 (assumed when D.O. control is not used)

	Design	**Peak**
Total Aeration Required in Aeration Basin, scfm	**386**	**N/A**

Air Correction

icfm = scfm / [((T_{std} + 460) / (T_{air} + 460)) * ((P_H - (RH% * SVP_{Tair})) / (14.7 - ($RH\%_{std}$ * SVP_{std}))) * ((P_A / P_H)]

Where:

T_{std}, °F	68	T_{air}	Maximum Air Temperature, °F	**104**
$RH\%_{std}$	36%	RH%	Maximum Relative Humidity, %	**80%**
SVP_{std}, psi	0.34	SVP_{Tair}	Saturated Vapor Pressure of Air @ T_{air}, psi	1.058
		P_A	Actual Atmospheric Pressure after Blower Inlet, psi	12.31

Minimum Air Required for Mixing in Second & Third Stage Aeration Basin, cfm	273	Side Roll
Aeration Pressure, in. H_2O	213	213
psi, std (does not include blower inlet/outlet)	**7.7**	**7.7**

	Design scfm	**Peak** scfm	**Design** icfm	**Peak** icfm
Aeration Basin - Coarse Bubble	386	0	524	0

Aero-Mod, Inc.

O&M COST CALCULATIONS

Project:	Grass Valley, NV Ph. 1	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English
Diffuser Type Used:	Tubular EPDM Fine Bubble Stainless Steel Coarse Bubble	***Aeration Blower:***	Kaeser FB791C-100HP

AERATION REQUIREMENTS

	Full Loading
Aeration Basin - Fine Bubble	665
Aeration Basin - Coarse Bubble	524
Aerobic Digester Tank	244
Clarifier RAS Airlift Pumps & Skimmers	106
Total Air Required, icfm	1,539
Total Air Capacity, icfm	1,783

POWER REQUIREMENTS

	Full Loading
Total Operating Blower Power, HP	93.7

	Nameplate HP	kW
Operating Power for Aeration Basin	2 @ 100	54.0
Operating Power for Digester		11.1
Operating Power for Clarifier		4.8
Operating Power for Pneumatic System	2 @ 3.0	0.3
Operating Power for Air Compressor Auto-Drains		0.05
Operating Power for Regenerative Desiccant Dryer		0.07
Operating Power for Positioning Actuators		0.07
Operating Power for Blower VFD Control Panels		2.00
Operating Power for PLC-based Process & D.O. Control		0.20
Total Operating Power, kW		72.6
Total Daily Power, kWh		1,742
Yearly Power @ $0.08/kWh		**$50,868**

LABOR REQUIREMENTS

Labor is assumed at what is actually required, and only for the plant proper. The labor rate includes base labor and overhead. Regional policy, existing contracts, and related duties may alter this figure significantly. The person-hours required per week is calculated for only the Aero-Mod equipment.

Time per Week, hrs	**15**
Rate per Hour, $	**$25.00**
	$19,500

REPLACEMENT PARTS & CONSUMABLES

	Quan.
Blower Belts	2
Blower Inlet Filter Element	2
Blower Oil (Twice)	2
Compressor Oil (Twice)	2
Filters for Regenerative Dryer	1
Desiccant for Regenerative Dryer (once every 3 years)	1
Misc. Parts	1

$1,600

CHEMICAL COST FOR PHOSPHORUS REMOVAL

Chemical Assumed to be Used	**N/A**
Estimated Amount of Chemical Added per Day, gal.	
Estimated Amount of Chemical Added per Year, gal.	
Estimated Cost per Gallon of Chemical (assumes bulk delivery)	

N/A

CHEMICAL COST FOR NITROGEN REMOVAL

Chemical Assumed to be Used	**N/A**
Estimated Amount of Chemical Added per Day, gal.	
Estimated Amount of Chemical Added per Year, gal.	
Estimated Cost per Gallon of Chemical (assumes bulk delivery)	

N/A

Aero-Mod, Inc.
CLARIFIER DESIGN CALCULATIONS

Project:	Grass Valley, NV Ph. 1	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English
Clarifier Type Used:	Split-ClarAtor		

FLOW CONDITIONS

Design Flow, MGD		0.405	
Peaking Factor, hourly	1,125 gpm	4.00	1.620 MGD
Duration, min		60	
Peaking Factor, sustained		3.00	1.215 MGD
Aeration Tank Volume, Mgal		0.405	
MLSS, mg/l		3,277	
Avg. RAS Recycle Rate, %		150%	

EQUIPMENT SIZING & SELECTION

Number of Clarifiers	**2**	Surface Area per Clarifier, sf	640
Clarifier Unit Model	**16320**	Total Surface Area, sf	**1,280**
Bridge Length, ft	16	Total Weir Length, ft	116
Clarifier Unit Width, ft	20	Tank Wall Depth, ft	18.0
Number of Units per Clarifier	2	Tank Water Depth, ft	16.0

SURFACE OVERFLOW RATE

	Design	
Design Flow, gpd/sf	**316**	
Peak Day Flow, gpd/sf	949	
Peak Hour Flow, gpd/sf	1,000	* Max allowed to leave clarifier
Max. Flow Allowed Through Clarifier Orifice, gpd/sf	1,000	* Max allowed to leave clarifier

WEIR OVERFLOW RATE

Design Flow, gpd/lin. ft	**3,491**
Peak Flow, gpd/lin. ft	11,034

SOLIDS LOADING RATE

Design Flow, lbs/day/sf	**21.6**
Peak Flow, lbs/day/sf	40.3

RETENTION TIME - including RAS

Design Flow, hr	**3.6**
Peak Flow, hr	1.9

PEAK FLOW HANDLING - IN-BASIN SURGE STORAGE

Hourly Peak Flow, MGD	1.620	Vol. of In-Basin Surge Storage, gal	15,514
Max. Flow Through Clarifier, MGD	1.280	Capacity of Surge Storage, hr.	1.1
Stored Peak Flow, gpm	236		

PEAK FLOW HANDLING - SIDE-LINE SURGE TANK

Hourly Peak Flow, MGD	1.620	Volume of Surge Tank	0
Max. Flow Through Clarifier, MGD	1.280	Capacity of Surge Tank, hr.	0.0
Diverted Peak Flow, gpm	236		

Peak Hour Capacity, hr. 1.1

Aero-Mod, Inc.

TANKAGE DESIGN CALCULATIONS

Project:	Grass Valley, NV Ph. 1	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English
Tank Construction:	Cast-in-Place Concrete		

BIO-P / SELECTOR TANK

Anaerobic Selector Volume Required, gal **33,750**

Number of Tanks	1	Tank Length, ft	40.0
Tank Wall Height, ft	18.0	Tank Width, ft	7.25
Tank Water Depth, ft	16.0	Total Volume, gallons	**34,707**
Freeboard, ft	2.0	Retention Time (Forward Flow) min.	123

AERATION TANK Volume Selected, gal **405,000**

Tank Wall Height, ft	18.0	Number of Trains	2
Tank Water Depth, ft	16.0	Number of Stages	2

Stage 1		*Stage 2*	
Number of Tanks	2	Number of Tanks	2
Tank Length, ft	42.0	Tank Length, ft	83.250
Tank Width, ft	20.250	Tank Width, ft	10.25
Area of Each Tank, sf	851	Area of Each Tank, sf	853
Total Volume, gallons	**203,576**	Total Volume, gallons	**204,249**

Total volume provided, gal **407,825**

CLARIFIER TANK

Number of Tanks	2	Tank Width, ft	16.0
Tank Wall Height, ft	18.0	Tank Length, ft	40.0
Tank Water Depth, ft	16.0	Total Volume, gallons	**153,190**

AEROBIC DIGESTER TANK Volume Selected, gal **121,500**

Number of Tanks	2	Tank Length, ft	15.5
Tank Wall Height, ft	18.0	Tank Width, ft	31.750
Tank Water Depth, ft	16.5	Total Volume, gallons	**121,476**

OVERALL TANKAGE DIMENSIONS

Total Length, ft	102.5	Wall Thickness, in	15.0
Total Width, ft	67.25	Floor Thickness, in	18.0
Total Area, sf	6,893	Total Concrete for Walls, cy	**626**
Total Wall Length, LF	751	Total Concrete for Slab, cy	**402**
		Total Grout for Clarifier, cy	**81**

Aero-Mod, Inc.

SLUDGE DEWATERING DESIGN CALCULATIONS

Project:	Grass Valley, NV Ph. 1	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English
Belt Filter Press Model Used:	Tritan series 1500		

NOTE: Actual operating conditions dependent upon loading of treatment plant.
This proposal assumes a population equivalent of about 4,000 people.

SLUDGE CONDITIONS

Volume of sludge per day (fully loaded), gallons *(avg over month)*		**3,993**
Solids concentration of sludge, mg/l		12,000
Solids concentration of sludge, %		1.20%
Solids to dewater, dry lbs/day *(avg over month)*		**400**
Polymer requirement, lbs/dry ton sludge		20
Dewatered solids concentration, %	Varies 13-16%	15.0%
Volume of dewatered sludge, ft^3		42.7

EQUIPMENT SIZING & SELECTION

Number of Belt Filter Presses Used	**1**
Polymer Feed Pump Used	**Diaphragm**
Sludge Feed Pump Used	**Prog. Cavity**
Pumping Capacity, gpm	137
BFP Solids Loading Rate, lbs/hr	825
Belt Filter Press Effective Belt Width, m	1.5
BFP Solids Loading Rate, lbs/hr/m	550
Projected Operational Time Period, hrs/day	6.0
Projected Operational Days Required/month	**2.4**
Sludge Cake Pump Used	**Prog. Cavity**

OPERATIONAL REQUIREMENTS

Total polymer requirement, lbs/month		120
Active polymer 50%	Polymer density, lb/gal 8.6	
Total polymer requirement, gal/month		28
Electrical usage per press, kWh	7.9	
Total electrical usage, kW/month		121
Total weight of dewatered sludge @	15.0% , tons/month	40

WASHWATER USE (per press)

Washwater use for normal operation, gpm	31.5
Washwater use for washdown cycle, gpm (≈30 min)	43.0
Recommended washwater supply, gpm	55.0

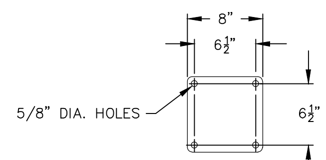
* Note: minimum water pressure (psi) of 50

BUDGET PRICE QUOTE FOR EQUIPMENT **$421,125**

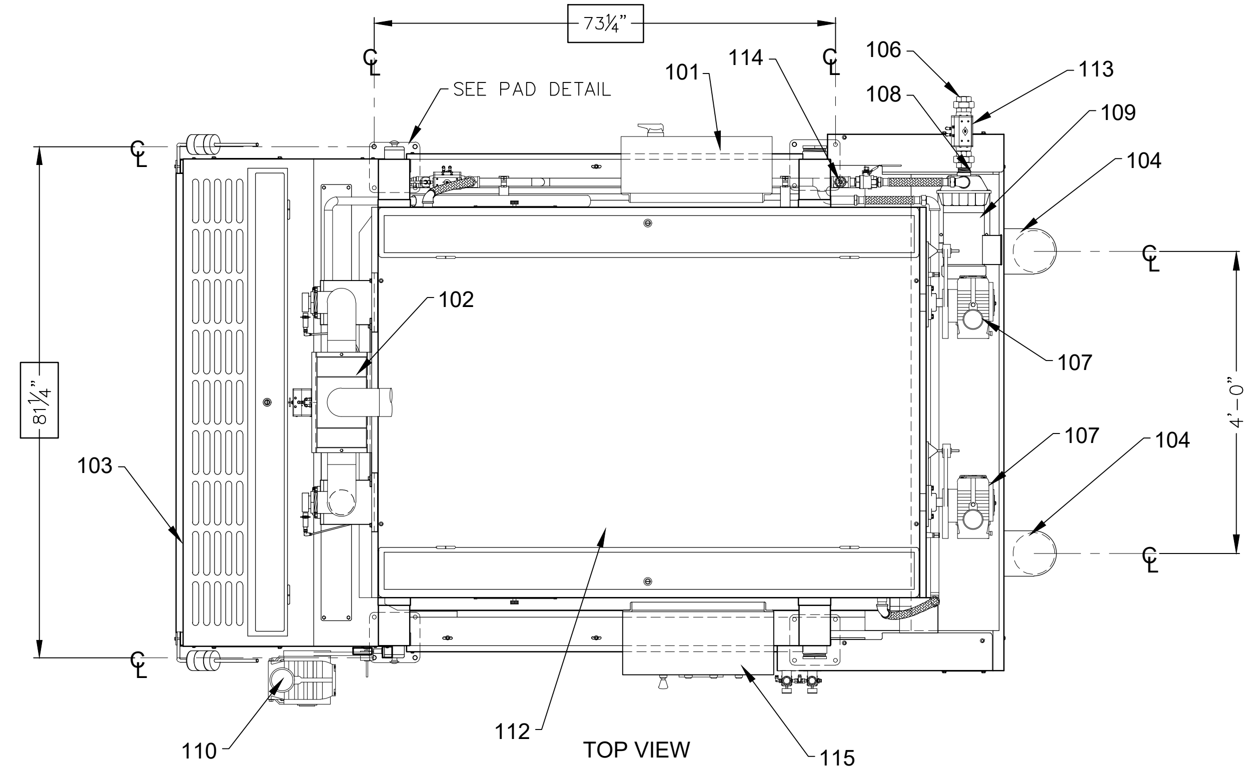
Includes:
- (1) Tritan Belt Filter Press, model 1500
- (1) PLC Master Control Panel w/ Touchscreen
- (1) Sludge Feed Pump/VFD Controls/Static Mixer on Stand
- (1) Polymer Feed System/Controls on Stand
- (1) Sludge Cake Pump/Sludge Hopper/VFD Controls
- (1) Day(s) of Operator Training & Equipment Startup
- LS Freight to Job-site

No.	Qty.	Item	hp	Connection
101	1	Main Power Panel (NEMA 4x)	N/A	P.O.C. by Others (230/460 V, 3 phase)
102	1	Sludge Inlet	N/A	P.O.C. by Others
103	1	Dry Cake Outlet	N/A	P.O.C. by Others (Conveying System and/or Storage Container)
104	2	Filtrate Outlets	N/A	P.O.C. by Others (6" Flex Connections)
105	1	Compressed Air Inlet (Instrument Quality)	N/A	P.O.C. by Others (90 to 100 p.s.i. @ 5.5 c.f.m.) 3/8" Compression
106	1	Water Inlet	N/A	P.O.C. by Others (1 1/2" N.P.T., 70 g.p.m. @ 50 p.s.i.)
107	2	Rotary Drum Thickener Motor	1.0hp	Power Supplied from 101
108	1	Centrifugal Water Washing Pump	N/A	N/A
109	1	Centrifugal Water Washing Pump Motor	3.0hp	Power Supplied from 101
110	1	Press Cylinder Motor	.5hp	Power Supplied from 101
111	1	Fork Lifting Supports	N/A	N/A
112	1	Rotary Drum Thickener	N/A	N/A
113	1	Automatic Water Shut-off Valve	N/A	Controlled from 115
114	1	Low Washwater Pressure Switch	N/A	Power Supplied from 115
115	1	PLC Control Panel (NEMA 4x)	N/A	Power Supplied from 101

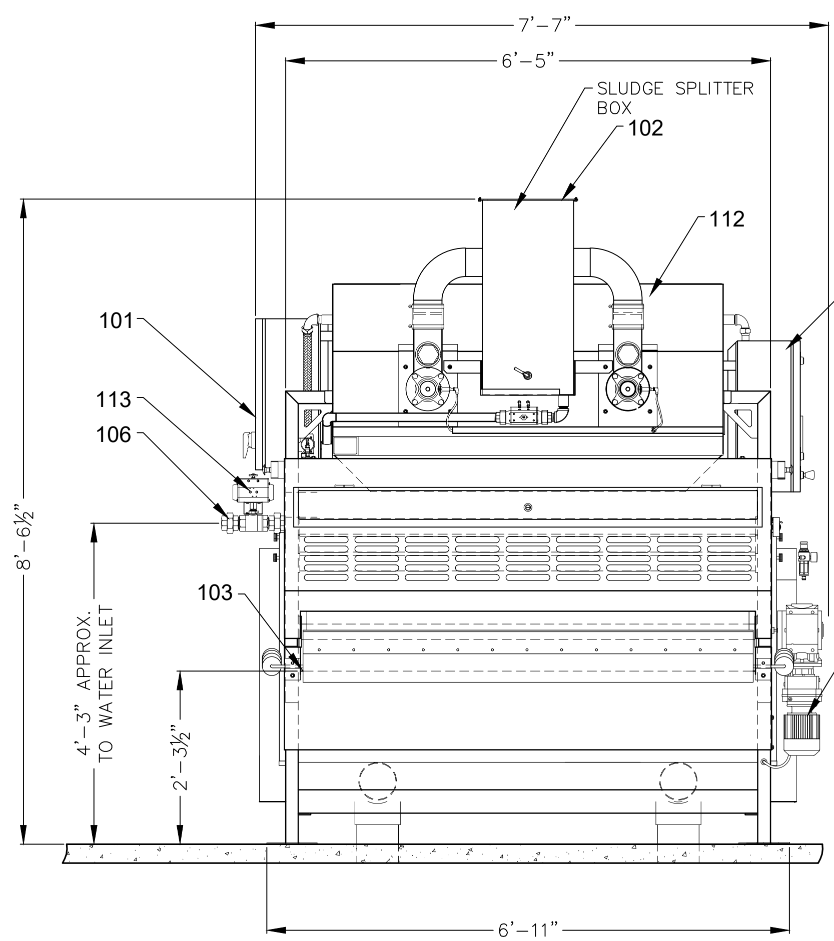
P.O.C. = Point of Connection
Minimum distance of 6' 0" required on each side of the TRITAN
Minimum distance of 3' 6" required in front and back of the TRITAN
APPROX. WT. = 5000 LBS. LOADED = 5600 LBS.



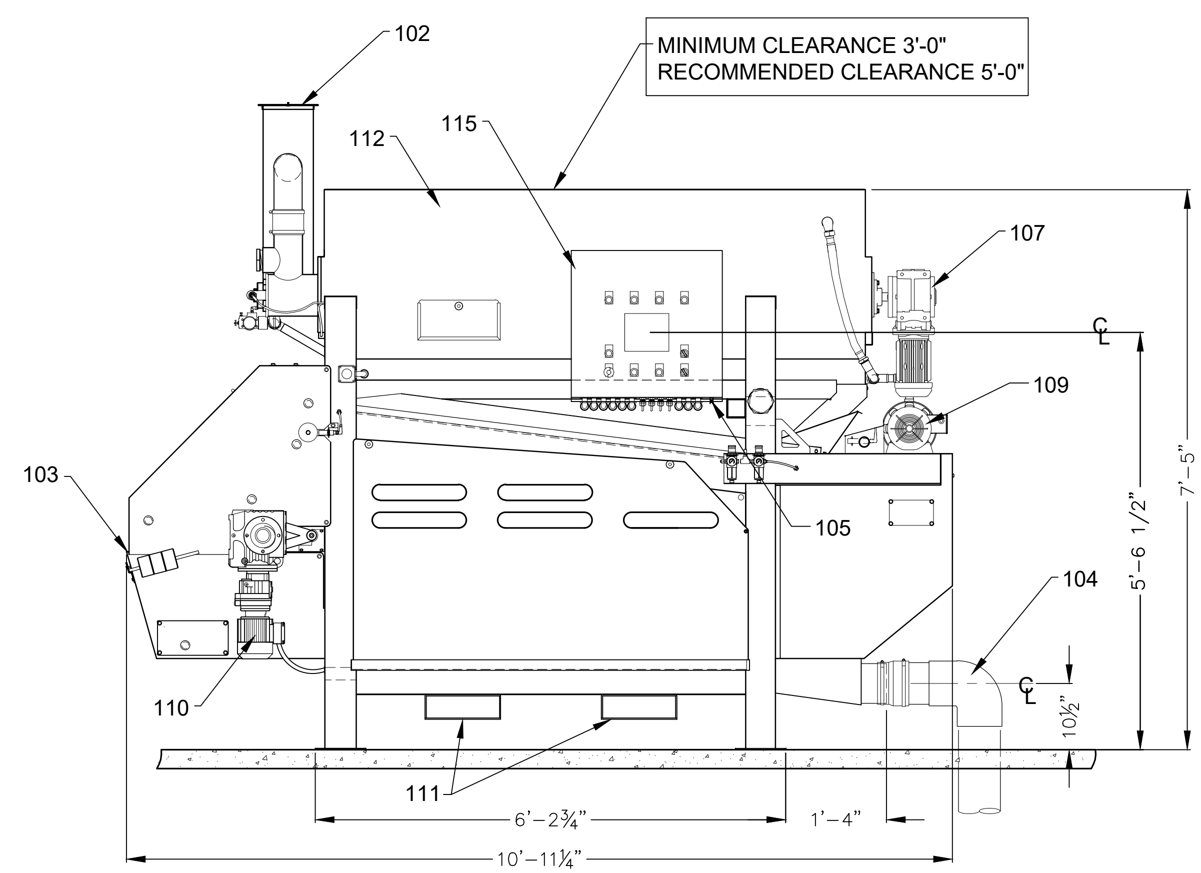
PAD DETAIL



TOP VIEW



END VIEW



SIDE VIEW

Date: 2-10-17
Scale: NTS
Chk by:
Drawn by:
Title: TRITAN FILTER PRESS MODEL 1500 SERIES

Aero - Mod, Inc.
7927 U.S. Highway 24
Manhattan, Kansas 66502
PHONE: (785) 537-4995
FAX : (785) 537-0813

F:\ANDRAFT\PRESS WITH PUMP PROJECT LAYOUTS\FORT BRAGG 8-8-18\BELT 1500-2017.dwg, 11 X 17 2017, 3/8/2019 10:49:34 AM

APPENDIX F – WELL COMPLETION REPORT EXTRACTS

HUMBOLDT COUNTY

WELL COMPLETION REPORT

FOR

GROUNDWATER MONITORING WELL CONSTRUCTION PROJECT

IN

HUMBOLDT COUNTY, NEVADA

January 2007

Prepared By

TRC
4875 Longley Lane Suite 100
Reno, NV 89502
(775) 322-3064 (775) 322-3795 fax

Prepared For

Humboldt County Commissioners
50 West Fifth Street
(775) 623-6300 (775) 623-6302 fax

Report Extract Includes: Pages 1-2

1.0 BACKGROUND

Humboldt County initiated a domestic well groundwater monitoring program in September of 1995. Since then, 16 wells have been monitored on a semi-annual basis. To more accurately assess the groundwater quality, the County had contracted with Vpoint to oversee the construction of four monitoring wells in 2003. In the opinion of the Nevada Division of Environmental Protection (NDEP), the wells constructed in 2003 do not provide a representative sample of the water table interface because the screened interval is too far below the static groundwater level. The County offered to have three additional wells drilled that would have a screened interval across the water table interface.

2.0 WELL CONSTRUCTION PROJECT

2.1 Well Locations

Three well locations were agreed upon by NDEP, the County and the County's engineering representative, TRC (formerly Vpoint). The wells are shown on Figure 1. All wells are located in County road alignments in the right of way. One well is located on Placer Way and is designated GVMW #6. The second monitoring well GVMW#7, is near the intersection of Jackson Road and East Thomas Canyon Road. The third monitoring well GVMW#8 is located in the Cul de Sac of Star City Avenue. Figure 1 is a map of the monitoring well locations showing the new and existing Humboldt County sites.

WELL	NORTHING	EASTING
6	15371985.965	2847236.636
7	[illegible]	[illegible]
8	15372949.966	2850869.950
SC	[illegible]	[illegible]

GRASS VALLEY MONITORING WELLS

LOCATION MAP

VPOINT

DESIGNING FOR THE FUTURE

PLANNERS • CONSULTING ENGINEERS • SURVEYORS

1465 TERMINAL WAY, SUITE 5 • RENO, NEVADA 89502 • (775) 322-3064

APPENDIX G – STATE DEMOGRAPHER DATA

Population Estimates of Nevada's Counties, Cities and Towns 2001 to 2021
Estimates from NV State Demographer, NV Department of Taxation

	JULY 1 2001	Percent Change 7/01 - 7/02	JULY 1 2002	Percent Change 7/02 - 7/03	JULY 1 2003	Percent Change 7/03 - 7/04	JULY 1 2004	Percent Change 7/04 - 7/05	JULY 1 2005	Percent Change 7/05 - 7/06	JULY 1 2006	Percent Change 7/06 - 7/07	JULY 1 2007	Percent Change 7/07 - 7/08	JULY 1 2008
State of Nevada	2,132,498	3.4%	2,206,022	4.1%	2,296,566	5.0%	2,410,768	4.5%	2,518,869	4.1%	2,623,050	3.6%	2,718,337	0.8%	2,738,733
Counties															
Incorp. Cities															
Unincorp. Towns															
Carson City	54,171	1.2%	54,844	0.7%	55,220	1.7%	56,146	1.7%	57,104	1.0%	57,701	0.0%	57,723	-0.2%	57,600
Churchill County	24,928	0.8%	25,116	2.8%	25,808	1.2%	26,106	1.8%	26,585	3.0%	27,371	-0.7%	27,190	-0.8%	26,981
Fallon	8,162	0.2%	8,178	1.5%	8,301	1.2%	8,398	-0.7%	8,339	-0.5%	8,299	1.8%	8,452	9.5%	9,258
Clark County	1,485,855	4.3%	1,549,657	4.6%	1,620,748	5.8%	1,715,337	4.7%	1,796,380	4.4%	1,874,837	4.2%	1,954,319	0.7%	1,967,716
Boulder City	14,760	0.6%	14,842	0.6%	14,934	0.8%	15,058	1.0%	15,203	1.8%	15,478	2.5%	15,863	5.2%	16,684
Henderson	196,780	6.5%	209,486	3.8%	217,448	5.8%	229,984	4.8%	241,134	4.2%	251,321	3.5%	260,161	3.6%	269,538
Las Vegas	503,188	2.3%	514,640	2.7%	528,617	4.0%	549,571	3.7%	569,838	1.8%	579,840	1.8%	590,321	0.5%	593,528
Mesquite	11,940	10.7%	13,216	5.1%	13,895	14.3%	15,881	3.4%	16,423	7.5%	17,656	6.4%	18,787	5.1%	19,754
North Las Vegas	127,897	6.3%	135,967	7.4%	146,005	13.0%	164,971	9.2%	180,219	10.2%	198,516	6.0%	210,472	2.0%	214,661
Bunkerville	1,147	2.9%	1,180	-1.3%	1,165	1.7%	1,185	1.1%	1,198	-1.6%	1,179	6.5%	1,255	-7.6%	1,160
Enterprise	34,017	35.8%	46,193	34.2%	62,001	27.9%	79,299	20.3%	95,377	24.9%	119,100	20.8%	143,917	4.0%	149,713
Indian Springs	1,471	5.8%	1,557	4.0%	1,619	2.6%	1,661	1.1%	1,679	13.6%	1,907	-13.0%	1,659	-10.3%	1,488
Laughlin	6,181	3.6%	6,403	8.6%	6,952	16.6%	8,105	1.5%	8,226	2.8%	8,458	4.1%	8,807	-0.5%	8,761
Moapa	925	16.3%	1,076	26.8%	1,364	-12.0%	1,200	5.1%	1,261	-20.5%	1,003	19.7%	1,201	-16.9%	998
Moapa Valley	5,672	10.7%	6,277	0.7%	6,323	3.6%	6,549	2.7%	6,726	1.8%	6,845	18.1%	8,085	-11.8%	7,134
Mt. Charleston	792	7.7%	853	2.3%	873	2.4%	894	-1.7%	879	-8.3%	806	46.4%	1,179	-5.2%	1,118
Paradise	184,870	1.6%	187,746	-1.3%	185,304	1.9%	188,768	1.5%	191,650	-2.8%	186,370	-0.2%	185,935	-2.0%	182,264
Searchlight	735	11.7%	822	30.6%	1,073	3.1%	1,106	-1.6%	1,088	-29.8%	764	4.4%	798	-6.1%	750
Spring Valley	133,469	4.4%	139,290	8.0%	150,402	7.2%	161,286	2.5%	165,335	4.1%	172,110	2.7%	176,815	0.1%	176,910
Summerlin	7,708	58.8%	12,239	33.2%	16,300	9.5%	17,841	13.5%	20,256	7.1%	21,692	21.8%	26,415	6.0%	27,992
Sunrise Manor	172,237	2.5%	176,587	2.7%	181,354	1.9%	184,801	0.9%	186,511	2.9%	191,858	0.1%	191,966	-3.2%	185,745
Whitney	16,899	12.3%	18,979	8.8%	20,640	5.3%	21,738	24.9%	27,155	22.1%	33,144	9.2%	36,182	0.0%	36,164
Winchester	34,767	-2.2%	33,994	1.1%	34,378	-1.3%	33,917	3.8%	35,208	-0.9%	34,874	7.7%	37,561	-1.1%	37,141
Douglas County	43,450	1.8%	44,212	3.1%	45,603	4.8%	47,803	4.8%	50,108	3.3%	51,770	1.2%	52,386	-0.5%	52,131
Gardnerville	3,851	5.6%	4,065	6.2%	4,316	17.4%	5,067	1.9%	5,165	7.4%	5,550	-2.8%	5,394	0.3%	5,412
Genoa	224	1.3%	227	1.0%	229	6.6%	244	1.4%	248	1.6%	252	0.2%	252	1.3%	255
Minden	2,861	-1.1%	2,830	1.4%	2,870	2.6%	2,945	1.3%	2,983	8.4%	3,234	0.2%	3,239	0.7%	3,261
Elko County	46,668	-0.2%	46,577	-1.7%	45,805	1.5%	46,499	2.3%	47,586	1.6%	48,339	4.3%	50,434	0.3%	50,561
Carlin	2,215	-6.4%	2,074	-1.4%	2,045	9.6%	2,240	1.0%	2,261	0.9%	2,281	0.6%	2,295	1.2%	2,322
Elko	17,093	-2.4%	16,690	-2.0%	16,354	4.8%	17,140	4.1%	17,850	1.9%	18,183	1.3%	18,427	0.0%	18,424
Wells	1,191	16.6%	1,389	-1.1%	1,373	2.4%	1,406	1.2%	1,423	1.9%	1,449	4.0%	1,508	1.1%	1,524
West Wendover	4,614	4.9%	4,839	-2.2%	4,732	2.1%	4,830	0.4%	4,848	0.5%	4,871	1.8%	4,958	0.6%	4,990
Jackpot	1,287	0.1%	1,288	-1.3%	1,271	0.8%	1,281	-0.6%	1,273	1.6%	1,293	-5.9%	1,217	0.4%	1,222
Montello	181	0.0%	181	0.0%	181	-1.1%	179	1.2%	181	-3.7%	175	-5.7%	165	0.4%	165
Mountain City	132	-4.0%	127	-1.6%	125	-1.3%	123	-1.8%	121	3.1%	125	3.5%	129	0.9%	130
Esmeralda County	1,038	8.4%	1,125	-0.8%	1,116	5.3%	1,176	8.5%	1,276	-1.1%	1,262	-2.1%	1,236	0.3%	1,240
Goldfield	498	-11.9%	438	0.2%	439	3.1%	453	-3.3%	438	-1.7%	430	4.2%	448	-7.5%	415
Silver Peak	162	-20.9%	128	-3.5%	124	2.4%	127	-0.9%	126	-7.1%	117	6.9%	125	45.9%	182
Eureka County	1,506	-8.1%	1,384	2.6%	1,420	4.4%	1,484	0.1%	1,485	-1.7%	1,460	-0.1%	1,458	6.5%	1,553
Crescent Valley	298	-6.3%	279	7.4%	300	1.4%	304	2.2%	311	-5.9%	292	-1.2%	289	-2.2%	283
Eureka (town)	470	-7.8%	434	2.9%	446	1.7%	454	-2.9%	440	-1.7%	433	-0.4%	431	9.6%	473
Humboldt County	16,164	0.9%	16,308	0.9%	16,457	1.4%	16,692	3.6%	17,293	2.6%	17,751	1.7%	18,052	-0.2%	18,014
Winnemucca	7,001	3.3%	7,234	0.6%	7,280	-0.4%	7,249	2.1%	7,401	3.3%	7,643	0.0%	7,646	0.2%	7,659
Lander County	5,761	-3.7%	5,547	-4.9%	5,277	1.5%	5,357	2.8%	5,509	2.7%	5,655	1.6%	5,747	2.5%	5,891
Austin	312	-5.5%	295	-8.0%	271	8.1%	293	-1.6%	288	-0.3%	287	-4.4%	275	12.4%	309
Battle Mountain	3,056	-9.3%	2,770	-5.3%	2,623	0.9%	2,645	1.8%	2,692	1.8%	2,740	3.8%	2,845	2.7%	2,922
Kingston	275	-6.9%	256	5.7%	271	-11.7%	239	20.5%	288	6.3%	306	1.0%	309	3.5%	320
Lincoln County	3,861	0.5%	3,879	-3.3%	3,749	1.9%	3,822	1.7%	3,886	2.6%	3,987	5.0%	4,184	4.0%	4,352
Caliente	1,276	-17.0%	1,058	11.8%	1,184	-14.4%	1,014	0.2%	1,015	-1.4%	1,002	8.7%	1,089	-1.1%	1,077
Alamo	367	20.6%	442	-3.1%	428	3.1%	441	-2.9%	428	0.7%	432	-1.0%	427	8.5%	464
Panaca	552	2.2%	564	-4.0%	541	2.1%	552	1.8%	562	-0.7%	558	6.7%	**595**	8.4%	645
Pioche	628	8.3%	680	-3.0%	659	1.5%	669	4.3%	698	0.7%	703	12.6%	791	-0.7%	785
Lyon County	37,329	3.9%	38,777	6.4%	41,244	8.2%	44,646	9.4%	48,860	10.6%	54,031	3.5%	55,903	-0.1%	55,820
Fernley	9,529	9.6%	10,440	12.2%	11,718	17.6%	13,775	18.7%	16,357	15.2%	18,850	3.9%	19,585	0.1%	19,609
Yerington	2,889	-1.0%	2,859	1.5%	2,902	0.3%	2,912	2.3%	2,980	9.3%	3,257	1.9%	3,319	0.2%	3,324
Mineral County	4,743	-1.0%	4,695	-0.2%	4,687	-0.3%	4,673	-0.9%	4,629	-5.0%	4,399	-0.5%	4,377	0.6%	4,401
Hawthorne	3,013	-0.6%	2,995	0.0%	2,995	-0.9%	2,968	-0.4%	2,956	-0.9%	2,931	1.0%	2,960	0.3%	2,970
Luning	89	4.4%	93	-1.3%	91	5.6%	97	-9.5%	87	-7.0%	81	-2.4%	79	0.6%	80
Mina	302	-5.7%	284	-2.2%	278	6.8%	297	-7.0%	276	-21.2%	218	-5.9%	205	1.4%	207
Walker Lake	330	-1.5%	325	-2.1%	318	0.0%	318	-2.5%	310	2.9%	319	-6.2%	299	1.8%	305
Nye County	34,384	1.9%	35,039	4.6%	36,651	4.2%	38,181	8.2%	41,302	8.5%	44,795	3.4%	46,308	2.3%	47,370
Amargosa	1,164	0.6%	1,171	-0.2%	1,169	3.6%	1,211	14.3%	1,383	3.7%	1,435	4.7%	1,503	1.2%	1,521
Beatty	1,104	-1.3%	1,089	-0.9%	1,079	-9.1%	981	5.2%	1,032	-0.7%	1,025	3.3%	1,059	-3.3%	1,024
Gabbs	334	-4.3%	320	-1.9%	314	0.9%	**316**	-1.4%	**312**	0.4%	313	3.0%	322	3.1%	332
Manhattan	123	-0.7%	122	10.7%	135	-4.8%	128	-3.2%	124	-1.9%	122	14.5%	140	-1.3%	138
Pahrump	26,470	4.0%	27,527	4.8%	28,847	5.6%	30,465	9.1%	33,241	10.2%	36,645	3.5%	37,928	2.5%	38,882
Round Mountain	864	-9.8%	779	0.7%	784	-2.1%	767	-3.1%	744	5.9%	787	5.5%	831	2.3%	850
Tonopah	2,779	-12.9%	2,422	2.4%	2,481	-5.6%	2,341	11.3%	2,607	-0.3%	2,600	0.4%	2,610	0.7%	2,628
Pershing County	6,873	0.9%	6,937	0.4%	6,967	-4.8%	6,631	1.6%	6,736	3.2%	6,955	1.7%	7,075	1.6%	7,192
Lovelock	2,144	5.7%	2,267	6.1%	2,405	-1.0%	2,381	-0.8%	2,363	2.7%	2,427	1.6%	2,465	-0.3%	2,458
Imlay	244	-1.4%	241	-1.1%	238	-5.4%	225	-1.0%	223	2.5%	228	1.9%	233	4.4%	243
Storey County	3,714	-2.0%	3,639	2.7%	3,736	1.6%	3,797	5.7%	4,012	2.4%	4,110	4.4%	4,293	2.1%	4,384
Gold Hill	178	-3.3%	172	4.2%	180	5.4%	189	0.7%	191	6.3%	203	3.0%	209	1.6%	212
Virginia City	911	-3.1%	882	2.4%	904	-1.8%	887	5.7%	938	1.7%	954	5.9%	1,011	1.5%	1,027
Washoe County	353,271	1.7%	359,423	3.8%	373,233	2.7%	383,453	3.5%	396,844	3.1%	409,085	2.2%	418,061	1.4%	423,833
Reno	186,883	0.5%	187,834	4.2%	195,727	1.8%	199,249	3.8%	206,735	3.7%	214,371	2.9%	220,613	1.1%	223,012
Sparks	71,753	4.9%	75,255	4.2%	78,435	4.1%	81,673	4.8%	85,618	2.6%	87,846	1.8%	89,449	2.5%	91,684
White Pine County	8,783	0.9%	8,863	-0.2%	8,842	1.4%	8,966	3.4%	9,275	2.9%	9,542	0.5%	9,590	2.5%	9,694
Ely	3,695	5.2%	3,886	-1.5%	3,829	3.5%	3,962	5.1%	4,166	3.8%	4,325	-0.7%	4,294	1.3%	4,352
Lund	146	0.2%	146	0.5%	147	0.0%	147	6.1%	156	3.7%	162	1.5%	164	-4.2%	157
McGill	1,059	1.1%	1,071	-0.4%	1,066	1.2%	1,079	2.8%	1,109	3.2%	1,145	-1.8%	1,125	0.3%	1,128
Ruth	366	1.9%	373	-0.3%	372	1.9%	379	3.9%	394	2.9%	405	-1.3%	400	1.8%	407

†Decennial Census counts are for reference only. They are not part of a time series reflecting the annual estimates certified by the Governor. Unincorporated Towns are geographically different from Census Designated Places.

Population Estimates of Nevada's Counties, Cities and Towns 2001 to 2021
Estimates from NV State Demographer, NV Department of Taxation

	Percent Change 7/08 - 7/09	JULY 1 2009	Percent Change 7/09 - 7/10	April 1 2010†	JULY 1 2010	Percent Change 4/10 - 7/11	Percent Change 7/10 - 7/11	JULY 1 2011	Percent Change 7/11 - 7/12	JULY 1 2012	Percent Change 7/12 - 7/13	JULY 1 2013	Percent Change 7/13 - 7/14	JULY 1 2014	Percent Change 7/14 - 7/15	JULY 1 2015
State of Nevada	-1.0%	2,711,206	0.5%	2,700,551	2,724,634	0.8%	-0.1%	2,721,794	1.0%	2,750,217	1.8%	2,800,967	1.5%	2,843,301	1.9%	2,897,584
Counties																
Incorp. Cities																
Unincorp. Towns																
Carson City	-1.9%	56,506	-1.2%	55,274	55,850	1.4%	0.4%	56,066	-1.1%	55,441	-1.4%	54,668	-1.3%	53,969	0.6%	54,273
Churchill County	-0.5%	26,859	-1.9%	24,877	26,360	1.0%	-4.6%	25,136	0.4%	25,238	0.3%	25,322	-0.9%	25,103	0.1%	25,126
Fallon	-1.6%	9,113	-2.3%	8,606	8,903	0.0%	-3.3%	8,609	1.1%	8,706	0.0%	8,706	-0.7%	8,645	1.4%	8,770
Clark County	-0.8%	1,952,040	0.9%	1,951,269	1,968,831	0.8%	-0.1%	1,967,722	1.0%	1,988,195	2.2%	2,031,723	1.9%	2,069,450	2.4%	2,118,353
Boulder City	-3.7%	16,064	-4.4%	15,023	15,359	2.1%	-0.2%	15,335	2.8%	15,759	-0.8%	15,635	0.0%	15,627	1.2%	15,813
Henderson	-0.7%	267,687	-0.2%	257,729	267,270	2.8%	-0.9%	264,839	0.8%	266,846	2.8%	274,270	2.4%	280,928	2.5%	287,828
Las Vegas	-0.4%	591,422	-0.8%	583,756	586,536	0.8%	0.3%	588,274	0.1%	589,156	1.6%	598,520	2.0%	610,637	1.7%	620,935
Mesquite	4.7%	20,677	-1.1%	15,276	20,440	11.5%	-16.6%	17,038	-1.5%	16,778	4.2%	17,477	4.5%	18,262	4.4%	19,061
North Las Vegas	0.2%	215,022	1.1%	216,961	217,482	3.2%	2.9%	223,873	-0.8%	222,009	1.9%	226,199	1.9%	230,491	2.1%	235,395
Bunkerville	5.3%	1,222	2.7%	1,256	1,255	-4.5%	-4.5%	1,199	-9.6%	1,084	-1.5%	1,067	-2.7%	1,039	5.7%	1,097
Enterprise	0.5%	150,473	9.8%	165,435	165,285	-2.9%	-2.8%	160,632	1.4%	162,872	4.8%	170,699	2.0%	174,064	5.6%	183,755
Indian Springs	-2.8%	1,447	-6.3%	1,357	1,356	-13.9%	-13.8%	1,169	2.0%	1,192	0.9%	1,203	1.4%	1,220	1.2%	1,235
Laughlin	-9.7%	7,914	-0.6%	7,874	7,867	-9.0%	-8.9%	7,166	17.4%	8,414	5.0%	8,835	1.4%	8,963	2.5%	9,186
Moapa	5.4%	1,052	0.8%	1,061	1,060	31.0%	31.1%	1,390	-21.8%	1,086	0.7%	1,094	23.6%	1,352	0.8%	1,363
Moapa Valley	1.9%	7,269	3.1%	7,503	7,496	1.9%	2.0%	7,647	-10.2%	6,868	0.0%	6,871	-0.3%	6,851	0.3%	6,875
Mt. Charleston	-5.0%	1,061	0.6%	1,069	1,068	-38.7%	-38.7%	655	-1.3%	647	0.7%	651	-2.5%	635	2.9%	653
Paradise	-1.8%	178,974	3.5%	185,472	185,304	-2.1%	-2.0%	181,635	1.7%	184,745	1.7%	187,949	1.6%	191,047	0.9%	192,810
Searchlight	-4.2%	718	3.4%	744	743	-23.2%	-23.1%	571	-30.7%	395	0.3%	397	-13.2%	344	0.8%	347
Spring Valley	-1.4%	174,458	1.3%	176,872	176,712	-2.5%	-2.4%	172,483	7.2%	184,910	2.1%	188,818	1.3%	191,342	3.5%	197,958
Summerlin	1.2%	28,342	4.7%	29,694	29,667	-15.3%	-15.3%	25,141	0.5%	25,260	6.3%	26,855	1.4%	27,244	3.9%	28,300
Sunrise Manor	-3.2%	179,808	-2.6%	175,365	175,206	8.9%	9.0%	191,007	2.9%	196,570	1.6%	199,754	1.5%	202,710	2.0%	206,720
Whitney	4.2%	37,690	-0.2%	37,637	37,603	3.9%	4.0%	39,122	-0.5%	38,910	2.4%	39,857	1.8%	40,567	2.7%	41,662
Winchester	-5.1%	35,235	-0.3%	35,174	35,142	-5.2%	-5.2%	33,329	-5.1%	31,634	1.0%	31,960	1.4%	32,413	1.1%	32,770
Douglas County	-1.4%	51,390	-4.2%	46,997	49,242	1.4%	-3.2%	47,661	0.7%	48,015	1.0%	48,478	0.2%	48,553	-0.7%	48,223
Gardnerville	-3.0%	5,250	-5.1%	4,756	4,983	15.0%	9.8%	5,469	0.5%	5,495	0.8%	5,541	4.0%	5,760	-0.2%	5,751
Genoa	0.2%	256	-4.7%	233	244	-7.2%	-11.5%	216	1.3%	219	0.6%	220	-1.5%	217	-1.1%	215
Minden	-1.0%	3,229	-0.5%	3,067	3,213	-2.7%	-7.1%	2,984	0.9%	3,010	-0.6%	2,993	2.7%	3,072	0.0%	3,072
Elko County	1.5%	51,325	1.5%	48,818	52,097	2.1%	-4.3%	49,861	3.8%	51,771	3.1%	53,384	0.0%	53,358	0.4%	53,551
Carlin	1.0%	2,345	1.1%	2,368	2,370	0.3%	0.3%	2,376	0.0%	2,376	20.0%	2,851	-4.2%	2,731	-0.1%	2,727
Elko	0.0%	18,428	2.2%	18,297	18,842	5.0%	1.9%	19,209	6.2%	20,406	2.7%	20,958	-0.4%	20,865	-0.7%	20,714
Wells	-0.6%	1,515	1.1%	1,292	1,531	-9.1%	-23.3%	1,174	9.0%	1,280	2.1%	1,307	8.0%	1,411	-2.8%	1,371
West Wendover	-0.9%	4,945	1.1%	4,410	4,999	1.4%	-10.6%	4,470	-2.3%	4,367	2.0%	4,453	-0.7%	4,420	1.3%	4,478
Jackpot	-3.1%	1,184	1.1%	1,103	1,197	-12.7%	-19.5%	963	-5.1%	914	1.0%	923	-1.8%	907	-1.0%	898
Montello	1.3%	167	1.0%	156	169	-49.3%	-53.3%	79	-23.5%	60	-0.3%	60	-6.3%	56	-0.9%	56
Mountain City	-7.0%	121	0.9%	112	122	-9.3%	-16.4%	102	7.4%	110	-0.7%	109	-1.6%	107	-7.0%	100
Esmeralda County	-4.3%	1,187	-3.5%	783	1,145	5.4%	-27.9%	825	4.3%	860	-0.2%	858	7.9%	926	-0.4%	923
Goldfield	6.4%	441	-9.4%	274	400	5.3%	-28.0%	288	-9.9%	259	12.8%	293	-7.2%	272	-3.7%	262
Silver Peak	-22.7%	141	-8.3%	88	129	32.6%	-9.3%	117	9.4%	128	3.4%	132	-3.2%	128	4.0%	133
Eureka County	0.6%	1,562	3.0%	1,987	1,609	0.4%	23.9%	1,994	0.8%	2,011	0.7%	2,024	-6.0%	1,903	-2.2%	1,862
Crescent Valley	0.2%	283	4.5%	366	296	8.3%	33.8%	396	-6.5%	370	0.2%	371	0.8%	374	0.0%	374
Eureka (town)	2.1%	483	3.3%	616	499	-0.8%	22.4%	611	17.3%	717	0.4%	720	-3.9%	691	0.8%	697
Humboldt County	-1.8%	17,690	3.8%	16,528	18,364	3.7%	-6.7%	17,135	1.5%	17,384	0.4%	17,457	-0.4%	17,388	-1.9%	17,057
Winnemucca	-0.9%	7,593	4.8%	7,396	7,961	6.0%	-1.5%	7,839	2.0%	7,997	2.4%	8,185	-1.8%	8,042	-3.0%	7,802
Lander County	1.9%	6,003	-0.2%	5,775	5,992	3.7%	-0.1%	5,988	3.9%	6,221	2.0%	6,343	3.4%	6,560	-4.8%	6,247
Austin	-1.7%	304	2.8%	301	312	-43.1%	-45.2%	171	1.0%	173	-2.2%	169	0.7%	170	-2.6%	166
Battle Mountain	1.5%	2,967	-1.5%	2,816	2,922	18.1%	13.8%	3,326	2.9%	3,421	6.9%	3,657	4.0%	3,804	-6.1%	3,573
Kingston	3.3%	331	-0.8%	316	328	-60.5%	-61.9%	125	-0.9%	124	0.1%	124	2.9%	128	-5.9%	120
Lincoln County	-0.8%	4,317	7.3%	5,345	4,631	-1.1%	14.1%	5,284	-3.5%	5,100	-1.6%	5,020	-0.3%	5,004	1.7%	5,088
Caliente	2.7%	1,106	3.5%	1,130	1,144	-7.3%	-8.5%	1,047	4.0%	1,089	-1.9%	1,068	-1.1%	1,056	-0.7%	1,049
Alamo	-1.9%	455	10.6%	608	503	3.1%	24.7%	627	-7.0%	583	0.0%	583	-0.9%	578	0.3%	580
Panaca	2.1%	659	-5.0%	757	626	3.2%	24.8%	781	6.5%	832	-2.5%	811	-1.7%	797	-1.8%	783
Pioche	6.6%	837	0.3%	1,014	839	-8.0%	11.2%	933	-13.2%	810	-2.5%	790	-0.7%	784	-5.1%	744
Lyon County	-3.6%	53,825	-2.8%	51,980	52,334	0.9%	0.2%	52,443	-0.4%	52,245	1.4%	52,960	0.7%	53,344	-0.1%	53,277
Fernley	-3.5%	18,929	-2.6%	19,368	18,434	-2.4%	2.5%	18,896	-0.3%	18,831	0.8%	18,987	0.5%	19,077	-0.7%	18,936
Yerington	-5.6%	3,138	-3.3%	3,048	3,034	3.8%	4.3%	3,165	-2.3%	3,094	0.4%	3,106	-0.4%	3,095	3.1%	3,191
Mineral County	1.7%	4,474	-0.1%	4,772	4,471	-3.6%	2.9%	4,601	1.7%	4,679	-0.4%	4,662	-1.7%	4,584	-1.0%	4,539
Hawthorne	1.9%	3,028	5.5%	3,409	3,194	-11.8%	-5.8%	3,008	2.6%	3,086	-0.3%	3,076	-1.7%	3,023	0.4%	3,035
Luning	-1.4%	79	-0.8%	83	78	5.7%	12.8%	88	12.3%	99	1.0%	100	-1.8%	98	3.1%	101
Mina	-0.2%	207	-14.1%	190	178	-32.1%	-27.5%	129	25.3%	162	0.9%	163	-1.6%	160	-4.9%	153
Walker Lake	3.8%	316	0.6%	339	318	-9.5%	-3.5%	307	13.7%	349	-0.7%	346	-5.0%	329	14.7%	378
Nye County	-2.1%	46,360	-1.9%	43,946	45,459	1.3%	-2.1%	44,513	-0.5%	44,292	1.0%	44,749	1.6%	45,456	1.3%	46,050
Amargosa	-8.5%	1,392	7.2%	1,442	1,492	-7.7%	-10.8%	1,331	1.7%	1,353	-0.8%	1,342	6.2%	1,426	-2.1%	1,396
Beatty	-14.0%	880	5.0%	893	924	9.6%	6.0%	979	3.2%	1,011	-4.5%	966	1.0%	975	-0.2%	973
Gabbs	-4.9%	316	-3.8%	294	304	-4.0%	-7.2%	282	-3.9%	271	-4.4%	259	-5.6%	245	-5.6%	231
Manhattan	-1.8%	135	-1.7%	129	133	-5.9%	-9.0%	121	3.4%	125	-0.7%	124	6.9%	133	0.9%	134
Pahrump	-1.6%	38,247	-1.2%	36,538	37,796	1.3%	-2.1%	36,995	-1.1%	36,593	1.2%	37,030	1.6%	37,626	2.3%	38,482
Round Mountain	-1.5%	837	-3.7%	779	806	-1.0%	-4.3%	771	4.9%	809	1.6%	822	2.9%	846	-1.0%	837
Tonopah	-1.8%	2,580	-3.6%	2,405	2,488	-2.5%	-5.7%	2,346	8.8%	2,552	1.6%	2,593	-0.6%	2,578	-9.0%	2,345
Pershing County	-0.6%	7,149	-0.2%	6,753	7,133	1.4%	-4.0%	6,847	2.4%	7,013	-1.9%	6,882	-2.4%	6,714	0.5%	6,750
Lovelock	-1.9%	2,411	-5.7%	1,894	2,274	14.6%	-4.5%	2,171	-10.8%	1,936	2.6%	1,987	-1.8%	1,952	-3.1%	1,893
Imlay	-4.1%	233	-0.1%	233	233	-31.3%	-31.3%	160	16.1%	186	31.5%	244	5.4%	257	-23.9%	196
Storey County	-1.5%	4,317	-1.9%	4,010	4,234	2.8%	-2.6%	4,123	-0.5%	4,103	-2.1%	4,017	-1.1%	3,974	0.3%	3,984
Gold Hill	-2.4%	207	-2.4%	191	202	24.4%	17.8%	238	-14.1%	204	-2.1%	200	0.6%	201	0.0%	201
Virginia City	-1.5%	1,011	-1.3%	945	998	-9.1%	-13.9%	859	-3.4%	830	1.3%	841	-1.1%	832	0.0%	831
Washoe County	-1.7%	416,632	0.2%	421,407	417,379	0.0%	1.0%	421,593	1.4%	427,704	1.1%	432,324	1.0%	436,797	1.2%	441,946
Reno	-2.2%	218,143	-0.4%	225,221	217,282	-1.1%	2.5%	222,801	3.2%	229,859	1.0%	232,243	1.3%	235,371	1.4%	238,615
Sparks	-0.5%	91,237	1.2%	90,264	92,331	2.3%	0.0%	92,302	-2.3%	90,214	1.5%	91,551	0.9%	92,396	1.3%	93,581
White Pine County	-1.3%	9,570	-0.7%	10,030	9,503	-0.3%	5.3%	10,002	-0.6%	9,945	1.5%	10,095	1.2%	10,218	1.2%	10,336
Ely	-1.4%	4,291	-1.3%	4,255	4,235	-3.9%	-3.4%	4,089	-0.6%	4,066	0.8%	4,100	1.6%	4,165	-2.6%	4,056
Lund	0.3%	158	2.7%	178	162	16.6%	27.8%	207	-0.4%	206	0.2%	206	0.8%	208	-5.5%	197
McGill	-1.7%	1,109	-0.1%	1,215	1,108	-3.8%	5.4%	1,168	0.6%	1,175	0.2%	1,177	2.0%	1,200	-3.2%	1,161
Ruth	-1.3%	402	-0.7%	437	399	-4.0%	5.3%	420	-0.5%	418	1.5%	424	1.2%	429	1.2%	434

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Population Estimates of Nevada's Counties, Cities and Towns 2001 to 2021
Estimates from NV State Demographer, NV Department of Taxation

	Percent Change 7/15 - 7/16	JULY 1 2016	Percent Change 7/16 - 7/17	JULY 1 2017	Percent Change 7/17 - 7/18	JULY 1 2018	Percent Change 7/18 - 7/19	JULY 1 2019	Percent Change 7/19 - 7/20	April 1 2020†	JULY 1 2020	Percent Change 4/20 - 7/21	Percent Change 7/20 - 7/21	JULY 1 2021
State of Nevada	1.9%	2,953,375	1.1%	2,986,656	2.4%	3,057,582	1.8%	3,112,937	1.0%	3,104,614	3,145,184	1.7%	0.4%	3,158,539
Counties														
Incorp. Cities														
Unincorp. Towns														
Carson City	1.7%	55,182	0.5%	55,438	1.1%	56,057	0.2%	56,151	0.5%	58,639	56,434	-2.7%	1.1%	57,073
Churchill County	0.6%	25,266	0.5%	25,387	1.0%	25,628	0.8%	25,832	1.4%	25,516	26,202	3.1%	0.4%	26,310
Fallon	1.2%	8,874	1.8%	9,030	1.1%	9,125	0.6%	9,184	-1.2%	9,327	9,077	-2.2%	0.5%	9,123
Clark County	2.3%	2,166,181	1.3%	2,193,818	2.6%	2,251,175	1.9%	2,293,391	1.2%	2,265,461	2,320,107	2.4%	0.0%	2,320,551
Boulder City	3.1%	16,298	-1.1%	16,121	-1.4%	15,887	1.9%	16,188	-0.4%	14,885	16,127	2.0%	-5.8%	15,189
Henderson	2.3%	294,359	2.2%	300,709	3.2%	310,244	2.4%	317,660	1.6%	317,610	322,800	4.1%	2.4%	330,561
Las Vegas	1.4%	629,649	0.5%	633,028	1.8%	644,113	1.4%	653,350	0.3%	641,903	655,489	3.6%	1.4%	664,960
Mesquite	4.9%	19,991	4.2%	20,838	8.2%	22,557	5.6%	23,827	4.8%	20,471	24,971	12.3%	-8.0%	22,981
North Las Vegas	2.3%	240,708	1.1%	243,339	2.2%	248,701	2.7%	255,327	1.3%	262,527	258,761	5.0%	6.6%	275,733
Bunkerville	-0.1%	1,096	-5.0%	1,042	0.7%	1,049	1.0%	1,060	-1.5%	1,010	1,044	-2.3%	-5.5%	987
Enterprise	2.6%	188,503	2.7%	193,572	6.6%	206,266	2.7%	211,761	4.0%	213,073	220,237	4.4%	1.0%	222,522
Indian Springs	1.9%	1,259	0.4%	1,264	-10.0%	1,138	12.8%	1,283	3.0%	1,279	1,322	-13.3%	-16.2%	1,108
Laughlin	2.1%	9,380	3.1%	9,672	3.6%	10,017	-0.2%	10,001	3.0%	9,971	10,306	-6.6%	-9.6%	9,313
Moapa	0.6%	1,370	-25.1%	1,026	39.6%	1,433	-0.1%	1,430	-0.7%	1,374	1,420	-7.3%	-10.3%	1,274
Moapa Valley	1.3%	6,967	2.1%	7,115	1.6%	7,231	1.9%	7,368	1.2%	7,215	7,458	-14.6%	-17.4%	6,163
Mt. Charleston	1.8%	665	0.2%	666	2.4%	682	2.6%	700	-2.4%	661	683	11.2%	7.6%	735
Paradise	-0.6%	191,705	1.0%	193,712	1.5%	196,586	2.1%	200,698	0.6%	195,245	201,810	-1.4%	-4.6%	192,552
Searchlight	2.6%	356	2.0%	364	1.0%	367	4.0%	382	2.1%	377	390	17.2%	13.4%	442
Spring Valley	6.7%	211,232	2.4%	216,228	3.7%	224,158	1.1%	226,723	1.4%	222,388	229,865	-3.4%	-6.5%	214,862
Summerlin	6.1%	30,013	1.6%	30,492	4.6%	31,894	1.0%	32,199	2.6%	31,977	33,052	3.1%	-0.3%	32,957
Sunrise Manor	1.6%	209,932	0.1%	210,216	1.5%	213,341	1.3%	216,021	0.2%	209,310	216,348	0.4%	-2.8%	210,189
Whitney	5.9%	44,110	0.8%	44,449	2.2%	45,419	2.0%	46,328	0.4%	45,014	46,528	5.4%	1.9%	47,426
Winchester	0.6%	32,972	0.3%	33,065	1.0%	33,402	2.1%	34,095	0.5%	33,153	34,268	4.8%	1.4%	34,749
Douglas County	0.0%	48,235	0.1%	48,300	1.6%	49,070	1.0%	49,537	-0.9%	49,488	49,082	0.3%	1.2%	49,661
Gardnerville	0.5%	5,780	-1.5%	5,693	3.2%	5,874	2.8%	6,036	-1.7%	5,982	5,933	3.4%	4.3%	6,188
Genoa	-0.5%	213	0.0%	213	2.5%	219	0.8%	220	-1.0%	220	218	-3.3%	-2.5%	213
Minden	1.2%	3,110	2.6%	3,191	2.5%	3,270	0.7%	3,293	0.0%	3,321	3,294	4.2%	5.1%	3,460
Elko County	0.8%	53,997	-1.3%	53,287	1.9%	54,326	1.5%	55,116	0.6%	53,702	55,435	1.6%	-1.6%	54,546
Carlin	-1.6%	2,684	-2.5%	2,617	-0.2%	2,613	1.9%	2,663	0.4%	2,050	2,674	27.6%	-2.2%	2,615
Elko	0.0%	20,704	0.4%	20,789	1.8%	21,158	0.2%	21,199	1.4%	20,564	21,492	2.0%	-2.4%	20,976
Wells	1.3%	1,388	-5.5%	1,312	4.0%	1,365	0.1%	1,366	-5.1%	1,237	1,296	2.9%	-1.8%	1,272
West Wendover	-0.1%	4,474	-6.1%	4,201	4.9%	4,406	1.4%	4,469	1.5%	4,512	4,535	-1.3%	-1.8%	4,452
Jackpot	0.0%	897	-4.2%	860	0.6%	865	13.0%	978	-1.7%	958	961	-1.4%	-1.8%	944
Montello	11.6%	62	0.6%	63	0.2%	63	1.0%	64	-3.5%	61	61	-1.6%	-1.9%	60
Mountain City	-4.1%	95	-8.4%	87	-15.4%	74	9.0%	81	-6.8%	75	75	-1.6%	-1.9%	74
Esmeralda County	4.5%	964	0.6%	970	-0.1%	969	1.4%	982	1.7%	729	999	37.2%	0.1%	1,000
Goldfield	-0.6%	260	1.2%	263	4.4%	274	2.8%	282	2.1%	210	288	39.0%	1.4%	292
Silver Peak	-7.6%	123	-1.1%	122	-17.2%	101	-0.5%	100	0.6%	74	101	23.5%	-9.8%	91
Eureka County	5.2%	1,959	-1.4%	1,932	1.0%	1,951	0.2%	1,955	-1.0%	1,855	1,936	2.3%	-2.0%	1,898
Crescent Valley	-0.5%	372	2.0%	380	-3.2%	367	3.7%	381	-2.7%	355	370	5.9%	1.5%	376
Eureka (town)	5.1%	732	-4.3%	701	4.8%	734	-2.4%	717	-2.2%	671	701	1.9%	-2.4%	684
Humboldt County	-1.2%	16,853	0.7%	16,978	0.1%	16,989	0.5%	17,079	-0.1%	17,285	17,064	-0.5%	0.8%	17,202
Winnemucca	-0.4%	7,772	2.3%	7,947	-1.1%	7,856	0.6%	7,903	0.4%	8,431	7,937	-1.5%	4.6%	8,306
Lander County	0.2%	6,257	-0.9%	6,200	-2.2%	6,065	0.7%	6,109	3.5%	5,734	6,324	8.0%	-2.0%	6,195
Austin	0.3%	166	0.0%	166	0.2%	167	-6.2%	156	0.9%	143	158	7.0%	-3.0%	153
Battle Mountain	-0.4%	3,559	-2.4%	3,473	-2.5%	3,387	0.1%	3,391	2.7%	3,157	3,482	8.5%	-1.7%	3,424
Kingston	13.3%	136	-9.5%	123	-0.5%	123	-0.5%	122	5.7%	117	129	7.8%	-2.3%	126
Lincoln County	-0.6%	5,057	2.2%	5,170	1.6%	5,255	0.2%	5,264	0.5%	4,499	5,293	15.3%	-2.0%	5,188
Caliente	-1.7%	1,031	3.4%	1,066	1.6%	1,084	0.2%	1,086	4.4%	990	1,133	11.1%	-2.9%	1,100
Alamo	13.8%	660	2.0%	673	1.6%	684	0.2%	686	3.1%	596	707	-0.8%	-16.4%	591
Panaca	1.9%	798	-0.2%	797	1.6%	810	0.2%	811	1.6%	695	824	21.0%	2.1%	841
Pioche	3.9%	773	1.4%	784	1.6%	797	0.2%	798	1.4%	683	809	18.6%	0.1%	810
Lyon County	0.7%	53,644	1.9%	54,657	1.6%	55,551	1.7%	56,497	2.0%	59,235	57,629	-2.0%	0.7%	58,051
Fernley	0.6%	19,042	1.4%	19,300	2.5%	19,790	3.1%	20,396	2.5%	22,895	20,901	-7.8%	1.0%	21,105
Yerington	-0.9%	3,162	1.3%	3,202	6.9%	3,424	-0.2%	3,418	2.1%	3,121	3,488	13.4%	1.4%	3,538
Mineral County	0.9%	4,578	2.1%	4,674	0.3%	4,690	0.9%	4,730	3.5%	4,554	4,896	6.0%	-1.4%	4,826
Hawthorne	-5.5%	2,868	6.9%	3,066	0.0%	3,065	1.2%	3,100	3.0%	2,969	3,192	6.2%	-1.3%	3,152
Luning	22.1%	123	-15.2%	105	1.6%	106	0.9%	107	-8.7%	91	98	1.0%	-6.0%	92
Mina	13.6%	173	-0.2%	173	0.7%	174	0.1%	174	2.4%	166	179	-7.4%	-13.8%	154
Walker Lake	6.8%	403	-20.1%	322	1.6%	327	0.9%	330	2.0%	313	337	1.2%	-5.9%	317
Nye County	-0.7%	45,737	1.4%	46,390	3.2%	47,856	1.3%	48,472	-0.1%	51,591	48,414	-4.5%	1.8%	49,289
Amargosa	-0.4%	1,390	-3.3%	1,344	-1.2%	1,327	0.0%	1,327	7.9%	1,527	1,433	-8.2%	-2.2%	1,401
Beatty	-2.3%	950	1.2%	961	1.4%	974	2.5%	998	-6.4%	996	935	-3.7%	2.6%	959
Gabbs	-2.1%	226	-3.4%	218	0.6%	220	0.7%	221	-39.9%	142	133	47.5%	57.2%	209
Manhattan	-2.7%	130	-3.3%	126	1.7%	128	7.3%	138	-3.4%	142	133	-8.3%	-2.2%	130
Pahrump	-0.6%	38,238	2.1%	39,023	3.7%	40,473	1.5%	41,069	1.0%	44,204	41,482	-5.1%	1.1%	41,940
Round Mountain	-4.6%	799	-3.3%	772	-0.5%	768	-0.7%	763	-2.5%	793	744	-7.5%	-1.4%	734
Tonopah	-2.3%	2,291	0.9%	2,311	-2.2%	2,259	-4.3%	2,163	-15.7%	1,942	1,823	11.7%	19.1%	2,170
Pershing County	-0.8%	6,693	0.7%	6,743	1.7%	6,858	1.1%	6,935	0.7%	6,650	6,983	5.0%	0.0%	6,984
Lovelock	1.2%	1,915	0.9%	1,933	1.7%	1,965	1.0%	1,985	3.1%	1,805	2,046	12.4%	-0.8%	2,029
Imlay	6.0%	208	-0.3%	207	-2.0%	203	2.5%	208	6.1%	217	221	-2.2%	-4.0%	212
Storey County	1.5%	4,043	1.0%	4,084	3.5%	4,227	0.7%	4,258	1.1%	4,104	4,304	6.2%	1.3%	4,359
Gold Hill	1.2%	204	-0.8%	202	2.7%	207	-0.6%	206	7.6%	212	222	0.1%	-4.5%	212
Virginia City	1.6%	845	0.6%	850	4.4%	887	1.9%	904	-12.0%	759	796	22.8%	17.1%	932
Washoe County	1.4%	448,316	0.8%	451,923	1.8%	460,237	2.1%	469,801	0.8%	486,492	473,606	-0.3%	2.4%	485,113
Reno	1.5%	242,158	1.0%	244,612	1.7%	248,806	2.6%	255,170	1.2%	264,165	258,230	0.1%	2.4%	264,318
Sparks	2.3%	95,726	1.3%	96,928	3.3%	100,140	2.4%	102,543	0.7%	108,445	103,230	-0.9%	4.1%	107,489
White Pine County	0.8%	10,413	2.8%	10,705	-0.2%	10,678	1.4%	10,826	-3.2%	9,080	10,477	13.4%	-1.8%	10,293
Ely	0.2%	4,065	4.9%	4,267	-2.8%	4,149	1.6%	4,217	1.4%	3,924	4,275	5.5%	-3.2%	4,138
Lund	2.9%	202	1.2%	205	0.7%	206	-0.6%	205	-0.3%	170	205	22.3%	1.7%	208
McGill	0.4%	1,166	2.2%	1,191	-0.4%	1,186	0.1%	1,187	2.0%	1,007	1,211	19.2%	-0.9%	1,201
Ruth	0.8%	437	2.8%	450	-0.2%	448	1.4%	455	-3.2%	366	440	18.1%	-1.8%	432

†Decennial Census counts are for reference only. They are not part of a time series reflecting the annual estimates certified by the Governor. Unincorporated Towns are geographically different from Census Designated Places.

APPENDIX H – ENVIRONMENTAL ASSESSMENT

Humboldt County
Grass Valley
Sewer System

Preliminary Environmental Assessment
for
Grass Valley
Sewer System Replacement Project

May 2022

OWNER:

Humboldt County

FARR WEST
ENGINEERING

ENGINEER

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RENO, NEVADA 89511

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1.0 SUMMARY

Farr West Engineering, on behalf of Humboldt County, is preparing a Preliminary Environmental Assessment (EA) for construction and installation of a Wastewater Treatment Facility (WWTF) and sanitary sewer collection system in Grass Valley, NV. The proposed project is necessary to address septic tanks that are impacting groundwater quality. The proposed improvements include the abandonment and cleanout of approximately 645 existing septic tanks, the installation of a sanitary sewer collection system (connected to existing residential and commercial sewer systems), a mechanical treatment facility, four (4) lift stations and three (3) rapid infiltration basins (RIBs) throughout the north end of Grass Valley, Nevada. The project covers an area of approximately 144 acres and lies within portions of Sections 10, 11, 12, 13, 14, and 15 of Township 35N, Range 37E. This Preliminary EA is required due to Humboldt County's application for federal financing of this project.

See Figure 4 for a map that depicts the Proposed Project Area for all construction activities. The proposed project locations are listed in Table 1**.**

Table 1 Proposed Wastewater System Project Locations

Project Location	Township and Range	Section
WWTF	T35N, R37E	Section 10 or 15
Rapid infiltration Basins	T35N, R37E	Section 10 or 15
Collection System	T35N, R37E	Sections 11, 12, 13, 14, & 15
Lift stations	T35N, R37E	Sections 10 or 15, and 11, & 12

Some mitigation or avoidance measures may be necessary to avoid potential adverse environmental impacts within the proposed project area. Potential environmental impacts are outlined below and include land use, geology and soils, water quality, floodplains, biological resources, air quality, noise, and health and human safety. Avoidance and/or mitigation of these potential impacts are addressed in this Preliminary EA.

2.0 PURPOSE AND NEED FOR THE PROJECT

2.1 INTRODUCTION

Grass Valley, located in Pershing and Humboldt Counties, is a 30-mile-long valley, just south of Winnemucca, nestled between two mountain ranges. Humboldt County (County), the oldest county in Nevada, is a largely rural county created in 1856 by the Utah Territorial Legislature. The County is named after the Humboldt River and contains three (3) nationally protected areas; The Black Rock Desert-High Rock Canyon Emigrant Trails National Conservation Area, under Bureau of Land Management (BLM) protection, The Humboldt National Forest, under United States Forest Service (USFS) protection, and the Sheldon National Wildlife Refuge, under United States Fish and Wildlife Service (USFWS) protection (Wikipedia, 2022). This project is located entirely within Humboldt County and lies outside of all nationally protected areas.

Grass Valley residents and businesses currently only have access to septic systems for wastewater treatment. The area is under jurisdiction of the County which does not own or operate a treatment facility in Grass Valley. The nearest treatment facility is owned and operated by the City of Winnemucca (City). The age of older septic systems could be estimated at 35-40 years, which exceeds the industry standard lifespan of 20-30 years. The capacities of the septic systems themselves have unknown constraints, however, the number of septic systems operating in the area are causing a strain on the aquifer by posing a threat to groundwater resources through contamination from septic leaching (Farr West Engineering, 2022).

2.2 PURPOSE AND NEED FOR ACTION

2.2.1 Health, Sanitation, and Security

The impacts to public health and groundwater quality caused by high nitrate levels are the primary and secondary reasons for the proposed project, respectively. In 1995 Humboldt County began a domestic well groundwater monitoring program after water samples in Grass Valley showed elevated levels of Nitrates and Total Dissolved Solids (TDS) in the groundwater. There are 7 monitoring wells in the area. The three newest monitoring wells were constructed after NDEP determined the preceding monitoring wells collected samples too far below the static groundwater level to accurately represent the quality of groundwater at the water table interface. Refer to the Preliminary Engineering Report (PER) for this project for more information on the Health, Sanitation, and Security.

The high density of septic systems operating in Grass Valley is a direct contributor to the high nitrate and TDS levels recorded in water samples. The federal Maximum Contaminant Level (MCL) for nitrate levels in groundwater is 10 milligrams/liter (mg/L). Nitrate levels exceeding this value can be linked to a variety of side effects including a lack of oxygen in the blood circulatory system with infants and pregnant women being the most at risk. The extent and severity of possible side effects will differ for each person affected. Water samples taken from Grass Valley have shown multiple instances of excess nitrate MCL as shown in Figure 1.

Although the elevated nitrate levels are the main concern regarding public health, the elevated TDS levels are worth noting. The MCL for TDS is 1,000 mg/L, typically an exceedance results in a poor aesthetic quality for drinking water. The TDS level results from water samples are shown in Figure 2.

Figure 1 Nitrate Sample Levels

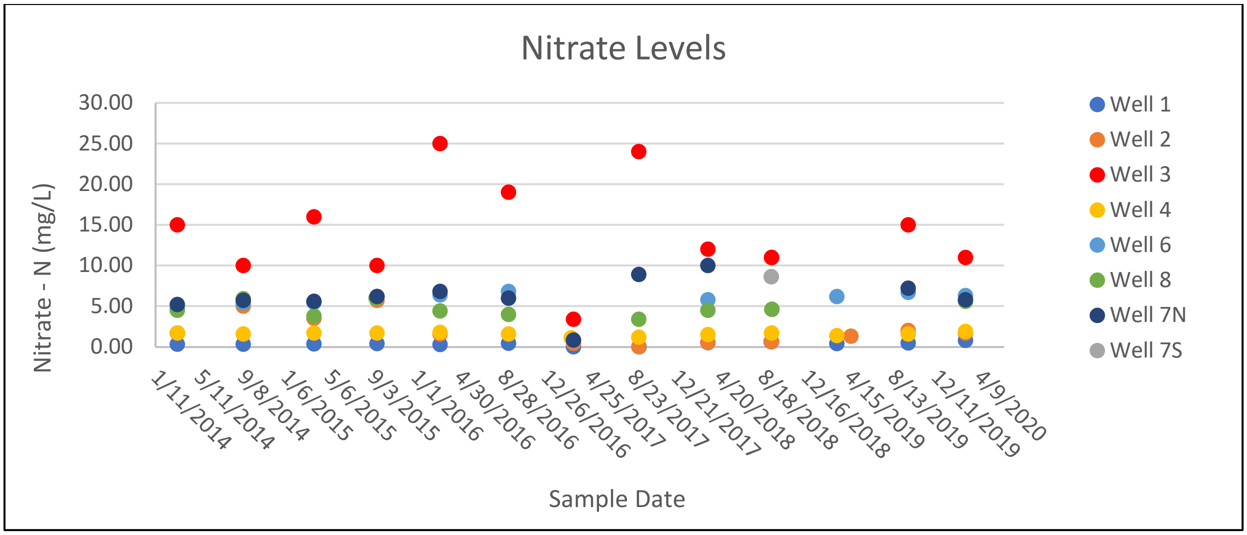
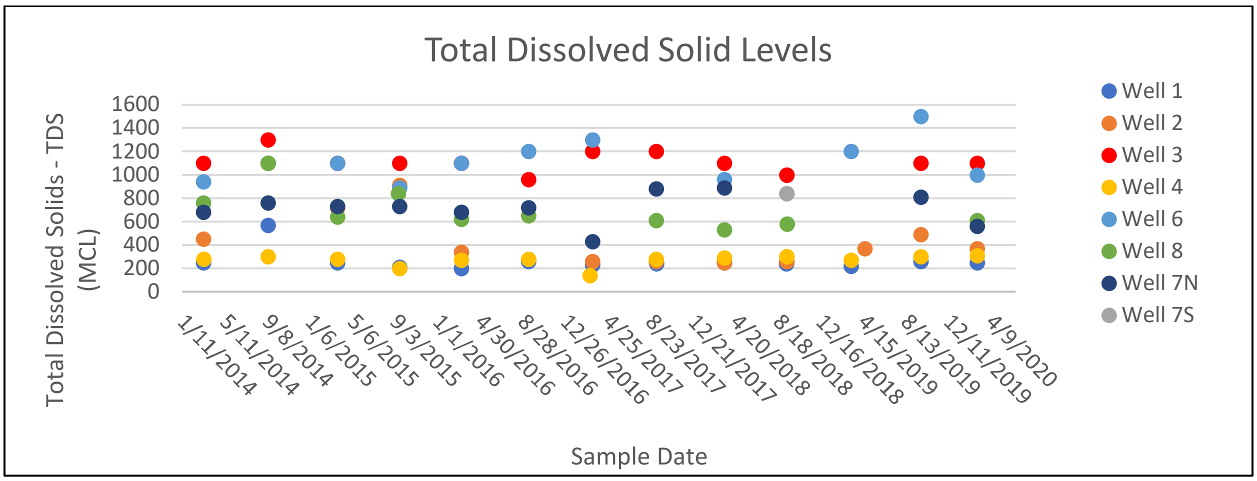


Figure 2 TDS Sample Levels



The wastewater systems undersized and aging septic system infrastructure poses increased threats to the groundwater supply through contamination. The proposed project will replace the infrastructure, eliminating system failures causing leaching into the groundwater which increase the Nitrate and TDS levels. The proposed project will have a beneficial effect on health and safety for the residents of Humboldt County and the surrounding communities and will protect groundwater quality in the aquifer.

2.2.2 Aging Infrastructure

As the age of individual septic systems continues to increase, there will be an increase of system failures, particularly when property owners neglect maintenance. Failures include:

- Inappropriate design or poor maintenance.
- Absorption field installed at sites with inadequate or inappropriate soils, excessive drain slopes.
- Failure to pump the septic tank generally at least every three to five years, resulting in solids in the tank to migrate into the drain field, clog the system and discharge excessive nitrates in the water.
- Cracked or leaky septic tank.

These conditions typically result in groundwater discharge with high concentrations of contaminants. A septic system failure could go undetected depending on its severity and the difficulty of inspecting for seemingly small failures. The septic systems in the project area are located on private property which would require the landowner's consent to dig up the septic tank or leach field to inspect for failures.

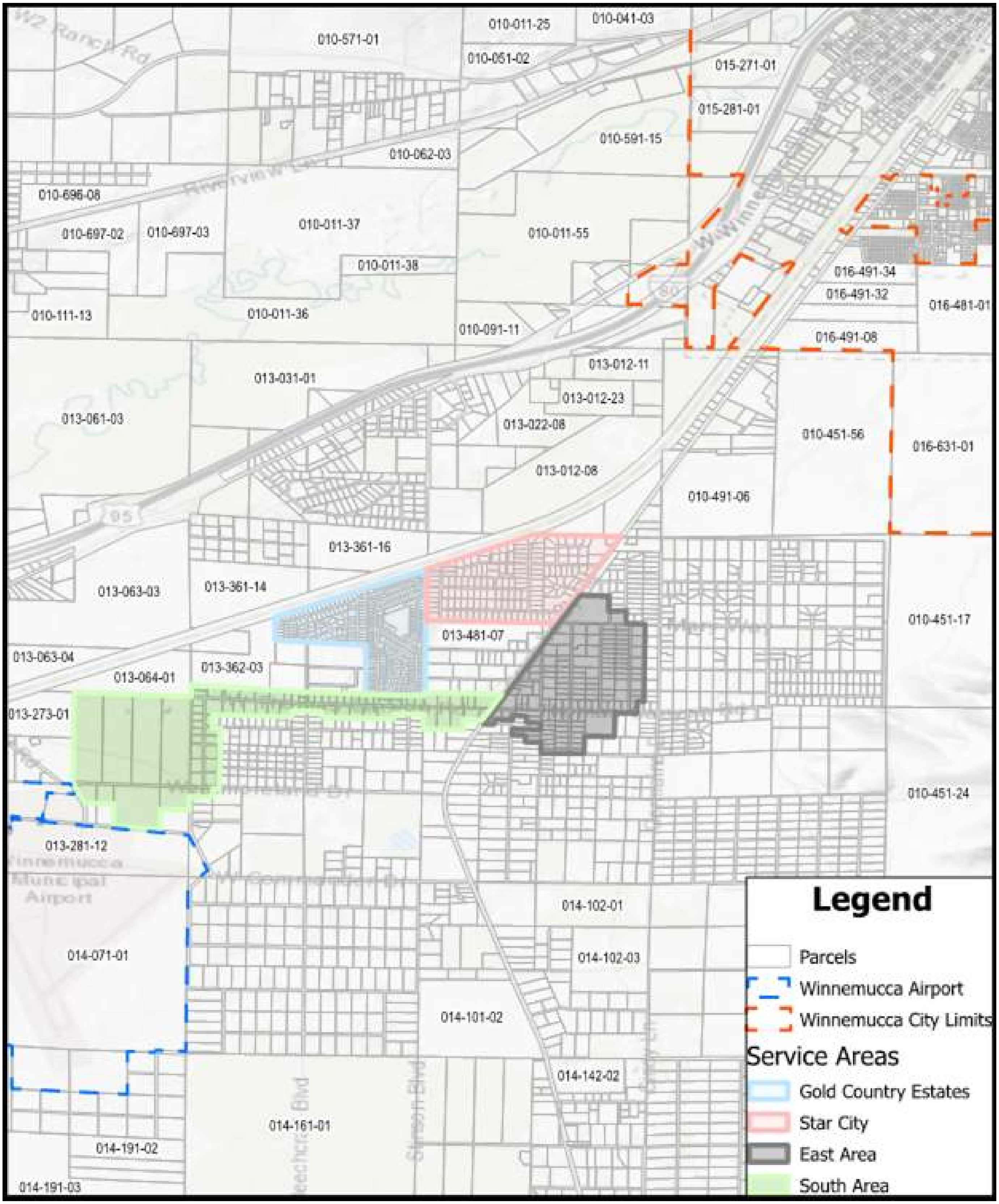
For more information on the Purpose and Need for the proposed project, see the Preliminary Engineering Report (PER) for this project.

3.0 PROJECT LOCATION

Grass Valley

The project planning area is located west of the Sonoma Range and southeast of the Humboldt River, in an area known as Grass Valley, and includes two rural subdivisions south of the City of Winnemucca: Star City Properties and Gold Country Estates. It also includes commercial areas north of the Winnemucca Municipal Airport and an area south of Grass Valley Elementary between Mary Way and Johnson Lane. Grass Valley is dependent on septic systems for sewer services and has multiple operating water systems. Humboldt County owns and operates the water system servicing Star City The water system servicing Gold Country is privately owned and operated. The project area including subdivisions, utility service areas and City of Winnemucca boundary is shown in Figure 3.

Figure 3 Project Area Map



4.0 DESCRIPTION OF PROPOSED ACTION

4.1 PROPOSED ACTION

The project will include a sanitary sewer collection system, a mechanical wastewater treatment facility (WWTF), and rapid infiltration basins (RIBs). The sanitary sewer collection system will be installed in the project area and connected to existing residential and commercial sewer systems. Three lift stations are included in the construction of the collection system and one station connected to the WWTF to contend with elevations that prohibit a gravity-based design. The new WWTF is currently being scoped for location on Humboldt County APN 013-064-01 (Parcel A) or Humboldt County APN 013-273-06 (Parcel B). See Figure 4 for Parcel Locations.

The project design will consist of the following:

1. Wastewater Treatment Facility
2. Three (3) Rapid Infiltration Basins (RIBs)
3. Sanitary Sewer Collection System including:
   a. Gravity sewer mains, approximately 61,417 linear feet (LF) consisting of:
      - Approximately 45,092 LF of 8" PVC SDR 35
      - Approximately 6,026 LF of 10" PVC SDR 35
      - Approximately 5,552 LF of 12" PVC SDR 35
      - Approximately 2,344 LF of 15" PVC SDR 35
      - Approximately 2,403 LF of 18" PVC SDR 35

   b. Sewer laterals, approximately 645 connections
   c. Force mains, approximately 6,264 LF of 8" PVC C900
   d. Sewer manholes, approximately 188 consisting of:
      - Approximately 184 Type 1-A 48" Manholes
      - Approximately 4 Type III 48" Manholes

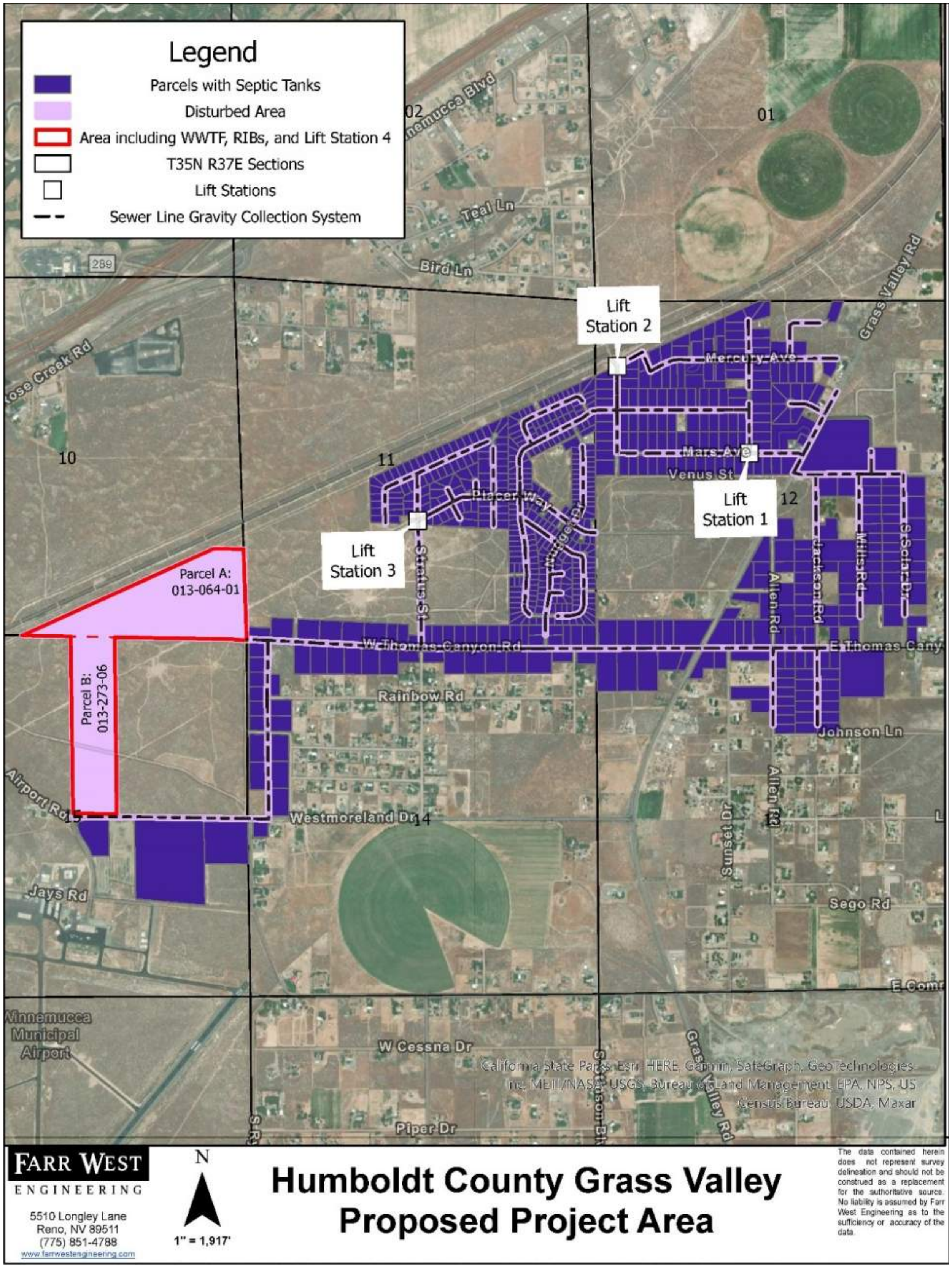
   e. Four lift stations consisting of the following:
      - Lift Station 1:
        - Located at the intersection of Saturn Street and Jupiter Street
        - Approximate Maximum flow rate: 215 GPM
        - Wet Well Storage Volume: 540 gal.
      - Lift Station 2:
        - Located at the North end of Venus Street
        - Approximate maximum flow rate: 331 GPM
        - Wet Well Storage Volume: 825 gal.
      - Lift Station 3:
        - Located at the intersection of Stratus Street and Placer Way
        - Approximate maximum flow rate: 540 GPM
        - Storage Volume: 1,350 gal.
      - Lift Station 4:
        - Located preceding the treatment facility
        - Approximate maximum flow rate: TBD
        - Storage Volume: TBD

   f. Abandonment and cleanout of existing septic tanks

The estimated average day volume to be generated by the planning area is 0.27 million gallons per day (MGD) with a potential maximum day volume of 0.405 MGD. Based on the calculated flow volumes, gravity sewer lines varying from 8, 10, 12, and 15-inch will be capable of sufficiently conveying the generated wastewater flows. An 8-inch force main will adequately convey the calculated wastewater flow for all sections of force main. The wastewater would be carried through the 15-inch sewer main to an additional lift station located at the WWTF; this lift station will convey the wastewater to the mechanical treatment process. Following the mechanical treatment process, the treated effluent will be discharged into a RIB where it would filtrated back into the groundwater.

Figure 4 shows the proposed area for the sanitary sewer collection system, WWTF, RIB's and lift stations.

Figure 4 Proposed Disturbed Area



5.0 ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

5.1 NO ACTION ALTERNATIVE

If no action is taken, the residents of Grass Valley will continue using their septic systems to collect wastewater. Action will not be taken to improve the groundwater quality or offset the high levels of nitrates in groundwater. This alternative will have a direct environmental impact as the quality of the water aquifer continues to be degraded, a social impact is also possible with a potential for health concerns from the ongoing exposure to the elevated nitrate levels. The No Action Alternative has an initial cost of zero (0) dollars but has potential to incur excessive future costs; the nitrate levels will ultimately need to be addressed. Cost for construction of a collection system and/or treatment facility will increase as inflation increases and depending on the extent and severity of the residences' exposure to the groundwater nitrates, corresponding legal ramifications could be encountered. This alternative does not support Humboldt County's Master Plan to alleviate the harmful impacts of nitrates on the water aquifer in Grass Valley, or to encourage commercial growth in the airport industrial park. The No Action alternative does not meet the needs of the community for safe drinking water or sustainable growth, would continue to pose threats to the environment, health and human safety and is therefore unacceptable and eliminated from consideration.

5.2 ALTERNATIVE 1 – CONNECT TO CITY SEWER

This alternative will consist of constructing a sewer collection system and construction of additional sewer lines to connect to the existing city sewer in Winnemucca to provide service to the project area. The nearest point of tie-in to the city sewer is located at the intersection of Potato Place and Potato Road, approximately 2 miles northeast of the project area. This alternative would require approximately 15,800 linear feet (LF) of additional force main to convey the wastewater from the planning area to the city sewer connection point. This alternative also proposes the construction of approximately 1,900 LF of 15-inch gravity sewer within the city boundary to accommodate the volume of flow from Grass Valley and prevent inhibiting the capacity of the existing collection system from future expansion. The operating capacity at Winnemucca's facility was given by the city manager as 1.5 MGD and the average daily flow treated during 2020 was recorded at 0.85 MGD leaving an available capacity of 0.65 MGD. The Winnemucca facility has the capability of treating the estimated 0.27 MGD to be generated by the planning area and continue operations below 75-percent capacity, allowing for some additional development in either area. Additional encroachment permits may be required for the construction to be completed in these areas.

For more information on why this alternative was eliminated from consideration, see the Preliminary Engineering Report for this proposed project.

5.3 ALTERNATIVE 3 – CONSTRUCT WASTEWATER TREATMENT PONDS

This alternative includes construction of the collection system, two treatment ponds with mechanical aeration, and RIBs. This alternative would also require approximately 2,400 LF of additional 15-inch gravity main to convey the wastewater to an aerated-facultative pond, also known as a partial-mix pond. After the wastewater has been treated, it would be discharged into a RIB where it would be infiltrated back into the groundwater.

A geomembrane or clay liner is required for treatment ponds to prevent seepage of untreated wastewater into the groundwater and avoid unnecessary negative environmental impacts. A plan for leak detection and timely corrective actions will be in place and include the use of monitoring wells. If maintenance or repair of a pond is required, it will be taken offline and the second pond in the system will be utilized for treatment.

For more information on why this alternative was eliminated from consideration, see the Preliminary Engineering Report for this proposed project.

6.0 ENVIRONMENTAL RESOURCES, IMPACTS, AND MITIGATION

6.1 EXISTING LAND USE/IMPORTANT FARMLAND/FORMALLY CLASSIFIED LANDS

6.1.1 Environmental Resources

Existing land uses within the proposed project area include residential, urban, and commercial activities. Parcels within the proposed project area are owned by the County and various private parties. There are no unique lands, forest lands, national natural landmarks, wilderness areas, national monuments, or national parks or trails located within the proposed project area, or area of interest. There are no wild and scenic rivers in Nevada. Because the proposed project is not within the immediate vicinity of any National/State Parks, monuments, wild and scenic rivers, etc.; formally classified lands were not considered further. The Nevada Natural Landmarks Map and Nevada Wilderness Areas Map are included in Appendix A of this report.

The existing septic tanks are located on private properties. Cleanup and abandonment of the septic tanks and construction and installation of a sewer collection system will require agreements, easements, and Rights-of-Way for work in these areas.

A soil survey of the proposed project area obtained from the National Resource Conservation Service (NRCS) shows three (3) soil types, two (2) of which support Farmland of Statewide importance if irrigated, and one (1) which can support prime farmland, if irrigated and reclaimed of excess salts and sodium (National Resource Conservation Service (NRCS), 2021). Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas (Matos, 2021). Farmland of Statewide importance, as defined by the U.S. Department of Agriculture, is land that is available for farming, but could currently be cropland, pastureland, rangeland, forestland, or other land, but not urban built-up land or water (U.S. Department of Agriculture, 1985).

Soil types that exist in the proposed project area are listed in Table 2. The full NRCS Soil report is included in Appendix A of this report.

Table 2 Project Area Soil Types

Soil Type	% Of Area of Interest	Prime Farmland Capability
Benin Silt Loam (131)	37.9%	Farmland of Statewide importance, if irrigated
Goldrun-Benin Complex, 0 to 15% Slopes (274)	57.7%	Farmland of Statewide Importance, if irrigated
Rad Fine Sandy Loam, 0 to 2% slopes (461)	4.4%	Prime Farmland if Irrigated and reclaimed of excess salts and sodium

6.1.2 Environmental Impacts

Land Use

Temporary soil disturbance will occur due to septic tank abatement and sewer collection system and WWTF construction work. When completed, the disturbed areas will be returned to pre-disturbance slopes and will be covered with native surface material and re-seeded where appropriate.

The areas of Prime Farmland and Farmland of Statewide importance as identified by the NRCS Soil report are located only on previously disturbed and developed land, so impacts to farmland are not anticipated. Changes from septic systems to wastewater are anticipated to help preserve soil quality though elimination of Nitrate and TDS seeping into soil.

Changes to Land Use will occur from the addition of a WWTF to an open parcel. Table 3 summarizes the projects potential environmental impacts to related to land use

Table 3 Environmental Impacts Related to Land Use

Direct Effects	Indirect Effects	Cumulative Effects
• Temporary Disturbances of residential land uses during construction • Removal and disposal of treated septic sludge	• None	• Preservation of soil quality through elimination of Nitrate and TDS seeping into soil

6.1.3 Mitigation

Mitigation may be required for treatment of septic sludge. While the disturbance in residential areas is all on previously disturbed land, Best Management Practices (BMPs) will be utilized to minimize erosions/disturbance in residential areas.

6.2 GEOLOGY AND SOILS

6.2.1 Environmental Resources

Geology

Grass Valley is in the Black Rock Desert-Humboldt subregion of the Great Basin. The geology of the region is very complex due to millions of years of movements and uplift in the earth's crust. The Humboldt River Basin is the only major river basin that is entirely within the state of Nevada. Precipitation supplies all the water that enters the basin; consequently, the variability in climate has significant impacts on the hydrology and hydrogeology of the area (Nevada Water Science Center, 2017).

Seismicity

The United States Geological Survey (USGS) seismic Hazard Map showing the Peak Ground Acceleration (PGA), expressed as percent of gravity, for the nation was assessed for the project area. PGA is equal to the amplitude of the largest absolute acceleration recorded at a site during an earthquake and is an important parameter for earthquake engineering (Earthquake Hazards, 2014). The MyHAZARDS – Nevada GIS web viewer from the University of Nevada, Reno shows the PGA surrounding the project area is 20%g, indicating a chance of slight shaking and movement that may occur near the project area within the next 50 years (University of Nevada, Reno (UNR), 2014). The USGS Seismic Hazard Map of Nevada is provided in Appendix A of this report.

Soils

The NRCS soil survey shows three (3) major soil types in the project area, described in

Table 4 below. The proposed project is not anticipated to have any effect on soil type, profile, or qualities. The full NRCS Report is included in Appendix A of this report.

Table 4 Project Area Soil Properties and Qualities

Soil Type	Typical Profile	Properties and Qualities
Benin	**H1- 0 to 8 inches**: Silt loam **H2 – 8 to 70 inches**: silty clay	**Slope**: 0 to 2 percent **Depth to restrictive feature**: More than 80 inches **Drainage class**: well drained **Runoff Class**: Very High **Capacity of the most limiting layer to transmit water (Ksat)**: Very low to moderately low **Depth to water table**: More than 80 inches **Frequency of flooding/ponding**: none **Calcium carbonate, maximum content**: 10 percent **Gypsum, maximum content**: 5 percent **Maximum salinity**: Moderately Saline to Strongly Saline **Sodium adsorption ratio, maximum**: 50.0 **Available water supply**: High (about 9.2 inches)
Goldrun	**H1- 0 to 7 inches:** fine sand **H2 – 7 to 67 inches:** fine sand	**Slope:** 2 to 15 percent **Depth to Restrictive feature:** More than 80 inches **Drainage class**: Somewhat excessively drained **Runoff Class:** Very Low **Capacity of the most limiting layer to transmit water (Ksat):** High to very high **Depth to water table:** More than 80 inches **Frequency of flooding/ponding:** None **Calcium carbonate, maximum content:** 1 percent **Maximum salinity:** nonsaline to very slightly saline **Sodium adsorption ratio, maximum:** 5.0 **Available water supply:** Low (about 4.8 inches)
Rad	**H1 – 0 to 6 inches:** fine sandy loam **H2- 6 to 20 inches:** stratified fine sandy loam to silt loam **H3 – 20 to 39 inches:** very fine sandy loam **H4 – 39 to 60 inches:** stratified sandy loam to silt loam	**Slope**: 0 to 2 percent **Depth to restrictive feature**: More than 80 inches **Drainage class**: well drained **Runoff Class**: Medium **Capacity of the most limiting layer to transmit water (Ksat)**: Moderately low to moderately high **Depth to water table**: More than 80 inches **Frequency of flooding/ponding**: none **Calcium carbonate, maximum content**: 5 percent **Maximum salinity**: moderately saline to strongly saline **Sodium adsorption ratio, maximum**: 40.0 **Available water supply**: High (about 10.5 inches)

6.2.2 Environmental Impacts

Geology

The project involves surface level disturbances and should have no effect on geologic resources.

Seismicity

The project involves surface level disturbances and should have no effects related to faults. Seismicity in the project area is projected to be low and no impacts are anticipated. Humboldt County's Seismic Design Category falls under IRC - D1 and IBC - D. All construction will meet building standards based on seismic zone and soil type from the 2018 International Building Code with the Northern Nevada Amendment package.

Soils

The construction of RIBs would have associated ground disturbance from the earthwork required. The scope of this report does not cover geotechnical investigation for the proposed RIB locations; however, it is assumed there will not be difficulties resultant from the soil properties at the site. Construction is not anticipated to cause any unique direct or indirect environmental impacts aside from the ground disturbance related to the construction of the facility and RIBs.

The land requirement for the RIBs is heavily dependent on the infiltration rate of the soil at their proposed location; percolation testing, and soil samples are outside of the scope of this report, however, according to the NDEP, a typical RIB size for small to medium-sized systems is 0.5 to 5-acres per RIB. Final design for this project would include the necessary site soil testing and would yield an accurate RIB design regarding the size of individual basins and the required number of basins in the system, there would be a minimum of two basins.

The project will change the topography through the RIB sites as the work involves extensive surface earthwork and grading. At buried pipes, all surface levels will be put back to preconstruction grades. Disturbed soils will be replaced with native soils and pipeline trenches will be back filled with native soils and returned to pre-construction gradients. Soil disturbances for this project will require Nevada Division of Environmental Protection (NDEP) Bureau of Air Pollution Control (BAPC) and Bureau of Water Pollution Control (BWPC) permitting to avoid other impacts related to soil disturbance. Table 5 summarizes the projects potential impacts to geology and soils.

Table 5 Environmental Impacts to Geology and Soils

Direct Effects	Indirect Effects	Cumulative Effects
• Temporary soil disturbance during construction • Topographic changes due to RIB installation	• Improved soils due to eliminating septic leaching.	• Improved soils due to eliminating septic leaching.

6.2.3 Mitigation

Temporary soil disturbance will be minimized using standard soil erosion BMPs. All contours disturbed will be returned to preconstruction grades following construction. This project is anticipated to have no permanent effect on geology, or seismic conditions in the project area.

To prevent erosion during and after construction, Best Management Practices (BMPs) will be implemented during construction depending upon conditions and need and may include but are not limited to:

- Soils and slopes at the site will be assessed,

- existing vegetation will be preserved wherever possible,
- impervious surfaces will be minimized,
- work to minimize exposed soil areas,
- development of a Storm Water Pollution Prevention Plan,
- salvage, stockpile, and reuse topsoil,
- install construction entrances and control dust,
- protect soils with vegetation, mulch, and binders,
- use sediment barriers including fiber rolls and silt fence,
- protecting culvert and ditch inlets and outlets,
- manage trash, materials, and supplies,
- project close-out including removing temporary sediment controls and final site stabilization.

The final design for the project will include the necessary soil testing for the RIBs and design may include project modifications to ensure unnecessary impacts to soils in the project area are avoided.

6.3 WATER QUALITY

6.3.1 Environmental Resources

Water Resources

The proposed project area is within the Nevada Division of Water Resources (NDWR) Hydrographic Groundwater Basin 71, Grass Valley, and is within Hydrographic Region 04, the Humboldt River Basin. Groundwater Basin 71 is an administratively designated Basin with a preferred water usage is environmental and temporarily stockwater. Most of the water rights within Basin 71 are used for Irrigation purposes (75%), followed by Municipal (14%), Mining and Milling (4%), Domestic (4%), Industrial (2%). The remaining 1% is divided between Commercial, Quasi-Municipal, and Stockwater use (State of Nevada Division of Water Resources, 2022). The water rights surrounding the project area are used mainly for irrigation, and some commercial (Snider, 2022). Additional water rights will likely be needed for operation of the WWTF. This will be determined in later design phases for the WWTF. The Hydrographic Area Summary Report is included in Appendix A.

Sole Source Aquifers

The EPA defines a sole source aquifer (SSA) as one where:

- The aquifer supplies at least 50% of the drinking water for its service area
- There are no reasonably available alternative drinking water sources should the aquifer become contaminated.

There are no SSA's in Nevada (United States Environmental Protection Agency, 2021) See map of EPA Region 9 SSA's in Appendix A.

Water Quality

The proposed project will have a positive impact on Grass Valley's drinking water aquifer and groundwater by reducing the high nitrate and TDS levels. Excess Nitrate and TDS levels in potable water supplies can lead to a life-threatening condition in humans called Methemoglobinemia (Nevada Division of Environmental Protection Bureau of Water Pollution Control, 2017).

The Rapid Infiltration (RI) process can infiltrate a much larger volume of wastewater on a much smaller land area than other land treatment concepts. Advantages of RIBs include:

- Gravity Distribution methods consume no energy
- No chemicals are required
- RI is a simple and economical method
- The process is not constrained by seasonal changes
- Effluent is of excellent quality
- The process is very reliable with sufficient resting periods
- RI provides a means for groundwater recharge, controlling groundwater levels, , and storage of renovated water in the aquifer
- The process is suitable for small plants where operator expertise is limited

Disadvantages include:

- As typically operated, RI systems receiving effluent from treatment ponds will not usually meet the stringent nitrogen levels required for discharge to drinking aquifers
- Requires long term commitment of a significant land area for treatment, with minimal secondary benefits such as are possible with other natural treatment systems (i.e., crop or forest production, habitat enhancement, etc.)
- Requires annual removal of accumulated deposits of organic matter on the infiltration surfaces in the basins
- May require occasional removal and disposal of the top few inches of soil to expose clean material
- clogging can occur when influent is received at high application rates from algal laden facultative lagoons and polishing ponds

(United States Environmental Protection Agency, 2003)

6.3.2 Environmental Impacts

The proposed sewer system improvement project will have a positive effect on water quality through reducing or eliminating septic leaching and producing wastewater that meets NDEP water quality standards.

During construction, there may be a temporary impact on water quality. Stormwater protection measures may be necessary to maintain water quality in the project area and will be the responsibility of the contactor. U.S. Environmental Protection Agency (EPA) regulations require stormwater discharge permits for certain activities that discharge stormwater to Waters of the United States (40 Code of Federal Regulations). In compliance with this regulation, the Nevada Division of Environmental Protection (NDEP) has issued several General Permits for stormwater discharges including construction permits for projects which will disturb 1 acre or more.

The objectives of NDEP's Construction Stormwater General Permit are to control and reduce pollution to waters of the State that meet the definition of Waters of the United States (WOUS) (Nevada Division of Environmental Protection, 2021). NDEP requires owner/operators to obtain a Construction Stormwater Permit if the project will discharge to a WOUS and meets the following conditions:

- Project will disturb one (1) or more acres, or
- Project will disturb less than one (1) acre but is part of a larger common plan for development or sale that will ultimately disturb one (1) acre or more.

- If NDEP determines that a project less than one (1) acre in size will impact receiving waters or its tributaries within a 1/4-mile radius of the project, the owner/operator of the project will also be required to obtain a construction stormwater permit

This project will disturb approximately a maximum total of 144 acres. An NDEP Construction Stormwater General Permit will be required. The contractor will be required to obtain a permit from NDEP and meet all requirements of the permit. Ultimately the project would have a positive impact on water quality by reducing or eliminating septic leaching and producing wastewater that meets NDEP water quality standards. Many disadvantages of RIBs will be avoided because wastewater is treated before entering the RIBs. Wastewater discharge from the RIBs will be tested and sampled to monitor water quality and ensure it meets discharge standards. While it is unlikely that the project would result in any violations of water quality standards, BMPs will be employed to prevent discharge into any nearby drainages or water bodies during construction. The proposed project is not anticipated to have a negative effect on the water quality in the Humboldt River Basin. Table 6 summarizes the projects potential impacts to water quality.

Table 6 Environmental Impacts to Water Quality

Direct Effects	Indirect Effects	Cumulative Effects
• Improve groundwater quality	• Potential for reduced water quality during construction	• Improved Water Quality for the Residents of Grass Valley

6.3.3 Mitigation

During construction activities, the construction contractor shall implement BMPs onsite to limit erosion and direct runoff from disturbed areas. Best Management Practices (BMPs) may include beams, sediment traps, or other accepted practices that are effective in limiting runoff and the release of sediment into water courses.

The construction contractor shall meet all current permit requirements and/or obtain appropriate project permits from the Nevada Department of Environmental Protection, Bureau of Water Pollution Control.

NDEP Bureau of Water Pollution Control Permitting

A Stormwater Pollution Prevention Plan will likely be required by NDEP. Permit requirements outline temporary and permanent erosion and sediment controls, locate stormwater discharge points; and describe best management practices to be implemented to prevent or reduce stormwater pollutant discharge associated with construction activities to the maximum extent practical.

To prevent erosion during and after construction, BMPs such as the following will be implemented during construction depending upon conditions and need:

- Soils and slopes at the site will be assessed,
- existing vegetation will be preserved wherever possible,
- impervious surfaces will be minimized,
- work to minimize exposed soil areas,
- development of a Storm Water Pollution Prevention Plan,
- salvage, stockpile, and reuse topsoil,
- install construction entrances and control dust,
- protect soils with vegetation, mulch, and binders,
- use sediment barriers including fiber rolls and silt fence,
- protecting culvert and ditch inlets and outlets,

- manage trash, materials, and supplies,
- project close-out including removing temporary sediment controls and final site stabilization.

6.4 FLOODPLAINS

6.4.1 Environmental Resources

The flood zones for the project area have been mapped by the Federal Emergency Management Agency (FEMA) and have been designated by the following panel numbers: 32013C4125C and *32013C4150C. Areas immediately adjacent to the Humboldt River are in Zone A. The entire project area lies outside of the FEMA designated flood zone. For reference, the following flood hazard zone designation is provided:

High Risk Areas:

Zone A: Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones (Department of Homeland Security, 2022)

*Panel not printed – no special flood hazard areas. See the project area FEMA National Flood Layers in Appendix A.

6.4.2 Environmental Impacts

The entire project area is outside of FEMA designated flood zones. No impacts to flood zones are anticipated and no mitigation is necessary. Best Management Practices (BMPs) should be considered in the design of the project so that flooding conditions are not negatively impacted. BMPs for managing Stormwater Runoff according to the EPA include:

- Reducing the volume of stormwater that enters the sewer system
- Reducing the maximum flow rate into the combined system by decreasing the stormwater volume and lengthening the duration of discharge.
- Improving water quality through volume reduction, filtering, and biological and chemical processes.

Table 7 summarizes the projects potential impacts to floodplains.

Table 7 Environmental Impacts to Flood Plains

Direct Effects	Indirect Effects	Cumulative Effects
• None	• None	• None

6.4.3 Mitigation

No Mitigation is anticipated to be necessary.

6.5 BIOLOGICAL RESOURCES

6.5.1 Environmental Resources

Consultation with the Nevada Division of Natural Heritage (NDNH), Nevada Department of Wildlife (NDOW), and the U.S. Fish and Wildlife (USFWS) Information for Planning and Conservation (IPaC) program was completed. All three programs provided species lists and/or protection/avoidance guidance relating to wildlife that might occur within the project area. See Appendix B for correspondences with these agencies.

Wildlife

NDOW provided wildlife resource information in the vicinity of the project area and a four-mile buffer around the project area.

Occupied pronghorn antelope distribution was identified throughout the entire project area, and occupied mule deer distribution was identified outside the project area but within portions of the four-mile buffer area. No known occupied bighorn sheep or elk distributions exist in the vicinity of the project area.

Greater sage-grouse habitat in the vicinity of the project area has primarily been identified as 'Other Habitat', but 'General Habitat' also exists in the vicinity of the project area. Other and general sage grouse habitat exists in the vicinity of the project area, but not within the identified project area of disturbance. There are no known radiomarked greater sage-grouse tracking locations in the vicinity of the project area. There are no known greater sage-grouse lek sites in the vicinity of the project area.

Various raptor species may have distribution ranges that include the project area and four-mile buffer area. The following raptor species have been directly observed in the vicinity of the project area:

- American kestrel
- Barn Owl
- Burrowing owl
- Ferruginous hawk
- Golden eagle
- Great horned owl
- Long-eared owl
- Prairie falcon
- Red-tailed hawk
- Rough-legged hawk
- Swainson's hawk

Eleven (11) known raptor nest sites were identified within 10 miles of the project area. Raptors are protected by state and federal law, some mitigation measures may be necessary if nests are identified within the project area.

The following species have also been observed in the vicinity of the project area. Table 8 summarizes the NDOW species observed in the project area.

Table 8 NDOW Species Observed in the Vicinity of the Project Area

Common Name	ESA	State	SWAP SoCP
Black-crowned night-heron		Protected	
Blue-winged teal			
Brook trout			
Brown trout			
Cinnamon teal			
Common Raven		Protected	
Cottontail (unknown)			
Coyote		Unprotected	

Junco (unknown)			
Lahontan cutthroat trout	Threatened		Yes
Little brown myotis			Yes
Long-nosed leopard lizard			Yes
Long-tailed weasel		Unprotected	
Mourning dove			
Northern desert horned lizard			Yes
Quail (unknown)			
Rainbow trout			
Rock dove			
Western grebe		Protected	

ESA: Endangered Species Act Status

State: State of Nevada Special Status

SWAP SoCP: Nevada State Wildlife Action Plan (2012) Species of Conservation Priority

The full wildlife resource correspondence provided by NDOW is in Appendix B.

Threatened, Endangered, and Candidate Species

The NDNH has identified no endangered threatened, candidate, and/or at-risk taxa within the project area, however, habitat may be available for the sensitive species listed in Table 9. Correspondence from The NDNH is in Appendix B.

Table 9 Sensitive Taxa with Potential Habitat

Common name	Scientific Name	Categorization
Invertebrates		
Nevada Viceroy	*Limenitis archippus lahontani*	NDNH: Critically Imperiled
Rice's Blue	*Euphilotes pallescens ricei*	Nevada BLM: Sensitive Species

The Endangered Species Act (ESA) requires federal agencies, in consultation with the U.S. Fish and Wildlife Service and/or the NOAA Fisheries Service, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. The law also prohibits any action that causes a "taking" of any listed species of endangered fish or wildlife. USFWS IPaC consultation identified 1 threatened, endangered, or candidate species that could be affected by the project, however, no critical habitats are identified within the project area. There are no refuge lands or fish hatcheries within the proposed project area. Table 10 identifies the Endangered Species Act Species that should be considered for this project. The USFWS IPaC Consultation is included in Appendix B.

Table 10 Endangered Species Act Species

Common Name	Scientific Name	Status
Monarch Butterfly	*Danaus plexippus*	Candidate

Migratory Birds

USFWS IPaC analysis states various migratory bird species may reside within the project area and the 10-mile vicinity of the project area. It is not anticipated that migratory birds will be affected by construction since the construction will take place on ground level, and at existing streets and road shoulders. Should any migratory birds be identified in the project area, or any impacts to migratory birds be anticipated, additional conservation measures will be evaluated. Construction activities should avoid breeding periods and periods with a high likelihood of presence. Breading season and likelihood of presence time frames are listed in Table 11.

Table 11 Migratory Bird Breeding Seasons

Common Name	Scientific name	Breeding Season	Greatest likelihood of presence in project area
Bald Eagle	*Haliaeetus leucocephalus*	Dec 1 to Aug 31	March
Rufous Hummingbird	*Selasphorus rufus*	Apr 15 – Jul 15	April
Willet	*Tringa semipalmata*	Apr 20-Aug 5	May & June

Noxious Weeds

No plant species were listed on correspondence with wildlife agencies. Noxious weeds can threaten native plant species and may be established because of ground disturbing activities.

A noxious weed is a plant that has been defined as a pest by law or regulation. Nevada Department of Agriculture's (NDA) policy regarding noxious weed abatement is that if a plant is found likely to be "detrimental or destructive and difficult to control or eradicate" (Nevada Revised Statute 555.005-201), the NDA, with approval of the Board of Agriculture, will designate the plant as a noxious weed.

It is the NDA's policy to use the "Noxious Weed Tier System" to determine what action is to be taken consistent with existing statutes which include authority for: the promulgation of quarantine, abatement for eradication and/or control; holding and inspecting; establishing weed control districts; and for other regulatory activities. At the time, the NDA lists a species, it will also give a rating of A, B, or C. These ratings reflect the NDA's view of the statewide importance of the noxious weed, the likelihood that eradication or control efforts would be successful, and the present distribution of noxious weeds within the state. These lists will be in the Nevada Administrative Code (NAC 555.010).

The following defines the NDA weed ratings:

"A" Weeds normally limited in distribution throughout the state; actively excluded from the state and actively eradicated wherever found; actively eradicated from nursery stock dealer premises; control required by the state.

"B" Weeds more widespread throughout the state; actively excluded where possible, actively eradicated from nursery stock dealer premises; control required by the state in areas where populations are not well established or previously unknown to occur.

"C" Weeds generally widespread throughout the state; actively eradicated from nursery stock dealer premises; abatement at the discretion of the state quarantine officer.

Table 12 is the NDA weed list with weeds classified per rating.

Table 12 Weeds Occurring in Nevada

CATEGORY	COMMON NAME	SCIENTIFIC NAME
Category A Weeds	African Rue	*Peganum harmala*
	Austrian fieldcress	*Rorippa austriaca*
	Austrian peaweed	*Sphaerophysa salsula / Swainsona salsula*
	Camelthorn	*Alhagi camelorum*
	Common crupina	*Crupina vulgaris*
	Dalmation Toadflax	*Linaria dalmatica*
	Dyer's woad	*Isatis tinctoria*
	Eurasian watermilfoil	*Myriophyllum spicatum*
	Giant Reed	*Arundo donax*
	Giant Salvinia	*Salvinia molesta*
	Goats rue	*Galega officinalis*
	Houndstongue	*Cynoglossum officinale*
	Hydrilla	*Hydrilla verticillata*
	Iberian Star thistle	*Centaurea iberica*
	Klamath weed	*Hypericum perforatum*
	Leafy spurge	*Euphorbia esula*
	Malta Star thistle	*Centaurea melitensis*
	Mayweed chamomile	*Anthemis cotula*
	Mediterranean sage	*Salvia aethiopis*
	Purple loosestrife	*Lythrum salicaria, L. virgatum and their cultivars*
	Purple Star thistle	*Centaurea calcitrapa*
	Rush skeletonweed	*Chondrilla juncea*
	Sow Thistle	*Sonchus arvensis*
	Spotted Knapweed	*Centaurea masculosa*
	Squarrose star thistle	*Centaurea virgata Lam. Var. squarrose*
	Sulfur cinquefoil	*Potentilla recta*
	Syrian Bean Caper	*Zygophyllum fabago*
	Yellow Starthistle	*Centaurea solstiltialis*
	Yellow Toadflax	*Linaria vulgaris*
Category B Weeds	Carolina Horse-nettle	*Solanum carolinense*
	Diffuse Knapweed	*Centaurea diffusa*
	Medusahead	*Taeniatherum caput-medusae*
	Musk Thistle	*Carduus nutans*
	Russian Knapweed	*Acroptilon repens*
	Sahara Mustard	*Brassica tournefortii*

CATEGORY	COMMON NAME	SCIENTIFIC NAME
	Scotch Thistle	*Onopordum acanthium*
	White Horse-nettle	*Solanum elaeagnifolium*
Category C Weeds	Black henbane	*Hyoscyamus niger*
	Canada Thistle	*Cirsium arvense*
	Green Fountain grass	*Pennisetum setaceum*
	Hoary cress	*Cardaria draba*
	Johnson grass	*Sorghum halepense*
	Perennial pepperweed	*Lepidium latifolium*
	Poison Hemlock	*Conium maculatum*
	Puncture vine	*Tribulus terrestris*
	Salt cedar (tamarisk)	*Tamarix spp*

6.5.2 Environmental Impacts

Wildlife

Wildlife may be impacted by disturbances due to construction activity, however, this proposed action is not anticipated to trigger existing authorities, regulations, or laws that NDOW oversees.

Threatened, Endangered, Candidate Species

Threatened, Endangered, and Candidate Species, and/or their habitat, may be impacted by disturbances due to construction activity. No loss of critical habitat will occur because there is no critical habitat in the project area.

Migratory Birds

It is not anticipated that migratory birds will be affected by construction since the construction will take place on ground level, and at existing disturbed areas. Should any migratory birds be identified in the project area, or any impacts to migratory birds be anticipated, additional conservation measures will be evaluated. Construction activities should avoid breeding periods and periods with a high likelihood of presence. If construction is anticipated to occur during breeding seasons, a biological survey is recommended.

Noxious Weeds

Disturbed areas will be returned to pre-construction conditions. All pipeline construction will be in roadways and previously disturbed areas, so no new disturbance causing Noxious Weeds to invade is anticipated to occur. The area planned for construction of the new WWTF will be reseeded and regraded to prevent the invasion of Noxious Weeds.

Table 13 summarizes the projects potential impacts to Biological Resources.

Table 13 Environmental Impacts to Biological Resources

Direct Effects	Indirect Effects	Cumulative Effects
• Loss of wildlife habitat to due construction of WWTF and RIBS	• Potential incidental wildlife death • Potential incidental loss of wildlife habitat	• Potential incidental reduced wildlife diversity

6.5.3 Mitigation

Wildlife

The Nevada Department of Wildlife makes the following recommendations regarding the protection of habitat and wildlife during construction:

- Avoid vegetation removal activities outside the migratory bird breeding season. If conducting vegetation disturbance activities during this time, we recommend that a qualified biologist survey for bird breeding behavior within 10 days of the disturbance. If breeding behavior is detected, please apply appropriate non-disturbance buffer, or contact NDOW or FWS for further direction,
- Avoid impacts to abandoned mines, caves, and roosting and foraging areas,
- Work crews take appropriate fire prevention and management measures (e.g., extinguishers, shovels, no smoking, spark arrestors, etc.) to prevent a fire from starting and spreading into adjacent wildlife habitat.
- Appropriate weed management plans be developed and implemented to monitor, prevent, and treat weeds from occupying the disturbance area and spreading into adjacent areas. Additionally, we recommend rehabilitating disturbed areas to prevent future weed infestations.

Threatened, Endangered, Candidate Species

Likewise, import, export, interstate, and foreign commerce of listed species are all generally prohibited. It is not anticipated that any threatened, endangered, or candidate species will be affected by construction since there is no critical habitat in the project area. Should any critical, endangered, or candidate species be identified in the project area, or any impacts be anticipated, additional conservation measures will be evaluated.

Migratory Birds

USFWS recommended general conservation measures related to migratory birds include:

- Educate all employees, contractors, and/or site visitors of relevant rules and regulations that protect wildlife. See the Service Webpage on Regulations and Policies for more information on regulations that protect migratory birds.
- Prior to removal of an inactive nest, ensure that the nest is not protected under the Endangered Species Act (ESA) or the Bald and Golden Eagle Protection Act (BGEPA). Nests protected under ESA or BGEPA cannot be removed without a valid permit.
- Do not collect birds (live or dead) or their parts (e.g., feathers) or nests without a valid permit.
- Provide enclosed solid waste receptacles at all project areas. Non-hazardous solid waste (trash) would be collected and deposited in the on-site receptacles. Solid waste would be collected and disposed of by a local waste disposal contractor.
- Report any incidental take of a migratory bird.

- Clearly delineating and maintaining project boundaries.

Noxious Weeds

Some mitigation may be required to prevent the spread of invasive weeds during and after construction of the proposed project. Mitigation may include the creation of a weed management plan to be developed and implemented by the contractor. The plan may include provisions like the following:

- Identify and flag all noxious and invasive weed populations present in the project area,
- Treat or contain any weed populations that may be impacted or disturbed by construction activity,
- Provide training to construction workers and equipment operators on the identification of weeds to be avoided,
- Certify that all construction material sources are weed-free,
- Minimize ground disturbance and vegetation removal as much as possible and practical,
- Rehabilitating or otherwise prevent the establishment of weeds in all areas of the job site.

6.6 WETLANDS

6.6.1 Environmental Resources

The National Wetlands Inventory (NWI) was consulted, and mapping obtained for the proposed project area. No wetlands were identified within in the project area. A map produced by the NWI mapper is found in Appendix A.

6.6.2 Environmental Impacts

No environmental impacts related to Wetlands are anticipated (U.S. Fish & Wildlife Service, 2021). Table 14 summarizes the projects potential impacts to Wetlands.

Table 14 Environmental Impacts to Wetlands

Direct Effects	Indirect Effects	Cumulative Effects
• None	• None	• None

6.6.3 Mitigation

No mitigation is anticipated to be necessary.

6.7 AIR QUALITY

6.7.1 Environmental Resources

The Clean Air Act, which was last amended in 1990, requires the EPA to set National Ambient Air Quality Standards (40 CFR part 50) for six principal pollutants ("criteria" air pollutants) which can be harmful to public health and the environment. The Clean Air Act identifies two types of national ambient air quality standards. Primary standards provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. Any county within the U.S. that is classified as a nonattainment area (an area that does not meet the national primary or secondary ambient air quality standard for NAAQS) is listed in the EPA Greenbook (EPA, 2022). Humboldt County does not contain any nonattainment level pollutants according to the EPA Greenbook.

6.7.2 Environmental Impacts

The Humboldt County Wastewater System Construction project may impact air quality by soil disturbance and equipment emissions during the construction phase. During Construction, the proposed project will disturb a maximum of approximately 144 total acres, much of which is previously disturbed. The project components will be constructed and installed in succession, so not all 144 acres will be disturbed at one time. However, it is likely that more than 5 acres will be disturbed at any one time, so a surface area disturbance permit should be obtained from the NDEP Bureau of Air Pollution Control (BAPC) by the construction contractor.

Temporary environmental impacts to air quality are anticipated during construction and operational phases of the project. Dust and other construction related contaminants will affect air quality near work areas and residential areas that are located within 500 meters of the work area. Table 15 summarizes the projects potential impacts to air quality.

Table 15 Environmental Impacts to Air Quality

Direct Effects	Indirect Effects	Cumulative Effects
• Temporary dust during construction near the disturbance area	• None	• None

6.7.3 Mitigation

An area of more than 5 acres is likely to be disturbed by this project, so a surface area disturbance permit will be obtained by the construction contractor from the NDEP BAPC. Any mitigation required in the terms of a BAPC permit will be followed.

In Accordance with NAC 445B.22037 fugitive dust will be always controlled during the project. This will be accomplished primarily by watering trucks. Areas left undisturbed for more than 90 days will be addressed by hydro-mulching or other methods approved under the permit.

Construction equipment emissions will have temporary effect on air quality during the construction phase. Examples of equipment and vehicles that potentially could be used during the project are listed below. Note that generally no more than three of these is in operation at the same time.

Examples of equipment to be used on project

- Side-dump haulers
- Motor graders
- A road roller machine
- Track excavators
- Wheel loaders
- Truck crane
- Asphalt Pavers
- Dozers
- Articulated Trucks
- Paddlewheel scrapers

6.8 CULTURAL AND HISTORICAL RESOURCES

6.8.1 Environmental Resources

The National Register of Historic Places (NRHP) and Nevada State Register of Historic Places (SRHP) lists historic districts, sites, buildings, structures, and objects all over the United States that have historical significance and are worthy of preservation. Consultation with the SHPO under Section 106 of the National Historic Preservation Act (February 2011) has been initiated on behalf of Humboldt County. Humboldt County has requested the assistance of the SHPO in identifying any additional historic properties that may be affected by the proposed project elements and requested that SHPO complete a check of The Nevada Cultural Resource Information System (NVCRIS) as part of initiating a Section 106 Consultation effort for a federal undertaking by a lead federal agency, should federal funding be secured by Humboldt County for this project.

Table 16 lists the properties in Humboldt County that are included on the State and National Registers of Historic Places (NRHP and SRHP) resources. None of the Resources are in or near the town of Grass Valley or within the project area.

Table 16 Historic Properties in Humboldt County

SR #	Resource Name	Address	City/Town	Listed in NRHP	Within Project Area
060141	Golconda School	Jct. of Morrison and Fourth Sts.	Golconda	Yes	No
810006	Applegate-Lassen Trail	Trail extends from Rye Patch NW to state line	Sulphur	Yes	No
150155	Berry, George G., House	451 W. Second St.	Winnemucca	No	No
080148	Cumley-Richardson House	175 Museum Lane (Corner of Maple Avenue and Jungo Road)	Winnemucca	No	No
810042	Record, W.C., House	146 W. 2nd St.	Winnemucca	Yes	No
050137	Winnemucca Hotel	95 S. Bridge St.	Winnemucca	Yes	No

6.8.2 Environmental Impacts

Historic resources are a nonrenewable resource that drives cultural and economic assets for the community. If not properly preserved, whether through development or erosion, the damage could be irreversible.

Based on the NRHP report, there are no recorded cultural resources in the direct project area. Absence of cultural resource information in a particular location does not indicate that cultural resources are lacking. Unidentified cultural resources may exist, and further inventory and research may be required.

Additional consultation was requested from the SHPO regarding potential impacts of the proposed project.

Identification Effort for Historic Properties

Humboldt County requested the assistance of the SHPO in identifying any additional historic properties that may be affected by the proposed project elements and requested the SHPO complete a check of the NVCRIS as part of the initiating a Section 106 Consultation effort. SHPO conducted the requested cursory review of the NVCIS, and identified no historic properties within the proejct area.

To complete Consultation under Section 106 the Federal Agency must determine if the previous inventory within the APE is adequate and inform the SHPO of their determination.

In addition, the Federal Agency must consult with Native American tribes concerning properties of religious or cultural significance. Efforts to consult directly with tribes seeking comment has not been initiated by the Federal Agency at this time. Notice of this proposed undertaking has been published by the Nevada State Clearinghouse.

Initial consultation with the SHPO is included in Appendix B.

Table 17 summarizes the projects potential impact on historic properties and cultural resources.

Table 17 Environmental Impacts to Cultural Resources

Direct Effects	Indirect Effects	Cumulative Effects
• Possible visual effects due to building construction of WWTF	• Possible visual effects due to building construction and vegetation on earthen berm	• None

6.8.3 Mitigation

Avoidance of cultural and historical properties is not anticipated to be necessary. No mitigation is anticipated to be necessary to protect cultural and historical resources within the project area. However, should an archaeological inventory of the direct APE indicate additional mitigation to protect cultural resources exit., mitigation options will be assessed, which may include but are not limited to archeologist consultation.

If previously unidentified cultural or archaeological resources are discovered during construction, all work shall cease. Humboldt County consultants shall consult with an archaeologist to determine the appropriate course of action before resuming construction.

6.9 ENVIRONMENTAL JUSTICE/SOCIO-ECONOMIC IMPACT

6.9.1 Environmental Resources

Humboldt County is in the rugged high desert region of north-central Nevada, bordered on the north by Oregon and by neighboring Nevada counties to the west, south, and east. The County’s 9,626 square miles offer some of the most varied, spectacular scenery in the State and a wide array of recreational opportunities. The County’s economy is derived in large part from its main industries: Mining, Agriculture and Agricultural Services, and Tourism and Construction. The County is in the rich gold mining center of the Western U.S. and is the leading agricultural county in the State of Nevada with over 100,000 acres under cultivation. Tourism is also a large part of the County’s economic base due to the large numbers of visitors the gaming industry brings to the area and the draw of the beautiful wide-open spaces, historical sites, and great hunting and fishing (Humboldt County Personnel, 2005).

The U.S. Census and Nevada State Demographer provides population data for Humboldt County in its entirety but does not provide population data for the Grass Valley area specifically. According to the

Nevada State Demographer there were 17,202 residents in Humboldt County in 2021 with an average household size of 2.56 persons. Based on the number of developed lots within the project area, Star City has a potential population of 356 people, while Gold Country's potential population is 858 people. Furthermore, within the project area's eastern extent there are potentially 328 people and another 92 people northeast of the airport. The total estimated population within the project area is 1,634 people.

According to the 2020 Census Bureau estimates, the median household income (MHI) for Humboldt County is $66,123 and 66.2 percent of the population accounts for the workforce. The construction and extraction industry account for the bulk of employment in the county followed by office and administrative support and sales or sales related occupations, respectively (United States Census Bureau, 2021). There is no distinctive data for the MHI or occupations of Grass Valley residents.

The Humboldt County Wastewater System project, and alternatives thereof, have been proposed to improve the quality of drinking water for all residents in Humboldt County, particularly those in the Grass Valley area. The project will benefit the entire community and will have not disproportionately high or adverse human health or environmental effects to minority or low-income populations. No mitigation is expected to be required.

See the PER for additional information regarding Historical Growth and Future Growth Rate of the project area.

6.9.2 Environmental Impacts

The proposed project is expected to have a beneficial effect on socio-economic conditions for all Humboldt County residents regardless of socio-economic group. No disparate impacts related to environmental justice are anticipated. Table 18 summarizes the potential impacts to Social and Environmental Justice.

Table 18 Environmental Impacts to Socio-Economic and Environmental Justice

Direct Effects	Indirect Effects	Cumulative Effects
• None	• None	• Beneficial Effect on Socio-Economic conditions for all Humboldt County residents

6.9.3 Mitigation

No mitigation is anticipated to be necessary.

6.10 NOISE

6.10.1 Environmental Resources

Anticipated noise will be related to temporary construction activities which are not expected to cause long term noise problems.

6.10.2 Environmental Impacts

Temporary impacts of the project construction include construction noise. Table 19 summarizes the projects potential impact on the auditory landscape.

Table 19 Environmental Impacts due to Noise

Direct Effects	Indirect Effects	Cumulative Effects

• Temporary construction noise and dust	• None	• None

6.10.3 Mitigation

Mitigation and BMPs to reduce construction noise may be necessary. The following practices will be observed during construction:

- Construction activities will take place during normal working hours between 7:00 am and 5:00 pm.
- Quieter methods or equipment will be used when possible.
- All equipment will be required to have efficient mufflers.
- Only equipment of necessary size and power will be used.
- All equipment will be properly lubricated and well maintained.

6.11 HEALTH AND HUMAN SAFETY

6.11.1 Environmental Resources

Electromagnetic Fields and Interference

Electrical systems will be installed to power the WWTF. Infrastructure to support future fiber optic facilities may be included in the project design. A transmission tower will not be installed, however, an antenna for SCADA may be installed. Electromagnetic Fields (EMFs) are expected to increase slightly.

6.11.2 Environmental Impacts

Any EMF increases will be within FCC/OSHA exposure limits. Environmental consequences are not anticipated to be related to electromagnetic field (Schlesinger, 2022). No real effects are anticipated with the electrical systems installed in the WWTF. Table 20 summarizes the projects potential impact to Health and Human Safety.

Table 20 Environmental Impacts to Health and Human Safety

Direct Effects	Indirect Effects	Cumulative Effects
• Increased Energy usage from the WWTF • Slightly Increased EMFs	• None	• None

6.11.3 Mitigation

The use of gravity in the project will maximize the flow of wastewater in an energy efficient way. The project will meet all OSHA requirements and Humboldt County building code standards for Health and Human Safety.

7.0 SUMMARY OF MITIGATION

Some mitigation or avoidance measures may be necessary to avoid potential adverse environmental impacts within the proposed project area. Potential mitigation measures are listed in Table 21. Mitigation measures are included for the following environmental resources:

- Land Use
- Geology and Soils
- Water Quality
- Biological Resources
- Air Quality
- Noise
- Health and Human Safety

Table 21 Summary of Potential Mitigation Measures

Environmental Resource	Mitigation
Land Use	• Mitigation may be required for treatment of septic sludge. • Best Management Practices (BMPs) will be utilized to minimize erosions/disturbance in residential areas.
Geology and Soils	• Temporary soil disturbance will be minimized using standard soil erosion BMPs. • All contours disturbed along pipe routes will be returned to preconstruction grades following construction. • To prevent erosion during and after construction, Best Management Practices (BMPs) will be implemented during construction depending upon conditions and need • The final design for the project will include the necessary soil testing for the RIBs and design may include project modifications to ensure unnecessary impacts to soils in the project area are avoided.
Water Quality	• During construction activities, the construction contractor shall implement BMPs onsite to limit erosion and direct runoff from disturbed areas. • The construction contractor shall meet all current permit requirements and/or obtain appropriate project permits from the Nevada Department of Environmental Protection, Bureau of Water Pollution Control.
Biological Resources	• Avoid vegetation removal activities outside the migratory bird breeding season. • Avoid impacts to abandoned mines, caves, and roosting and foraging areas, • Work crews take appropriate fire prevention and management measures to prevent a fire from starting and spreading into adjacent wildlife habitat.

	• Appropriate weed management plans be developed and implemented to monitor, prevent, and treat weeds from occupying the disturbance area and spreading into adjacent areas. • Rehabilitating disturbed areas to prevent future weed infestations. • Educate all employees, contractors, and/or site visitors of relevant rules and regulations that protect wildlife. • Prior to removal of an inactive nest, ensure that the nest is not protected under the Endangered Species Act (ESA) or the Bald and Golden Eagle Protection Act (BGEPA). Nests protected under ESA or BGEPA cannot be removed without a valid permit. • Do not collect birds (live or dead) or their parts (e.g., feathers) or nests without a valid permit. • Provide enclosed solid waste receptacles at all project areas. • Report any incidental take of a migratory bird. • Clearly delineating and maintaining project boundaries. • Identify and flag all noxious and invasive weed populations present in the project area, • Treat or contain any weed populations that may be impacted or disturbed by construction activity, • Provide training to construction workers and equipment operators on the identification of weeds to be avoided, • Certify that all construction material sources are weed-free, • Minimize ground disturbance and vegetation removal as much as possible and practical, • Rehabilitating or otherwise prevent the establishment of weeds in all areas of the job site.
Air Quality	• a surface area disturbance permit will be obtained by the construction contractor from the NDEP BAPC. Any mitigation required in the terms of a BAPC permit will be followed. • fugitive dust will be always controlled during the project.
Noise	• Some mitigation and BMPs to reduce construction noise may be necessary.
Health and Human Safety	• The use of gravity to maximize the flow of wastewater in an energy efficient way. • The project will meet all OSHA requirements and Humboldt County building code standards for Health and Human Safety.

8.0 PUBLIC INVOLVEMENT

Consultation with State Agencies and the public was sent on 05/18/2022. Notice of preparation of this EA was published on 05/25/2022 by the Nevada State Clearinghouse seeking public and agency comments. Copies of these letters can be found in Appendix B. This EA will be updated with all comments, once received.

Consultation with state and federal agencies will continue when funding is secured for the project. The lead federal agency will complete Environmental Review which will include additional opportunities for public comment.

9.0 CONCLUSIONS

Based on the information in this Preliminary Environmental Assessment, the proposed project would have no significant adverse effects on the environment. No mitigation beyond avoidance, best management practices, measures proposed in this EA, and permit requirements would be required. These actions would not have a significant effect on the quality of the human environment and do not require preparation of an environmental impact statement. An environmental review and issue decision document will be drafted by the lead federal agency, when one is identified.

10.0 LIST OF PREPARERS

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APPENDIX A

This section includes the following exhibits:

- NV Natural Landmarks
- NV Wilderness Area
- Nevada Hazard Map
- Hydrographic Area Summary Report
- EPA Region 9 SSA
- NRCS Soil Report
- NWI Map
- FEMA Maps
- NV nonattainment level pollutants

APPENDIX B

This section includes the following exhibits:

- NDOW correspondence
- IPaC report
- NDNH correspondence
- Copies of Agency Correspondence Letters
    - NDEP Bureau of Air Quality Planning
    - NDEP Bureau of Safe Drinking Water
    - Nevada Division of Water Resources
    - Nevada Bureau of Water Pollution Control
    - Nevada State Historic Preservation Office
    - Nevada State Clearing House

Appendix A

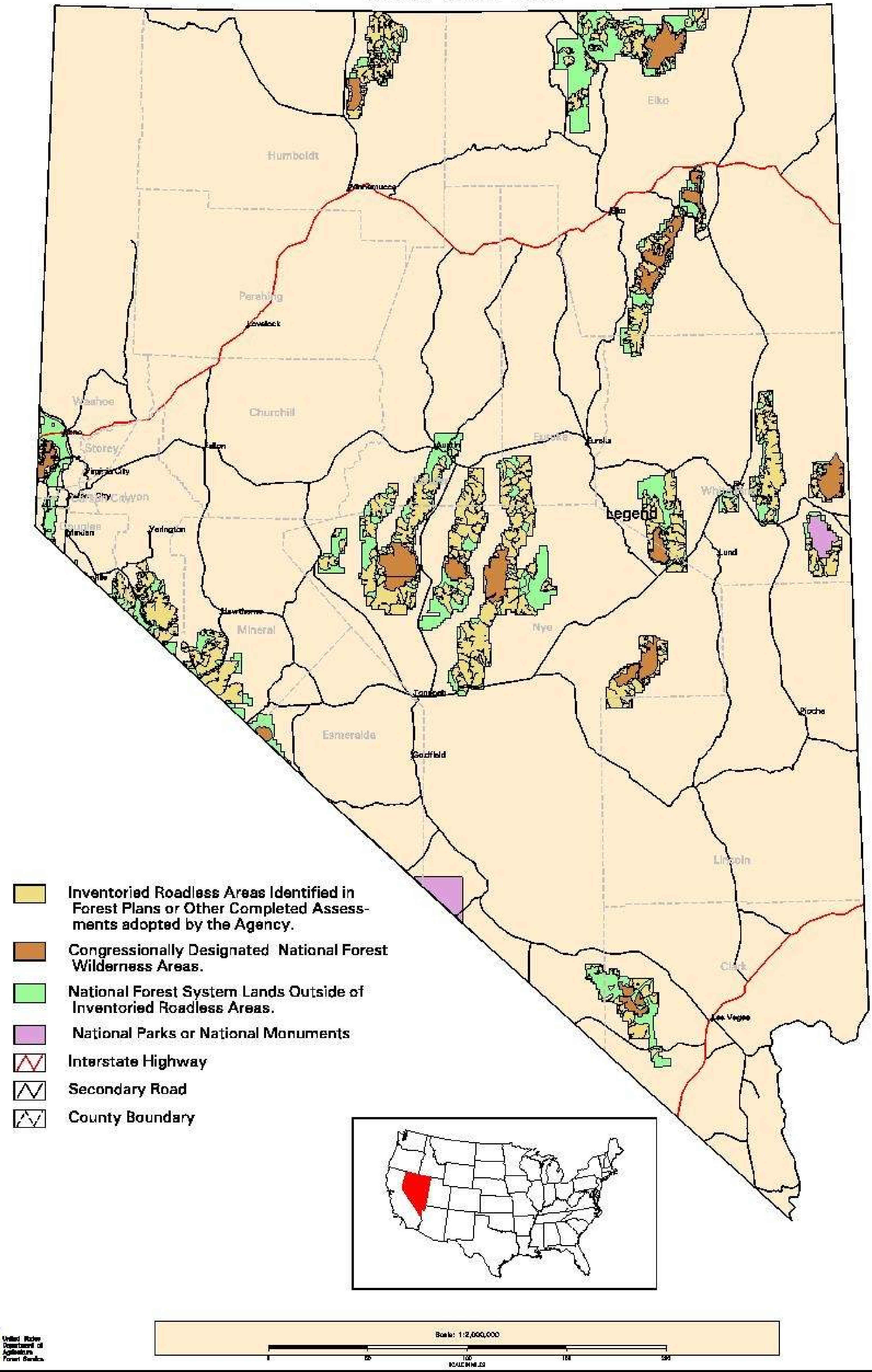

80
Ruby Marsh
Nevada
Carson
Ichthyosaur Site
Lunar Crater
Hot Creek
Springs and Marsh
Timber Mountain Caldera
Valley of Fire
California
15

Inventoried Roadless Areas and Designated Wilderness Areas

Working Draft - January 25, 2000

USDA Forest Service - Region 4

State of Nevada




2014 Nevada Hazard
-120°
-115°
40°
35°
Carson City
Sacramento
Salt Lake City
US Seismic Hazard
2% in 50 years PGA
Hazard (%g)
0-2
2-4
4-6
6-10
10-14
14-20
20-30
30-40
40-60
> 60
Plates
Subduction
Transform
Divergent
Others
Counties

Nevada Division of Water Resources

Hydrographic Area Summary

Hydrographic Area No. 071 **Hydrographic Area Name** GRASS VALLEY

Subarea Name

Hydrographic Region No. 04 **Hydrographic Region Name** HUMBOLDT RIVER BASIN

Area (sq. mi.) 520

Counties within the hydrographic area Pershing, Humboldt

Nearest Communities to Hydrographic Area Winnemucca

Designated (Y/N, Order No.) Y, O-1247 **For All or Portion of Basin:** All

Preferred Use (Order No., Description) O-1247 ENV, temp STK **For All or Portion of Basin:** All

State Engineer's Orders: **For All or Portion of Basin:**

State Engineer's Rulings:

Pumpage Inventory Status Ongoing **Crop Inventory Status** None

Water Level Measurement? Y

Yield Values

Perennial Yield (AFY) 13000

System Yield (AFY) 20000

Yield Reference(s) USGS Recon. 29

Yield Remarks

Source of Committed Data: NDWR Database **Supplementally Adjusted?**

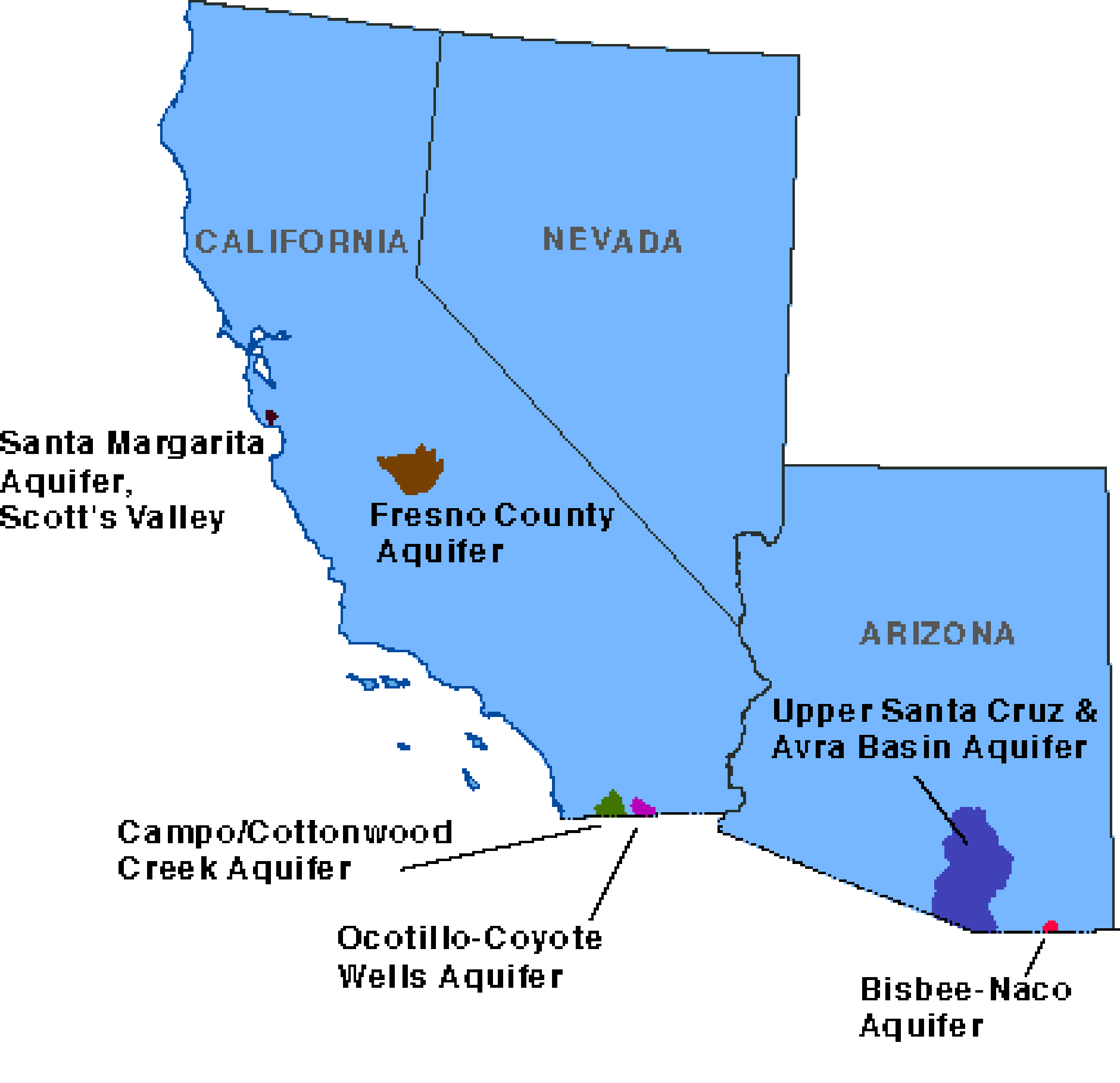
Manner of Use	Underground	Geothermal	Other Ground Water
Commercial	117.09	0.00	0.00
Construction	0.00	0.00	0.00
Domestic	1,422.87	0.00	0.00
Environmental	0.00	0.00	0.00
Industrial	1,122.48	0.00	0.00
Irrigation	29,575.02	0.00	0.00
Mining and Milling	1,447.94	0.00	0.00
Municipal	5,539.53	0.00	0.00
Power	0.00	0.00	0.00
Quasi-Municipal	380.62	0.00	0.00
Recreation	0.00	0.00	0.00
Stockwater	75.29	0.00	0.00
Storage	0.00	0.00	0.00
Wildlife	0.00	0.00	0.00
Other	0.00	0.00	0.00
Totals	39,680.84	0.00	0.00

Related Reports

USGS Reconnaissance 29 **USGS Bulletin** None

Other References

Comments Supplemental adjustment in process since 10/1/2011


CALIFORNIA
NEVADA
ARIZONA
Santa Margarita Aquifer, Scott's Valley
Fresno County Aquifer
Upper Santa Cruz & Avra Basin Aquifer
Campo/Cottonwood Creek Aquifer
Ocotillo-Coyote Wells Aquifer
Bisbee-Naco Aquifer

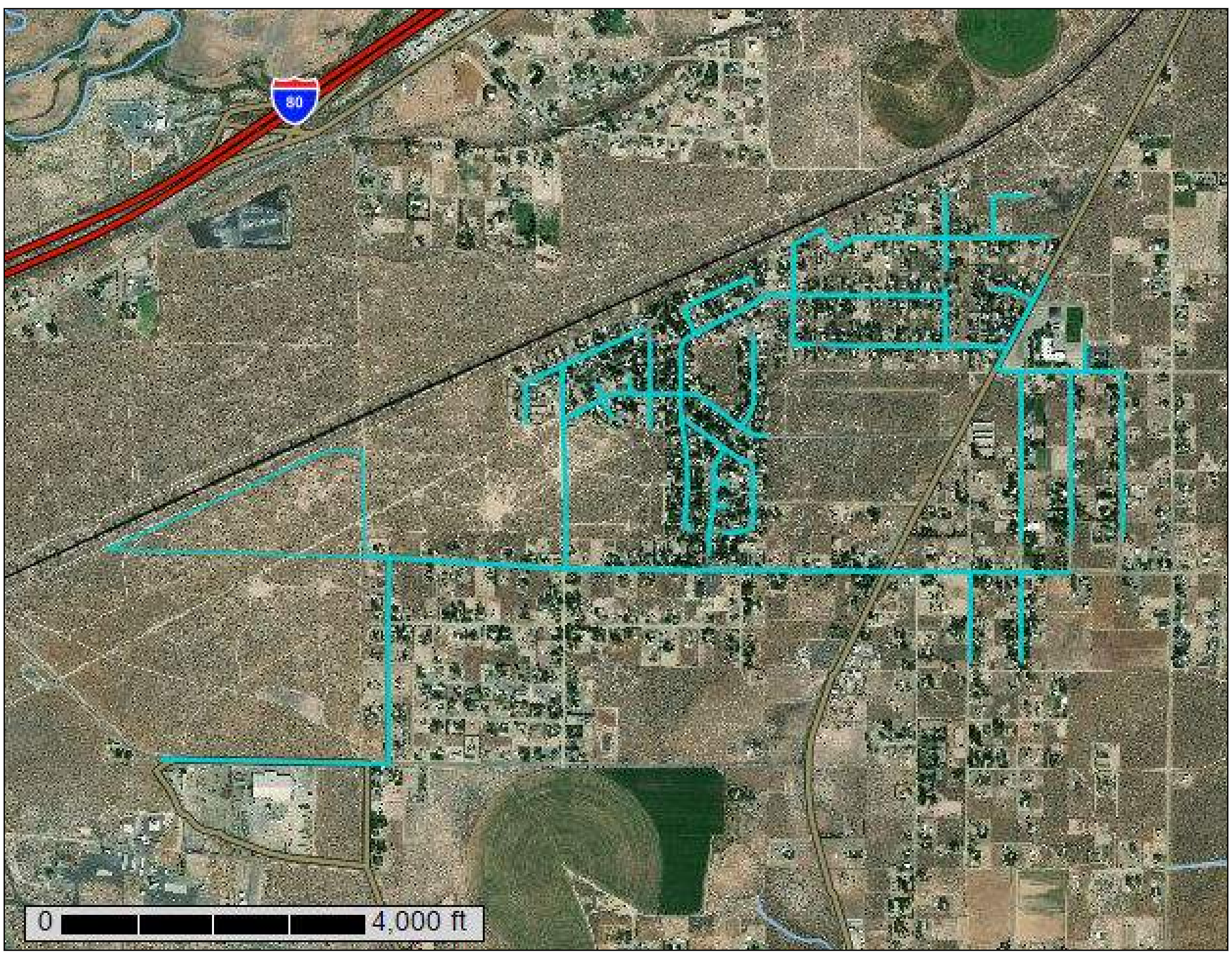
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for
Humboldt County, Nevada, East Part



January 6, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

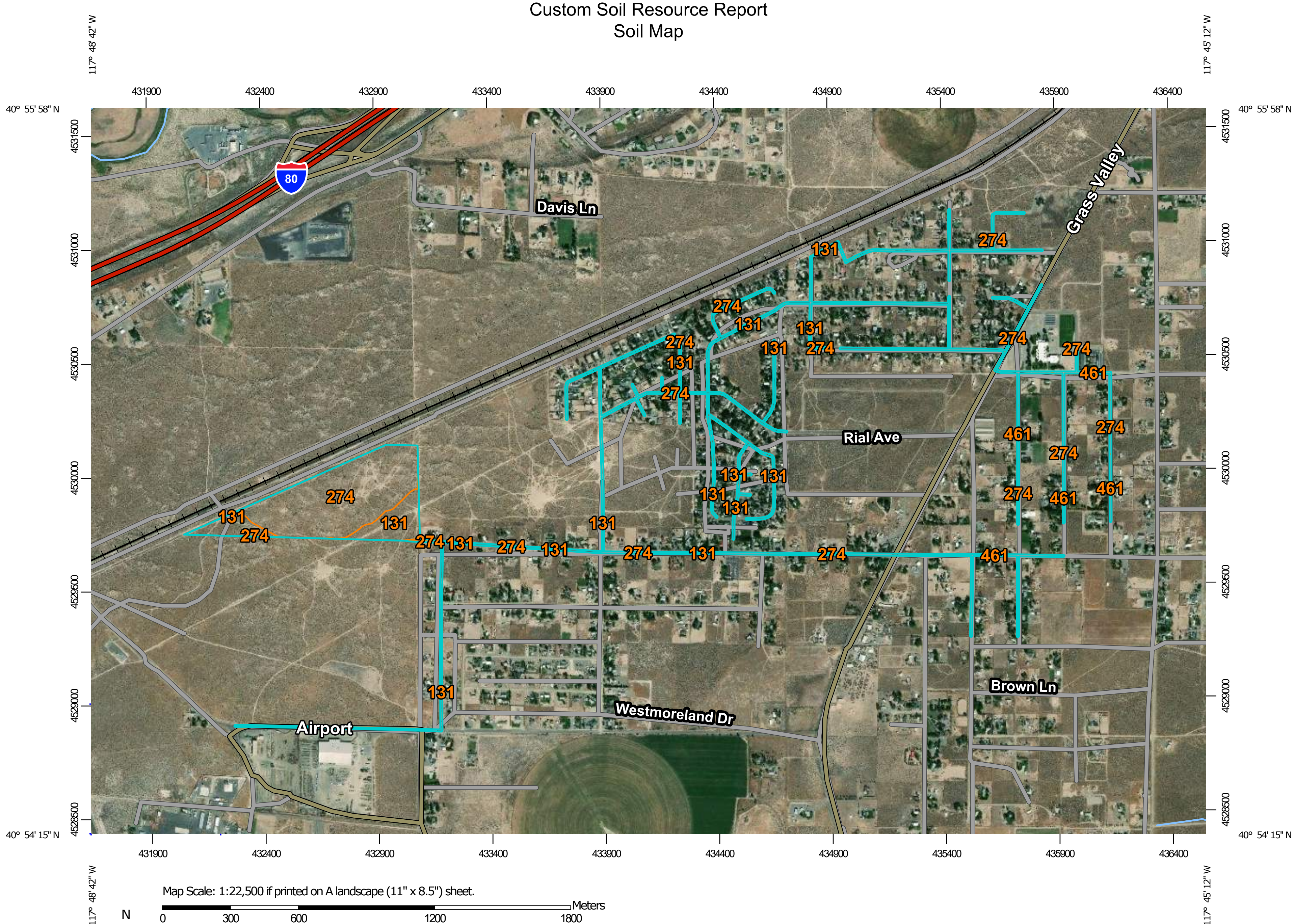
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:22,500 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 300, 600, 1200, 1800

Feet: 0, 1000, 2000, 4000, 6000

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Humboldt County, Nevada, East Part
Survey Area Data: Version 15, Sep 9, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 15, 2014—Oct 6, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
131	Benin silt loam 1/	24.2	23.6%
274	Goldrun-Benin complex, 0 to 15 percent slopes 1/	72.2	70.3%
461	Rad fine sandy loam, 0 to 2 percent slopes 1/	6.4	6.2%
Totals for Area of Interest		**102.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Humboldt County, Nevada, East Part

131—Benin silt loam 1/

Map Unit Setting

National map unit symbol: hyrx
Elevation: 4,160 to 5,000 feet
Mean annual precipitation: 6 to 8 inches
Mean annual air temperature: 47 to 49 degrees F
Frost-free period: 100 to 120 days
Farmland classification: Farmland of statewide importance, if irrigated

Map Unit Composition

Benin and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Benin

Setting

Landform: Lake terraces
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Lacustrine deposits

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 70 inches: silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 50.0
Available water supply, 0 to 60 inches: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: R024XY002NV - LOAMY 5-8 P.Z.
Other vegetative classification: LOAMY 5-8 P.Z. (024XY002NV_1)
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 10 percent

274—Goldrun-Benin complex, 0 to 15 percent slopes 1/

Map Unit Setting

National map unit symbol: hyyz
Elevation: 4,160 to 4,600 feet
Mean annual precipitation: 6 to 9 inches
Mean annual air temperature: 47 to 49 degrees F
Frost-free period: 90 to 120 days
Farmland classification: Farmland of statewide importance, if irrigated

Map Unit Composition

Goldrun and similar soils: 50 percent
Benin and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Goldrun

Setting

Landform: Dunes
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian deposits

Typical profile

H1 - 0 to 7 inches: fine sand
H2 - 7 to 67 inches: fine sand

Properties and qualities

Slope: 2 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): 4s

Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: R024XY001NV - DUNES 6-10 P.Z.
Hydric soil rating: No

Description of Benin

Setting

Landform: Lake terraces
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Lacustrine deposits

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 70 inches: silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 50.0
Available water supply, 0 to 60 inches: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: R024XY002NV - LOAMY 5-8 P.Z.
Other vegetative classification: LOAMY 5-8 P.Z. (024XY002NV_1)
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 15 percent

461—Rad fine sandy loam, 0 to 2 percent slopes 1/

Map Unit Setting

National map unit symbol: hz1l

Elevation: 4,200 to 4,600 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 47 to 49 degrees F
Frost-free period: 100 to 120 days
Farmland classification: Prime farmland if irrigated and reclaimed of excess salts and sodium

Map Unit Composition

Rad and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rad

Setting

Landform: Fan skirts
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium

Typical profile

H1 - 0 to 6 inches: fine sandy loam
H2 - 6 to 20 inches: stratified fine sandy loam to silt loam
H3 - 20 to 39 inches: very fine sandy loam
H4 - 39 to 60 inches: stratified sandy loam to silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 40.0
Available water supply, 0 to 60 inches: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): 2c
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: C
Ecological site: R024XY017NV - SANDY 8-10 P.Z.
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 15 percent

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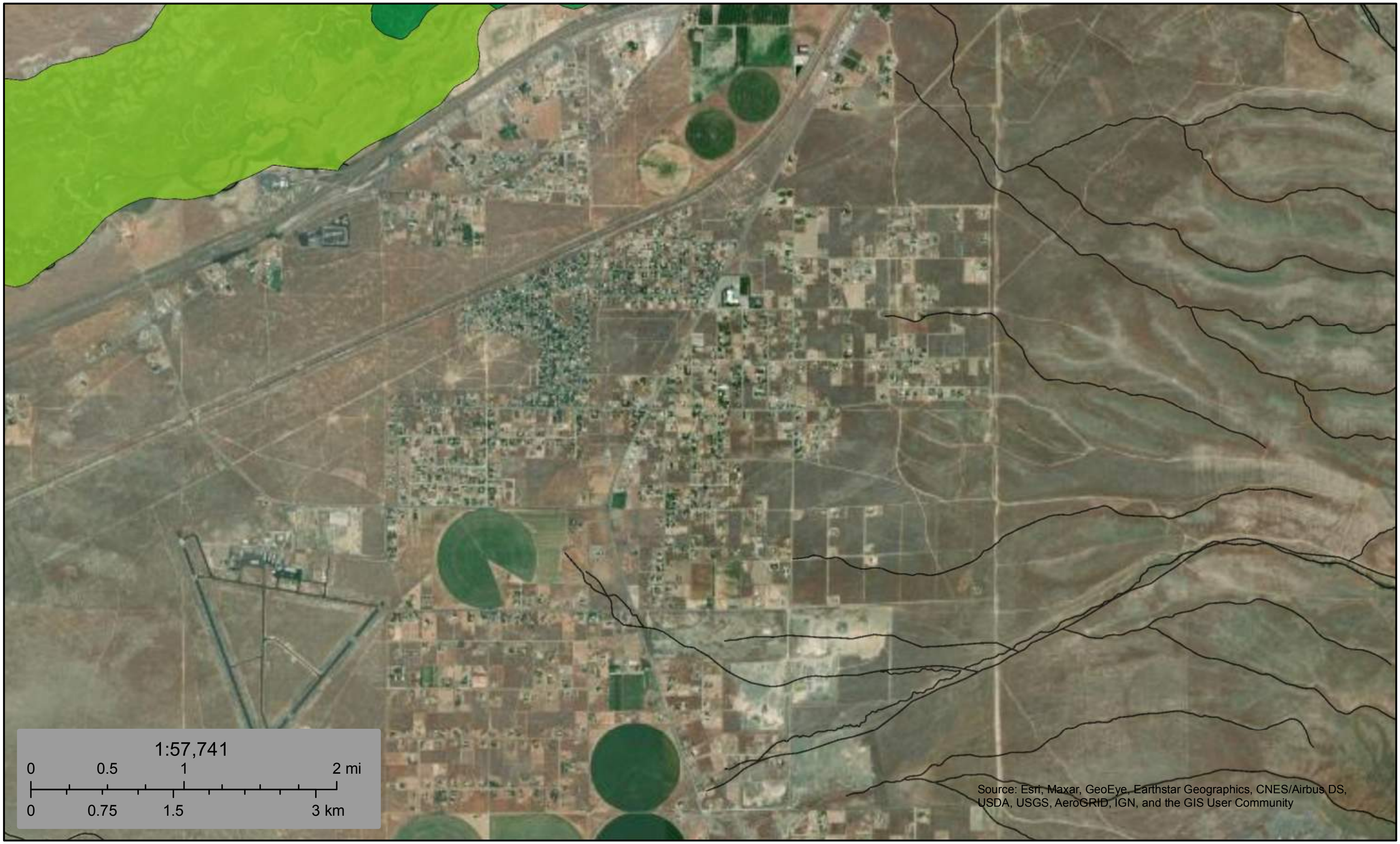
U.S. Fish and Wildlife Service

National Wetlands Inventory

Humboldt GV Close



January 4, 2022

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

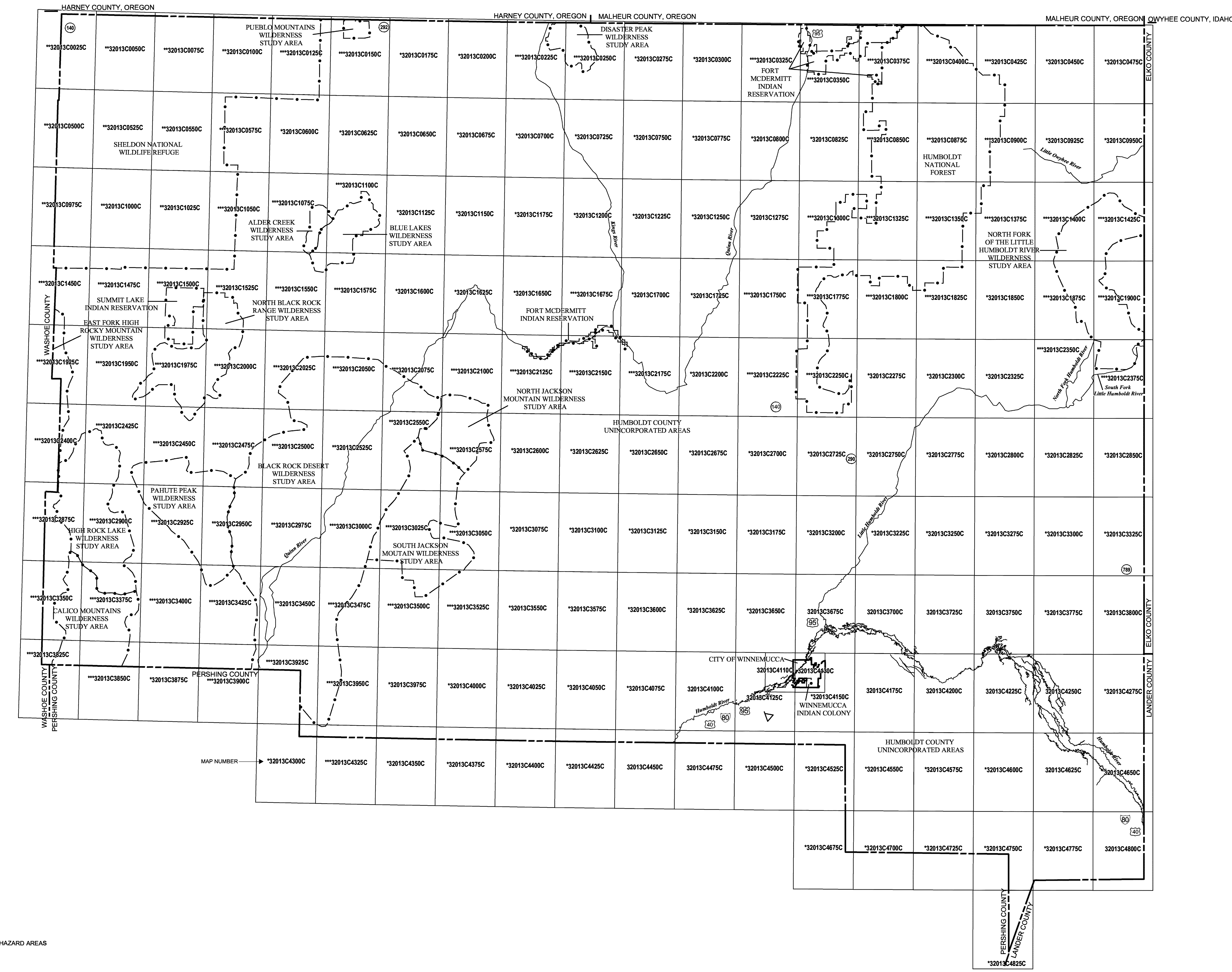
LISTING OF COMMUNITIES

COMMUNITY NAME	COMMUNITY NUMBER	LOCATED ON PANELS	INITIAL NFIP MAP DATE	INITIAL FIRM DATE	MOST RECENT FIRM PANEL DATE
HUMBOLDT COUNTY (UNINCORPORATED AREAS)	320011	0025*, 0050*, 0075*, 0100*, 0125*, 0150*, 0175*, 0200*, 0225*, 0250*, 0275*, 0300*, 0325*, 0350*, 0375*, 0400*, 0425*, 0450*, 0475*, 0500*, 0525*, 0550*, 0575*, 0600*, 0625*, 0650*, 0675*, 0700*, 0725*, 0750*, 0775*, 0800*, 0825*, 0850*, 0875*, 0900*, 0925*, 0950*, 0975*, 1000*, 1025*, 1050*, 1075*, 1100*, 1125*, 1150*, 1175*, 1200*, 1225*, 1250*, 1275*, 1300*, 1325*, 1350*, 1375*, 1400*, 1425*, 1450*, 1475*, 1500*, 1525*, 1550*, 1575*, 1600*, 1625*, 1650*, 1675*, 1700*, 1725*, 1750*, 1775*, 1800*, 1825*, 1850*, 1875*, 1900*, 1925*, 1950*, 1975*, 2000*, 2025*, 2050*, 2075*, 2100*, 2125*, 2150*, 2175*, 2200*, 2225*, 2250*, 2275*, 2300*, 2325*, 2350*, 2375*, 2400*, 2425*, 2450*, 2475*, 2500*, 2525*, 2550*, 2575*, 2600*, 2625*, 2650*, 2675*, 2700*, 2725*, 2750*, 2775*, 2800*, 2825*, 2850*, 2875*, 2900*, 2925*, 2950*, 2975*, 3000*, 3025*, 3050*, 3075*, 3100*, 3125*, 3150*, 3175*, 3200*, 3225*, 3250*, 3275*, 3300*, 3325*, 3350*, 3375*, 3400*, 3425*, 3450*, 3475*, 3500*, 3525*, 3550*, 3575*, 3600*, 3625*, 3650*, 3675, 3700, 3725, 3750, 3775*, 3800*, 3825*, 3850*, 3875*, 3900*, 3925*, 3950*, 3975*, 4000*, 4025*, 4050*, 4075*, 4100, 4110, 4125, 4130, 4150*, 4175, 4200, 4225, 4250, 4275*, 4300*, 4325*, 4350*, 4375*, 4400*, 4425*, 4450, 4475, 4500*, 4525*, 4550*, 4575*, 4600*, 4625, 4650, 4675*, 4700*, 4725*, 4750*, 4775*, 4800, 4825*	5/04/1987	5/04/1987	03/17/2010
CITY OF WINNEMUCCA	320012	4110, 4130, 4150*	4/23/1976	9/4/1985	03/17/2010

*Panel Not Printed

FIRM Panel dates For Printed Panels of Humboldt County, NV And Incorporated Areas

Panel	Effective Date	Panel	Effective Date	Panel	Effective Date
3675C	MARCH 17, 2010	4125C	MARCH 17, 2010	4450C	MARCH 17, 2010
3700C	MARCH 17, 2010	4130C	MARCH 17, 2010	4475C	MARCH 17, 2010
3725C	MARCH 17, 2010	4175C	MARCH 17, 2010	4625C	MARCH 17, 2010
3750C	MARCH 17, 2010	4200C	MARCH 17, 2010	4650C	MARCH 17, 2010
4100C	MARCH 17, 2010	4225C	MARCH 17, 2010	4800C	MARCH 17, 2010
4110C	MARCH 17, 2010	4250C	MARCH 17, 2010		



* PANEL NOT PRINTED - NO SPECIAL FLOOD HAZARD AREAS
** PANEL NOT PRINTED - ALL ZONE D
*** PANEL NOT PRINTED - ZONE D/X PANEL

ELEVATION DATUM

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282
(301) 713-3242

MAP REPOSITORIES

(Maps available for reference only, not for distribution.)

HUMBOLDT COUNTY
(UNINCORPORATED AREAS):
Planning & Zoning
50 West 5th Street
Winnemucca, NV 89445

CITY OF WINNEMUCCA
City of Winnemucca
90 West 4th Street
Winnemucca, NV 89445

BASE MAP SOURCE

Base map information shown on this FIRM was provided in digital format by the USDA National Agriculture Imagery Program (NAIP). This information was photogrammetrically compiled at a scale of 1:12,000 from aerial photography dated 2006.

NOTE TO USER

Future revisions to this FIRM Index will only be issued to communities that are located on FIRM panels being revised. This FIRM Index therefore remains valid for FIRM panels dated March 17, 2010 or earlier. Please refer to the "MOST RECENT FIRM PANEL DATE" column in the Listing of Communities table to determine the most recent FIRM Index date for each community.

MAP DATES

This FIRM Index displays the map dates for each FIRM panel at the time that this Index was printed. Because this Index may not be distributed to unaffected communities in subsequent revisions, users may determine the most current map date for each FIRM panel by visiting the FEMA Map Service Center website at http://msc.fema.gov or by calling the Map Service Center at 1-800-358-9616.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Map Service Center at the number listed above.

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

MAP INDEX

FIRM

FLOOD INSURANCE RATE MAP

HUMBOLDT COUNTY, NEVADA AND INCORPORATED AREAS

(SEE LISTING OF COMMUNITIES TABLE)

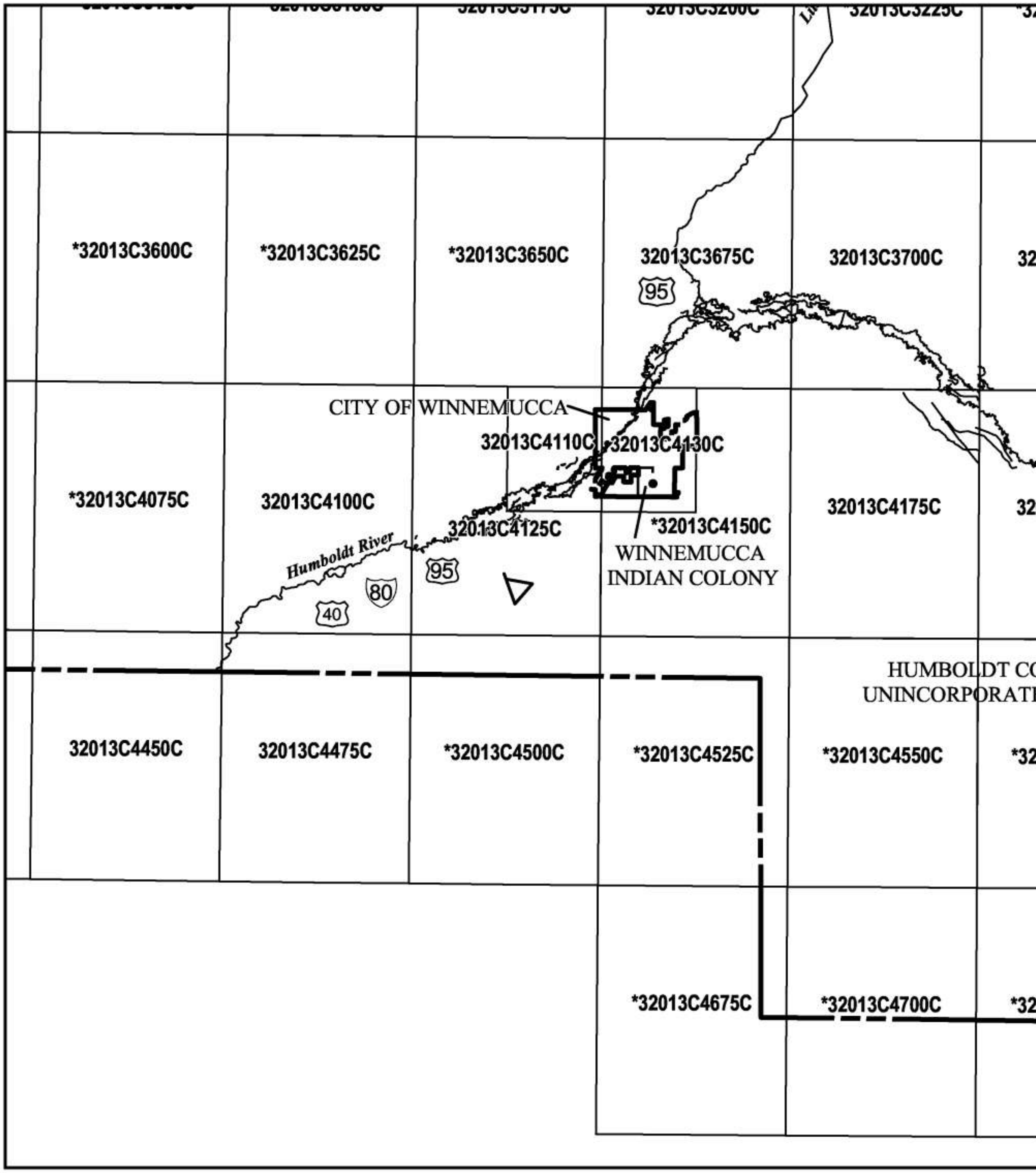
MAP INDEX

PANELS PRINTED: 3675, 3700, 3725, 3750, 4100, 4110, 4125, 4130, 4175, 4200, 4225, 4250, 4450, 4475, 4625, 4650, 4800

MAP NUMBER
32013CIND0A

EFFECTIVE DATE
MARCH 17, 2010

Federal Emergency Management Agency



NFIP

NATIONAL FLOOD INSURANCE PROGRAM

MAP INDEX

FIRM

FLOOD INSURANCE RATE MAP

HUMBOLDT COUNTY, NEVADA
AND INCORPORATED AREAS

(SEE LISTING OF COMMUNITIES TABLE)

MAP INDEX

PANELS PRINTED: 3675, 3700, 3725, 3750, 4100, 4110, 4125, 4130, 4175, 4200, 4225, 4250, 4450, 4475, 4625, 4650, 4800

MAP NUMBER
32013CIND0A

EFFECTIVE DATE
MARCH 17, 2010

Federal Emergency Management Agency

f flood insurance is available in this community, contact the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 2000'

1000 0 2000 4000 FEET

600 0 600 1200 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 4125C

FIRM
FLOOD INSURANCE RATE MAP
HUMBOLDT COUNTY, NEVADA
AND INCORPORATED AREAS

PANEL 4125 OF 4825

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HUMBOLDT COUNTY	320011	4125	C

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 32013C4125C

EFFECTIVE DATE MARCH 17, 2010

Federal Emergency Management Agency

Change the State:

NEVADA GO

Important Notes

Download National Dataset: dbf | xls | Data dictionary (PDF)

County	NAAQS	Area Name	Nonattainment in Year	Redesignation to Maintenance	Classification	Whole or/ Part County	Population (2010)	State/ County FIPS Codes
NEVADA								
Carson City	Carbon Monoxide (1971)	Lake Tahoe, NV	92 93 94 95 96 97 98 99 00 01 02 03	02/13/2004	Not Classified	Part	10,342	32/510
Clark County	8-Hour Ozone (1997)-NAAQS revoked	Las Vegas, NV	04 05 06 07 08 09 10 11 12	02/07/2013	Marginal	Part	1,918,819	32/003
Clark County	8-Hour Ozone (2015)	Las Vegas, NV	18 19 20 21	/ /	Marginal	Part	1,892,250	32/003
Clark County	Carbon Monoxide (1971)	Las Vegas, NV	92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09	09/27/2010	Serious	Part	679,034	32/003
Clark County	PM-10 (1987)	Clark Co, NV	92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13	11/05/2014	Serious	Part	1,951,248	32/003
Douglas County	Carbon Monoxide (1971)	Lake Tahoe, NV	92 93 94 95 96 97 98 99 00 01 02 03	02/13/2004	Not Classified	Part	10,401	32/005
Washoe County	1-Hour Ozone (1979)-NAAQS revoked	Reno, NV	92 93 94 95 96 97 98 99 00 01 02 03 04	/ /	Marginal	Whole	421,407	32/031
Washoe County	Carbon Monoxide (1971)	Lake Tahoe, NV	92 93 94 95 96 97 98 99 00 01 02 03	02/13/2004	Not Classified	Part	12,516	32/031
Washoe County	Carbon Monoxide (1971)	Reno, NV	92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07	08/04/2008	Moderate <= 12.7ppm	Part	221,743	32/031
Washoe County	PM-10 (1987)	Washoe Co, NV	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15	01/07/2016	Serious	Part	421,404	32/031
White Pine County	Sulfur Dioxide (1971)	Central Steptoe Valley (White Pine Co.), NV	92 93 94 95 96 97 98 99 00 01	06/11/2002		Part	2,165	32/033

Appendix B

STEVE SISOLAK
Governor

STATE OF NEVADA

DEPARTMENT OF WILDLIFE

6980 Sierra Center Parkway, Suite 120
Reno, Nevada 89511
Phone (775) 688-1500 • Fax (775) 688-1595

TONY WASLEY
Director

BONNIE LONG
Deputy Director

JACK ROBB
Deputy Director

May 17, 2022

Emily Paris
Water Rights Technician
Farr West Engineering
5510 Longley Lane
Reno, Nevada 89511

Re: Humboldt County Wastewater Project

Dear Emily Paris:

I am responding to your request for information from the Nevada Department of Wildlife (NDOW) on the known or potential occurrence of wildlife resources in the vicinity of the Humboldt County Wastewater Project located in Humboldt County, Nevada. In order to fulfill your request, a query was performed using the best available data from the NDOW's wildlife occurrences, raptor nest sites and ranges, greater sage-grouse leks and habitat, and big game distributions databases. No warranty is made by the NDOW as to the accuracy, reliability, or completeness of the data for individual use or aggregate use with other data. The absence of data does not imply the absence of species or associated habitat, and additional coordination may be necessary to adequately address species or habitat presence or limits to existing data. These data should be considered **sensitive** and may contain information regarding the location of sensitive wildlife species or resources. All appropriate measures should be taken to ensure that the use of this data is strictly limited to serve the needs of the project described on your GIS Data Request Form. Abuse of this information has the potential to adversely affect the existing ecological status of Nevada's wildlife resources and could be cause for the denial of future data requests.

To adequately provide wildlife resource information in the vicinity of the proposed project the NDOW delineated an area of interest that included a four-mile buffer around the project area provided by you on Tuesday, May 17, 2022. Wildlife resource data was queried from the NDOW databases based on this area of interest. The results of this analysis are summarized below.

Big Game - Occupied pronghorn antelope distribution exists throughout the entire project area and four-mile buffer area. Occupied mule deer distribution exists outside of the project area within portions of the four-mile buffer area. No known occupied bighorn sheep or elk distributions exist in the vicinity of the project area. Please refer to the attached maps for details regarding big game distributions relative to the proposed project area.

Greater Sage-Grouse - Greater sage-grouse habitat in the vicinity of the project area has primarily been classified as Other habitat by the Nevada Sagebrush Ecosystem Program (http://sagebrusheco.nv.gov). General habitat also exists in the vicinity of the project area. Please refer to the attached map for details regarding greater sage-grouse habitat relative to the proposed project area. There are no known radio-marked greater sage-grouse tracking locations in the vicinity of the project area. There are no known greater sage-grouse lek sites in the vicinity of the project area.

Raptors - Various species of raptors, which use diverse habitat types, may reside in the vicinity of the project area. American kestrel, bald eagle, barn owl, burrowing owl, Cooper's hawk, ferruginous hawk, golden eagle, great horned owl, long-eared owl, merlin, northern goshawk, northern harrier, northern saw-whet owl, osprey, peregrine falcon, red-tailed hawk, rough-legged hawk, sharp-shinned hawk, short-eared owl, Swainson's hawk, turkey vulture, and western screech owl have distribution ranges that include the project area and four-mile buffer area. Furthermore, the following raptor species have been directly observed in the vicinity of the project area:

American kestrel	golden eagle	red-tailed hawk
barn owl	great horned owl	rough-legged hawk
burrowing owl	long-eared owl	Swainson's hawk
ferruginous hawk	prairie falcon	

Raptor species are protected by State and Federal laws. In addition, bald eagle, burrowing owl, California spotted owl, ferruginous hawk, flammulated owl, golden eagle, northern goshawk, peregrine falcon, prairie falcon, and short-eared owl are NDOW species of special concern and are target species for conservation as outlined by the Nevada Wildlife Action Plan. Per the *Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance* (United States Fish and Wildlife Service 2010) we have queried our raptor nest database to include raptor nest sites within ten miles of the proposed project area. There are 11 known or suspected raptor nest sites within ten miles of the project area:

Active Date	Check Date	Township/Range/Section	Probable Use
	4/29/1983		accipiter/buteo
	4/25/1980		buteo
	4/25/1980		buteo
	1/1/1974		eagle
	6/10/1975		falcon
	1/1/1980		falcon
	4/28/1983		ferruginous hawk
	1/1/1999		ferruginous hawk
	4/25/1980		northern goshawk
	4/25/1980		owl
	4/28/1983		owl

<u>* Nest Size</u> – If a stick nest, the general size of the nest. For example, ravens and sharp-shinned hawks often build "small" nests, "medium"-sized nests could be larger accipiters or most buteos, "large"-sized nests could be larger buteos (e.g., large ferruginous hawk nests) or most eagle nests, and "extra large" nests are most often very large eagle nests.

Other Wildlife Resources

There are no big game and one small game water developments in the vicinity of the project area. The following species have also been observed in the vicinity of the project area:

Common Name	ESA	State	SWAP SoCP
black-crowned night-heron		Protected	
blue-winged teal			
brook trout			
brown trout			
cinnamon teal			
common raven		Protected	
cottontail (unknown)			
coyote		Unprotected	
junco (unknown)			
Lahontan cutthroat trout	Threatened		Yes
little brown myotis			Yes
long-nosed leopard lizard			Yes

long-tailed weasel		Unprotected	
mourning dove			
northern desert horned lizard			Yes
quail (unknown)			
rainbow trout			
rock dove			
western grebe		Protected	

ESA: Endangered Species Act Status
State: State of Nevada Special Status
SWAP SoCP: Nevada State Wildlife Action Plan (2012) Species of Conservation Priority

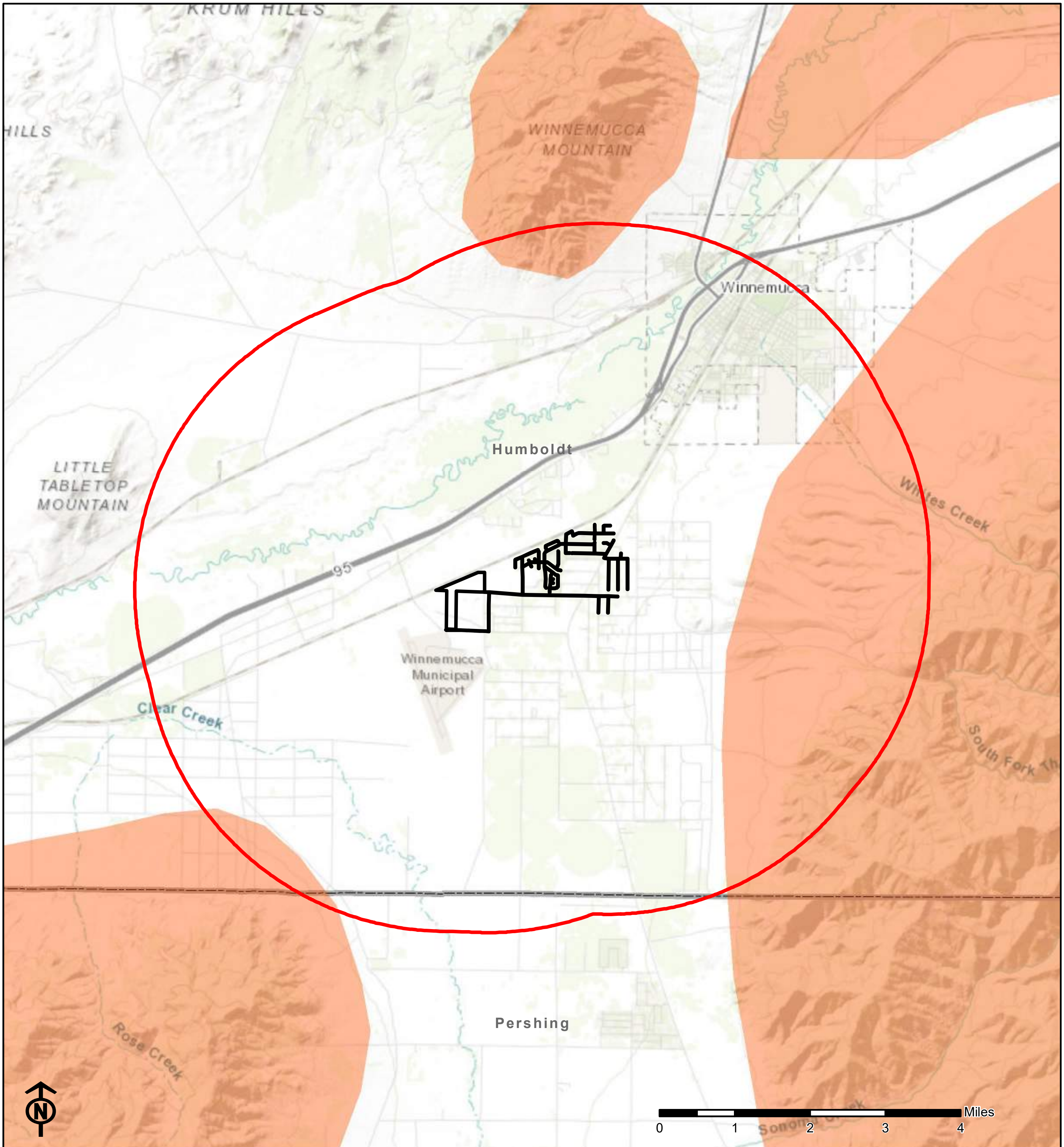
The proposed project area may also be in the vicinity of abandoned mine workings, which often provide habitat for state and federally protected wildlife, especially bat species, many of which are protected under NAC 503.030. To request data regarding known abandoned mine workings in the vicinity of the project area please contact the Nevada Division of Minerals (http://minerals.state.nv.us/).

The above information is based on data stored at our Reno Headquarters Office and does not necessarily incorporate the most up to date wildlife resource information collected in the field. Please contact the Habitat Division Supervising Biologist at our to discuss the current environmental conditions for your project area and the interpretation of our analysis. Furthermore, it should be noted that the information detailed above is preliminary in nature and not necessarily an identification of every wildlife resource concern associated with the proposed project. Consultation with the Supervising Habitat biologist will facilitate the development of appropriate survey protocols and avoidance or mitigation measures that may be required to address potential impacts to wildlife resources.

Katie Andrle - Western Region Supervising Habitat Biologist (775.688.1145)

Federally listed Threatened and Endangered species are also under the jurisdiction of the United States Fish and Wildlife Service. Please contact them for more information regarding these species.

If you have any question regarding the results or methodology of this analysis, please do not hesitate to contact Jinna Larkin at (755) 688-1580.



Project Area
Four Mile Buffer Area Boundary
Mule Deer Distribution

Humboldt County Wastewater Project
Mule Deer Distribution

May 17, 2022

Projection: UTM Zone 11 North, NAD83

No warranty is made by the Nevada Department of Wildlife as to the accuracy, reliability, or completeness of the data for individual use or aggregate use with other data.

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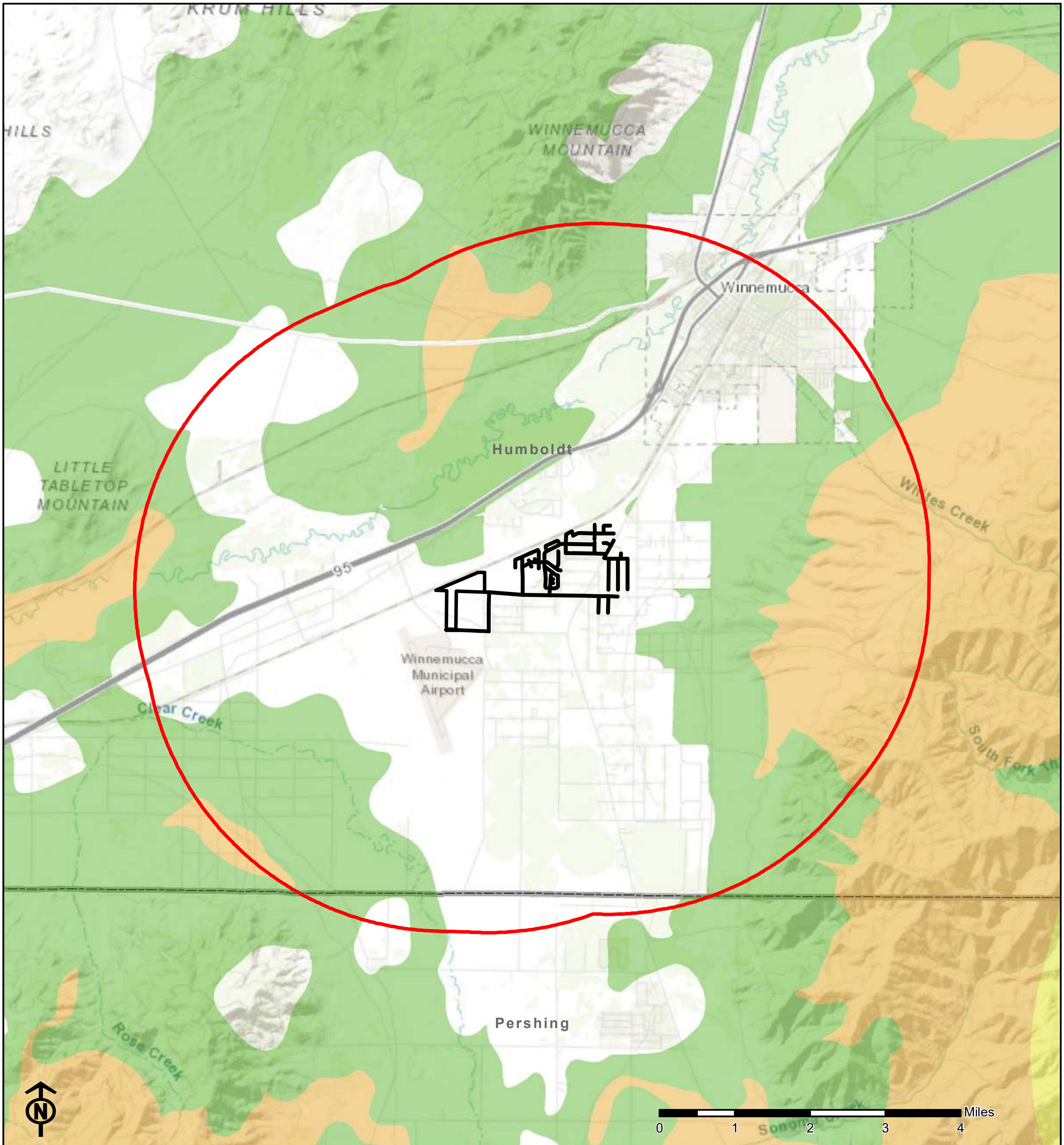


Project Area

Four Mile Buffer Area Boundary

Priority Habitat

General Habitat

Other Habitat

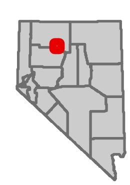
Bi-State Habitat

Humboldt County Wastewater Project
Greater Sage-Grouse Habitat

May 17, 2022

Projection: UTM Zone 11 North, NAD83

No warranty is made by the Nevada Department of Wildlife as to the accuracy, reliability, or completeness of the data for individual use or aggregate use with other data.



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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Reno Fish And Wildlife Office
1340 Financial Boulevard, Suite 234
Reno, NV 89502-7147
Phone: (775) 861-6300 Fax: (775) 861-6301
http://www.fws.gov/reno/

In Reply Refer To: May 17, 2022
Project Code: 2022-0043876
Project Name: Humboldt County Grass Valley Sewer Project

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Reno Fish And Wildlife Office
1340 Financial Boulevard, Suite 234
Reno, NV 89502-7147
(775) 861-6300

Project Summary

Project Code: 2022-0043876
Event Code: None
Project Name: Humboldt County Grass Valley Sewer Project
Project Type: Wastewater Facility - New Construction
Project Description: The basis for design will include a sanitary sewer collection system, a mechanical treatment facility (WWTF), and rapid infiltration basins (RIBs). The sanitary sewer collection system will be installed in the project area and connected to existing residential and commercial sewer systems. There will be three lift stations included in the construction of the collection system and one station just prior to the WWTF to contend with elevations that prohibit a gravity-based design. The new WWTF is planned to be on Humboldt County APN 013-064-01 (Parcel A) or Humboldt County APN 013-273-06 (Parcel B). See Figure 4 for Parcel Locations.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@40.9185609,-117.79698008940846,14z

Counties: Humboldt County, Nevada

Endangered Species Act Species

There is a total of 1 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Rufous Hummingbird *selasphorus rufus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8002	Breeds Apr 15 to Jul 15

NAME	BREEDING SEASON
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

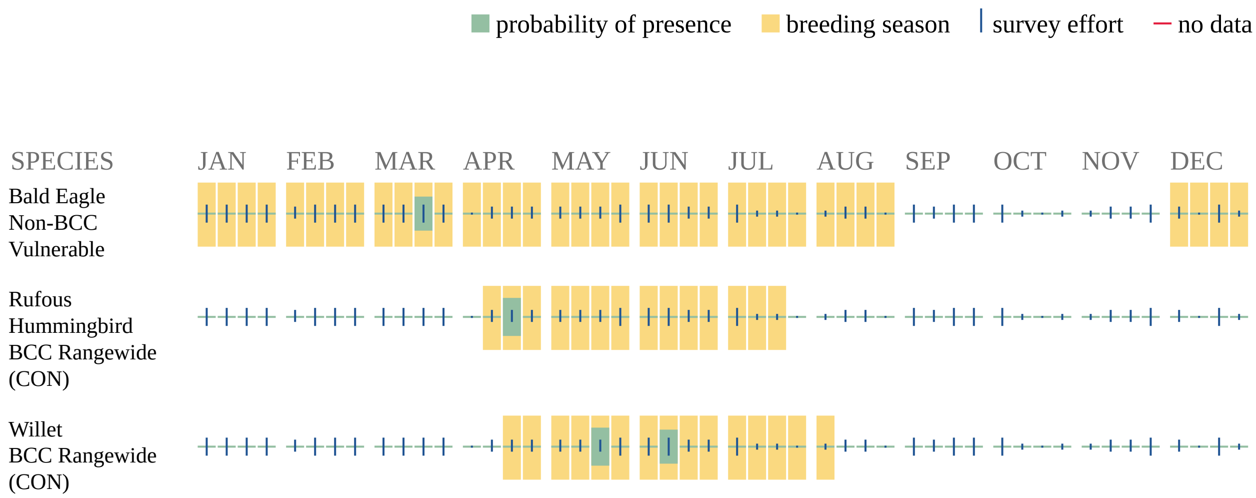
1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles)

potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

WETLAND INFORMATION WAS NOT AVAILABLE WHEN THIS SPECIES LIST WAS GENERATED. PLEASE VISIT HTTPS://WWW.FWS.GOV/WETLANDS/DATA/MAPPER.HTML OR CONTACT THE FIELD OFFICE FOR FURTHER INFORMATION.

IPaC User Contact Information

Agency: County of Humboldt
Name: Emily Paris
Address: 5510 Longley Lane
City: Reno
State: NV
Zip: 89511
Email eparis@farrwestengineering.com
Phone: 7753360404

NEVADA
DIVISION OF
NATURAL HERITAGE

STATE OF NEVADA
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
Nevada Division of Natural Heritage

Steve Sisolak
Governor

Bradley Crowell
Director

Kristin Szabo
Administrator

18 May 2022

Emily Paris
Farr West Engineering
5510 Longley Lane
Reno, NV 89511

RE: Data request received 18 May 2022

Dear Ms. Paris:

We are pleased to provide the information you requested on endangered, threatened, candidate, and/or At-Risk plant and animal taxa recorded within or near the Humboldt County Revised Wastewater System Installation Project areas in Humboldt Co. We searched our database and maps for the following, a 2-kilometer radius around the shape files provided, including:

Township 35N   Range 37E   Sections 10-15

There are no at-risk taxa recorded within the given area. However, habitat may be available for, the Nevada viceroy, *Limenitis archippus lahontani*, a Taxon determined to be Critically Imperiled by the Nevada Division of Natural Heritage, and the Rice's blue, *Euphilotes pallescens ricei*, a Nevada Bureau of Land Management Sensitive Species. The Nevada Department of Wildlife (NDOW) manages, protects, and restores Nevada's wildlife resources and associated habitat. Please contact Jinna Larkin, NDOW GIS Coordinator (775) 688-1580 to obtain further information regarding wildlife resources within and near your area of interest. Removal or destruction of state protected flora species requires a special permit from Nevada Division of Forestry (NRS 527.270).

Please note that our data are dependent on the research and observations of many individuals and organizations and, in most cases, are not the result of comprehensive or site-specific field surveys. Natural Heritage reports should never be regarded as final statements on the taxa or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments.

Thank you for checking with our program. Please contact us for additional information or further assistance.

Sincerely,

Eric S. Miskow
Biologist/Data Manager

FARR WEST
ENGINEERING

May 19, 2022

Sig Jaunarais
Planning Supervisor
Nevada Department of Environmental Protection
Bureau of Air Quality Planning
901 S. Stewart St., Suite 4003
Carson City, NV 89701

Re: Humboldt County/Grass Valley Sewer System Replacement Project

Dear Mr. Jaunarais;

Farr West Engineering, on behalf of Humboldt County, is preparing a Preliminary Environmental Assessment for the Grass Valley Sewer System Replacement Project. The project planning area is west of the Sonoma Range and southeast of the Humboldt River, known as Grass Valley, and includes two rural subdivisions south of the City of Winnemucca: Star City Properties and Gold Country Estates. The project area also includes commercial areas north of the Winnemucca Municipal Airport and an area south of Grass Valley Elementary between Mary Way and Johnson Lane. The Grass Valley community is dependent on septic systems for sewer services and has multiple operating water systems. The impacts to public health and groundwater quality caused by high nitrate levels are the primary needs for this project.

The proposed project includes construction of a sanitary sewer collection system, a mechanical treatment facility, and rapid infiltration basins (RIBs). The sanitary sewer collection system will be installed in the project area and connected to existing residential and commercial sewer systems.

The new wastewater treatment facility (WWTF) is planned to be located northwest of Winnemucca Municipal Airport. The project will be located within portions of sections 10, 11, 12, 13, 14, and 15 Township 35N, Range 37E, including approximately 144 acres of possible disturbance, much of which is previously disturbed area. Actual disturbance will be less, the exact location of which will be dependent on placement of the WWTP facility. This Preliminary Environmental Assessment is required due to Humboldt County's application for federal financing of this project.

Enclosed is a Project Location Figure that depicts the project area for all construction activities proposed by this project.

Project components include:

1. Wastewater Treatment Facility
2. Approximately four (4) Rapid Infiltration Basins (RIBs)
3. Collection System including:
    a. Gravity sewer mains, approximately 61,417 linear feet (LF) consisting of:
        i. Approximately 45,092 LF of 8" PVC SDR 35
        ii. Approximately 6,026 LF of 10" PVC SDR 35
        iii. Approximately 5,552 LF of 12" PVC SDR 35
        iv. Approximately 2,344 LF of 15" PVC SDR 35

   v. Approximately 2,403 LF of 18” PVC SDR 35
b. Sewer laterals, approximately 631 connections
c. Force mains, approximately 6,264 LF of 8” PVC C900
d. Sewer manholes, approximately 188 consisting of:
   i. Approximately 184 Type 1-A 48” Manholes
   ii. Approximately 4 Type III 48” Manholes
e. Four Lift Stations
   i. Lift Station 1: Located at the intersection of Saturn Street and Jupiter Street
   ii. Lift Station 2: Located at the North end of Venus Street
   iii. Lift Station 3: Located at the intersection of Stratus Street and Placer Way
   iv. Lift Station 4: Located preceding the treatment facility
f. Abandonment and cleanout of approximately 631 existing septic tanks

The affected areas are located as follows:

Project Component	Township and Range	Section
WWTF	T35N, R37E	Section 10, 15
Rapid Infiltration Basins	T35N, R37E	Section 10, 15
Collection System	T35N, R37E	Sections 11, 12, 13, 14, & 15
Lift stations	T35N, R37E	Sections 10, 11, 12 & 15

Humboldt County, Farr West, and partnering agencies, are committed to complying with federal requirements and Executive Orders that apply to state and federal financial assistance. I am contacting you to ensure this project complies with applicable regulations and policies under your agency’s jurisdiction. We are also requesting information on the possible effects of the above proposed project in which the Bureau determines if the project will have any negative environmental impact and/or any other potential effects regarding air quality. We would appreciate any recommendations you have to minimize or avoid these effects. We also seek your assessment of the compatibility of the proposed project with State, Local, and Federal government or any private programs and policies regarding the environmental impacts of construction within the proposed project area.

We would appreciate a response within 30 days. If you need further information or with to discuss the project, please contact Jessica Dugan of Farr West Engineering at (775) 997-7495.

Thank you,

Jessica L. Dugan, M.S., J.D.
Regulatory and Environmental Specialist

Encls: Project Location Figure
Cc: David Pulley, P.E.
    Dave Mendiola, Humboldt County

FARR WEST
ENGINEERING

May 19, 2022

Brendon Grant
Supervisor, Professional Engineer IV, Vulnerability Assessment
Nevada Department of Environmental Protection
Bureau of Safe Drinking Water
901 S. Stewart Street, Suite 4001
Carson City, NV 89701

Re: Humboldt County/Grass Valley Sewer System Replacement Project

Dear Mr. Grant;

Farr West Engineering, on behalf of Humboldt County, is preparing a Preliminary Environmental Assessment for the Grass Valley Sewer System Replacement Project. The project planning area is west of the Sonoma Range and southeast of the Humboldt River, known as Grass Valley, and includes two rural subdivisions south of the City of Winnemucca: Star City Properties and Gold Country Estates. The project area also includes commercial areas north of the Winnemucca Municipal Airport and an area south of Grass Valley Elementary between Mary Way and Johnson Lane. The Grass Valley community is dependent on septic systems for sewer services and has multiple operating water systems. The impacts to public health and groundwater quality caused by high nitrate levels are the primary needs for this project.

The proposed project includes construction of a sanitary sewer collection system, a mechanical treatment facility, and rapid infiltration basins (RIBs). The sanitary sewer collection system will be installed in the project area and connected to existing residential and commercial sewer systems. The new wastewater treatment facility (WWTF) is planned to be located northwest of Winnemucca Municipal Airport.

The project will be located within portions of sections 10, 11, 12, 13, 14, and 15 Township 35N, Range 37E, including approximately 144 acres of possible disturbance, much of which is previously disturbed. Actual disturbance will be less, the exact location of which will be dependent on placement of the WWTP facility. This Preliminary Environmental Assessment is required due to Humboldt County's application for federal financing of this project.

Enclosed is a Project Location Figure that depicts the project area for all construction activities proposed by this project.

Project components include:

a. Wastewater Treatment Facility
b. Approximately four (4) Rapid Infiltration Basins (RIBs)
c. Collection System including:
a. Gravity sewer mains, approximately 61,417 linear feet (LF) consisting of:
    i. Approximately 45,092 LF of 8" PVC SDR 35
    ii. Approximately 6,026 LF of 10" PVC SDR 35
    iii. Approximately 5,552 LF of 12" PVC SDR 35

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iv. Approximately 2,344 LF of 15” PVC SDR 35
v. Approximately 2,403 LF of 18” PVC SDR 35

b. Sewer laterals, approximately 631 connections
c. Force mains, approximately 6,264 LF of 8” PVC C900
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    ii. Approximately 4 Type III 48” Manholes
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f. Abandonment and cleanout of approximately 631 existing septic tanks

The affected areas are located as follows:

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Collection System	T35N, R37E	Sections 11, 12, 13, 14, & 15
Lift stations	T35N, R37E	Sections 10, 11, 12 & 15

Humboldt County, Farr West, and partnering agencies, are committed to complying with federal requirements and Executive Orders that apply to state and federal financial assistance. I am contacting you to ensure this project complies with applicable regulations and policies under your agency’s jurisdiction. We are also requesting information on the possible effects of the above proposed project in which the Bureau determines if the project will have any negative environmental impact and/or any other potential effects regarding safe drinking water. We would appreciate any recommendations you have to minimize or avoid these effects. We also seek your assessment of the compatibility of the proposed project with State, Local, and Federal government or any private programs and policies regarding the environmental impacts of construction within the proposed project area.

We would appreciate a response within 30 days. If you need further information or with to discuss the project, please contact Jessica Dugan of Farr West Engineering at (775) 997-7495.

Thank you,

Jessica L. Dugan, M.S., J.D.
Regulatory and Environmental Specialist

Encls: Project Location Figure
Cc: David Pulley, P.E.
    Dave Mendiola, Humboldt County

FARR WEST
ENGINEERING

May 19, 2022

Adam Sullivan, P.E.
State Engineer
Nevada Division of Water Resources
901 S. Stewart St., Suite 2002
Carson City, NV 89701

Re: Humboldt County/Grass Valley Sewer System Replacement Project

Dear Mr. Sullivan;

Farr West Engineering, on behalf of Humboldt County, is preparing a Preliminary Environmental Assessment for the Grass Valley Sewer System Replacement Project. The project planning area is west of the Sonoma Range and southeast of the Humboldt River, known as Grass Valley, and includes two rural subdivisions south of the City of Winnemucca: Star City Properties and Gold Country Estates. The project area also includes commercial areas north of the Winnemucca Municipal Airport and an area south of Grass Valley Elementary between Mary Way and Johnson Lane. The Grass Valley community is dependent on septic systems for sewer services and has multiple operating water systems. The impacts to public health and groundwater quality caused by high nitrate levels are the primary needs for this project.

The proposed project includes construction of a sanitary sewer collection system, a mechanical treatment facility, and rapid infiltration basins (RIBs). The sanitary sewer collection system will be installed in the project area and connected to existing residential and commercial sewer systems. The new wastewater treatment facility (WWTF) is planned to be located northwest of Winnemucca Municipal Airport.

The project will be located within portions of sections 10, 11, 12, 13, 14, and 15 Township 35N, Range 37E, including approximately 144 acres of possible disturbance, much of which is previously disturbed. Actual disturbance will be less, the exact location of which will be dependent on placement of the WWTP facility. This Preliminary Environmental Assessment is required due to Humboldt County's application for federal financing of this project.

Enclosed is a Project Location Figure that depicts the area for all construction activities proposed by this project.

Project components include:

g. Wastewater Treatment Facility
h. Approximately four (4) Rapid Infiltration Basins (RIBs)
i. Collection System including:
a. Gravity sewer mains, approximately 61,417 linear feet (LF) consisting of:
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    ii. Approximately 6,026 LF of 10" PVC SDR 35
    iii. Approximately 5,552 LF of 12" PVC SDR 35
    iv. Approximately 2,344 LF of 15" PVC SDR 35

5510 Longley Lane • Reno, Nevada 89511 • (775) 851-4788 • Fax (775) 851-0766
421 Court Street • Elko, Nevada 89801 • (775) 738-2121 • Fax (775) 738-7955
www.farrwestengineering.com

v. Approximately 2,403 LF of 18” PVC SDR 35

b. Sewer laterals, approximately 631 connections
c. Force mains, approximately 6,264 LF of 8” PVC C900
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Lift stations	T35N, R37E	Sections 10, 11, 12 & 15

Humboldt County, Farr West, and partnering agencies, are committed to complying with federal requirements and Executive Orders that apply to state and federal financial assistance. I am contacting you to ensure this project complies with applicable regulations and policies under your agency’s jurisdiction. We are also requesting information on the possible effects of the above proposed project in which the Division determines if the project will have any negative environmental impact and/or any other potential effects regarding water resources. We would appreciate any recommendations you have to minimize or avoid these effects. We also seek your assessment of the compatibility of the proposed project with State, Local, and Federal government or any private programs and policies regarding the environmental impacts of construction within the proposed project area.

We would appreciate a response within 30 days. If you need further information or with to discuss the project, please contact Jessica Dugan of Farr West Engineering at (775) 997-7495.

Thank you,

Jessica L. Dugan, M.S., J.D.
Regulatory and Environmental Specialist

Encls: Project Location Figure
Cc: David Pulley, P.E.
    Dave Mendiola, Humboldt County

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ENGINEERING

May 19, 2022

Katrina Pascual, P.E.
Branch Supervisor
Nevada Bureau of Water Pollution Control
901 S. Stewart St., Suite 2002
Carson City, NV 89701

Re: Humboldt County/Grass Valley Sewer System Replacement Project

Dear Ms. Pascual;

Farr West Engineering, on behalf of Humboldt County, is preparing a Preliminary Environmental Assessment for the Grass Valley Sewer System Replacement Project. The project planning area is west of the Sonoma Range and southeast of the Humboldt River, known as Grass Valley, and includes two rural subdivisions south of the City of Winnemucca: Star City Properties and Gold Country Estates. The project area also includes commercial areas north of the Winnemucca Municipal Airport and an area south of Grass Valley Elementary between Mary Way and Johnson Lane. The Grass Valley community is dependent on septic systems for sewer services and has multiple operating water systems. The impacts to public health and groundwater quality caused by high nitrate levels are the primary needs for this project.

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The project will be located within portions of sections 10, 11, 12, 13, 14, and 15 Township 35N, Range 37E, including approximately 144 acres of possible disturbance, much of which is previously disturbed. Actual disturbance will be less, the exact location of which will be dependent on placement of the WWTP facility. This Preliminary Environmental Assessment is required due to Humboldt County's application for federal financing of this project.

Enclosed is a Project Location Figure that depicts the area for all construction activities proposed by this project.

Project components include:

- j. Wastewater Treatment Facility
- k. Approximately four (4) Rapid Infiltration Basins (RIBs)
- l. Collection System including:
- g. Gravity sewer mains, approximately 61,417 linear feet (LF) consisting of:
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    - iii. Approximately 5,552 LF of 12" PVC SDR 35

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iv. Approximately 2,344 LF of 15” PVC SDR 35
v. Approximately 2,403 LF of 18” PVC SDR 35

h. Sewer laterals, approximately 631 connections
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The affected areas are located as follows:

Project Component	**Township and Range**	**Section**
WWTF	T35N, R37E	Section 10, 15
Rapid Infiltration Basins	T35N, R37E	Section 10, 15
Collection System	T35N, R37E	Sections 11, 12, 13, 14, & 15
Lift stations	T35N, R37E	Sections 10, 11, 12 & 15

Humboldt County, Farr West, and partnering agencies, are committed to complying with federal requirements and Executive Orders that apply to state and federal financial assistance. I am contacting you to ensure this project complies with applicable regulations and policies under your agency’s jurisdiction. We are also requesting information on the possible effects of the above proposed project in which the Division determines if the project will have any negative environmental impact and/or any other potential effects regarding water quality. We would appreciate any recommendations you have to minimize or avoid these effects. We also seek your assessment of the compatibility of the proposed project with State, Local, and Federal government or any private programs and policies regarding the environmental impacts of construction within the proposed project area.

We would appreciate a response within 30 days. If you need further information or with to discuss the project, please contact Jessica Dugan of Farr West Engineering at (775) 997-7495.

Thank you,

Jessica L. Dugan, M.S., J.D.
Regulatory and Environmental Specialist

Encls: Project Location Figure
Cc: David Pulley, P.E.
Dave Mendiola, Humboldt County

FARR WEST
ENGINEERING

May 19, 2022

Rebecca Palmer
Nevada State Historic Preservation Office
901 S. Stewart Street, Suite 5004
Carson City, Nevada 89701-5248

Re: Humboldt County/Grass Valley Sewer System Replacement Project

Dear Ms. Palmer,

Farr West Engineering, on behalf of Humboldt County, is preparing a Preliminary Environmental Assessment for the Grass Valley Sewer System Replacement Project. The project planning area is west of the Sonoma Range and southeast of the Humboldt River, known as Grass Valley, and includes two rural subdivisions south of the City of Winnemucca: Star City Properties and Gold Country Estates. The project area also includes commercial areas north of the Winnemucca Municipal Airport and an area south of Grass Valley Elementary between Mary Way and Johnson Lane. The Grass Valley community is dependent on septic systems for sewer services and has multiple operating water systems. The impacts to public health and groundwater quality caused by high nitrate levels are the primary needs for this project.

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The project will be located within portions of sections 10, 11, 12, 13, 14, and 15 Township 35N, Range 37E, including approximately 144 acres of possible disturbance, much of which is previously disturbed. Actual disturbance will be less, the exact location of which will be dependent on placement of the WWTP facility. This Preliminary Environmental Assessment is required due to Humboldt County's application for federal financing of this project.

Enclosed is a Project Location Figure that depicts the project area for all construction activities proposed by this project.

Project components include:

m. Wastewater Treatment Facility
n. Approximately four (4) Rapid Infiltration Basins (RIBs)
o. Collection System including:
a. Gravity sewer mains, approximately 61,417 linear feet (LF) consisting of:
    i. Approximately 45,092 LF of 8" PVC SDR 35
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    iii. Approximately 5,552 LF of 12" PVC SDR 35
    iv. Approximately 2,344 LF of 15" PVC SDR 35

    v. Approximately 2,403 LF of 18” PVC SDR 35

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Project Component	Township and Range	Section
WWTF	T35N, R37E	Section 10, 15
Rapid Infiltration Basins	T35N, R37E	Section 10, 15
Collection System	T35N, R37E	Sections 11, 12, 13, 14, & 15
Lift stations	T35N, R37E	Sections 10, 11, 12 & 15

Humboldt County, Farr West, and partnering agencies, are committed to complying with federal requirements and Executive Orders that apply to state and federal financial assistance. I am contacting you to ensure this project complies with applicable regulations and policies under your agency’s jurisdiction. We are also requesting information on the possible effects of the above proposed project in which the SHPO determines if the project will have any negative environmental impact and/or any other potential effects regarding State Cultural and Historic resources and Section 106 Consultation. We would appreciate any recommendations you have to minimize or avoid these effects. We also seek your assessment of the compatibility of the proposed project with State, Local, and Federal government or any private programs and policies regarding the environmental impacts of construction within the proposed project area.

We would appreciate a response within 30 days. If you need further information or with to discuss the project, please contact Jessica Dugan of Farr West Engineering at (775) 997-7495.

Thank you,

Jessica L. Dugan, M.S., J.D.
Regulatory and Environmental Specialist

Encls: Project Location Figure
Cc: David Pulley, P.E.
    Dave Mendiola, Humboldt County

FARR WEST
ENGINEERING

May 19, 2022

Nevada State Clearinghouse
901 S. Stewart St., Suite 5003
Carson City, NV 89701

Re: Humboldt County/Grass Valley Sewer System Replacement Project- EA

Dear Interested Public,

Farr West Engineering, on behalf of Humboldt County, is preparing an Environmental Assessment for the Grass Valley Sewer System Replacement Project. The project planning area is west of the Sonoma Range and southeast of the Humboldt River, known as Grass Valley, and includes two rural subdivisions south of the City of Winnemucca: Star City Properties and Gold Country Estates. The project area also includes commercial areas north of the Winnemucca Municipal Airport and an area south of Grass Valley Elementary between Mary Way and Johnson Lane. The Grass Valley community is dependent on septic systems for sewer services and has multiple operating water systems. The impacts to public health and groundwater quality caused by high nitrate levels are the primary needs for this project.

The proposed project includes construction of a sanitary sewer collection system, a mechanical treatment facility, and rapid infiltration basins (RIBs). The sanitary sewer collection system will be installed in the project area and connected to existing residential and commercial sewer systems. The new wastewater treatment facility (WWTF) is planned to be located northwest of Winnemucca Municipal Airport.

The project will be located within portions of sections 10, 11, 12, 13, 14, and 15 Township 35N, Range 37E, including approximately 144 acres of possible disturbance, much of which is previously disturbed. Actual disturbance will be less, the exact location of which will be dependent on placement of the WWTP facility. This Preliminary Environmental Assessment is required due to Humboldt County's application for federal financing of this project.

Enclosed is a Project Location Figure that depicts the project area for all construction activities proposed by this project.

Project components include:

a. Wastewater Treatment Facility
b. Approximately four (4) Rapid Infiltration Basins (RIBs)
c. Collection System including:
d. Gravity sewer mains, approximately 61,417 linear feet (LF) consisting of:
    i. Approximately 45,092 LF of 8" PVC SDR 35
    ii. Approximately 6,026 LF of 10" PVC SDR 35
    iii. Approximately 5,552 LF of 12" PVC SDR 35
    iv. Approximately 2,344 LF of 15" PVC SDR 35
    v. Approximately 2,403 LF of 18" PVC SDR 35
e. Sewer laterals, approximately 631 connections
f. Force mains, approximately 6,264 LF of 8" PVC C900

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g. Sewer manholes, approximately 188 consisting of:
    vi. Approximately 184 Type 1-A 48” Manholes
    vii. Approximately 4 Type III 48” Manholes
h. Four Lift Stations
    viii. Lift Station 1: Located at the intersection of Saturn Street and Jupiter Street
    ix. Lift Station 2: Located at the North end of Venus Street
    x. Lift Station 3: Located at the intersection of Stratus Street and Placer Way
    xi. Lift Station 4: Located preceding the treatment facility
i. Abandonment and cleanout of approximately 631 existing septic tanks

The affected areas are located as follows:

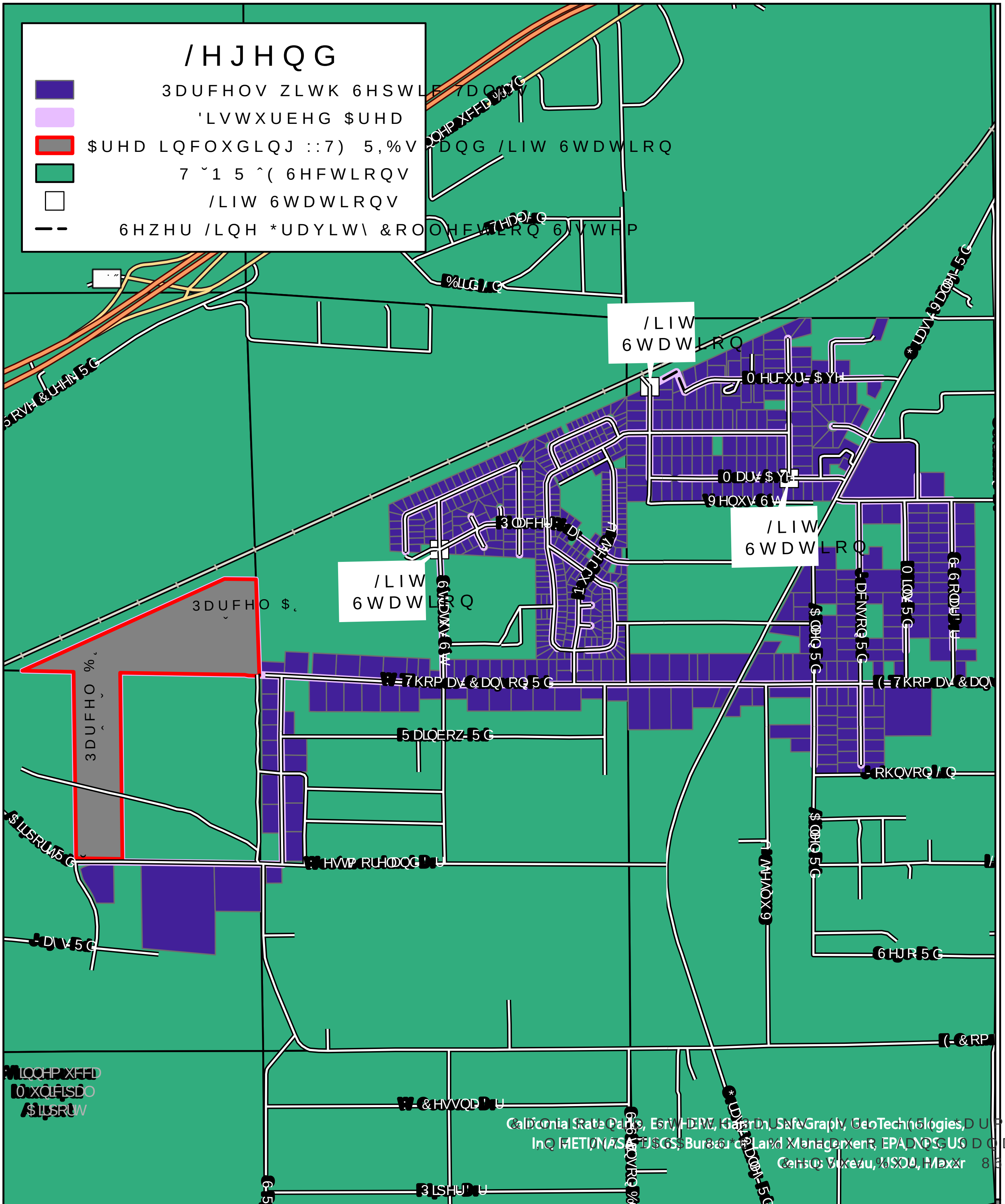
Project Location	**Township and Range**	**Section**
WWTF	T35N, R37E	Section 10, 15
Rapid Infiltration Basins	T35N, R37E	Section 10, 15
Collection System	T35N, R37E	Sections 11, 12, 13, 14, & 15
Lift stations	T35N, R37E	Sections 10, 11, 12 & 15

Humboldt County, Farr West, and partnering agencies, are committed to complying with federal requirements and Executive Orders that apply to state and federal financial assistance. Please distribute this information to any entity that might have an interest in the project. All responses and/or recommendations will be used to complete the Environmental Assessment. We would appreciate a response within 30 days. If you need further information or wish to discuss the project, please contact Jessica Dugan of Farr West Engineering at (775) 997-7495.

Thank you,

Jessica L. Dugan, M.S., J.D.
Regulatory and Environmental Specialist

Encls: Project Location Figure
Cc: David Pulley, P.E.
    Dave Mendiola, Humboldt County



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APPENDIX I – GRASS VALLEY MASTER SEWER PLAN

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Grass Valley Master Sewer Plan

Humboldt County

June 2022

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EXECUTIVE SUMMARY

This Master Sanitary Sewer Plan Report (Master Sewer Plan) has been prepared by Farr West Engineering (Farr West) at the request Humboldt County to provide preliminary recommendations for the design and phasing of a wastewater collection and treatment system proposed to serve Grass Valley.

Grass Valley has a known groundwater quality issue associated with elevated nitrate levels. Developed properties in Grass Valley are dependent on individual septic systems for wastewater disposal. The cumulative disposal of wastewater from the septic systems has been determined to be a direct contributor the elevated nitrate levels. Water quality samples taken from monitoring wells in Grass Valley have indicated multiple exceedances of the maximum contaminant level for nitrates. Furthermore, in the Gold Country Subdivision, Production Wells 1 and 2, that serve drinking water to the subdivision residents, have nitrate issues. Well 1 had a recorded nitrate maximum contaminant level (MCL) exceedance of 10 mg/L in 2011. Production Well 2 water sample results indicated an increase in nitrate levels from 1.7 mg/L in April of 2017 to 9.0 mg/L in July of 2021.

Various studies have been completed over the past decades to consider ways to address the nitrate issue and provide mitigation recommendations. Most recently, Humboldt County retained Farr West Engineering to prepare a Preliminary Engineering Report (PER) that considers a wastewater collection system for the residential subdivisions with higher densities and to compare treatment alternatives. The PER concludes with a recommendation that Humboldt County consider constructing a collection system and mechanical treatment facility in and around the Gold County and Star City subdivisions in Grass Valley.

The purpose of this report is to present a master sewer plan for the preliminary design of the wastewater collection and treatment systems to ensure that pipe and other facilities are properly sized and that treatment systems can be expanded to accommodate areas of existing development and of future in Grass Valley.

The master sewer plan area was split into four phases, the first phase based on the PER project area, and three other phases of equivalent volume based on the number of connections to serve. Phases with lower property densities end up requiring more materials and construction to cover the larger distances. As needed, the master sewer plan phases can be divided into smaller areas to become more affordable to construct. Phase volumes and estimated construction costs are listed below:

Phase (Order of Priority)	Phase Volume*	Cumulative Volume*	Phase Estimate	Running Total
Phase 1 (PER Planning Area)	0.405 MGD	0.405 MGD	$ 27,796,200	$ 27,796,200
Phase 2	0.305 MGD	0.710 MGD	$ 30,354,920	$ 58,151,170
Phase 3	0.305 MGD	1.015 MGD	$ 36,023,700	$ 94,174,870
Phase 4	0.305 MGD	1.32 MGD	$ 29,560,390	$ 123,735,260

*MGD = Million Gallons/Day

The estimates above are based on current monetary conditions and do not include inflationary projections since such projections are unknown at this time, particularly for a project that may take decades to complete. The estimates above also assume that a centralized treatment facility will be constructed requiring miles of pipe to drain north to connect to a treatment facility. Decentralized treatment may reduce the amount of conveyance pipe needed, and hence, reduce costs.

1.0 INTRODUCTION

Grass Valley, located in Pershing and Humboldt Counties is a 30-mile-long valley. The north end of the valley is just a few miles south of Winnemucca and is nestled between two mountain ranges to the east and west. Humboldt County is the oldest county in Nevada, was created in 1856 by the Utah Territorial Legislature, and is named after the Humboldt River. Grass Valley's permanent residents began to be established as ranches and farms developed in the area. Eventually, large parcels of land began to be subdivided as outgrowth from the City of Winnemucca expanded south into Grass Valley.

Gold Country Estates and Star City Subdivision are the most densely populated communities in Grass Valley with lot sizes in the range 0.25 to 1-acre, most lots are a half-acre or smaller. These subdivisions are served by community water systems and dispose of wastewater via individual septic systems. Other subdivisions or parcels in the area consist of larger lot sizes and are served by individual water wells and septic systems.

The industry standard lifespan of a septic system is typically 20-30 years. While most septic systems in Grass Valley are at or more than 20 years old, some systems are estimated to be 35-40 years old. The useful life of a septic system frequently depends on environmental conditions that impact it. The condition of septic systems in Grass Valley are unknown because they are privately owned and maintained. Septic systems that have failed will contribute to increased loading of nitrates and other constituents.

The cumulative disposal of wastewater through septic systems in Grass Valley has impacted groundwater quality increasing nitrates and total dissolved solids to near or above maximum contaminant levels. The increase of nitrates impacting groundwater has been the subject of studies for the Grass Valley area. The reports have concluded that an alternative wastewater management system should be implemented to stop increasing negative impacts to groundwater. Extracts from the previous Preliminary Engineering Reports (PERs) are attached in Appendix B.

Farr West Engineering (Farr West) has prepared a PER that examines the potential installation of a sanitary sewer collection system to replace the septic systems in the highest density area, Gold Country and Star City subdivisions, with additional sewer service to some Airport Industrial Park Parcels, area churches, and the elementary school. If the findings of the PER are implemented, the wastewater collection and treatment systems would be considered Phase 1 of a master sewer plan for Grass Valley.

The purpose of this report is to present a master sewer plan for the design of the wastewater collection and treatment systems to ensure that pipe and other facilities are properly sized and that treatment systems can be expanded to accommodate areas of existing development and of future growth, identified by county staff, mostly adjacent to Grass Valley Road, south into higher density housing areas of Pershing County.

Humboldt County has adopted a county-wide master plan with a Grass Valley specific goal to improve groundwater quality by reducing impacts from high nitrate levels. Another master plan goal specific to Grass Valley is to increase opportunities for development of airport industrial park parcels helping to provide an economic boost for the region as businesses develop. These goals can be achieved in part by installing a wastewater collection and treatment system.

1.1 BACKGROUND INFORMATION

In 1993 a PER was completed to address the feasibility of water and sewer utilities in Grass Valley. The report determined there were localized problems with nitrates and recommended a groundwater monitoring program be initiated. Humboldt County followed the recommendation and in 1995 a domestic well groundwater monitoring program commenced. Observations were completed on a semi-annual basis.

A technical memorandum completed in 1999 concluded that the monitoring system demonstrated an increase in nitrates and total dissolved solids in the groundwater over the course of four years of completed observations. It concluded this was resultant from the density of discharge from individual septic systems.

In 2003, four new monitoring wells were constructed; however, the Nevada Department of Environmental Protection (NDEP) felt the depth of these wells did not provide a representative sample of the water table interface and requested replacement wells to be constructed.

In 2007, the County had three additional monitoring wells constructed at locations agreed upon with the NDEP. The monitoring wells used for the observations mentioned in this report are shown in Figure 1.

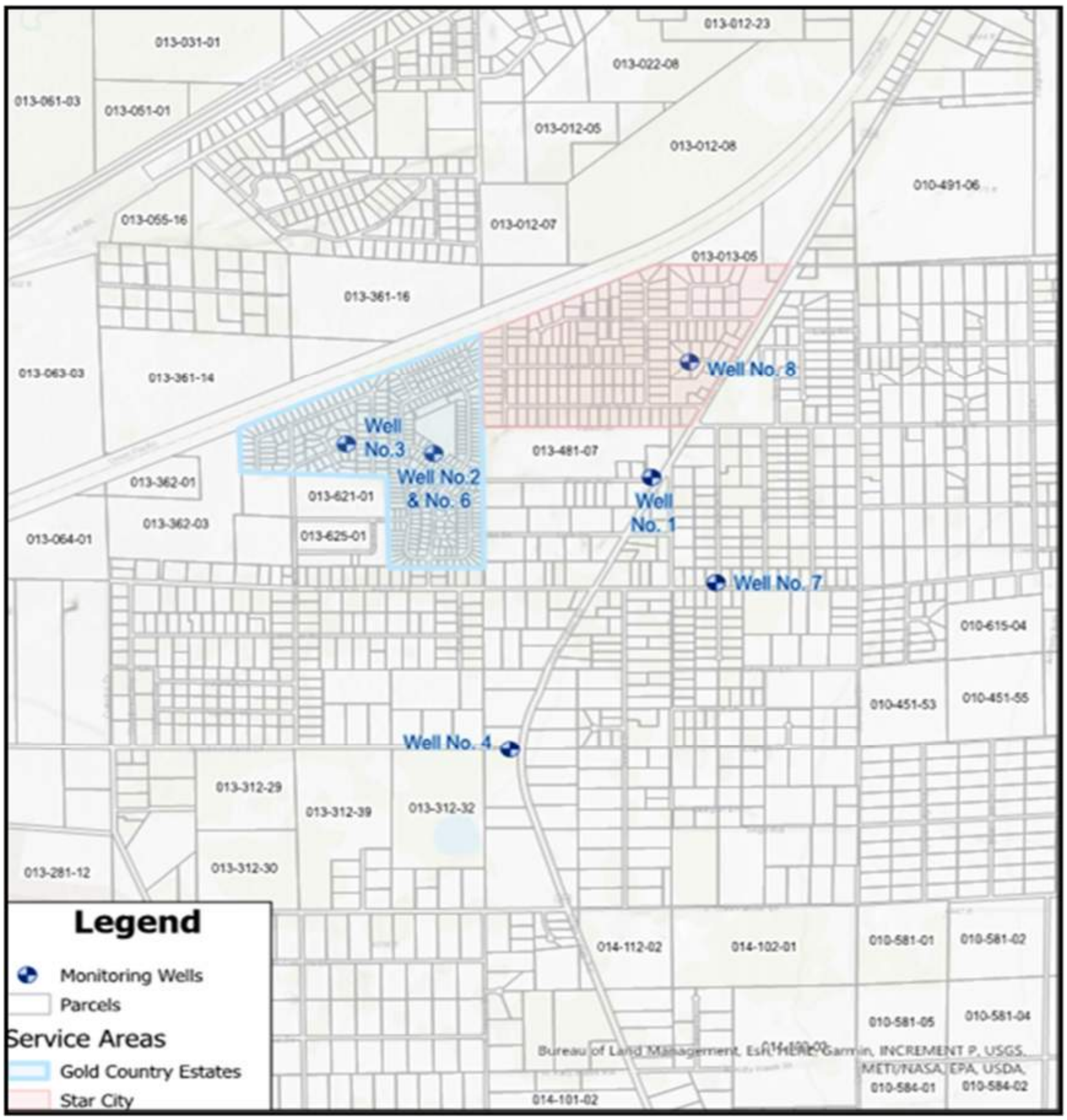


Figure 1: Monitoring Well Locations

Monitoring well sample results gathered from January 2014 to April 2020 are shown in Figure 2. Monitoring Well 3 (MW-3), located in the Gold Country Estates subdivision, shows consistently elevated nitrate levels over the course of monitoring with exception to the result given for the early 2017 sample. MW-7N, approximately one mile southeast of MW-3, indicates two exceedances of the allowable MCL and otherwise upper limit readings also with exception to the result given for the early 2017 sample.

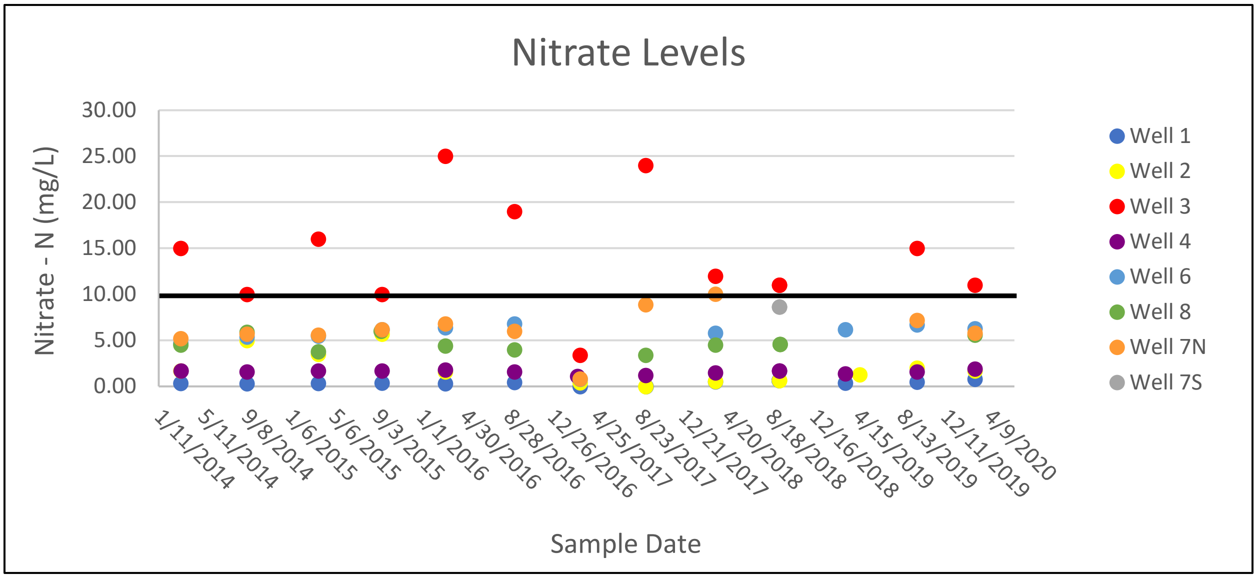


Figure 2: Monitoring Well Sample Data

The maximum contaminant level (MCL) set by the Environmental Protection Agency (EPA) for nitrates found in drinking water is 10 milligrams per liter (mg/L). As shown above, MW-3 and MW-7N have yielded water samples exceeding the allowable MCL for nitrates.

In February of 2022, the *Gold Country Water Company Nitrate Mitigation Assessment PER* was completed by One Water Consulting. The report focused on the water quality of production wells that serve the Gold Country Subdivision with specific documentation given to nitrate concentration levels and methods of mitigation. The PER concluded that nitrate levels in their production wells 1 and 2 have increased over time. Production Well 1 had a recorded nitrate MCL exceedance of 10 mg/L in 2011 and Well 2 recorded an increase in nitrate levels from 1.7 mg/L in April of 2017 to 9.0 mg/L in July of 2021.

High nitrate levels have been linked to a variety of negative side effects, including a lack of oxygen in the blood circulatory system which is most likely to affect infants and pregnant women. The severity and extent of potential side effects is different for each person affected. Nitrate level exceedances are often linked to runoff from fertilizer use, erosion of natural deposits, or leakage from septic tanks. The consistent exceedances combined with the age and density of septic systems operating in the area support the assumption; the cause of elevated nitrate levels is linked to septic systems.

2.0 STUDY AREA

2.1 GENERAL LOCATION

Grass Valley, located in Pershing and Humboldt Counties is a 30-mile-long valley. The north end of the valley is just a few miles south of the City of Winnemucca. Most of the valley is within the Pershing side of the county line; however, most of the population is on the Humboldt side. The area defined as the project planning area in the PER concentrates on the Star City Subdivision, Gold Country Estates, and adjacent residential and commercial areas. The PER planning area is shown in Figure 3.

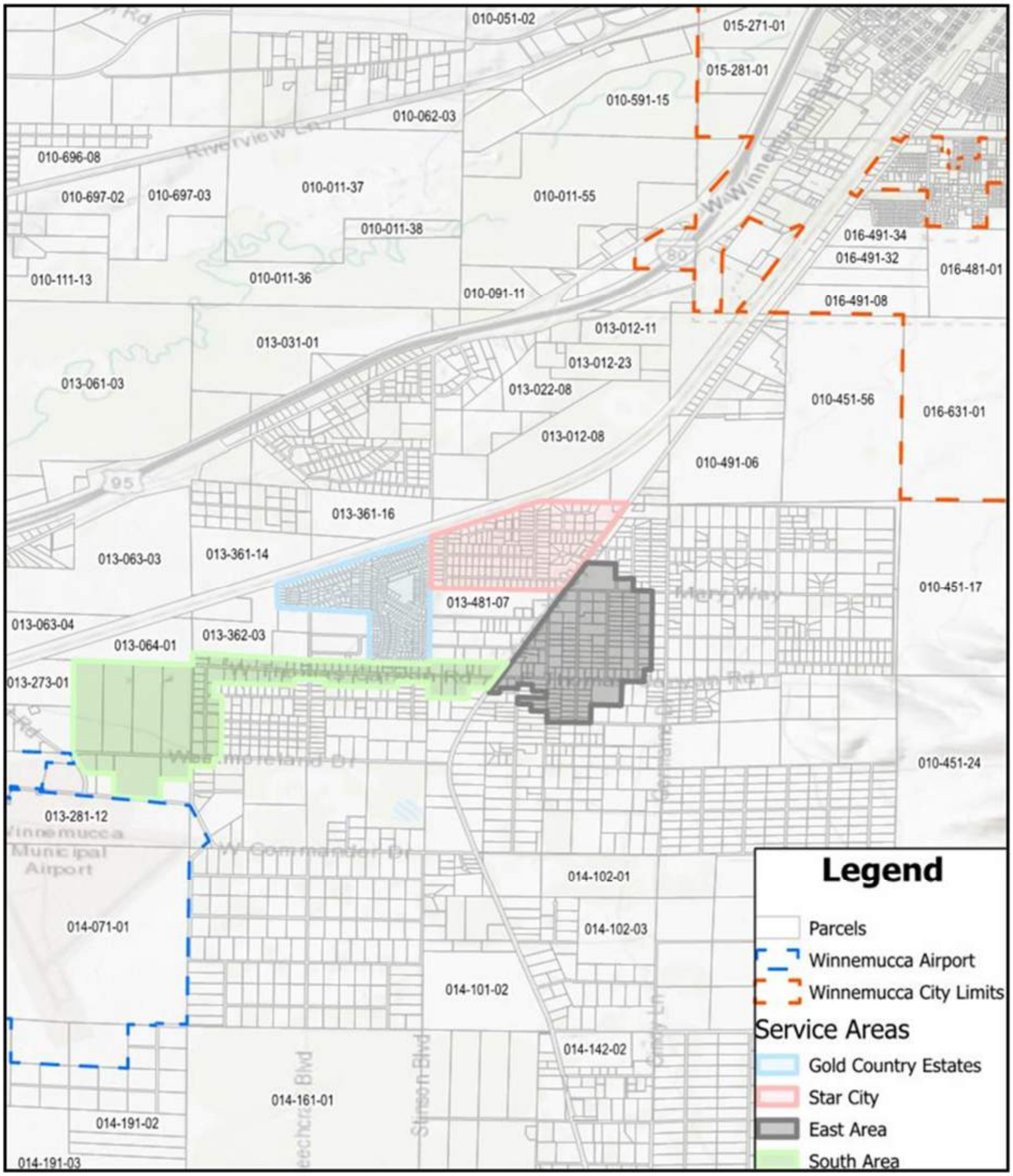


Figure 3: PER Planning Area

As the PER project planning area was reviewed and discussed with county staff, it was concluded that the wastewater collection area would have to continue to expand over time to connect to existing and future development to reduce nitrates discharging into the groundwater aquifer. The Humboldt Development Authority provided information on potential areas of future growth in Grass Valley. Input was also received from Pershing County on areas of future growth. The multi-county approach is thought to enhance opportunities for project funding.

With consideration of potential growth, existing development, and a multi-county approach, the master sewer plan area was defined as shown in Figure 4. The area includes the PER planning area, surrounding residential and commercial areas beginning in the north at Interstate-80 and south 2 miles into Pershing County.

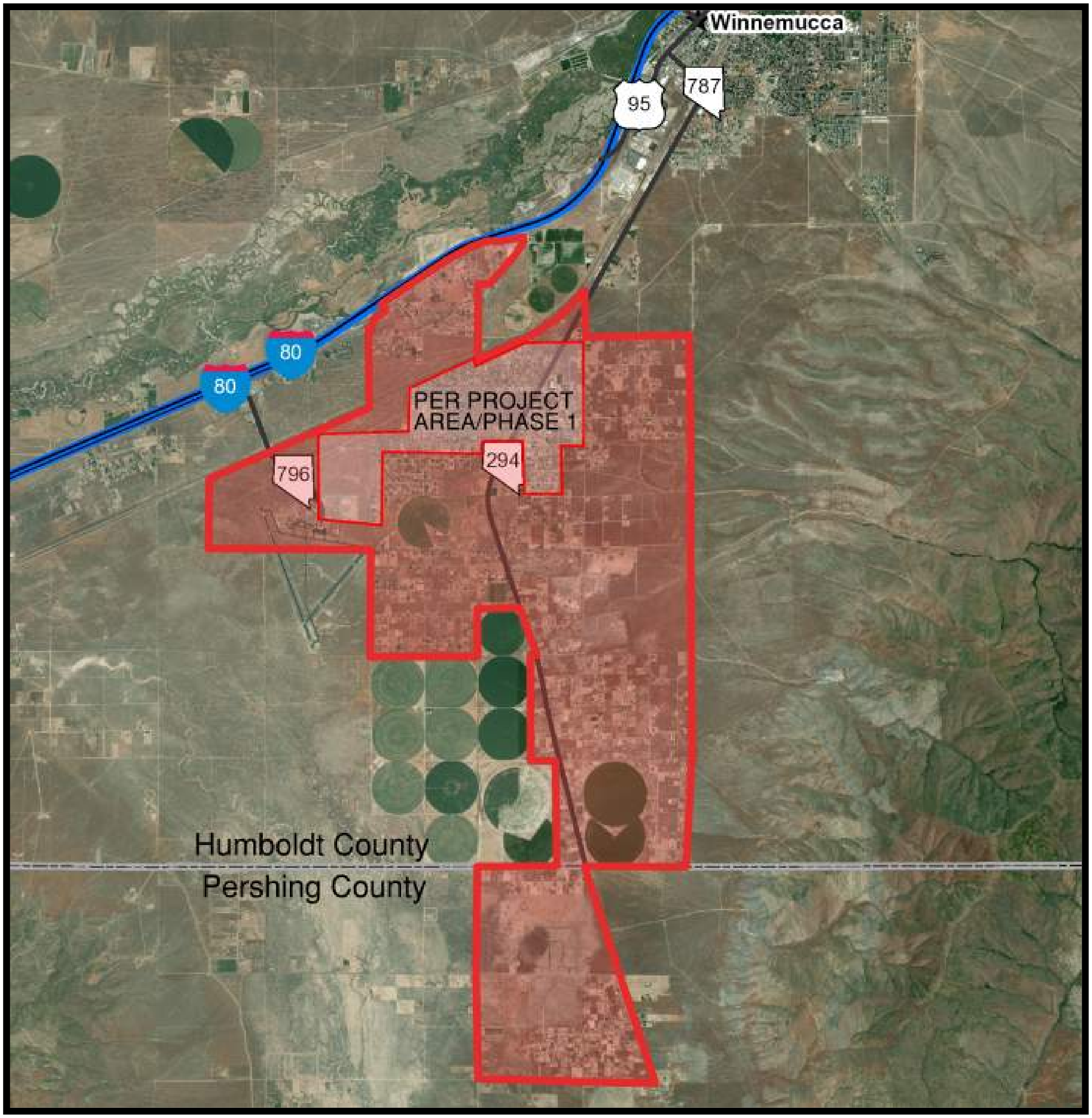


Figure 4: Master Planning Area

The proposed master sewer plan area encompasses approximately 16.8 square miles consisting of 14.1 square miles in Humboldt County north of the Pershing County boundary, mostly along the east and west sides of Grass Valley Road (State Route 294). The area includes the commercial and industrial parcels north of the airport. Most of the agricultural areas southeast of the airport are excluded from the project area. There are 2.7 square miles in Pershing County south of the county boundary and west of Grass Valley Road. The project area within Humboldt County includes, township 35 north (T35N), range 37 east (R37E), with all or part of the sections 01, 02, 10, 11, 12, 13, 14, 15, 16, 23, 24, 25, and within T35N, R38E, sections 07, 18, 19, 30, 31. The project area within Pershing County includes T34N, R37E sections 01 and 12. Additionally, T34N, R38E part of the sections 06 and 07.

2.2 ENVIRONMENTAL RESOURCES PRESENT

The environmental resources present in Phase 1 of this master sewer plan area are thoroughly discussed in the environmental assessment (EA) prepared in conjunction with the PER. The PER provides a high-level overview of the EA's findings. To summarize, there are no major negative environmental impacts expected with the construction of the wastewater system in Phase 1, the PER Planning Area. It is anticipated that similar EA results will be discovered as future assessments are prepared with the phasing of the system. The most important environmental impact will be the reduction of nitrates in the groundwater aquifer.

2.3 GROWTH AREAS AND POPULATION TRENDS

2.3.1 Base Population

The U.S. Census Bureau and the Nevada State Demographer provide demographic information for the whole of Humboldt County and the City of Winnemucca, but do not provide information or data specific to Grass Valley. Information provided for the county and Winnemucca was used to make assumptions and combined with observational data gathered from aerial imagery to determine basic population data for the Grass Valley project area. According to the state demographer, there are 17,064 residents in Humboldt County with an average household size of 2.56 persons. Within the master planning area there are approximately 1,792 developed lots which at the average household size computes to 4,588 residents or 27 percent of the county's population. There are an estimated 1,087 undeveloped lots in the planning area that would increase the population by approximately 2,783 residents. The undeveloped lot count and population estimate is subject to change if the current lot zoning is altered to either increase or decrease the number of lots per area.

2.3.2 Projected Growth

Based on available aerial imagery information, the PER planning area experienced an approximate development of 40 lots over a period of nine years, from 2006 to 2015, resulting in an average development rate of 4.5 lots per year. Growth at 4.5 lots per year over the next 20 years means that approximately 90 lots may be developed. This is considered a low-end, slow growth average.

The earliest aerial imagery with a clear visual of the PER project area subdivisions is from 1994, which shows approximately 272 lots were developed at that time. The next clear aerial imagery is from 2006 and shows that approximately 171 additional lots were developed during that 12-year period, an average of 14.25 lots per year.

Although aerial imagery is not available for earlier than 1994, it may be possible that most of the development took place within a few years and coincided with the increase in gold mining activity of the late 1980's and early 1990's. If the 272 lots were developed in a period of 5 years, then the development rate could be as high as 54 lots per year.

The pending development of lithium mining in northern Humboldt County may have a similar effect on demand for residential housing. The large undeveloped parcels in Grass Valley are expected to be subdivided into smaller residential lots, specifically areas adjacent to Star City Subdivision and Gold Country Estates.

3.0 EXISTING WASTEWATER FACILITIES

Grass Valley residential and commercial establishments are dependent on the use of septic systems for wastewater management, the nearest treatment facility is located in Winnemucca. Connecting to the city's collection system was considered as an alternative to treat Grass Valley's wastewater, but it was determined not to be a preferred alternative due to the limited capacity available to the county.

The exact age of septic systems operating Grass Valley is not readily available; however, based on aerial imagery the oldest systems are potentially more than 40 years old, assuming they have not been replaced. A typical industry standard for septic system operation is 25 to 30 years before replacement, dependent on the degree of maintenance performed. Some of the aging septic systems may have unknown operating deficiencies contributing to the elevated nitrate levels.

3.1 OTHER WATER UTILITY SERVICES

There is a privately owned water system serving Gold Country Estates and a county owned water system operating in Star City Subdivision, the remaining residential and commercial lots are provided water through individual or community well systems.

In 2018, records indicate the Star City Water System served 120 single family lots, a 25-unit mobile home park, and a convenience store. Originally operated as a non-profit water system by subdivision residents, it became impossible to find willing volunteers to take over management of the system. In 2019, Humboldt County determined it would take ownership of the water system and the county's public works department would be responsible for the management and operations of the system.

The water service in Gold Country Estates is operated by SPB Utility Services, Inc., a water utility provider that offers services throughout Nevada. There are 353 service connections in Gold Country Estates, all of which are single family residential connections. Humboldt County is reviewing the possibility of acquiring the Gold Country water system and operating it in conjunction with the Star City Water System.

4.0 PROJECT DESIGN PARAMETERS

4.1 UNIT TOTALS

With the guidance of the Humboldt Development Authority, areas of future growth in Grass Valley were identified to create the master sewer plan area. In Humboldt County, the plan area is estimated to serve approximately 1,556 existing and 823 future equivalent residential units (ERU) respectively. The plan area would also include service to 500 total existing and future properties in Pershing County.

4.2 WASTEWATER CHARACTERISTICS

Wastewater characterization data is not readily available for the Grass Valley sewer system since a representative sample would have to be collected from numerous private septic systems. However, typical characterization data from wastewater systems in the United States is assumed to be applicable and listed in Table 1. The five-day biochemical oxygen demand (BOD_5) determines the amount of oxygen consumed to break-down biodegradable organic materials and provides an effective gauge of treatment efficiency. Nitrate levels are the primary driver of this report and temperature is required to estimate nitrogen removal; therefore, total nitrogen and temperature assumptions were made.

Table 1: Influent Characterization Assumptions

Design Parameters	Influent Characterization
Total Nitrogen	40 mg/L
BOD_5	240 mg/L
Temperature	60 °F

The wastewater characterization listed in the above table would be considered normal or average strength wastewater. Grass Valley is assumed to have normal strength wastewater because most homes are several years old and would not be equipped with low water use fixtures. Treatment system sizing will be based in part on the wastewater strength. As new developments are constructed in the area it is anticipated that modern low water use fixtures will be installed in the homes resulting in a less diluted wastewater. Adjustments in design parameters will be necessary to accommodate significant amounts of high solids concentration wastewater.

4.3 WASTEWATER VOLUME

The volume of the wastewater generated in the master sewer plan area is estimated using lot counts multiplied by design volumes that are extrapolated from various wastewater utility sources. The number of developed lots in the planning area was estimated based on aerial imagery. Zoning descriptions for the included lots were gathered from the Humboldt County Assessor's data. The design volumes used for this report are shown in Table 2, categorized by zoning descriptions.

Table 2: Average Day Design Volumes

Zoning Description	Design Volume	Unit of Measure
Residential Unit	300	gpd (gallons per day)
Public Facility	2600	gpd/acre
Neighborhood Commurcial/Rural District	2600	gpd/acre
General Commerical	780	gpd/acre
Airport/Industrial District	457	gpd/acre

The average volumes listed in Table 2 are factored by 1.5 for maximum-day flow and 2.5 for peak-hour flow. Factored flows are utilized to size conveyance and treatment facilities.

4.4 PLAN PHASING

The PER planning area (Phase 1) in Figure 3 became the basis for determining potential phases of the master sewer plan for Grass Valley. The first phase location was determined by the considerations established in the PER, mostly centered around eliminating septic systems in the highest density housing areas at the Gold Country and Star City subdivisions. Phase 1 is comprised of 638 existing residential units and 27 ERU which consist of the existing elementary school, churches, commercial, and industrial properties. These existing non-residential properties do not include the full property area in the volume calculations since most of the properties consist of parking, landscaping, laydown areas, and so forth which do not contribute to wastewater flows. Moreover, non-residential properties will generate peak wastewater flows at opposite times of residential properties. These factors were combined to reduce the calculated amount of volume contributed to the treatment facility. In addition to the existing development, Phase 1 has area for growth estimated at 234 ERU or 26 percent of the Phase 1 treatment capacity. The estimated wastewater to be generated in the Phase 1 area is 0.405 MGD.

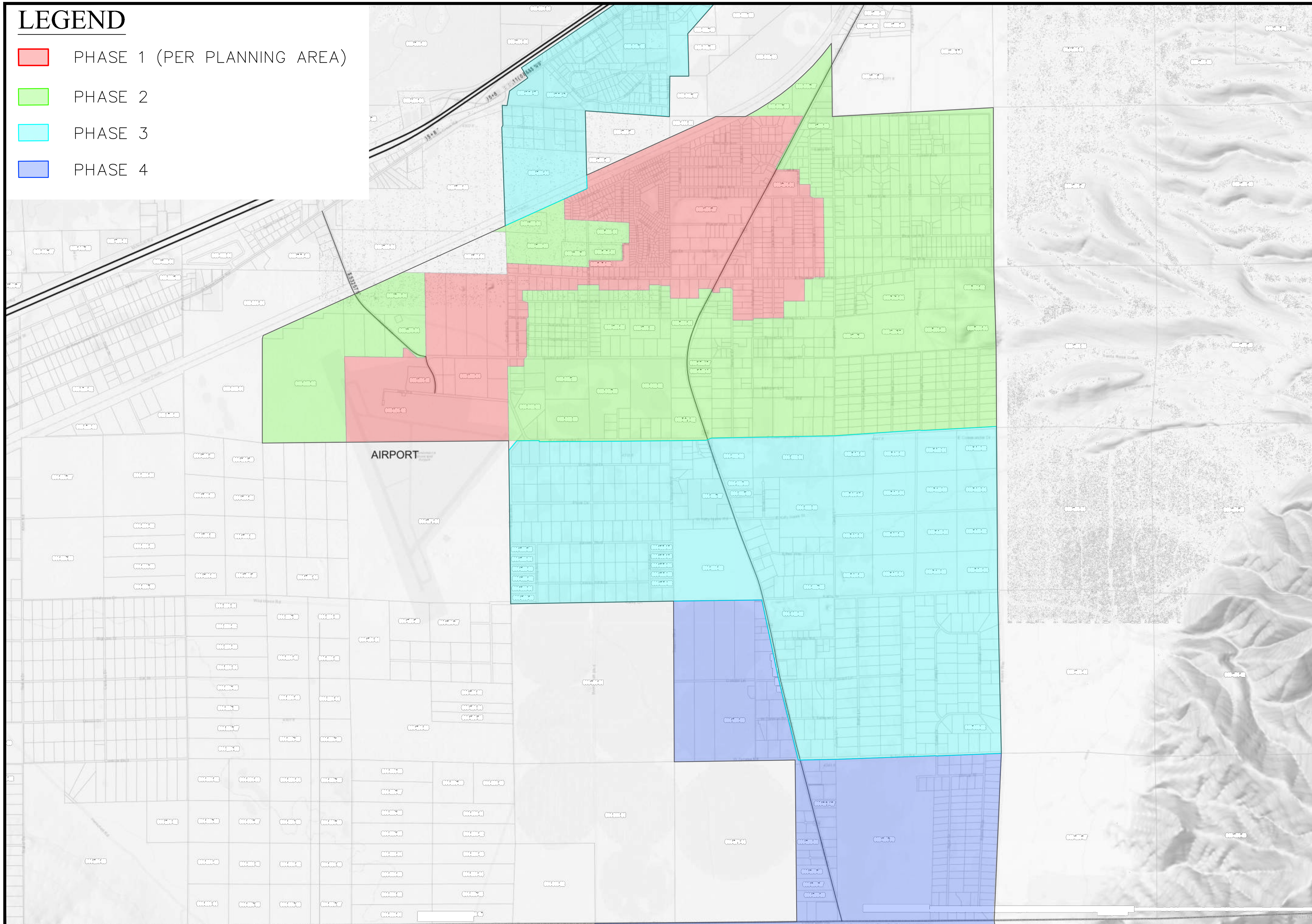
With the design parameters established for the Phase 1, PER area, and with consideration of existing and future service connections, it was determined the ultimate treatment facility buildout would need capacity for 1.32 million gallons per day (MGD). The volume assigned to each phase and the cumulative wastewater treatment facility (WWTF) capacity are shown in Table 3.

Table 3: WWTF Capacity

Phase Description	Phase Volume (GPD)	WWTF Capacity (GPD)	
Phase 1 (PER Planning Area)	405,000	405,000	
Phase 2	305,000	710,000	
Phase 3	305,000	1,015,000	
Phase 4	305,000	1,320,000	
Total Avg. Day Volume Capacity		0.88	MGD
Total Max Day Volume Capacity		1.32	MGD
Estimated Peak Hour Flow		461	GPM

After Phase 1, the remaining phases would each have an allotted volume of 0.305 MGD for a total of 0.915 MGD. It is not feasible at this time to determine the exact geographical boundaries for the remaining phases; however, phase boundaries were delineated based on the geographical locations in relation to the treatment facility. It is assumed those areas closer to the facility would receive services before areas further away. The phasing boundaries also considered providing sewer to entire neighborhoods rather than having gaps in the service area.

Phase four, the final phase, would encompass the remaining areas on the Humboldt County side of the planning area and provide an allotted capacity of 150,000 GPD, the equivalent of five hundred residential units, to Pershing County. The breakdown of capacity by type of service connection for each phase is given in Table 4, the percentage of lots developed in each phase is also provided. The proposed phasing boundaries are shown in Figure 5.



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CHECKED: DLP
DATE: FEB 2022

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MASTER SEWER PLAN

HUMBOLDT COUNTY NEVADA

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Table 4: Phase Capacity Breakout

Phase	No. of Units		Vol / Unit		Avg. Flow (GPD)
Phase 1 (PER Planning Area)					
Residential Units	638	ERU	300	gpd	191,400
General Commercial District	0.24	Acre	780	gpd/acre	187
Public Facility	2.03	Acre	2600	gpd/acre	5,278
Neighborhood Commercial/Rural District	0.18	Acre	2600	gpd/acre	468
Airport/Industrial District*	5.18	Acre	457	gpd/acre	2,367
Additional Capacity	234	ERU	300	gpd	70,200
				Estimated Avg. Day Volume	269,900 GPD
				Estimated Max. Day Volume	404,851 GPD
				Estimated Peak Hour Flow	469 GPM
Phase 2 (45% Developed)					
Residential Units	630	ERU	300	gpd	189,000
Neighborhood Commercial/Rural District	1.88	Acre	2600	gpd/acre	4,888
Airport/Industrial District*	21	Acre	457	gpd/acre	9,597
				Estimated Avg. Day Volume	203,485 GPD
				Estimated Max. Day Volume	305,228 GPD
				Estimated Peak Hour Flow	353 GPM
Phase 3 (75% Developed)					
Residential Units	660	ERU	300	gpd	198,000
Airport/Industrial District*	10	Acre	457	gpd/acre	4,570
				Estimated Avg. Day Volume	202,570 GPD
				Estimated Max. Day Volume	303,855 GPD
				Estimated Peak Hour Flow	352 GPM
Phase 4 (35% Developed)					
Residential Units	161	ERU	300	gpd	48,300
Airport/Industrial District*	10	Acre	457	gpd/acre	4,570
Pershing County Capacity	500	ERU	300	gpd	150,000
				Estimated Avg. Day Volume	202,870 GPD
				Estimated Max. Day Volume	304,305 GPD
				Estimated Peak Hour Flow	352 GPM

*The available land in the airport/industrial district was divided between phases under the assumption it would be developed over periods of time. Phase 2 was given the majority of acreage under the assumption it would experience the most development.

4.5 TREATMENT EVALUATION OVERVIEW

An evaluation of wastewater treatment alternatives was conducted to determine the preferred type of treatment for the Grass Valley system. Evaluated criteria included the ease and reliability of operation, the expected treatment performance and quality, constructability, sustainability, expandability, and cost. The alternatives considered activated-sludge processes including an extended aeration package plant and an oxidation ditch. Appendix C contains manufacturer's information for three extended aeration systems and one oxidation ditch system. This section provides a summation of the comparison of the treatment alternatives and a recommendation for a treatment process.

4.5.1 Extended Aeration Package Plant

Extended aeration package plants are typically very stable, reliable, and known to consistently meet effluent permit limitations with proper operations and maintenance procedures. Some systems can be operated with sequential reactions to minimize the mixing requirements and perform nitrification and denitrification in the aeration basins. Dissolved oxygen levels may be monitored coupled with a control system to provide the minimum air necessary for proper treatment. Aeration and mixing are used to achieve the lowest biologically attainable nitrogen levels. The system clarifier regulates the effluent flow and contains sludge to waste. A small portion of the sludge is returned to the beginning of the treatment sequence.

The advantages of an extended aeration package plant include:

- Successful operational history
- Established and understood treatment process
- Operator friendly, simple mechanical process
- Superior effluent quality
- Does not require highly efficient screening
- Easily constructable
- Conducive to phased expansion
- Ability to reduce energy consumption
- Overall smaller footprint

The disadvantages of an extended aeration package plant include:

- Solids separation requires additional, separate facilities
- Activated sludge requires close monitoring
- Tertiary treatment requires separate processes

4.5.2 Oxidation Ditch

Oxidation ditch treatment systems are also typically very stable, reliable, and consistently meet effluent permit limitations, with proper operations and maintenance procedures. Aeration equipment typically includes brush aerators, but jet aeration can be incorporated into the system. Dissolved oxygen probes continuously monitor and report oxygen levels to control whether the system is functioning in an on or off aeration mode. On/off operation helps eliminate costly over-aeration by meeting the minimum oxygen demand to maintain process stability. Separation of liquids and solids typically occurs via gravity in a secondary clarifier. A time-based operational strategy provides the ability to effectively vary process volumes to accommodate a range of influent flow and characteristics.

The advantages of an oxidation ditch include:

- Successful operational history
- Established and understood treatment process
- Does not require highly efficient screening
- Characteristically low energy demands

- Ability to incorporate phase expansion

The disadvantages of an oxidation ditch include:

- Solids separation requires additional, separate facilities
- System footprint requires large area
- Activated sludge requires close monitoring
- Tertiary treatment requires separate processes

4.5.3 Treatment Recommendation

Based on the information provided above and from the manufacturer, it was determined that an extended aeration treatment system would be the optimal option for the proposed Grass Valley treatment facility. Extended aeration systems require a smaller footprint and are easily customizable and expandable for varying conditions and phase expansions.

4.6 PROJECT COST AND FUNDING

The cost information provided for Phase 1 of the project was determined during the development of the PER. A detailed breakdown of those cost estimates for the collection system, treatment facility, and annual operations and maintenance are included in Appendix A Table 1, 2, and 3, respectively. Cost information for the remaining phases was determined based on similar parameters for Phase 1. All cost estimates provided are based on pricing for the 1st quarter of 2022. Depending on the rate of inflation, which is currently very high, the cost estimates provided in this section will need to be adjusted at the design of each phase.

The pipe length and manhole count provided for Phases 2 through 4 are approximations founded on the preliminary design of Phase 1 from the PER. Based on an aerial view of Grass Valley, it was estimated that Phase 2 will cover approximately twice the area of Phase 1, and therefore, will require twice the amount of pipe length and number of manholes to construct the collection system. Considering the density of Phase 2 compared to Phase 1, it was estimated that 85 percent of the Phase 2 collection system would be 8-inch pipe, 10 percent would be 10-inch pipe, and 5 percent would be 12-inch pipe. A similar process was followed for Phases 3 and 4. The number of manholes estimated in Phases 2 through 4 are based on an assumed spacing of approximately 325 feet along the total pipe length. The approximated pipe lengths and associated costs for Phases 2 through 4 for the “collection systems” are shown in Table 5 below. Detailed information for Phase 1 pipe is provided in Table 1 in Appendix A.

Table 5: Phase 2-4 Collection System Cost Estimations

Phase	Component	Quantity		Cost/Unit	Total Cost
Phase 2	8” PVC SDR-35 Pipe	104,409	LF	$ 125	$ 13,051,100
	10” PVC SDR-35 Pipe	12,283	LF	$ 175	$ 2,149,500
	12” PVC SDR-35 Pipe	6,142	LF	$ 195	$ 1,197,690
	Type 1-A 48” Manhole	376	EA	$ 9,500	$ 3,572,000
				Subtotal	**$ 19,970,290**
Phase 3	8” PVC SDR-35 Pipe	142,794	LF	$ 125	$ 17,849,250
	10” PVC SDR-35 Pipe	7,677	LF	$ 175	$ 1,343,470
	12” PVC SDR-35 Pipe	3,071	LF	$ 195	$ 598,850
	Type 1-A 48” Manhole	470	EA	$ 9,500	$ 4,465,000
				Subtotal	**$ 24,256,570**
Phase 4	8” PVC SDR-35 Pipe	116,692	LF	$ 125	$ 14,586,500
	10” PVC SDR-35 Pipe	6,142	LF	$ 175	$ 1,074,850
	Type 1-A 48” Manhole	376	EA	$ 9,500	$ 3,572,000
				Subtotal	**$ 19,233,350**

Cost estimations, including the expansion of the treatment facility for each phase, are provided in Table 6. The estimates for Phases 2 through 4 assume the construction of an additional RIB equal to the half the cost of the RIB construction in Phase 1 will be required. The WWTF expansion estimate also includes the cost of an additional components for Phases 2 through 4. The cost estimates provided are based on current pricing and will need to be adjusted to match economic conditions at the time of design. Topographic and property mapping of Grass Valley will enable a more accurate design and will likely result in the identification of additional items such as lift stations or easements that will be necessary to have a fully functional system.

Table 6: Phase Costs

Phase 1			
WWTF Construction	5,603,900	LS	$ 5,603,900
RIB Construction	250,000	LS	$ 250,000
Collection System	14,062,710	LS	$ 14,062,710
Service Connection w/ Cleanout ($3,500/EA)	645	EA	$ 2,257,500
		Subtotal	$ 22,174,110
Construction Management, Engineering, Legal			$ 2,673,300
Construction Contingency			$ 2,543,800
Cultural Resources Inventory/ Additional Environmental Studies			$ 30,000
Land, Easements, Permits			$ 375,000
		Phase Total	**$ 27,796,200**
Phase 2			
WWTF Expansion	2,361,000	LS	$ 2,361,000
RIB Expansion	125,000	LS	$ 125,000
Collection System Expansion	19,970,290	LS	$ 19,970,290
Service Connection w/ Cleanout ($3,500/EA)	635	EA	$ 2,222,500
		Subtotal	$ 24,678,790
Construction Management, Engineering, Legal			$ 2,714,670
Construction Contingency			$ 2,961,460
		Phase Total	**$ 30,354,920**
Phase 3			
WWTF Expansion	2,361,000	LS	$ 2,361,000
RIB Expansion	125,000	LS	$ 125,000
Collection System Expansion	24,256,570	LS	$ 24,256,570
Lift Station	1	LS	$ 235,000
Service Connection w/ Cleanout ($3,500/EA)	660	EA	$ 2,310,000
		Subtotal	$ 29,287,570
Construction Management, Engineering, Legal			$ 3,221,630
Construction Contingency			$ 3,514,500
		Phase Total	**$ 36,023,700**
Phase 4			
WWTF Expansion	2,361,000	LS	$ 2,361,000
RIB Expansion	125,000	LS	$ 125,000
Collection System Expansion	19,233,350	LS	$ 19,233,350
Service Connection w/ Cleanout ($3,500/EA)	661	EA	$ 2,313,500
		Subtotal	$ 24,032,850
Construction Management, Engineering, Legal			$ 2,643,600
Construction Contingency			$ 2,888,940
		Phase Total	**$ 29,560,390**

Approximately $17.8 million of the cost estimated for Phase 4 can be attributed to Pershing County related expenses, this does not include costs associated with construction management, engineering, legal, or construction contingencies. Providing sewer mains that convey wastewater north to treatment from the south near the Pershing County and Humboldt County boundary may not be cost effective for either county. A more cost-effective option may be to construct a small treatment facility to service that area.

The cost for the treatment facility construction and each phase of expansion was determined from budgetary proposal information provided by facility manufacturers, information is attached in Appendix C. Although three manufacturers provided budgetary quote information for extended aeration systems, the quote provided by Aero-Mod, Inc. (Aero-Mod) was the most complete of the received quotes. For this reason, the Aero-Mod quote was used as the basis for determining WWTF costs. This does not imply the selection of a WWTF manufacturer to provide treatment equipment for Grass Valley.

The county intends to secure grants and low interest or principal forgiveness loans from the Nevada Clean Water State Revolving Loan Fund (SRF) to finance the project. The PER qualified for funding assistance through SRF with a Class A designation and the 7th highest priority. Class A projects are those that benefit the public health and/or the environment. The goal of constructing a collection system and treatment facility is to protect the public's health and alleviate the negative groundwater impacts from elevated nitrate levels. Phase 1 is the highest priority area planned for a wastewater system and is the only phase currently being pursued to determine what funding is available and the financial impacts that may result.

4.7 CONSTRUCTION ISSUES

Connecting existing residential and commercial sewer laterals and constructing sewer mains is anticipated to have difficulties due to obstructions in the path of the sewer lines such as other utilities, surface infrastructure, trees, etc. Environmental concerns or cultural resources are not anticipated to be significant impacts for construction.

4.8 PROJECT PERMITTING

Various permits will be required prior to the construction of each phase. The following is a brief summary of identified permit requirements:

- NDEP's BWPC Plan Approval – Complete plans and specifications must be submitted and approved by the BWPC. The approval evaluates whether the proposed project is compliant with NAC 445A, and other design guidance adopted in the code.
- Humboldt County Building Permit – This permit is issued by Humboldt County to ensure the project follows adopted building codes that apply to components of the treatment plant construction. This permit will require plan review, approval, and milestone building inspections to be completed by certified inspectors to ensure the construction meets building code requirements.
- Encroachment Permits – The collection system will cross or be within NDOT and Union Pacific Railroad right-of-way in a few cases, thus requiring permits to encroach and complete work within the right-of-way.
- During construction NDEP-BWPC will require a storm water discharge permit since more than one acre will be disturbed by construction. Best Management Practices will be installed to mitigate runoff and the release of sediment into water courses.
- It is likely that more than 5 acres will be disturbed at any one time, so a surface area disturbance permit should be obtained from the NDEP Bureau of Air Pollution Control (BAPC) by the construction contractor.
- Discharge Permit – This permit is issued by the BWPC to ensure the RIBs will meet or exceed the standards for design, construction, operation, and maintenance.

In addition to the above permits, the project must also be reviewed by any funding agencies to ensure that the plans and specifications follow applicable funding requirements.

At this preliminary stage it is assumed that Phase 1 will have at least private one lot that will need to serve as a sewer crossing to maintain a gravity driven design. It is possible additional easements may be required for other lots as well, during design accurate survey data will determine the final layout of the collection system. Otherwise, the majority of the work should be completed in street and utility right-of-way.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the information presented in this report the following conclusions and recommendations for Humboldt County to consider benefitting the health and well-being of the public and to reduce the harmful impact to the Grass Valley groundwater aquifer:

- Nitrates are increasing in the aquifer impacting drinking water quality due to the cumulative discharge of wastewater through septic systems. If left unimpeded, nitrates are expected to be found consistently exceeding maximum contaminate levels in water quality samples.
- Continue to educate the public of the current and potential health risks of doing nothing.
- Grass Valley is an area that can accommodate both residential and commercial growth if wastewater infiltration from septic systems can be eliminated by implementing a new wastewater collection and treatment system.
- There are no major negative environmental impacts expected with the construction of a new wastewater system.
- Pursue the Phase 1 project as outlined in the Grass Valley PER. Communication with NDEP and pre-application to funding agencies should be completed as the proposed project will need advanced planning.
- Topographic and property mapping of Grass Valley will enable a more accurate design and will likely result in the identification of additional items such as lift stations or easements that will be necessary to have a fully functional system.
- The wastewater system phases can be refined into multiple smaller projects that may be more easily funded.
- Install the wastewater collection and treatment system as soon as possible for the benefit and protection of the public’s health and to reduce significant degradation to the groundwater aquifer.

APPENDIX A – COST BREAKDOWN

Table 1: Engineer's Opinion of Collection System Cost

Line	Description	Quantity	Unit	Cost/Unit	Total Cost
1	Mobilization/Demobilization	1	LS	$ 700,000	$ 700,000
2	Temporary Traffic Control	1	LS	$ 350,000	$ 350,000
3	Best Management Practices	1	LS	$ 60,000	$ 60,000
4	8” PVC SDR-35 Pipe	45,092	LF	$ 125	$ 5,636,500
5	10” PVC SDR-35 Pipe	6,026	LF	$ 175	$ 1,054,550
6	12” PVC SDR-35 Pipe	5,552	LF	$ 195	$ 1,082,640
7	15” PVC SDR-35 Pipe	2,344	LF	$ 205	$ 480,520
8	18” PVC SDR-35 Pipe	2,403	LF	$ 215	$ 516,645
9	Pressure Force Main	6,264	LF	$ 160	$ 1,002,240
10	Type 1-A 48” Sewer Manhole	184	EA	$ 9.500	$ 1,748,000
11	Type III (Drop) 48” and 60” Sewer Manhole	4	EA	$ 13.500	$ 54,000
12	WW Lift Station	3	EA	$ 235,000	$ 705,000
13	Sewer Service Connection with Cleanout	645	EA	$ 3,500	$ 2,257,500
14	3” AC Patch Paving	56,670	SF	$ 4.50	$ 255,015
15	NDOT Jack and Bore	3	LS	$ 139,200	$ 417,600
16				**Total**	**$ 16,320,210**
17					
	Non-Construction Items:				
18	12 % Construction Contingency				$ 1,958,425
19	Cultural Resources Inventory/Additional Environmental Studies				$ 30,000
20	Legal, Engineering, Construction Program Management, Funds Administration				$ 1,795,223
21	Land, Easements, Permits				$ 375,000
22				**Total**	**$ 4,158,648**
23					
24				**Total Project Cost**	**$ 20,478,858**

Table 2: Engineer's Opinion of WWTF Cost

Line	Description	Quantity	Unit	Cost/Unit	Total Cost
1	Mobilization/Demobilization	1	LS	$ 290,000	$ 290,000
2	Rough Grading & Earthwork – RIBs	1	LS	$ 250,000	$ 250,000
3	Plant Site Work	1	LS	$ 27,000	$ 27,000
4	Concrete	1	LS	$ 65,000	$ 65,000
5	Auger in Vault	1	LS	$ 240,825	$ 240,825
6	Supply and Install 350,000-gallon WWTF with clarifier	1	LS	$ 2,795,000	$ 2,795,000
7	Supply and Install Chlorine Containment Unit 150-gallon Double Walled Storage Tank, Peristaltic Pumps, Chemical Tubing, Injectors, Saddle, Pipe, etc.	1	LS	$ 61,100	$ 61,100
8	Supply and Install Sludge Pump and Vault	1	LS	$ 90,025	$ 90,025
9	Building, Building Pad, Slab, Mechanical, Plumbing, Electrical	1	LS	$ 295,500	$ 295,500
10	Supply and Install Sludge Press and Polymer Pump	1	LS	$ 436,150	$ 436,150
11	Supply and Install Generator and ATS	1	LS	$ 133,900	$ 133,900
12	48” Type III Manhole, 48” Type 1-B Manhole (2), and Lift Pumps	1	LS	$ 235,000	$ 235,000
13	Stainless Steel Slide Gate	1	EA	$ 10,758	$ 10,758
14	8” Magnetic Meter	1	EA	$ 10,563	$ 10,563
15	2” Steel Ceramic Epoxy Lined Pipe	20	LF	$ 267	$ 5,330
16	Flow Control Valve Assembly	1	LS	$ 16,478	$ 16,478
17	Site Electrical	1	LS	$ 412,325	$ 412,325
18	NV Energy Service Extension	1	LS	$ 120,000	$ 120,000
19	Project SCADA	1	LS	$ 203,125	$ 203,125
20	Computer/Server/Software Allowance	1	LS	$ 36,400	$ 36,400
21	¾” Yard Hydrant	3	EA	$ 2,828	$ 8,483
22	Standard Cleanout	2	EA	$ 991	$ 1,983
23	Wells	1	EA	$ 71,500	$ 71,500
24	Best Management Practices	1	LS	$ 19,000	$ 19,000
25	3” Plantmix Bituminous Patch/Driveway Apron	3200	SF	$ 6	$ 18,462
26				**Construction Subtotal**	**$ 5,853,907**
27	**Non-Construction Items:**				
28	10 % Construction Contingency				$ 585,391
29	Legal, Engineering, Construction Program Management, Funds Administration				$ 878,086
30				**Non-Construction Subtotal**	$ 1,463,477
31					
32				**Total Project Cost**	**$ 7,317,384**

Table 3:Annual Operating and Maintenance Costs

Operational Item	Cost
Salaries and Benefits	$ 142,000
Supplies and Chemicals	$ 38,000
Short Lived Asset Maintenance/Replacement	$ 10,400
Administrative and Support Services	$ 26,400
Energy Cost	$ 69,000
Sludge Hauling Equipment	$ 36,000
Sludge Disposal Fee	$ 30,000
Annual Discharge Permit Fee	$ 1,900
Total Annual Cost	**$ 353,700**

APPENDIX B – PER EXTRACTS

COPY

GRASS VALLEY

WATER AND SEWER FEASIBILITY REPORT

PREPARED FOR
HUMBOLDT COUNTY

DECEMBER, 1993

waterESOURCE
consulting engineers, inc.
RENO, NEVADA

1993 PER Extracts Include: Section 1 Pages 1-4, Section 3 Pages 6-7

SECTION 1.0
SUMMARY

1.1 INTRODUCTION

This Project Feasibility Report was prepared to give the reader a brief but thorough understanding of the water and sewer infrastructure requirements to provide these utilities in Grass Valley and their probable economic impact. It is not intended to be used as a detailed facilities planning study which presents detailed information and cost estimates, but rather as a preliminary guide and planning tool for the development of future projects.

1.2 PLANNING AREA AND GROWTH (Section 2.0)

Due to the large size of the Valley (Figure 2.1, Page 2-2), which is over 520 square miles and lies in Humboldt and Pershing Counties, a smaller planning area was developed (Figure 2.2, Page 2-3). This planning area encompasses the more densely populated areas such as Gold Country Estates and Star City. The last few years have shown a tremendous growth increase in Grass Valley averaging approximately 12.5 percent per year. Currently, the population within the planning area is estimated at 1,766 which is estimated to increase to 3,563 by the year 2012. The average persons per household is estimated to be 3.04. It is estimated that the present average day water demand in the planning area is 581,000 gallons per day and the wastewater produced is in the order of 349,000 gallons per day.

1.3 GROUNDWATER SOURCE OF SUPPLY (Section 3.0)

The planning area encompasses two hydrographic basins known as the Winnemucca Segment and Grass Valley. All of the groundwater in the planning area however, is either in the Grass Valley Basin or is directly from the Grass Valley Hydrographic Basin (Figure 3.1, Page 3-2). A significant portion of the groundwater in Grass Valley is derived from infiltration of tributary stream flows from the Sonoma Range and the East Range which are derived primarily from snowpack.

Existing water rights (Certificated and Permitted) in Grass Valley (42,600 acre-feet) far exceed the present estimated pumpage (10,000 acre-feet) and estimated safe yield of the aquifer (13,000 acre-feet). The majority of the groundwater is utilized for irrigation. The State of Nevada Division of Water Resources (DWR) is extremely concerned with the continued increase of individual domestic wells. They prefer the Community Water System concept which provides them the ability to more accurately account for groundwater pumpage, lessens the risk of groundwater contamination caused by the proliferation of individual domestic wells and provides the public with a relatively safe and reliable source of water.

The current water quality in the large municipal wells at Gold Country and Star City is very good and meets all of the current Federal Drinking Water Standards. It is estimated that there are 775 private domestic wells in Grass Valley. The State of Nevada Bureau of Health Protection Services conducted an informal study of 249 of these individual domestic wells. The results of the study indicated that although there are some localized problems with Nitrates, Total Dissolved Solids and Chlorides, the majority of the wells sampled were of good quality water with respect to the previously referenced constituents.

The State of Nevada Division of Environmental Protection (DEP) is very concerned with individual sewage disposal systems and the potential of groundwater contamination resulting from these systems. The Division of Environmental Protection is not approving any subdivision maps for Grass Valley until a groundwater study is performed. All of Grass Valley is presently served by individual sewage disposal systems. This report recommends that a groundwater monitoring program must be initiated.

1.4 WATER SYSTEM ALTERNATIVES (Section 4.0)

Two alternatives were investigated for providing water service to the Grass Valley planning area. The major difference between the alternatives was whether Grass Valley would provide the source of water (Alternative A) or the City of Winnemucca would provide the source (Alternative B). Table 1.1 (page 1-4) presents the cost comparison of the water alternatives. Both alternatives appear equally feasible and ultimately will cost in the order of $2.0 million to construct a core system with an additional $1.6 million initially to serve the outlying areas of the planning area.

1.5 SEWER SYSTEM ALTERNATIVES (Section 5.0)

As with the water alternatives, two sewer system alternatives were investigated for providing wastewater conveyance and disposal for the planning area. The primary difference between the alternatives was whether Grass Valley would construct and maintain their own treatment plant (Alternative C), or whether the wastewater effluent would be pumped to the City of Winnemucca to be disposed of at their treatment facility (Alternative D). Selection of an alternative for the sewer system is difficult at best because of the unknowns which surround acquiring land for a treatment facility for Alternative C and the uncertainty of the City of Winnemucca's ability or desire to accept Grass Valley sewage. Table 1.1 (page 1-4) presents a summary of the costs for the sewer alternatives. At best the initial capital cost to serve the core area is estimated to be in the order of $3.8 - $4.3 million. To serve all of the existing developments in the outlying areas of the planning area an additional $2.6 million cost is estimated.

1.6 FUNDING (Section 6.0)

Several sources of potential funding may exist, including a Community Development Block Grant, State Water Grant, Economic Development Agency, State Revolving Loan Fund, Farmers Home Administration Loan and Private Financing. Because of the large magnitude of the projects required, the funding will most likely require a combination of all feasible sources.

TABLE 1.1
COST SUMMARY

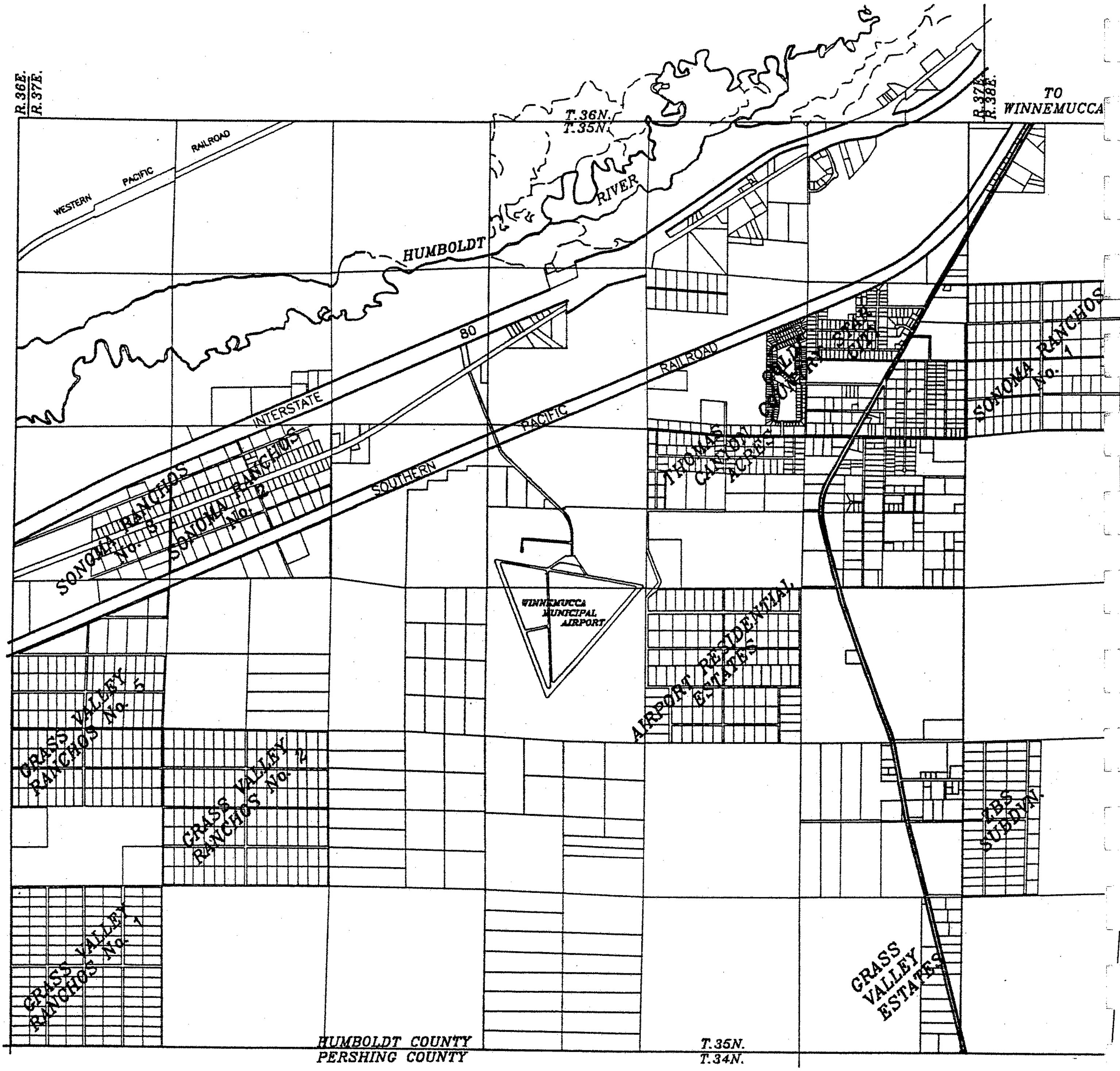
ALTERNATIVE		TOTAL COST $
Water	A, Phase I	1,970,810
	A, Phase II	1,626,250
	B, Phase I, Option I*	2,501,450
	B, Phase I, Option II	1,970,810
	B, Phase II	1,626,250
Sewer	C, Phase I **	3,791,700
	C, Phase II	2,566,000
	D, Phase I***	4,321,500
	D, Phase II	2,566,000

* Does not include cost for City of Winnemucca to deliver water
** Does not include cost for acquiring land for treatment facility
*** Does not include cost for City of Winnemucca to accept wastewater

The total per unit cost to deliver water is estimated to be $22.40 per month, per residential service for operation and maintenance plus $16.52 per month, per residential service to repay the loan to construct the capital improvements.

The cost per unit to convey the wastewater is approximately $16.90 per month, per unit for operation and maintenance plus $35.80 per month, per residential unit for loan repayment required to construct the capital improvements.

The loan repayment schedule assumed that the entire project was funded through a loan and no grant monies were included.



waterresource
consulting engineers, inc.
[illegible] TAHOE STREET - RENO, NEVADA - [illegible]

FIGURE 2.1 – GRASS VALLEY

TABLE 3.2
SUMMARY GRASS VALLEY
DRINKING WATER AWARENESS PROJECT

45 1cm = 1

Total Wells Sampled	249
Samples Exceeding 10 mg/l Nitrate	11
Samples Exceeding 1000 mg/l TDS	13
Samples Exceeding 500 mg/l TDS but less than 1000 mg/l	38
Samples Exceeding 400 mg/l Chloride	4
Samples Exceeding 250 mg/l Chloride But Less Than 400 mg/l	8
Number of Samples Exceeding TDS, Chloride and Nitrate	8

It appears from the results of the study that the majority of the domestic wells sampled in Grass Valley are producing excellent quality water with respect to TDS, Chlorides and Nitrates.

There are many unknown factors however when sampling from individual domestic wells such as well depth, presence or absence of a surface seal and location of the well with respect to septic system or other potential contamination sources. Because of these factors the Grass Valley Water Awareness Project is probably not an indicator of the overall quality of the groundwater; however, it does provide an initial concern for the groundwater quality and its relationship to individual sewage disposal systems.

Another indicator is the water quality of the larger domestic wells in Gold Country and Star City Subdivisions. These wells were presumably constructed to State standards since they are wells serving a public water system. In addition, they are relatively deep (greater than 300 ft) and because of the relatively large amount of water they continuously pump, undoubtedly provide representative samples of the groundwater. The water quality from the wells in both Star City and Gold Country meet all the Drinking Water Standards and are of good quality. Appendix B.3 contains the water quality results reported by the State of Nevada for the Gold Country and Star City wells.

Unfortunately, because the Gold Country and Star City wells are at the very end of the Grass Valley Hydrographic Basin, they would be the last to show contamination occurring upgradient in the aquifer. It is strongly recommended that a monitoring program be implemented throughout the Grass Valley Hydrographic Basin. A system of monitoring wells beginning at the southernmost portion of Grass Valley and proceeding northwestward towards the Humboldt River Valley Basin should be developed. Since Grass valley encompasses two counties, Humboldt and Pershing, it is recommended that both governmental entities cooperate in a shared groundwater monitoring program. It Is essential that development occurring in Pershing County be monitored closely because potential groundwater contamination occurring in Pershing County will eventually travel into Humboldt County. Existing suitable wells, in strategic locations, may be utilized as monitoring wells in Grass Valley thus saving the expense of drilling new monitoring wells. The wells should not only be monitored for water quality (Total Dissolved Solids, Chlorides, Nitrates, Arsenic) but also static water levels. A series of 10 to 20 monitoring wells should be developed and tested quarterly and semi-annually dependent on their locations. This would provide data throughout the groundwater aquifer for assessing the potential of contamination and water level declines and would be the initial step in developing a groundwater study for Grass Valley.

The above normal presence of TDS, Chlorides and Nitrates can be an indication that individual sewage disposal systems (ISDS), primarily septic tanks with leach fields, are producing a negative impact on the groundwater. All of Grass Valley is served by ISDS including Star City and Gold Country Estates. Current estimates indicate that there are approximately 851 septic systems within that portion of Grass Valley in Humboldt County including a large system at the Grass Valley School. It is further estimated that there are 253 septic tanks in the Pershing County portion of Grass Valley. This equates to a total of approximately 660,000 gallons per day of wastewater effluent disposed in the Grass Valley Hydrographic Basin aquifer.

TECHNICAL MEMORANDUM

GRASS VALLEY PHASE I
SEWER SYSTEM

PHASE I – REGIONAL
SYSTEM CONCEPT REVIEW

PREPARED FOR

HUMBOLDT COUNTY

November 30, 1999

1999 PER Extracts Include: Pages 1-11

waterESOURCE
consulting engineers, inc.

GEORGE W. BALL JR., P.E.
PRESIDENT

730 TAHOE STREET • RENO, NEVADA 89509 • (702) 322-9443 • FAX (702) 322-9507

TECHNICAL MEMORANDUM

DATE: **November 30, 1999**

TO: **HUMBOLDT COUNTY**

ATTN: **John Milton, Chairman**

FROM: **George W. Ball, Jr., P.E.**

RE: **Grass Valley Phase I Sewer System**
Phase I – Regional System Concept Review

JOB NO.: **9304.30**

SECTION 1.0 – INTRODUCTION

The objective of Phase I of WATERESOURCE's March 3, 1999 proposal (see Appendix A) was to form a review committee consisting of Humboldt County, City of Winnemucca, Winnemucca Farms, Vista Ridge Development, Nevada Division of Environmental Protection and WATERESOURCE, as technical advisor, and review the various Grass Valley sewer system alternatives proposed in WATERESOURCE's January 1998 Report concerning the Phase I Sewer System Concept (see Figure 1, page 6). The goal of the committee's efforts was to ascertain if there is any future feasibility for integration of the four entities into a regional sewer system since it does not appear feasible to have four separate treatment facilities in the Winnemucca/Grass Valley area.

The Grass Valley wastewater effluent is a valuable water resource, as well as a potential water right for Humboldt County. Therefore, the Phase I Sewer System Concept is to treat the effluent that is presently going untreated into the groundwater aquifer and beneficially using it, thereby conserving other water resources such as the groundwater aquifer for higher uses, i.e. drinking water. The **PRIMARY** objective of sewering Grass Valley is to protect the drinking water resources of Grass Valley, as well as portions of the City of Winnemucca.

WATERESOURCE did not perform Task 2.0 of our March 3, 1999 proposal (see Appendix A), regarding a conference with the funding agencies. WATERESOURCE, together with the County, had two conferences with the City, Winnemucca Farms and the Vista Ridge Development parties to ascertain various issues related to the project feasibility. The principal issues that were discussed by all parties were: (1) is the Vista Ridge project viable; (2) does a regional wastewater facility have the potential to be adequately funded; and (3) will the construction of a joint wastewater treatment and disposal facility be in the best interests of Humboldt County? The result of the conferences, together with the declining Humboldt County mining activities, has suggested that entering into a Grass Valley Regional Sewer System project at this time is not in the best interest of Humboldt County.

One of the critical and very important aspects of this project, with regards to funding, is establishing the revenue base. Individual homeowners may need a County mandate to convince them to convert from an operational septic system to a regional sewer collection system requiring monthly operation and maintenance charges and possibly a connection fee. Hopefully, the deciding factor will be the potential effect of the septic system's discharge to the groundwater reservoir effecting the potability of domestic wells.

The Grass Valley project is listed on the Nevada State Revolving Loan Fund Project Priority List for fiscal year 2001, for a total of $10.650 million. This project priority list indicates a loan award date of April of 2001. WATERESOURCE recommends that Humboldt County continue to submit a project priority listing request for this project in the future.

SECTION 2.0 – SUMMARY

2.1 Background

2.1.1 Need for the Wastewater System

The requirement for a wastewater treatment and disposal system in Grass Valley is primarily driven by the density of development, particularly in Gold Country Estates and the adjacent Star City Development. In addition, as the Grass Valley groundwater monitoring program has demonstrated, the groundwater is experiencing a nitrate and total dissolved solids increase. It is the conclusion, at this point in time, that this results from the discharge of the individual septic disposal systems into the groundwater system. Therefore, the primary goal, as noted previously, is to protect the water resource for this area.

2.1.2 Wastewater System Concept

The collection system concept involves a septic tank effluent pumping (STEP) system to collect and convey the effluent from the Grass Valley area to the treatment/disposal facility. This concept was presented in the January 1997 Addendum to the December 1993 Water and Sewer Feasibility Report prepared for Humboldt County. The 1993 Feasibility Report presented a conventional gravity sewer collection system with pumping stations as required. The treatment alternatives that have been evaluated include:

a. Connection to the Winnemucca Farms' system,
b. Connection to the City of Winnemucca system,
c. A joint venture treatment facility with other entities, and
d. A stand-alone, County-only system.

2.1.3 Projected Wastewater Flows

a. 2000 = 0.40 mgd
b. 2005 = 0.50 mgd
c. 2010 = 0.55 mgd

2.1.4 Estimated Cost

a. Facility plan, including an environmental assessment - $70,000.00.
b. Collection system, including engineering and construction management - $7,930,000.00.
c. Treatment, including engineering and construction administration - $2,650,000.00.

Total = $10,650,000.00

2.2 Regional Wastewater System

2.2.1 Interested Entities

The entities involved in the discussions concerning a regional system in Grass Valley are: (a) Vista Ridge Development, (b) City of Winnemucca, (c) Winnemucca Farms, and (d) Humboldt County.

2.2.2 Future Interest in Grass Valley Wastewater Treatment and Disposal Facility

a. City of Winnemucca – They have no immediate interest in a regional wastewater system simply because their existing treatment facility is sized to accommodate their expansion into the near future and is appropriately permitted with an NDPES permit. However, at some future time, they would entertaln the potential of sewering the east side of the collection system by gravity to a proposed future Grass Valley wastewater treatment and disposal facility. This would accomplish two things for the City of Winnemucca: (1) eliminate the need to treat that portion of thelr existing demand ln the existing City Wastewater Treatment Facillty, and (2) extend the life of the existing treatment facility.

b. Winnemucca Farms – Winnemucca Farms presently is managing their treatment and disposal needs with their new facility. However, in the future, they may have an Interest in conveying some of their treated effluent to a joint regional treatment facility for further treatment and disposal. Presently, Winnemucca Farms disposes their effluent through land application; however, winter conditions sometimes make this very difficult.

c. Vista Ridge has expressed an interest in pursuing a joint regional wastewater treatment and disposal facility with Humboldt County, as evidenced by the May 24, 1999 letter from First Federal Development, LLC (see Appendix B). The Vista Ridge Development's proposal is to construct a wastewater facility that will be sized, not only to manage their total development, but also incorporate the sewage collection system from the County's Grass Valley area. Disposal would include golf course irrigation in the summer and winter storage in holding ponds and rapid Infiltration basin.

SECTION 3.0 – BACKGROUND

3.1 Need for Wastewater Treatment and Disposal

Figure 1, page 6, presents the densest developed area to be sewered initially. The driving force for a sewer collection, treatment and disposal system in Grass Valley results from growth and the groundwater monitoring program, initiated by Humboldt County over four years ago. This monitoring program has continually sampled 17 sites for between 3 to 4 years. The results from these tests indicate increasing trends of nitrate in 14 of the 17 monitoring sites. The program strongly suggests that the increase in nitrates, as well as total dissolved solids in the groundwater system, results from the discharge of untreated septlc tank effluent to the groundwater system. Since this is the only water resource for the Grass Valley/ Winnemucca area, its protection and maintenance of an acceptable water quality is paramount. The Nevada Division of Environmental Protection also supports the development of a sewer collection, treatment and disposal system for the Grass Valley area, primarily because of the density of development in the northern portion of the valley in Humboldt County.

In addition, the County Is desirous of removing septage dlsposal from their landfill and disposing of it in a wastewater treatment facllity. The City of Winnemucca will not accept septage at their facility at this time.

3.2 County Commitment

Since the initiation and development of the December 1993 Grass Valley Water and Sewer Feasibility Report, prepared by WATERESOURCE for Humboldt County, the County has been steadfast in maintaining thelr support for developing a wastewater collectlon, treatment and disposal system in the Grass Valley area. It is presently estimated that the discharge from septlc tank effluent into the groundwater system in the area delineated in Figure 1, page 6, is in the order of 350,000 – 380,000 gallons per day.

3.2.1 Collection System Concept

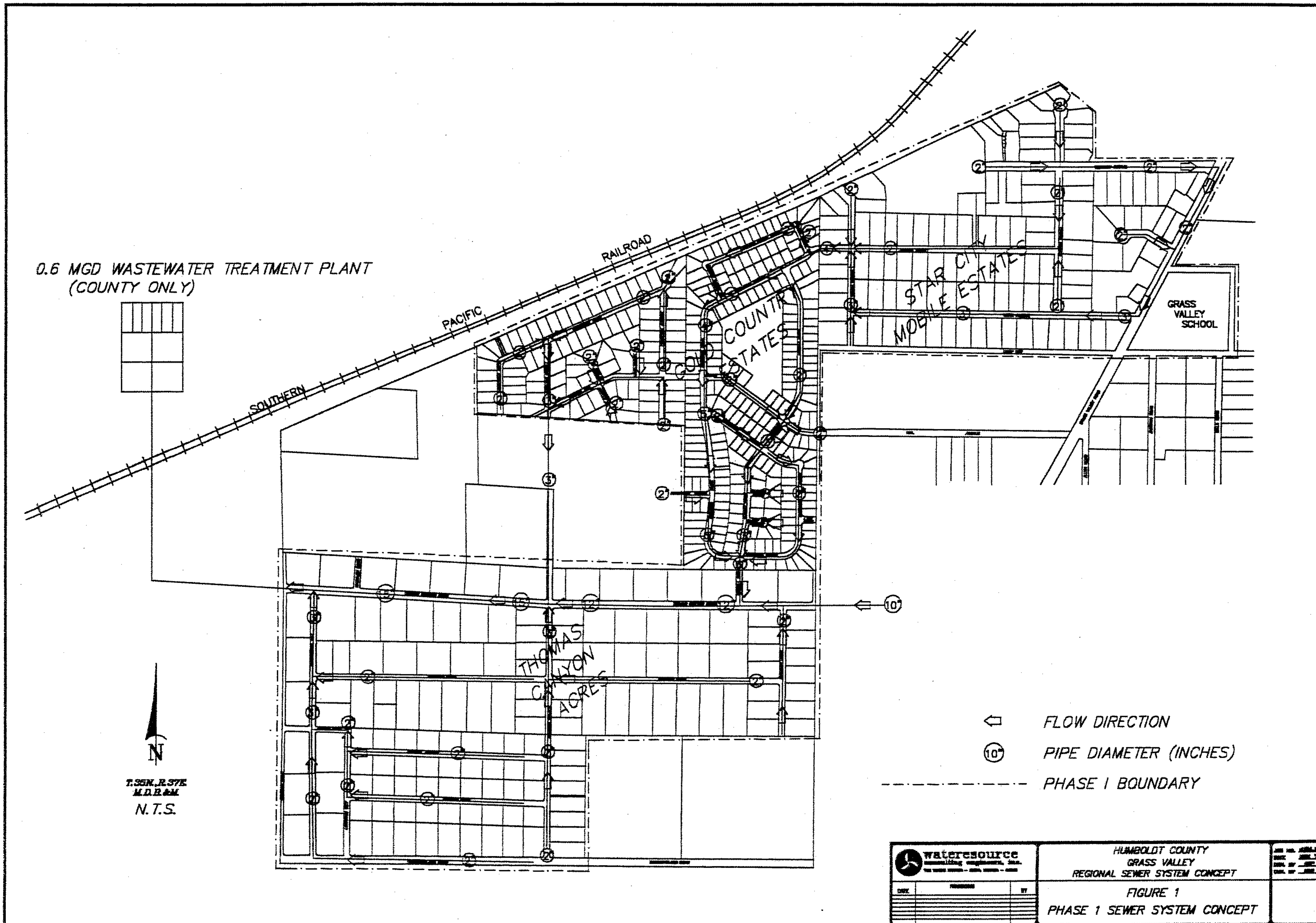
Figure 1, page 6, presents the collection system, utilizing the septic tank effluent pump (STEP) concept. This concept envisions each septic tank at individual residence and other facilities, havlng a small pump that discharges effluent from the septic tank through a pressurized service line to a small diameter pressure main that conveys the wastewater, along with other pumped septic tank effluent, to a central collection treatment and disposal facility.

3.2.2 Treatment Alternatives

The treatment alternatives that were evaluated include:

a. Connection to Winnemucca Farms and utilization of their existing treatment facility. Since Winnemucca Farms' treatment requirements is approaching their plant capacity, they will not have sufficient capacity to Integrate Grass Valley Into their system. In addition, the discharge of Grass Valley domestic wastewater into the Winnemucca Farms' treatment facility would change the characteristics of the wastewater they are presently treating by adding pathogens and viruses, as well as requiring a higher level of treatment, including dislnfection and a higher level of operator certification.

b. Connection to the City of Winnemucca. This alternative appears to have some feasibility; however, the Grass Valley system is removed



HUMBOLDT COUNTY
GRASS VALLEY
REGIONAL SEWER SYSTEM CONCEPT

FIGURE 1
PHASE 1 SEWER SYSTEM CONCEPT

from the City of Winnemucca's collection system by approximately three miles. In addition, the existing collection system in the City of Winnemucca appears inadequate to convey the projected Grass Valley wastewater to the City's treatment facility. Therefore, this alternative would require expensive collection system reconstruction, including a new river and freeway crossing. In addition, adding the Grass Valley wastewater to the City's system would significantly reduce their available capacity for growth, requiring them to look at a future plant expansion at a much sooner planning horizon.

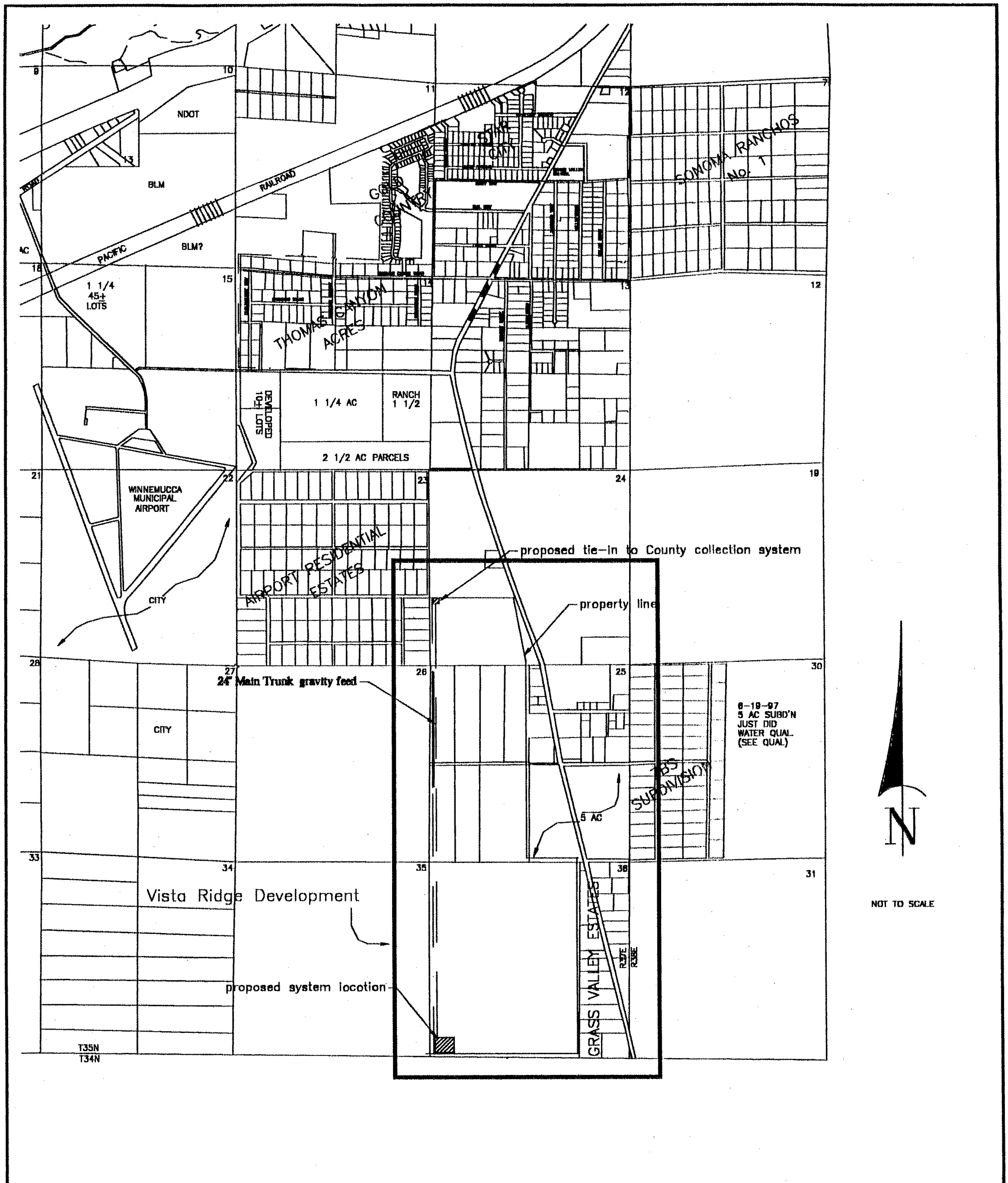
c. The Vista Ridge proposed development is presented in Figure 2, page 8. Their Interest in pursuing a Joint Wastewater Treatment Facility with the County is reflected in their letter to WATERESOURCE (Appendix B). However, subsequent discussions with them, by WATERESOURCE, suggested that the County is the key player, I.e. they would proceed with a regional facility if the County would participate. The issue involved in an inter-local agreement between Vista Ridge and the County have not been defined. In addition, WATERESOURCE has not heard of any interest from the developers in this project since June 1999. This, together with the decline in mining activity in the Winnemucca area, suggests the development is not feasible at this time.

d. The fourth alternative, County stand-along treatment facility for Grass Valley, was evaluated in the 1993 Feasibility Report which presented a conventional gravity collection system, and the January 1997 Addendum which evaluated a STEP system collection. The obvious disadvantage of a stand-alone facility is the capital cost outlay borne totally by the County, as well as a necessity for developing a rate base to support the system. In addition, the County would have to set up for the Grass Valley treatment system a total integrated wastewater collection treatment and disposal facility organization, along with the administrative and maintenance staff to administer and manage such a utility.

3.3 Previous Studles

3.3.1 Grass Valley Water and Sewer Feasibility Report, December 1993

This feasibility report was prepared to give Humboldt County an understanding of the water and sewer Infrastructure requirements to provide these utilities in Grass Valley and their probable economic impact. It served as a preliminary guide and planning tool for development of future projects.



waterresource consulting engineers, inc.

DATE	REVISIONS	BY

HUMBOLDT COUNTY
GRASS VALLEY
REGIONAL SEWER SYSTEM CONCEPT

FIGURE 2
VISTA RIDGE DEVELOPMENT

JOB NO.
DATE
DRN. BY
CHK. BY

3.3.2 Grass Valley Water and Sewer Feasibility Report Addendum, January 1997

This report was prepared as an alternative sewer collection system based on emerging technology relating to a septic tank effluent pumping (STEP) system in comparison to a community gravity sewer collection system as presented in the 1993 Report. One of the main purposes of the report was to compare the cost of the gravity collection system and the STEP system.

3.3.3 Sewer Collection/Treatment System Phase I Concept and Funding Investigation/Evaluation, January 1998

The primary objective of this investigation was to evaluate the various funding avenues available to Humboldt County for purpose of constructing a sewer collection and treatment system in Grass Valley. In addition, the investigation further delineated the area for the initial phase of the sewer collection system.

SECTION 4.0 – REGIONAL WASTEWATER SYSTEM ISSUES

4.1 Interested Entities

4.1.1 Vista Ridge Development

In a conference (4/1/99) with the Vista Ridge Development, they presented a conceptual design for a 1.5 mgd treatment facility with an estimated cost of $2.7 million. The effluent from the treatment facility would be used for golf course irrigation and storage in the winter in 50 - 60 million gallon storage lagoons. They would also dispose of the effluent in the winter time in rapid infiltration basins. Their treatment concept envisioned filtration with disinfection with the effluent nitrate in the order of 0.5 mg/l and utilization of ultra-violet (UV) disinfection. The Vista Ridge Development indicated they will enter Into an agreement with the County to construct the treatment facility with sharlng of the capital and O & M costs.

Both the City and the County were interested in the Vista Ridge Development proposal since it would provide both water and wastewater service to the airport properties which would allow potential development of the airport's industrial development property. As noted previously herein, the project economic feasibility, at this point in time, does not appear to exist.

4.1.2 City of Winnemucca

Steve West, City Manager, has Indicated they have no requirements from the Division of Environmental Protection to upgrade their treatment technology or move their treatment facility. The City is very pleased with their aerated lagoons system because of its ease of operation. They are at 44% of their present deslgn capacity; however, they have limited land for disposal. West is concerned that adding Grass Valley will bring thelr treatment requirements up to near capacity. He also expressed concern that the river crossing may not be big enough to convey the total City of Winnemucca and Grass Valley flows to the treatment facility.

The City dld express an interest of sewering, in the future, the southeastern portion of the City to a future regional facility in Grass Valley. They felt that that in the future there would be a distinct advantage since they could gravity from the higher portions of the City to the Grass Valley treatment facility. NDEP indicated an interest in this alternative since it would unload the existing City's treatment facility and reduce the amount of water going to the rapid infiltration basins. The City indicated that if their sewage load started to Increase dramatically or their monitoring wells indicated some problems from their treatment process that this would accelerate the conversion of the southeastern portion of the City of Winnemucca to a Grass Valley system, if it existed.

4.1.3 WInnemucca Farms

Winnemucca Farms indicated that their plant Is operating efficiently. They would have some concern Integrating Grass Valley's wastewater into their facility, particularly with the change in characteristics of the wastewater. Presently, they are treating 350,000 to 400,000 gallons per day with a BOD ten times the municipal wastewater strength. Winnemucca Farms believes their plant would need expansion wlth the Grass Valley system integratlon into their plant. They also feel that taking their effluent to a regional facility would not have any great benefit to WInnemucca Farms. Winnemucca Farm's present plant and capacity Is sufficient for their needs for ten years into the future.

SECTION 5.0 – CONCLUSION

The need and participants to create a Regional Wastewater Treatment and DIsposal Facility in the Grass Valley area exists; however, the timing does not appear to be feasible, primarily due to the overall economy of Humboldt County at this time. Development of funding resources appears feasible particularly in a joint venture scenario

The need for a Grass Valley treatment and disposal facility is highlighted by the groundwater quality impact from septic tank effluent. Therefore, a wastewater treatment and disposal facility will be required in the future to manage the Grass Valley Wastewater and protect the groundwater resource.

cc: Janet Kubichek, Vice Chairman
Bob Cassinelli, Commissioner
Buster Dufurrena, Commissioner
Chuck Giordino, Commissioner
Bill Diest, County Administrator

APPENDIX C – WWTF MANUFACTURERS INFORMATION

Sequox® ClarAtor® SR Diffuser Access System

Specializing in Custom Designed Wastewater Treatment Facilities

Grass Valley, NV

WWTP Proposal

for

Farr West Engineering

March 9, 2022

Aero-Mod, Inc.

7927 U.S. Highway 24
Manhattan, KS 66502 USA
Ph: (785) 537-4995
www.aeromod.com

Phase 1 - 0.405 MGD

Aero-Mod, Inc.

EQUIPMENT AND SERVICES COST ESTIMATE

Project:	Grass Valley, NV Ph. 1	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English

EQUIPMENT SUPPLIED

AERATION EQUIPMENT

2	Aeration pd blower/sound enclosure package, 100 HP - 460 V, 3 ph	
4	SEQUOX aeration control butterfly valve, pneumatically-actuated	
2	SEQUOX aeration throttling butterfly valve, gear-operated	
2	SEQUOX aeration control butterfly valve, electrically-actuated	
2	Aeration flow conditioner/flow sensor/SS flanged pipe spool	
24	Wall mounted aeration assembly, Model WA-PF6-2	- First Stage Aeration Basins
16	Wall mounted aeration assembly, Model WA-PS4-2	- Second Stage Aeration Basins

BIO-P EQUIPMENT

1	Aeration control butterfly valve, pneumatically-actuated
2	Aeration throttling butterfly valve, gear-operated
4	Wall mounted aeration assembly, Model WAD-PS2-2

CLARIFIER & RAS EQUIPMENT

2	Aero-Mod Split-ClarAtor Clarifier System - 640 sf/each

DIGESTION, SLUDGE HOLDING & WAS EQUIPMENT

2	WAS airlift pump, Model AL-600
2	Aeration control butterfly valve, pneumatically-actuated
2	Aeration control butterfly valve, electrically-actuated
2	Aeration flow conditioner/flow sensor/SS flanged pipe spool
8	Wall mounted aeration assembly, Model WAD-PS2-2

ELECTRICAL & CONTROLS EQUIPMENT

1	SEQUOX Process Control Panel w/ Allen Bradley PLC, Model SQC-100 Series - 115 V
2	Blower control panel w/ Allen Bradley 6-pulse VFD - 460 V, 3 ph
2	Air compressor, 3.0 HP with 80 gallon tank & auto-drain - 460 V, 3 ph
1	Air compressor alternation panel - 460 V
1	Regenerative desiccant dryer mounted on 60 gal dry storage tank - 115 V wall outlet
1	D.O. Control System - probe analyzer & sunshield w/ rail-mounted sensor probes

ANCILLARY EQUIPMENT

280	Wall mounted walkway & handrail, LF
2	Wall mounted stop plates & frames 2 SS wall-mounted frames 2 Aluminum stop plates
LS	Spare Parts
LS	Interior tank installation materials - SS brackets, SS bolts, PVC wall inserts, pneumatic tubing, misc.

SERVICES

LS	Freight to jobsite
LS	Aero-Mod equipment dry inspection/equipment start-up & training, two (2) days
LS	Aero-Mod PLC startup & training, two (2) days
LS	Aero-Mod biological training, two (2) days
LS	Operator training school - 2 days at Aero-Mod facilities in Manhattan, KS

===========

TOTAL EQUIPMENT COST **$979,850**

EST'D INSTALLATION of Aero-Mod EQUIPMENT by Contractor $235,000

(Includes Interior Tank PVC Piping)

ESTIMATED CONCRETE TANK COST by Contractor $941,000

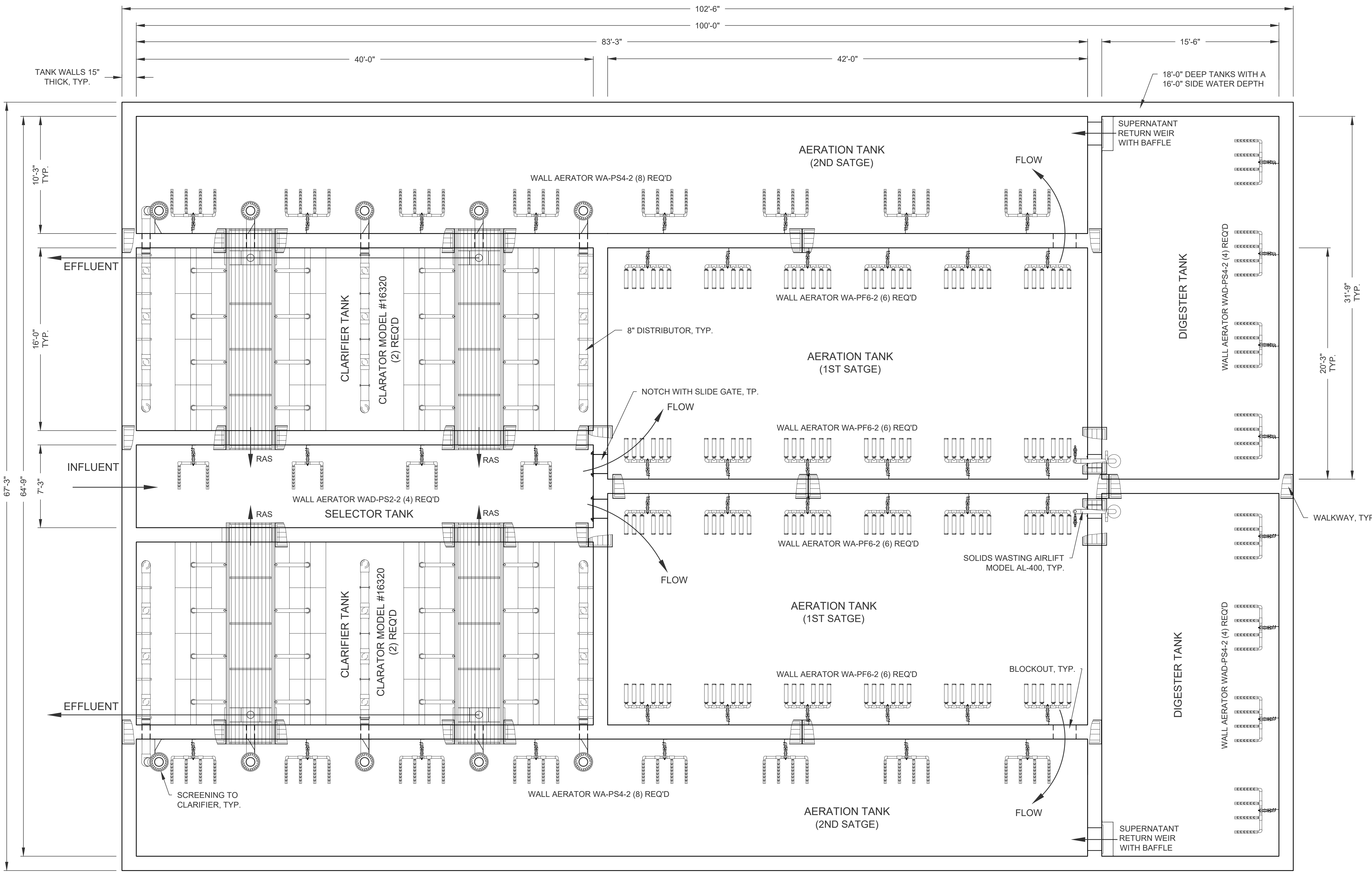
Concrete for Tank Walls, cy	626
Installed Concrete Cost, $/cy	$900
Concrete for Tank Slab, cy	402
Installed Concrete Cost, $/cy	$800
Grout for Clarifier Bottom, cy	81
Installed Concrete Cost, $/cy	$700

===========

ESTIMATED COST **$2,155,850**

PLEASE NOTE THE FOLLOWING

1. Buildings, site work, and auxiliary equipment are not included within this estimate.
2. No RAS pump station and associated electrical requirements are required.
3. Yard piping is not required between each Aero-Mod tank.
4. All associated walkways & handrail for the clarifier and tankage are included in the above estimate.
5. This estimate is valid for 90 days from the above date.



Date: 03/09/22

Scale: NTS

Chk by:

Drawn by: JB

Title: GRASS VALLEY PHASE 1 - 0.405 MGD WASTE WATER TREATMENT PLANT

Aero - Mod, Inc.

7927 U.S. Highway 24
Manhattan, Kansas 66502
PHONE: (785) 537-4995

Aero-Mod, Inc.

ACTIVATED SLUDGE DESIGN CALCULATIONS

Project:	Grass Valley, NV Ph. 1	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English
Act. Sludge Process:	SEQUOX BNR		

DESIGN CONDITIONS & PARAMETERS

	Influent	Clarifier Effluent
Flow (Q), MGD	**0.405**	
BOD_5, mg/l	**240**	**15.0**
BOD_5, lbs/day	811	50.7
BOD_L, mg/l	351	
TSS, mg/l	**240**	**15.0**
TSS, lbs/day	811	50.7
Ammonia-N, mg/l	**40**	**3.0**
Ammonia-N, lbs/day	135.1	10.1
TN, mg/l (assumes rDON < 1.0 mg/l)		**10.0**
TN, lbs/day		33.8
Phosphorus-P, mg/l	**8.0**	**4.9**
Phosphorus-P, lbs/day	27.0	16.5
Net Alkalinity Loss, mg/l as $CaCO_3$		**(206)**

Aeration Basin	
Retention Time, hours	**24.0**
Aeration Tank Volume, Mgal	0.405
MCRT, days	**20.0**
Wastewater Temperature, ^{o}C	16
Aerobic Digester	
Volume, % of Aeration Tank	30.0
Maximum Solids Conc., mg/l	12,000
Maximum Solids Conc., %	1.20%
Digester Temperature, ^{o}C	16
Sludge Holding Tank	
Volume, % of Aeration Tank	0.0
Maximum Solids Conc., mg/l	25,000
Maximum Solids Conc., %	2.50%

PROJECTED OPERATING CONDITIONS - AERATION BASIN

Mixed Liquor Suspended Solids, mg/l		**3,277**
Excess MLSS due to Phos-P Uptake/Removal, mg/l	0	
Mixed Liquor Volatile Suspended Solids, %		72%
F/M Ratio, lbs BOD_5/lb MLVSS		0.10
F/M Ratio, lbs BOD_5/lb MLSS		0.07
Organic Loading, lbs BOD_5/1000 cf of tank/day		15.0
Oxygen Requirements (Carbonaceous), mg/l/hr		9.48
Oxygen Requirements (Nitrogenous), mg/l/hr		7.09
Solids Production, lbs/day		553
WAS - Solids Wasted per Day, lbs/day		503
WAS - Solids Wasted per Day, gal/day @	0.33%	18,396

PROJECTED OPERATING CONDITIONS - AEROBIC DIGESTER

Volatile Solids Loading in Digester, lbs VSS/1,000 cf of tank/day	22
Volatile Solids Reduction in Digester, %	29%
Solids Wasted from Digester, lbs/day	400
Mass Solids Yield in Process & Digester per Mass Influent BOD_5, %	56%
Volume Wasted from Digester, gallons/day	3,993
Digester Sludge Age, days	**30**
Air Required for Stabilization, scfm	149
Air Required for Mixing @ 30 cfm/1000 cf	487

Aero-Mod, Inc.
AERATION DESIGN CALCULATIONS

Project: Grass Valley, NV Ph. 1 ***Date:*** 9-Mar-22
Engineer: Farr West Engineering ***Units:*** English
Diffuser Type Used: Tubular EPDM Fine Bubble

	Design	Peak		Design	Peak
Q, MGD	0.405	N/A	TKN_o, mg/l	50.0	N/A
BOD_o, mg/l	240	N/A	$TKN_{assimilation}$, mg/l	9.1	N/A
BOD_{rem}, mg/l	240	N/A	TKN_{rem}, mg/l	50.0	N/A
BOD_{rem}, lb/day	811	N/A	TKN_{rem}, lb/day	168.9	N/A
O_2 Requirement, lb O_2/lb BOD_{rem}	1.500		O_2 Requirement, lb O_2/lb TKN_{rem}	4.60	

AERATION REQUIREMENTS - FIRST STAGE

	Design	Peak
Removal in First Stage	70%	70.0%
BOD_{oxy} - Oxygen Required for BOD [Q * BOD_{rem} * 8.34 * O_2 Req. / 24], lbs O_2/hr	35.5	N/A
TKN_{oxy} - Oxygen Required for TKN [Q * TKN_{rem} * 8.34 * O_2 Req. / 24], lbs O_2/hr	22.7	N/A
Actual Oxygenation Rate (AOR), lbs O_2/hr	**58.1**	**N/A**
Standard Oxygenation Rate (SOR), lbs O_2/hr	**164.7**	**N/A**

SOR = [(AOR * $C_{s,20}$) / (α * Θ^$^{(T-20)}$ * (Tau * Ω * β * $C_{s,20}$ - C_L))]

Where:

$C_{s,T,H}$	Actual Value of D.O. Saturation, mg/l	**9.08**	C_L	Residual D.O. Conc., mg/l	**2.0**
$C_{s,20}$	Steady State Value of D.O. Saturation, mg/l	9.08	T	Temperature of Water, °C	**20**
Tau	Oxygen Saturation Value ($C_{s,T,H}/C_{s,20}$)	1.000	F		
α	Alpha - Oxygen Transfer Correction Factor for Waste	0.60	Θ	Theta - Oxygen Transfer Coeff	1.024
β	Beta - Salinity-Surface Tension Correction Factor	0.95		Site Elevation, FASL	**4,390**
P_H	Atmospheric Pressure at Site Elevation, psi	12.51	Ω	Omega (P_H/P_s)	0.851

Air Requirement = [SOR / (Oxygen Density * TE% * Diffuser Depth) / 60], scfm — **581** — **N/A**

Where:

Oxygen Density, lbs O_2/cf	0.0175	Diffuser Depth Below Water Surface, ft	**15.0**
Transfer Efficiency per Foot of Submergence, %	**1.80%**		

Denitrification Credit = [Air Rqmt * (TKN_{oxy} / AOR) * 50% * ((TKN_o - TN_e) / TKN_o)], scfm — 91 — N/A

Where: TN_e = TKN_o / 2 (assumed when D.O. control is not used)

Total Aeration Required in Aeration Basin, scfm — **490** — **N/A**

Air Correction

icfm = scfm / [((T_{std} + 460) / (T_{air} + 460)) * ((P_H - (RH% * SVP_{Tair})) / (14.7 - ($RH\%_{std}$ * SVP_{std}))) * (P_A / P_H)]

Where:

T_{std}, °F	68	T_{air}	Maximum Air Temperature, °F	**104**
$RH\%_{std}$	36%	RH%	Maximum Relative Humidity, %	**80%**
SVP_{std}, psi	0.34	SVP_{Tair}	Saturated Vapor Pressure of Air @ T_{air}, psi	1.058
		P_A	Actual Atmospheric Pressure after Blower Inlet, psi	12.31

Minimum Air Required for Mixing in First Stage Aeration Basin, cfm	272	Side Roll
Minimum Air Required for Mixing in Second & Third Stage Aeration Basin, cfm	273	Side Roll
Minimum Air Required for Operating Full Plant, cfm (mixing requirement for 24 hrs)	814	

	Design	Peak	Design	Peak
Aeration Pressure, in. H_2O			228	228
psi, std (does not include blower inlet/outlet)			**8.2**	**8.2**

		scfm	scfm	icfm	icfm
Aeration Basin - Fine Bubble		490	0	665	0
Aeration Basin - Coarse Bubble		386	0	524	0
Aerobic Digester Tank	(sequenced aeration)	244	0	244	0
Bio-P / Selector Tank		46	0	46	0
Post Aeration Tank		0	0	0	0
Clarifier RAS Airlift Pumps & Skimmers		60	0	60	0
	Total Air Required	1,227		1,539	
	Total Air Available			**1,783**	

POWER REQUIREMENTS

	Unit	Power	Power
Operating Power for Aeration Basin, HP	Blower	72.4	
Operating Power for Digester, HP	Blower	14.8	
Operating Power for Selector Tank, HP	Blower	2.8	
Operating Power for Post Aeration Tank, HP	Blower	0.0	
Operating Power for Clarifier, HP	Blower	3.7	
Operating Power for Pneumatic System, HP	Air Compr.	0.4	
Operating Power Required at Full Loading, HP		**94.1**	
Minimum Power Required to Operate Full Plant , HP		**48.1**	

Aero-Mod, Inc.

AERATION DESIGN CALCULATIONS

Project:	Grass Valley, NV Ph. 1	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English
Diffuser Type Used:	Stainless Steel Coarse Bubble		

AERATION REQUIREMENTS - SECOND & THIRD STAGE

	Design	Peak
Removal in Second Stage	30%	30.0%
Oxygen Required for BOD [Q * BOD_{rem} * 8.34 * O_2 Req. / 24], lbs O_2/hr	15.2	N/A
Oxygen Required for TKN [Q * TKN_{rem} * 8.34 * O_2 Req. / 24], lbs O_2/hr	9.7	N/A
Actual Oxygenation Rate (AOR), lbs O_2/hr	**24.9**	**N/A**
Standard Oxygenation Rate (SOR), lbs O_2/hr	**56.5**	**N/A**

SOR = [(AOR * $C_{s,20}$) / (α * Θ^$^{(T-20)}$ * (Tau * Ω * β * $C_{s,20}$ - C_L))]

Where:

$C_{s,T,H}$	Actual Value of D.O. Saturation, mg/l	9.08	**C_L**	Residual D.O. Conc, mg/l	**2.0**
$C_{s,20}$	Steady State Value of D.O. Saturation, mg/l	9.08	**T**	Temperature of Water, °C	20
Tau	Oxygen Saturation Value ($C_{s,T,H}$/$C_{s,20}$)	1.000	**F**		
α	Alpha - Oxygen Transfer Correction Factor for Waste	0.75	Θ	Theta - Oxygen Transfer Coeffi	1.024
β	Beta - Salinity-Surface Tension Correction Factor	0.95		Site Elevation, FASL	**4,390**
P_H	Atmospheric Pressure at Site Elevation, psi/FASL	12.51	Ω	Omega (P_H/P_s)	0.851

	Design	Peak
Air Requirement = [SOR / (Oxygen Density * TE% * Diffuser Depth) / 60], scfm	**434**	**N/A**

Where:

Oxygen Density, lbs O_2/cf	0.0175	Diffuser Depth Below Water Surface, ft	**15.5**
Transfer Efficiency per Foot of Submergence, %	**0.80%**		

	Design	Peak
Denitrification Credit = [Air Rqmt * (TKN_{oxy} / AOR) * 50% * ((TKN_o - TN_e) / TKN_o)], scfm	47	N/A

Where: TN_e = TKN_o / 2 (assumed when D.O. control is not used)

	Design	Peak
Total Aeration Required in Aeration Basin, scfm	**386**	**N/A**

Air Correction

icfm = scfm / [((T_{std} + 460) / (T_{air} + 460)) * ((P_H - (RH% * SVP_{Tair})) / (14.7 - ($RH\%_{std}$ * SVP_{std}))) * ((P_A / P_H)]

Where:

T_{std}, °F	68	T_{air}	Maximum Air Temperature, °F	**104**
$RH\%_{std}$	36%	RH%	Maximum Relative Humidity, %	**80%**
SVP_{std}, psi	0.34	SVP_{Tair}	Saturated Vapor Pressure of Air @ T_{air}, psi	1.058
		P_A	Actual Atmospheric Pressure after Blower Inlet, psi	12.31

Minimum Air Required for Mixing in Second & Third Stage Aeration Basin, cfm	273	Side Roll
Aeration Pressure, in. H_2O	213	213
psi, std (does not include blower inlet/outlet)	**7.7**	**7.7**

	Design scfm	Peak scfm	Design icfm	Peak icfm
Aeration Basin - Coarse Bubble	386	0	524	0

Aero-Mod, Inc.

O&M COST CALCULATIONS

Project:	Grass Valley, NV Ph. 1	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English
Diffuser Type Used:	Tubular EPDM Fine Bubble Stainless Steel Coarse Bubble	***Aeration Blower:***	Kaeser FB791C-100HP

AERATION REQUIREMENTS

	Full Loading
Aeration Basin - Fine Bubble	665
Aeration Basin - Coarse Bubble	524
Aerobic Digester Tank	244
Clarifier RAS Airlift Pumps & Skimmers	106
Total Air Required, icfm	1,539
Total Air Capacity, icfm	1,783

POWER REQUIREMENTS

		Full Loading
Total Operating Blower Power, HP		93.7
	Nameplate HP	kW
Operating Power for Aeration Basin	2 @ 100	54.0
Operating Power for Digester		11.1
Operating Power for Clarifier		4.8
Operating Power for Pneumatic System	2 @ 3.0	0.3
Operating Power for Air Compressor Auto-Drains		0.05
Operating Power for Regenerative Desiccant Dryer		0.07
Operating Power for Positioning Actuators		0.07
Operating Power for Blower VFD Control Panels		2.00
Operating Power for PLC-based Process & D.O. Control		0.20
Total Operating Power, kW		72.6
Total Daily Power, kWh		1,742
Yearly Power @ $0.08/kWh		**$50,868**

LABOR REQUIREMENTS

Labor is assumed at what is actually required, and only for the plant proper. The labor rate includes base labor and overhead. Regional policy, existing contracts, and related duties may alter this figure significantly. The person-hours required per week is calculated for only the Aero-Mod equipment.

Time per Week, hrs	**15**
Rate per Hour, $	**$25.00**
	$19,500

REPLACEMENT PARTS & CONSUMABLES

	Quan.	
Blower Belts	2	
Blower Inlet Filter Element	2	
Blower Oil (Twice)	2	
Compressor Oil (Twice)	2	
Filters for Regenerative Dryer	1	
Desiccant for Regenerative Dryer (once every 3 years)	1	
Misc. Parts	1	
		$1,600

CHEMICAL COST FOR PHOSPHORUS REMOVAL

Chemical Assumed to be Used	**N/A**
Estimated Amount of Chemical Added per Day, gal.	
Estimated Amount of Chemical Added per Year, gal.	
Estimated Cost per Gallon of Chemical (assumes bulk delivery)	
	N/A

CHEMICAL COST FOR NITROGEN REMOVAL

Chemical Assumed to be Used	**N/A**
Estimated Amount of Chemical Added per Day, gal.	
Estimated Amount of Chemical Added per Year, gal.	
Estimated Cost per Gallon of Chemical (assumes bulk delivery)	
	N/A

Aero-Mod, Inc.

CLARIFIER DESIGN CALCULATIONS

Project:	Grass Valley, NV Ph. 1	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English
Clarifier Type Used:	Split-ClarAtor		

FLOW CONDITIONS

Design Flow, MGD		0.405	
Peaking Factor, hourly	1,125 gpm	4.00	1.620 MGD
Duration, min		60	
Peaking Factor, sustained		3.00	1.215 MGD
Aeration Tank Volume, Mgal		0.405	
MLSS, mg/l		3,277	
Avg. RAS Recycle Rate, %		150%	

EQUIPMENT SIZING & SELECTION

Number of Clarifiers	**2**	Surface Area per Clarifier, sf	640
Clarifier Unit Model	**16320**	Total Surface Area, sf	**1,280**
Bridge Length, ft	16	Total Weir Length, ft	116
Clarifier Unit Width, ft	20	Tank Wall Depth, ft	18.0
Number of Units per Clarifier	2	Tank Water Depth, ft	16.0

SURFACE OVERFLOW RATE

	Design	
Design Flow, gpd/sf	**316**	
Peak Day Flow, gpd/sf	949	
Peak Hour Flow, gpd/sf	1,000	* Max allowed to leave clarifier
Max. Flow Allowed Through Clarifier Orifice, gpd/sf	1,000	* Max allowed to leave clarifier

WEIR OVERFLOW RATE

Design Flow, gpd/lin. ft	**3,491**
Peak Flow, gpd/lin. ft	11,034

SOLIDS LOADING RATE

Design Flow, lbs/day/sf	**21.6**
Peak Flow, lbs/day/sf	40.3

RETENTION TIME - including RAS

Design Flow, hr	**3.6**
Peak Flow, hr	1.9

PEAK FLOW HANDLING - IN-BASIN SURGE STORAGE

Hourly Peak Flow, MGD	1.620	Vol. of In-Basin Surge Storage, gal	15,514
Max. Flow Through Clarifier, MGD	1.280	Capacity of Surge Storage, hr.	1.1
Stored Peak Flow, gpm	236		

PEAK FLOW HANDLING - SIDE-LINE SURGE TANK

Hourly Peak Flow, MGD	1.620	Volume of Surge Tank	0
Max. Flow Through Clarifier, MGD	1.280	Capacity of Surge Tank, hr.	0.0
Diverted Peak Flow, gpm	236		

Peak Hour Capacity, hr. 1.1

Aero-Mod, Inc.

TANKAGE DESIGN CALCULATIONS

Project:	Grass Valley, NV Ph. 1	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English
Tank Construction:	Cast-in-Place Concrete		

BIO-P / SELECTOR TANK

Anaerobic Selector Volume Required, gal **33,750**

Number of Tanks	1	Tank Length, ft	40.0
Tank Wall Height, ft	18.0	Tank Width, ft	7.25
Tank Water Depth, ft	16.0	Total Volume, gallons	**34,707**
Freeboard, ft	2.0	Retention Time (Forward Flow) min.	123

AERATION TANK Volume Selected, gal **405,000**

Tank Wall Height, ft	18.0	Number of Trains	2
Tank Water Depth, ft	16.0	Number of Stages	2

Stage 1		*Stage 2*	
Number of Tanks	2	Number of Tanks	2
Tank Length, ft	42.0	Tank Length, ft	83.250
Tank Width, ft	20.250	Tank Width, ft	10.25
Area of Each Tank, sf	851	Area of Each Tank, sf	853
Total Volume, gallons	**203,576**	Total Volume, gallons	**204,249**

Total volume provided, gal **407,825**

CLARIFIER TANK

Number of Tanks	2	Tank Width, ft	16.0
Tank Wall Height, ft	18.0	Tank Length, ft	40.0
Tank Water Depth, ft	16.0	Total Volume, gallons	**153,190**

AEROBIC DIGESTER TANK Volume Selected, gal **121,500**

Number of Tanks	2	Tank Length, ft	15.5
Tank Wall Height, ft	18.0	Tank Width, ft	31.750
Tank Water Depth, ft	16.5	Total Volume, gallons	**121,476**

OVERALL TANKAGE DIMENSIONS

Total Length, ft	102.5	Wall Thickness, in	15.0
Total Width, ft	67.25	Floor Thickness, in	18.0
Total Area, sf	6,893	Total Concrete for Walls, cy	**626**
Total Wall Length, LF	751	Total Concrete for Slab, cy	**402**
		Total Grout for Clarifier, cy	**81**

Phase 2 - 0.305 MGD

Aero-Mod, Inc.

EQUIPMENT AND SERVICES COST ESTIMATE

Project:	Grass Valley, NV Ph. 2-4	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English

EQUIPMENT SUPPLIED

AERATION EQUIPMENT

2	Aeration pd blower/sound enclosure package, 75 HP - 460 V, 3 ph	
4	SEQUOX aeration control butterfly valve, pneumatically-actuated	
2	SEQUOX aeration throttling butterfly valve, gear-operated	
2	SEQUOX aeration control butterfly valve, electrically-actuated	
2	Aeration flow conditioner/flow sensor/SS flanged pipe spool	
20	Wall mounted aeration assembly, Model WA-PF6-2	- First Stage Aeration Basins
16	Wall mounted aeration assembly, Model WA-PS4-2	- Second Stage Aeration Basins

BIO-P EQUIPMENT

1	Aeration control butterfly valve, pneumatically-actuated
2	Aeration throttling butterfly valve, gear-operated
4	Wall mounted aeration assembly, Model WAD-HS2-2

CLARIFIER & RAS EQUIPMENT

2	Aero-Mod Split-ClarAtor Clarifier System - 480 sf/each

DIGESTION, SLUDGE HOLDING & WAS EQUIPMENT

2	WAS airlift pump, Model AL-400
2	Aeration control butterfly valve, pneumatically-actuated
2	Aeration control butterfly valve, electrically-actuated
2	Aeration flow conditioner/flow sensor/SS flanged pipe spool
6	Wall mounted aeration assembly, Model WAD-PS4-2

ELECTRICAL & CONTROLS EQUIPMENT

1	SEQUOX Process Control Panel w/ Allen Bradley PLC, Model SQC-100 Series - 115 V
2	Blower control panel w/ Allen Bradley 6-pulse VFD - 460 V, 3 ph
2	Air compressor, 3.0 HP with 80 gallon tank & auto-drain - 460 V, 3 ph
1	Air compressor alternation panel - 460 V
1	Regenerative desiccant dryer mounted on 60 gal dry storage tank - 115 V wall outlet
1	D.O. Control System - probe analyzer & sunshield w/ rail-mounted sensor probes

ANCILLARY EQUIPMENT

270	Wall mounted walkway & handrail, LF
2	Wall mounted stop plates & frames 2 SS wall-mounted frames 2 Aluminum stop plates
LS	Spare Parts
LS	Interior tank installation materials - SS brackets, SS bolts, PVC wall inserts, pneumatic tubing, misc.

SERVICES

LS	Freight to jobsite
LS	Aero-Mod equipment dry inspection/equipment start-up & training, two (2) days
LS	Aero-Mod PLC startup & training, two (2) days
LS	Aero-Mod biological training, two (2) days
LS	Operator training school - 2 days at Aero-Mod facilities in Manhattan, KS

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TOTAL EQUIPMENT COST **$889,500**

EST'D INSTALLATION of Aero-Mod EQUIPMENT by Contractor $185,000

(Includes Interior Tank PVC Piping)

ESTIMATED CONCRETE TANK COST by Contractor $741,500

Concrete for Tank Walls, cy	496
Installed Concrete Cost, $/cy	$900
Concrete for Tank Slab, cy	316
Installed Concrete Cost, $/cy	$800
Grout for Clarifier Bottom, cy	60
Installed Concrete Cost, $/cy	$700

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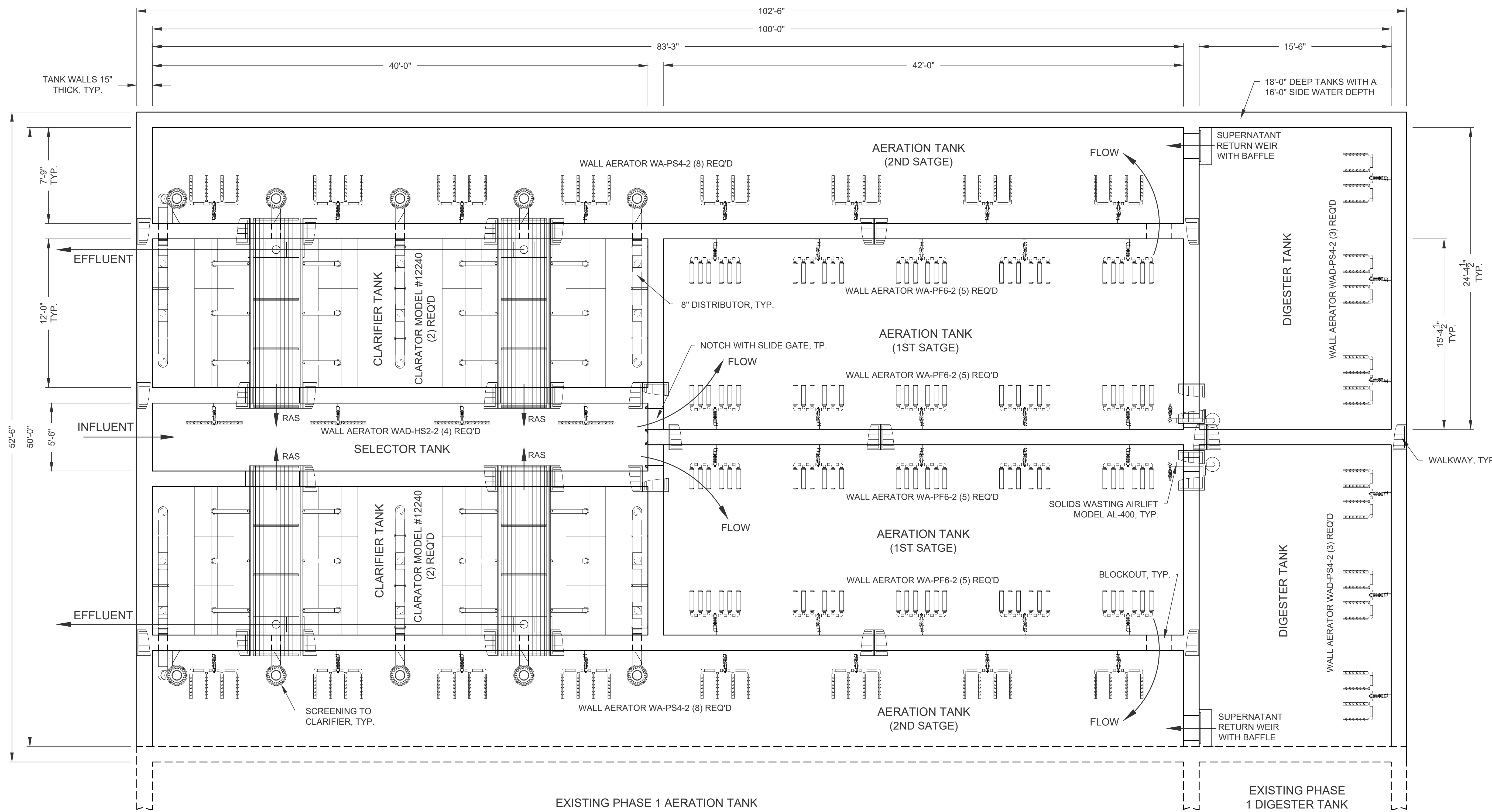
ESTIMATED COST **$1,816,000**

PLEASE NOTE THE FOLLOWING

1. Buildings, site work, and auxiliary equipment are not included within this estimate.
2. No RAS pump station and associated electrical requirements are required.
3. Yard piping is not required between each Aero-Mod tank.
4. All associated walkways & handrail for the clarifier and tankage are included in the above estimate.
5. This estimate is valid for 90 days from the above date.



Date: 03/09/22

Scale: NTS

Chk by:

Drawn by: JB

Title: GRASS VALLEY PHASE 2 - 0.305 MGD WASTE WATER TREATMENT PLANT

Aero - Mod, Inc.

7927 U.S. Highway 24
Manhattan, Kansas 66502

PHONE: (785) 537-4995

Aero-Mod, Inc.

ACTIVATED SLUDGE DESIGN CALCULATIONS

Project:	Grass Valley, NV Ph. 2-4	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English
Act. Sludge Process:	SEQUOX BNR		

DESIGN CONDITIONS & PARAMETERS

	Influent	Clarifier Effluent
Flow (Q), MGD	**0.305**	
BOD_5, mg/l	**240**	**15.0**
BOD_5, lbs/day	610	38.2
BOD_L, mg/l	351	
TSS, mg/l	**240**	**15.0**
TSS, lbs/day	610	38.2
Ammonia-N, mg/l	**40**	**3.0**
Ammonia-N, lbs/day	101.7	7.6
TN, mg/l (assumes rDON < 1.0 mg/l)		**10.0**
TN, lbs/day		25.4
Phosphorus-P, mg/l	**8.0**	**4.9**
Phosphorus-P, lbs/day	20.3	12.5
Net Alkalinity Loss, mg/l as $CaCO_3$		**(206)**

Aeration Basin	
Retention Time, hours	**24.0**
Aeration Tank Volume, Mgal	0.305
MCRT, days	**20.0**
Wastewater Temperature, ^oC	16
Aerobic Digester	
Volume, % of Aeration Tank	30.0
Maximum Solids Conc., mg/l	12,000
Maximum Solids Conc., %	1.20%
Digester Temperature, ^oC	16
Sludge Holding Tank	
Volume, % of Aeration Tank	0.0
Maximum Solids Conc., mg/l	25,000
Maximum Solids Conc., %	2.50%

PROJECTED OPERATING CONDITIONS - AERATION BASIN

Mixed Liquor Suspended Solids, mg/l		**3,277**
Excess MLSS due to Phos-P Uptake/Removal, mg/l	0	
Mixed Liquor Volatile Suspended Solids, %		72%
F/M Ratio, lbs BOD_5/lb MLVSS		0.10
F/M Ratio, lbs BOD_5/lb MLSS		0.07
Organic Loading, lbs BOD_5/1000 cf of tank/day		15.0
Oxygen Requirements (Carbonaceous), mg/l/hr		9.48
Oxygen Requirements (Nitrogenous), mg/l/hr		7.09
Solids Production, lbs/day		417
WAS - Solids Wasted per Day, lbs/day		379
WAS - Solids Wasted per Day, gal/day @	0.33%	13,854

PROJECTED OPERATING CONDITIONS - AEROBIC DIGESTER

Volatile Solids Loading in Digester, lbs VSS/1,000 cf of tank/day	22
Volatile Solids Reduction in Digester, %	29%
Solids Wasted from Digester, lbs/day	301
Mass Solids Yield in Process & Digester per Mass Influent BOD_5, %	56%
Volume Wasted from Digester, gallons/day	3,007
Digester Sludge Age, days	**30**
Air Required for Stabilization, scfm	112
Air Required for Mixing @ 30 cfm/1000 cf	367

Aero-Mod, Inc.

AERATION DESIGN CALCULATIONS

Project:	Grass Valley, NV Ph. 2-4	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English
Diffuser Type Used:	Tubular EPDM Fine Bubble		

	Design	Peak		Design	Peak
Q, MGD	0.305	N/A	TKN_o, mg/l	50.0	N/A
BOD_o, mg/l	240	N/A	$TKN_{assimilation}$, mg/l	9.1	N/A
BOD_{rem}, mg/l	240	N/A	TKN_{rem}, mg/l	50.0	N/A
BOD_{rem}, lb/day	610	N/A	TKN_{rem}, lb/day	127.2	N/A
O_2 Requirement, lb O_2/lb BOD_{rem}	1.500		O_2 Requirement, lb O_2/lb TKN_{rem}	4.60	

AERATION REQUIREMENTS - FIRST STAGE

	Design	Peak
Removal in First Stage	70%	70.0%
BOD_{oxy} - Oxygen Required for BOD [Q * BOD_{rem} * 8.34 * O_2 Req. / 24], lbs O_2/hr	26.7	N/A
TKN_{oxy} - Oxygen Required for TKN [Q * TKN_{rem} * 8.34 * O_2 Req. / 24], lbs O_2/hr	17.1	N/A
Actual Oxygenation Rate (AOR), lbs O_2/hr	**43.8**	**N/A**
Standard Oxygenation Rate (SOR), lbs O_2/hr	**124.0**	**N/A**

SOR = $[(AOR * C_{s,20}) / (\alpha * \Theta^{(T-20)} * (Tau * \Omega * \beta * C_{s,20} - C_L))]$

Where:

$C_{s,T,H}$	Actual Value of D.O. Saturation, mg/l	**9.08**	C_L	Residual D.O. Conc., mg/l	**2.0**
$C_{s,20}$	Steady State Value of D.O. Saturation, mg/l	9.08	**T**	Temperature of Water, °C	**20**
Tau	Oxygen Saturation Value ($C_{s,T,H}/C_{s,20}$)	1.000	**F**		
α	Alpha - Oxygen Transfer Correction Factor for Waste	0.60	Θ	Theta - Oxygen Transfer Coeff	1.024
β	Beta - Salinity-Surface Tension Correction Factor	0.95		Site Elevation, FASL	**4,390**
P_H	Atmospheric Pressure at Site Elevation, psi	12.51	Ω	Omega (P_H/P_s)	0.851

	Design	Peak
Air Requirement = [SOR / (Oxygen Density * TE% * Diffuser Depth) / 60], scfm	**437**	**N/A**

Where:

Oxygen Density, lbs O_2/cf	0.0175	Diffuser Depth Below Water Surface, ft	**15.0**
Transfer Efficiency per Foot of Submergence, %	**1.80%**		

	Design	Peak
Denitrification Credit = [Air Rqmt * (TKN_{oxy} / AOR) * 50% * ((TKN_o - TN_e) / TKN_o)], scfm	68	N/A

Where: $TN_e = TKN_o / 2$ (assumed when D.O. control is not used)

	Design	Peak
Total Aeration Required in Aeration Basin, scfm	**369**	**N/A**

Air Correction

icfm = scfm / $[((T_{std} + 460) / (T_{air} + 460)) * ((P_H - (RH\% * SVP_{Tair})) / (14.7 - (RH\%_{std} * SVP_{std}))) * ((P_A / P_H)]$

Where:

T_{std}, °F	68	T_{air}	Maximum Air Temperature, °F	**104**
$RH\%_{std}$	36%	RH%	Maximum Relative Humidity, %	**80%**
SVP_{std}, psi	0.34	SVP_{Tair}	Saturated Vapor Pressure of Air @ T_{air}, psi	1.058
		P_A	Actual Atmospheric Pressure after Blower Inlet, psi	12.31

Minimum Air Required for Mixing in First Stage Aeration Basin, cfm	207	Side Roll
Minimum Air Required for Mixing in Second & Third Stage Aeration Basin, cfm	206	Side Roll
Minimum Air Required for Operating Full Plant, cfm (mixing requirement for 24 hrs)	628	

	Design	Peak	Design	Peak
Aeration Pressure, in. H_2O			228	228
psi, std (does not include blower inlet/outlet)			**8.2**	**8.2**

		scfm	scfm	icfm	icfm
Aeration Basin - Fine Bubble		369	0	501	0
Aeration Basin - Coarse Bubble		291	0	395	0
Aerobic Digester Tank	(sequenced aeration)	183	0	183	0
Bio-P / Selector Tank		35	0	35	0
Post Aeration Tank		0	0	0	0
Clarifier RAS Airlift Pumps & Skimmers		57	0	57	0
	Total Air Required	936		1,171	
	Total Air Available			**1,355**	

POWER REQUIREMENTS

	Unit	Power	Power
Operating Power for Aeration Basin, HP	Blower	54.7	
Operating Power for Digester, HP	Blower	11.2	
Operating Power for Selector Tank, HP	Blower	2.1	
Operating Power for Post Aeration Tank, HP	Blower	0.0	
Operating Power for Clarifier, HP	Blower	3.5	
Operating Power for Pneumatic System, HP	Air Compr.	0.4	
Operating Power Required at Full Loading, HP		**71.9**	
Minimum Power Required to Operate Full Plant , HP		**37.3**	

Aero-Mod, Inc.
AERATION DESIGN CALCULATIONS

Project:	Grass Valley, NV Ph. 2-4	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English
Diffuser Type Used:	Stainless Steel Coarse Bubble		

AERATION REQUIREMENTS - SECOND & THIRD STAGE

	Design	Peak
Removal in Second Stage	30%	30.0%
Oxygen Required for BOD [Q * BOD_{rem} * 8.34 * O_2 Req. / 24], lbs O_2/hr	11.4	N/A
Oxygen Required for TKN [Q * TKN_{rem} * 8.34 * O_2 Req. / 24], lbs O_2/hr	7.3	N/A
Actual Oxygenation Rate (AOR), lbs O_2/hr	**18.8**	**N/A**
Standard Oxygenation Rate (SOR), lbs O_2/hr	**42.5**	**N/A**

$$SOR = [(AOR * C_{s,20}) / (\alpha * \Theta^{(T-20)} * (Tau * \Omega * \beta * C_{s,20} - C_L))]$$

Where:

$C_{s,T,H}$	Actual Value of D.O. Saturation, mg/l	9.08	C_L	Residual D.O. Conc, mg/l	**2.0**
$C_{s,20}$	Steady State Value of D.O. Saturation, mg/l	9.08	**T**	Temperature of Water, °C	20
Tau	Oxygen Saturation Value ($C_{s,T,H}/C_{s,20}$)	1.000	**F**		
α	Alpha - Oxygen Transfer Correction Factor for Waste	0.75	Θ	Theta - Oxygen Transfer Coeffi	1.024
β	Beta - Salinity-Surface Tension Correction Factor	0.95		Site Elevation, FASL	**4,390**
P_H	Atmospheric Pressure at Site Elevation, psi/FASL	12.51	Ω	Omega (P_H/P_s)	0.851

	Design	Peak
Air Requirement = [SOR / (Oxygen Density * TE% * Diffuser Depth) / 60], scfm	**327**	**N/A**

Where:

Oxygen Density, lbs O_2/cf	0.0175	Diffuser Depth Below Water Surface, ft	**15.5**
Transfer Efficiency per Foot of Submergence, %	**0.80%**		

	Design	Peak
Denitrification Credit = [Air Rqmt * (TKN_{oxy} / AOR) * 50% * ((TKN_o - TN_e) / TKN_o)], scfm	36	N/A

Where: $TN_e = TKN_o / 2$ (assumed when D.O. control is not used)

	Design	Peak
Total Aeration Required in Aeration Basin, scfm	**291**	**N/A**

Air Correction

$$icfm = scfm / [((T_{std} + 460) / (T_{air} + 460)) * ((P_H - (RH\% * SVP_{Tair})) / (14.7 - (RH\%_{std} * SVP_{std}))) * ((P_A / P_H)]$$

Where:

T_{std}, °F	68	T_{air}	Maximum Air Temperature, °F	**104**
$RH\%_{std}$	36%	RH%	Maximum Relative Humidity, %	**80%**
SVP_{std}, psi	0.34	SVP_{Tair}	Saturated Vapor Pressure of Air @ T_{air}, psi	1.058
		P_A	Actual Atmospheric Pressure after Blower Inlet, psi	12.31

Minimum Air Required for Mixing in Second & Third Stage Aeration Basin, cfm	206	Side Roll
Aeration Pressure, in. H_2O	213	213
psi, std (does not include blower inlet/outlet)	**7.7**	**7.7**

	Design scfm	Peak scfm	Design icfm	Peak icfm
Aeration Basin - Coarse Bubble	291	0	395	0

Aero-Mod, Inc.
O&M COST CALCULATIONS

Project:	Grass Valley, NV Ph. 2-4	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English
Diffuser Type Used:	Tubular EPDM Fine Bubble Stainless Steel Coarse Bubble	***Aeration Blower:***	Kaeser FB621C-75HP

AERATION REQUIREMENTS

	Full Loading
Aeration Basin - Fine Bubble	501
Aeration Basin - Coarse Bubble	395
Aerobic Digester Tank	183
Clarifier RAS Airlift Pumps & Skimmers	92
Total Air Required, icfm	1,171
Total Air Capacity, icfm	1,355

POWER REQUIREMENTS

		Full Loading
Total Operating Blower Power, HP		71.5
	Nameplate HP	kW
Operating Power for Aeration Basin	2 @ 75	40.8
Operating Power for Digester		8.3
Operating Power for Clarifier		4.2
Operating Power for Pneumatic System	2 @ 3.0	0.3
Operating Power for Air Compressor Auto-Drains		0.05
Operating Power for Regenerative Desiccant Dryer		0.07
Operating Power for Positioning Actuators		0.07
Operating Power for Blower VFD Control Panels		2.00
Operating Power for PLC-based Process & D.O. Control		0.20
Total Operating Power, kW		56.0
Total Daily Power, kWh		1,345
Yearly Power @ $0.08/kWh		**$39,262**

LABOR REQUIREMENTS

Labor is assumed at what is actually required, and only for the plant proper. The labor rate includes base labor and overhead. Regional policy, existing contracts, and related duties may alter this figure significantly. The person-hours required per week is calculated for only the Aero-Mod equipment.

Time per Week, hrs	**15**
Rate per Hour, $	**$25.00**
	$19,500

REPLACEMENT PARTS & CONSUMABLES

	Quan.	
Blower Belts	2	
Blower Inlet Filter Element	2	
Blower Oil (Twice)	2	
Compressor Oil (Twice)	2	
Filters for Regenerative Dryer	1	
Desiccant for Regenerative Dryer (once every 3 years)	1	
Misc. Parts	1	
		$1,600

CHEMICAL COST FOR PHOSPHORUS REMOVAL

Chemical Assumed to be Used	**N/A**
Estimated Amount of Chemical Added per Day, gal.	
Estimated Amount of Chemical Added per Year, gal.	
Estimated Cost per Gallon of Chemical (assumes bulk delivery)	
	N/A

CHEMICAL COST FOR NITROGEN REMOVAL

Chemical Assumed to be Used	**N/A**
Estimated Amount of Chemical Added per Day, gal.	
Estimated Amount of Chemical Added per Year, gal.	
Estimated Cost per Gallon of Chemical (assumes bulk delivery)	
	N/A

Aero-Mod, Inc.

CLARIFIER DESIGN CALCULATIONS

Project:	Grass Valley, NV Ph. 2-4	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English
Clarifier Type Used:	Split-ClarAtor		

FLOW CONDITIONS

Design Flow, MGD		0.305		
Peaking Factor, hourly	847 gpm	4.00	1.220	MGD
Duration, min		60		
Peaking Factor, sustained		3.10	0.946	MGD
Aeration Tank Volume, Mgal		0.305		
MLSS, mg/l		3,277		
Avg. RAS Recycle Rate, %		150%		

EQUIPMENT SIZING & SELECTION

Number of Clarifiers	**2**	Surface Area per Clarifier, sf	480
Clarifier Unit Model	**12240**	Total Surface Area, sf	**960**
Bridge Length, ft	12	Total Weir Length, ft	84
Clarifier Unit Width, ft	20	Tank Wall Depth, ft	18.0
Number of Units per Clarifier	2	Tank Water Depth, ft	16.0

SURFACE OVERFLOW RATE

	Design	
Design Flow, gpd/sf	**318**	
Peak Day Flow, gpd/sf	985	
Peak Hour Flow, gpd/sf	1,000	* Max allowed to leave clarifier
Max. Flow Allowed Through Clarifier Orifice, gpd/sf	1,000	* Max allowed to leave clarifier

WEIR OVERFLOW RATE

Design Flow, gpd/lin. ft	**3,631**
Peak Flow, gpd/lin. ft	11,429

SOLIDS LOADING RATE

Design Flow, lbs/day/sf	**21.7**
Peak Flow, lbs/day/sf	40.4

RETENTION TIME - including RAS

Design Flow, hr	**3.6**
Peak Flow, hr	1.9

PEAK FLOW HANDLING - IN-BASIN SURGE STORAGE

Hourly Peak Flow, MGD	1.220	Vol. of In-Basin Surge Storage, gal	11,725
Max. Flow Through Clarifier, MGD	0.960	Capacity of Surge Storage, hr.	1.1
Stored Peak Flow, gpm	181		

PEAK FLOW HANDLING - SIDE-LINE SURGE TANK

Hourly Peak Flow, MGD	1.220	Volume of Surge Tank	0
Max. Flow Through Clarifier, MGD	0.960	Capacity of Surge Tank, hr.	0.0
Diverted Peak Flow, gpm	181		

Peak Hour Capacity, hr. 1.1

Aero-Mod, Inc.

TANKAGE DESIGN CALCULATIONS

Project:	Grass Valley, NV Ph. 2-4	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English
Tank Construction:	Cast-in-Place Concrete		

BIO-P / SELECTOR TANK

Anaerobic Selector — Volume Required, gal **25,417**

Number of Tanks	1	Tank Length, ft	40.0
Tank Wall Height, ft	18.0	Tank Width, ft	5.50
Tank Water Depth, ft	16.0	Total Volume, gallons	**26,330**
Freeboard, ft	2.0	Retention Time (Forward Flow) min.	124

AERATION TANK — Volume Selected, gal **305,000**

Tank Wall Height, ft	18.0	Number of Trains	2
Tank Water Depth, ft	16.0	Number of Stages	2

Stage 1		*Stage 2*	
Number of Tanks	2	Number of Tanks	2
Tank Length, ft	42.00	Tank Length, ft	83.250
Tank Width, ft	15.375	Tank Width, ft	7.75
Area of Each Tank, sf	646	Area of Each Tank, sf	645
Total Volume, gallons	**154,567**	Total Volume, gallons	**154,432**

Total volume provided, gal **308,999**

CLARIFIER TANK

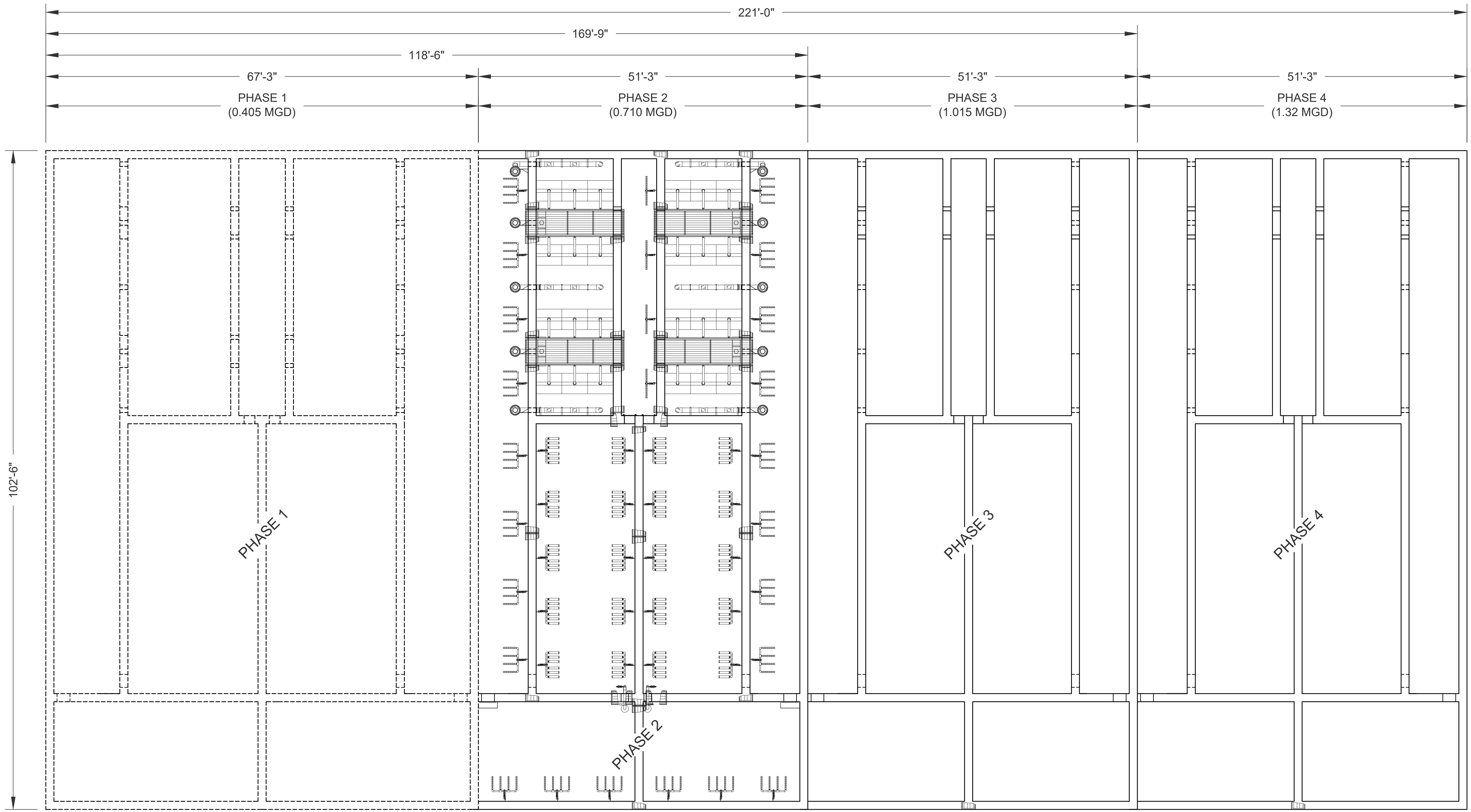
Number of Tanks	2	Tank Width, ft	12.0
Tank Wall Height, ft	18.0	Tank Length, ft	40.0
Tank Water Depth, ft	16.0	Total Volume, gallons	**114,893**

AEROBIC DIGESTER TANK — Volume Selected, gal **91,500**

Number of Tanks	2	Tank Length, ft	15.50
Tank Wall Height, ft	18.0	Tank Width, ft	24.375
Tank Water Depth, ft	16.5	Total Volume, gallons	**93,259**

OVERALL TANKAGE DIMENSIONS

Total Length, ft	102.50	Wall Thickness, in	15.0
Total Width, ft	52.50	Floor Thickness, in	18.0
Total Area, sf	5,381	Total Concrete for Walls, cy	**496**
Total Wall Length, LF	595	Total Concrete for Slab, cy	**316**
		Total Grout for Clarifier, cy	**60**



Date: 03/09/22

Scale: NTS

Drawn by: JB

Chk by:

Title:
GRASS VALLEY
PHASE 1 - 0.405 MGD THROUGH PHASE 4 - 1.320 MGD
WASTE WATER TREATMENT PLANT

Aero - Mod, Inc.

7927 U.S. Highway 24
Manhattan, Kansas 66502

PHONE: (785) 537-4995

AEROMOD
Wastewater Process Solutions

SEQUOX® Biological Nutrient Removal

Activated Sludge Process Provides Nutrient Removal with High Quality Treatment and Energy Savings

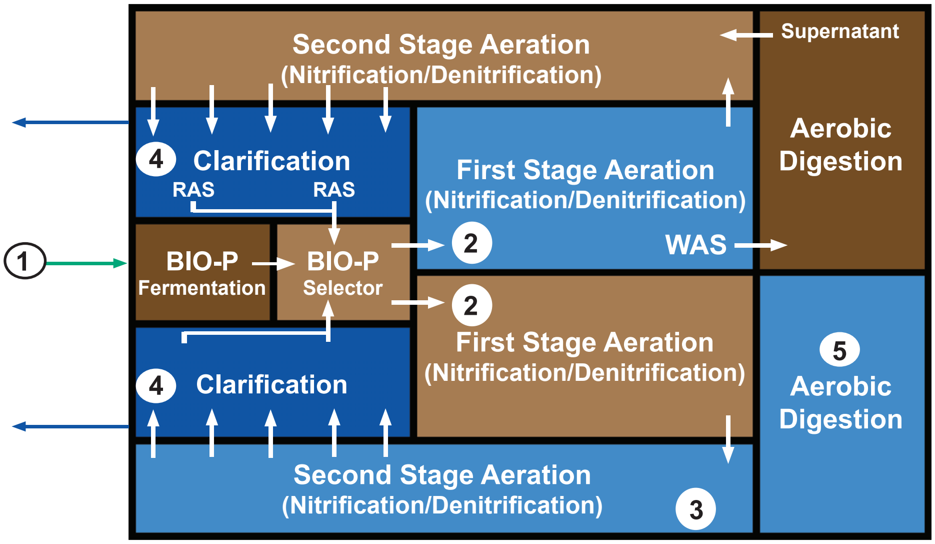
Holton, KS 0.528 MGD

FEATURES

- Biological Nutient Removal
- Plug flow kinetics
- Continuous clarification with sequencing aeration
- Sequential reactions without turning blowers on/off
- Superior energy control
- Operator friendly and low maintenance
- Automatic back-up controls should PLC fail
- Selector tank promotes better settling characteristics
- No moving parts below the water surface

Aero-Mod believes nutrient removal requires energy efficiencies. The SEQUOX® Biological Nutrient Removal Process along with the DOptimizer control meets this requirement. It is the latest innovation for biological nutrient removal from Aero-Mod. SEQUOX (SEQUential OXidation) offers the benefits of sequencing aeration with plug flow kinetics and the reliability of continuous clarification. Consistent superior effluent quality is achieved with total nitrogen levels as low as 3 mg/L. Phosphorus removal can be achieved by incorporating a fermentor/anaerobic selector and/or chemical addition. The process is energy efficient and has a small footprint. Furthermore, it requires no recycle pumps or mixers.

The SEQUOX® process often incorporates the ClarAtor® clarifier technology which is low-maintenance and operator friendly. Featuring stainless steel and fiberglass components with no moving parts below the water, its unique flow regulation system provides in-basin surge storage. The DOptimizer control system maximizes energy efficiency by balancing organic demand with mixing energy requirements.



SEQUOX® Biological Nutrient Removal

1 – Flow enters into an **Anoxic- Selector Tank** or **BIO-P Fermentor/Anaerobic Selector Tank,** where the raw sewage is combined with returned activated sludge (RAS) from the clarifiers.

2 – This mixture then flows into the **First Stage Aeration Basins** where the air is sequenced on/off on a 2 hour cycle. During peak organic loadings the DOptimizer controls the alternation of air and can activate both 1st Stage Aeration Basins.

3 – Flow continues into the **Second Stage Aeration Tanks**. The aeration is sequenced on/off on a 2 hour cycle between these two basins. The sequencing of this on/off air is opposite to the 1st Stage Aeration Basins. The end result of the plug flow process with sequential reactions is excellent nitrification/denitrification without having blowers turned on and off nor have dedicated internal recycle pumps and associated mixers in separate anoxic tanks.

The combination of cyclical aeration in the four (4) basins creates excellent aerobic conditions for BOD and ammonia removal when aerating. When the air is off, the nitrate laden MLSS settles and becomes oxygen deprived, creating anoxic conditions for the nitrates to become the oxygen source and allow for denitrification to occur. The plug flow process repeats this cyclical on/off aeration several times as the liquid mass progresses through the SEQUOX® process and on to the clarifier.

4 – The flow then enters the **ClarAtor Clarifier** where the biomass is settled and returned to the Selector Tank. The clarified effluent is withdrawn and discharged.

5 – At regular intervals solids are automatically or manually wasted to an **Aerobic Digester/Aerated Sludge Holding Tank.** Supernatant is simultaneously decanted back to the aeration process over a fixed level weir.

The SEQUOX® process with our innovative DOptimizer control strategy offers optimal energy efficiencies. It has more turn down for under loaded plants than ever before. The control philosophy allows the plant to mimic the actual organic loading coming to it. A plant is driven either in an organically "ACTIVE" mode; or, it is in a mixing "SEMI-ACTIVE" mode; or, it is virtually under no organic load and can "REST". Energy savings is the result of operating the minimum required basins and reducing blower usage for minimum mixing energy, or, no energy as the blowers are turned off in the "REST" mode.

LOAD TUNE YOUR PLANT WITH THE

DOptimizer™

CONTROL STRATEGY

ClarAtor® Clarifier

Combining the SEQUOX process with the ClarAtor clarifier technology offers cost effective compact solution. Other ClarAtor advantages include:

- No moving parts below the water
- Unique ability to regulate effluent flow rate for in-basin surge storage
- Uniform influent distribution and collection
- Stainless steel and fiberglass fabrication
- Rapid and positive sludge withdrawal
- Minimal maintenance

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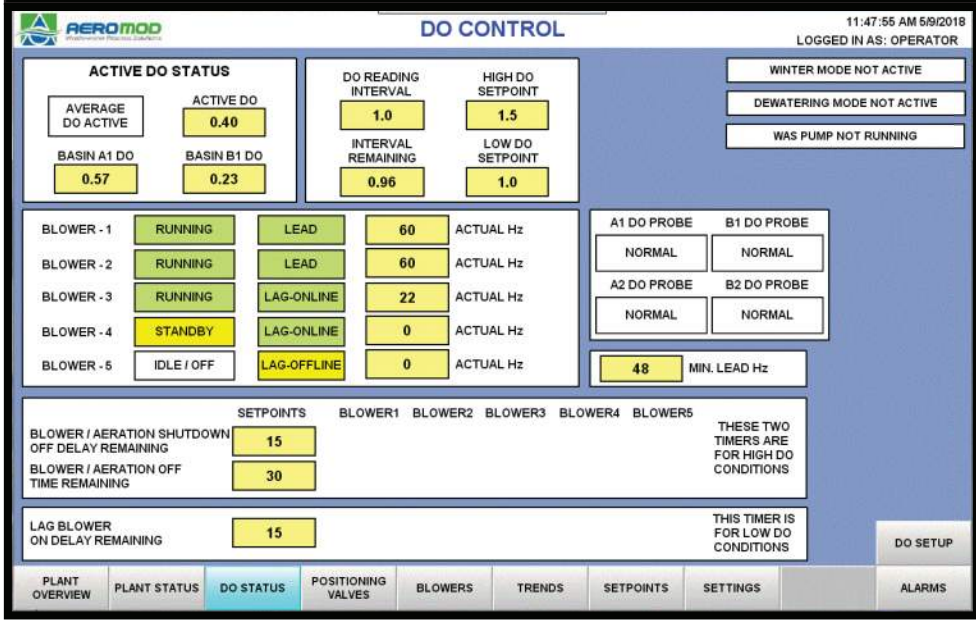
www.aeromod.com • aeromod@aeromod.com

DO2ptimizer™ Process Control

Use the SEQUOX® Process and DO$_2$ptimizer™ D.O. Control to "Load-Tune" Your Process

Aero-Mod's SEQUOX® process has a continuous, plug-flow pattern with sequential reactions. Sequential reactions means the aeration basins are aerated intermittently to minimize the mixing requirements to half of the tankage. Sequential reactions also means that with the alternating conditions of aerobic and anoxic, nitrification and denitrification will occur in the aeration basins. Denitrification will reclaim a portion of the oxygen used in nitrification. Use of the DO$_2$ptimizer™ D.O. Control System provides control of the air supplied to the aeration system in the tankage to provide the minimum air necessary for proper treatment and operation. At all times the Dissolved Oxygen (D.O.) level in the aeration basins is monitored, and the proper blower operation is correspondingly controlled. During periods of high loading (organic driven), the blower speed and quantity are adjusted to maintain the D.O. level within a set range. During periods of low loading (mixing driven), the blower speed and quantity are adjusted to maintain mixing intensity while limiting the D.O. to a maximum level. During periods of minimal or no loading (rest), the blowers are turned off to allow the process to "rest". The combination of the SEQUOX Process and the DO$_2$ptimizer D.O. Control System provide a cost-effective way of maintaining the most power-efficient operation of the wastewater treatment plant while achieving Total Nitrogen removal to the lowest levels attainable biologically.

Operator-friendly settings give the operator full control of the process.



- TN levels to lowest achieved biologically
- Mimics/matches actual demand to achieve energy efficiency
- Able to reduce energy consumption over conventional D.O. control
- Operates with energy efficiency even on plants well below design capacity

AEROMOD Wastewater Process Solutions

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AEROMOD
Wastewater Process Solutions

ClarAtor® Clarifier Technology

Headache Free Clarifier With No Moving Parts

The ClarAtor clarifier equipment is installed into concrete tankage, utilizing common-wall aeration basin construction, helping to lower capital and construction costs.

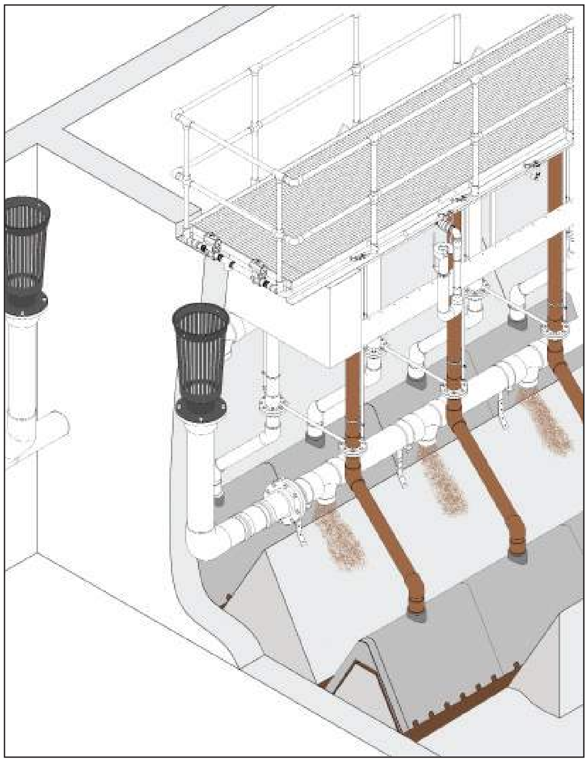
ClarAtor® Clarifier

- No moving parts below the water surface
- No motors, gears or electrical components
- Stainless steel and fiberglass fabrication
- No field welding or painting
- Uniform influent distribution
- Unique ability to regulate effluent flow rate provides in-basin surge storage
- Rapid and positive sludge withdrawal
- Minimal maintenance
- Applicable over a wide range of flows

Aero-Mod's proven ClarAtor® clarifier technology puts the operator in the best position to succeed. It features no moving parts below the water, a uniform distribution of the influent, and a uniform collection of the effluent. It also offers the unique ability to regulate the effluent flow rate. It is applicable to municipal and industrial biological wastewater treatment plants.

This secondary clarifier technology can be used for a wide range of flows (including infiltration and inflow problems) and can be applicable for retrofitting rectangular clarifiers.

The clarifier equipment is typically installed in conjunction with the SEQUOX nutrient removal process. It is installed into concrete tankage that is common wall to the activated sludge process. The equipment is fabricated of stainless steel, fiberglass and associated PVC piping with a bridge that includes grating and aluminum handrails. Typical operator attention required is periodic cleaning of the walkways, skimmers, and effluent discharge weirs. Because no mechanical equipment is below water, maintenance is virtually eliminated.

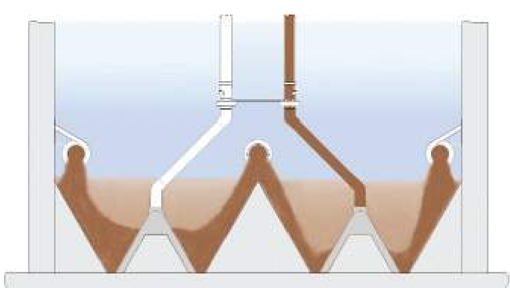


Distribution and removal system creates the optimal settling environment for wastewater treatment plant clarification. Futhermore, the ClarAtor's unique effluent regulation system allows more flow to enter the plant than is exiting, creating in-basin surge storage.

Settling occurs under ideal conditions because there is not a moving sludge scraper. Settled solids are rapidly removed from the bottom of the clarifier through stationary hydraulic suction hoods evenly spaced across the floor of the clarifier. Airlifts attached to the top of these suction hoods provide the pumping mechanism. The return activated sludge (RAS) rate is controlled by a timer which controls the airlifts in a "minutes on/minutes off" mode. The return activated sludge is discharged back to the selector/aeration tank through the RAS trough on the bridge.

Effluent is evenly withdrawn across the clarifier through submerged launders and discharges through a flow regulation system. This unique system with the ClarAtor technology creates a clarifier able to regulate the effluent flow rate on the downstream end and absorb the excess flow within the basins or in a sideline surge tank. This flow control system limits the upward velocity in the clarifier, producing a better quality effluent with a more regulated flow rate to downstream tertiary treatment or disinfection systems.

With no moving parts under the water and common-wall construction of the process tanks; a complete treatment plant fits in a rectangular configuration. This greatly reduces yard piping, electrical requirements, transfer pump stations and treatment footprint. The end result can be significant savings in capital and maintenance costs.



The hydraulic suction hood assemblies have ports along the bottom of the clarifier to allow solids removal via airlifts evenly spaced along the length of the suctions hoods.

SEQUOX® Process

Combining the ClarAtor Clarifier with the SEQUOX process offers a compact low maintenance plant. Other SEQUOX advantages include:

- Biological nutrient removal
- Continuous clarification with sequencing aeration
- Operator friendly, low mechanical process
- Reduced energy requirements
- Superior effluent quality

SR Diffuser Access System

An Innovative Solution to the Challenge of Diffuser Inspection and Maintenance

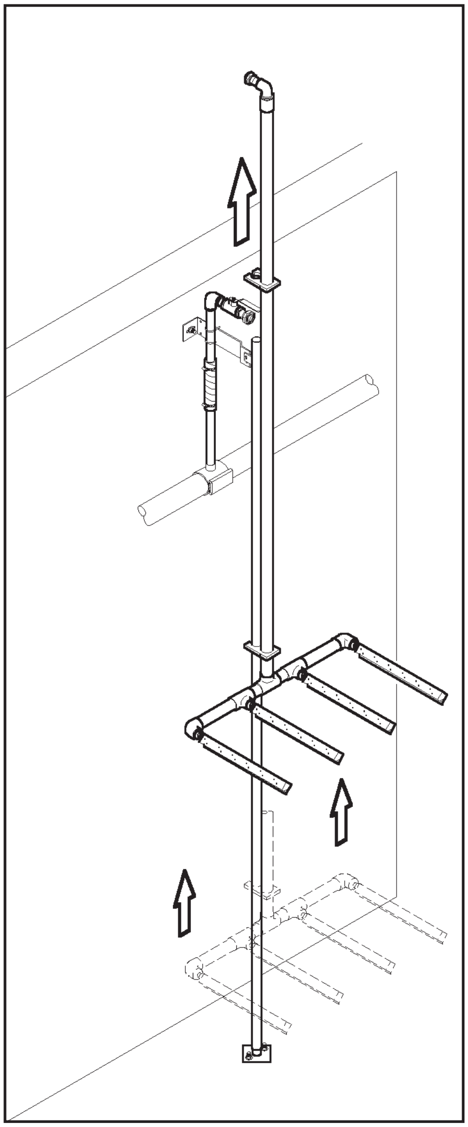
The SR (Slide Rail) Diffuser Access System provides simple removal of the aeration diffusers within a tank without turning off the blowers or draining the tank(s). Applications for the system are typically for aeration or digester basins.

Isolation and air control are provided by a ball valve on each assembly. Removal is achieved by loosening a stainless steel union and lifting up the PVC assembly on guides. Rigidity is provided by a permanently mounted stainless steel slide rail firmly bolted to the tank wall and floor. The result is a low maintenance, operator friendly system for diffuser upkeep.

SR Diffuser Access System

- Lightweight diffuser system
- Provides access to diffusers without turning off the blowers or draining tanks
- Individual isolation and control
- Constructed from long lasting, non-corrodible materials - SS and PVC
- Excellent for retrofits of existing aeration basins
- Eliminates the need for hoist or winching systems
- Provides access to an individual drop pipe without affecting the entire system

Diffuser inspection is easily accomplished without draining the tanks, turning off the blowers, or using a hoist. Diffuser cleaning and maintenance can be performed without affecting the operation of the treatment plant or shutting off other diffuser assemblies.



Typical installations include the tubular type of coarse or fine bubble diffusers. Two to six diffuser assemblies are usually mounted to a common slide rail system.

Installation of the SR Diffuser Access System can include new construction or retrofits to existing mixing or aeration basins.

Systems can be designed for "wet installation" in retrofit applications with all hardware mounted above the water.

PVC Drop Pipe

Typically, a two inch schedule 40 PVC pipe is used to transfer air to the diffusers below the surface of the water in the tank. Supports are mounted to the drop pipe that direct the assembly along the guide rail for inspection and maintenance. At the top, a stainless steel union is installed on the pipe that can be easily disconnected for removal of the assembly. Additionally, a stainless steel shut-off throttling ball valve is located at the top of the assembly to isolate the assembly from the air line.

Guide Rail Mounting System

The rigidity needed for operation of the SR Diffuser Access System is provided by the 1.5" stainless steel guide rail. The guide rail is attached to the side of the tank near the top by a stainless steel wall bracket and then secured to the bottom of the tank by a stainless steel floor mounted support.

Diffusers

The SR Diffuser Access System can be used with stainless steel coarse or tubular membrane diffusers. The arrangement of the diffusers per drop pipe is usually two, four or six diffusers in either 12" or 24" diffuser lengths. The number of diffusers and the total number of slide rail assemblies are contingent on the air requirements. This flexible system readily accepts most types of diffusers in varying amounts.

Aero-Mod, Inc.

SLUDGE DEWATERING DESIGN CALCULATIONS

Project:	Grass Valley, NV Ph. 1	***Date:***	9-Mar-22
Engineer:	Farr West Engineering	***Units:***	English
Belt Filter Press Model Used:	Tritan series 1500		

NOTE: Actual operating conditions dependent upon loading of treatment plant.
This proposal assumes a population equivalent of about 4,000 people.

SLUDGE CONDITIONS

Volume of sludge per day (fully loaded), gallons *(avg over month)*		**3,993**
Solids concentration of sludge, mg/l		12,000
Solids concentration of sludge, %		1.20%
Solids to dewater, dry lbs/day *(avg over month)*		**400**
Polymer requirement, lbs/dry ton sludge		20
Dewatered solids concentration, %	Varies 13-16%	15.0%
Volume of dewatered sludge, ft^3		42.7

EQUIPMENT SIZING & SELECTION

Number of Belt Filter Presses Used	**1**
Polymer Feed Pump Used	**Diaphragm**
Sludge Feed Pump Used	**Prog. Cavity**
Pumping Capacity, gpm	137
BFP Solids Loading Rate, lbs/hr	825
Belt Filter Press Effective Belt Width, m	1.5
BFP Solids Loading Rate, lbs/hr/m	550
Projected Operational Time Period, hrs/day	6.0
Projected Operational Days Required/month	**2.4**
Sludge Cake Pump Used	**Prog. Cavity**

OPERATIONAL REQUIREMENTS

Total polymer requirement, lbs/month — 120

Active polymer 50% — Polymer density, lb/gal 8.6

Total polymer requirement, gal/month — 28

Electrical usage per press, kWh 7.9

Total electrical usage, kW/month — 121

Total weight of dewatered sludge @ 15.0% , tons/month — 40

WASHWATER USE (per press)

Washwater use for normal operation, gpm	31.5
Washwater use for washdown cycle, gpm (≈30 min)	43.0
Recommended washwater supply, gpm	55.0

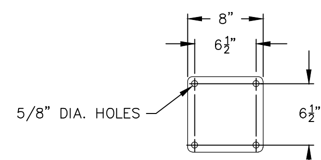
* Note: minimum water pressure (psi) of 50

BUDGET PRICE QUOTE FOR EQUIPMENT **$421,125**

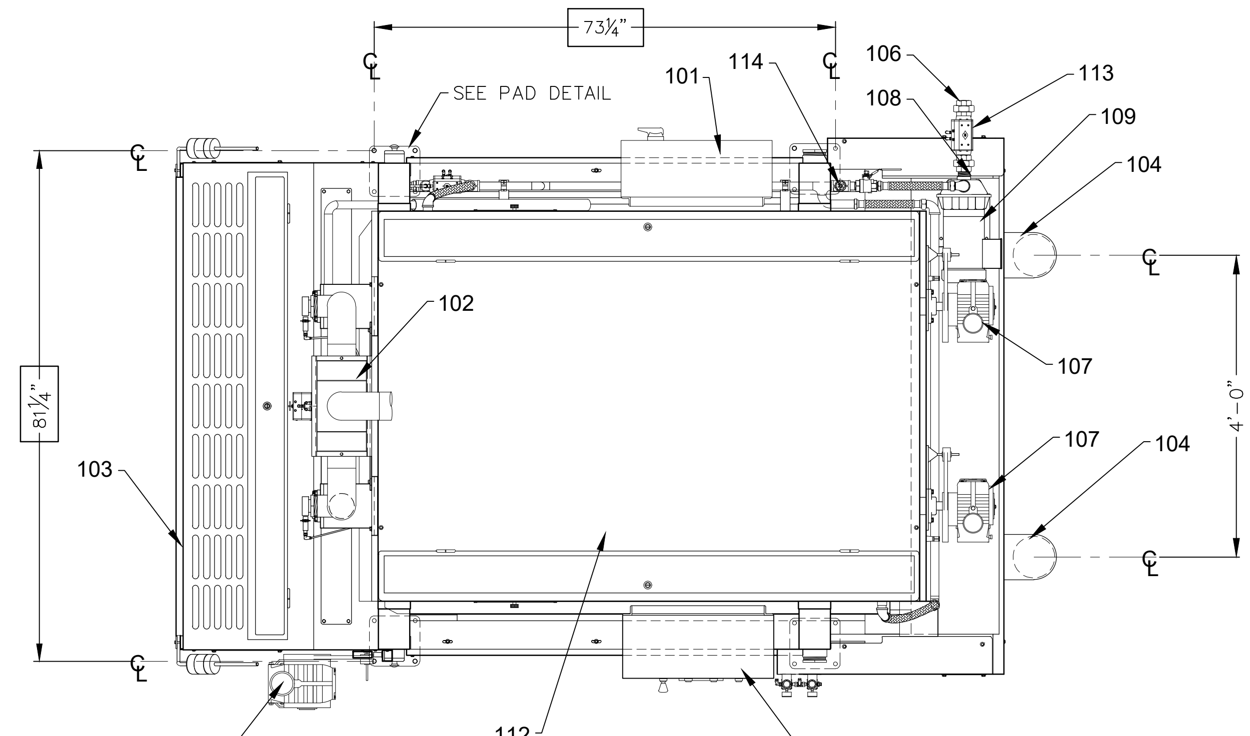
Includes:
- (1) Tritan Belt Filter Press, model 1500
- (1) PLC Master Control Panel w/ Touchscreen
- (1) Sludge Feed Pump/VFD Controls/Static Mixer on Stand
- (1) Polymer Feed System/Controls on Stand
- (1) Sludge Cake Pump/Sludge Hopper/VFD Controls
- (1) Day(s) of Operator Training & Equipment Startup
- LS Freight to Job-site

No.	Qty.	Item	hp	Connection
101	1	Main Power Panel (NEMA 4x)	N/A	P.O.C. by Others (230/460 V, 3 phase)
102	1	Sludge Inlet	N/A	P.O.C. by Others
103	1	Dry Cake Outlet	N/A	P.O.C. by Others (Conveying System and/or Storage Container)
104	2	Filtrate Outlets	N/A	P.O.C. by Others (6" Flex Connections)
105	1	Compressed Air Inlet (Instrument Quality)	N/A	P.O.C. by Others (90 to 100 p.s.i. @ 5.5 c.f.m.) 3/8" Compression
106	1	Water Inlet	N/A	P.O.C. by Others (1 1/2" N.P.T., 70 g.p.m. @ 50 p.s.i.)
107	2	Rotary Drum Thickener Motor	1.0hp	Power Supplied from 101
108	1	Centrifugal Water Washing Pump	N/A	N/A
109	1	Centrifugal Water Washing Pump Motor	3.0hp	Power Supplied from 101
110	1	Press Cylinder Motor	.5hp	Power Supplied from 101
111	1	Fork Lifting Supports	N/A	N/A
112	1	Rotary Drum Thickener	N/A	N/A
113	1	Automatic Water Shut-off Valve	N/A	Controlled from 115
114	1	Low Washwater Pressure Switch	N/A	Power Supplied from 115
115	1	PLC Control Panel (NEMA 4x)	N/A	Power Supplied from 101

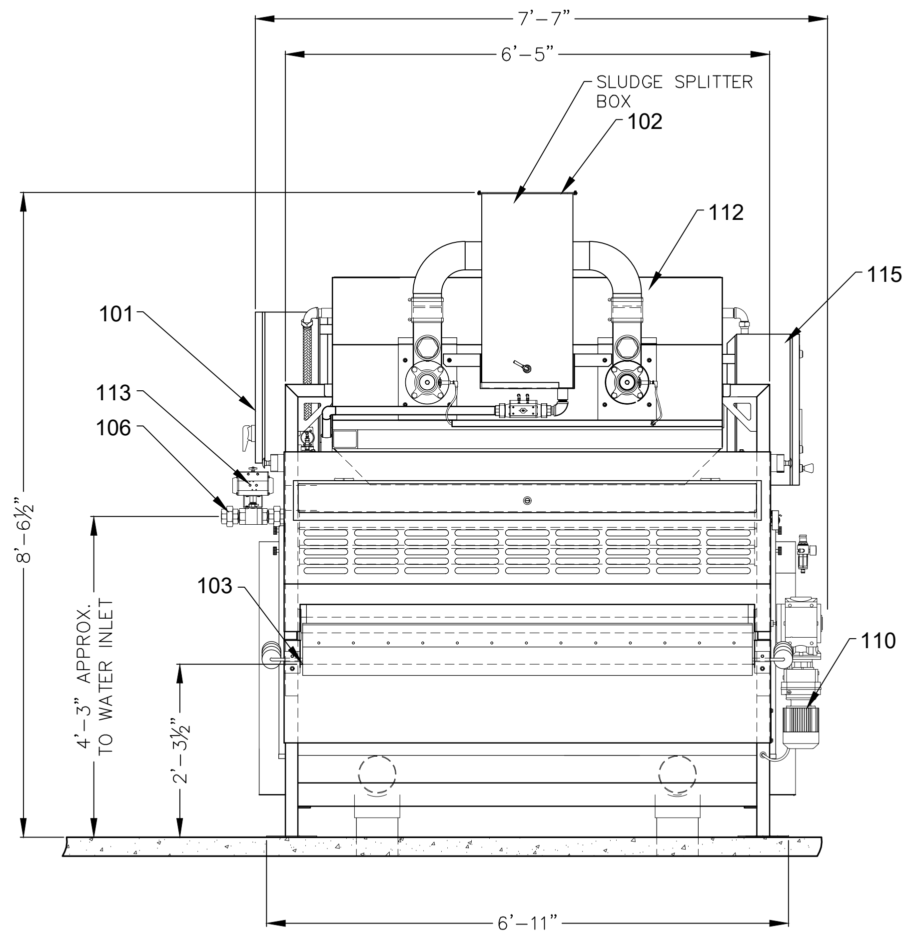
P.O.C. = Point of Connection
Minimum distance of 6' 0" required on each side of the TRITAN
Minimum distance of 3' 6" required in front and back of the TRITAN
APPROX. WT. = 5000 LBS. LOADED = 5600 LBS.



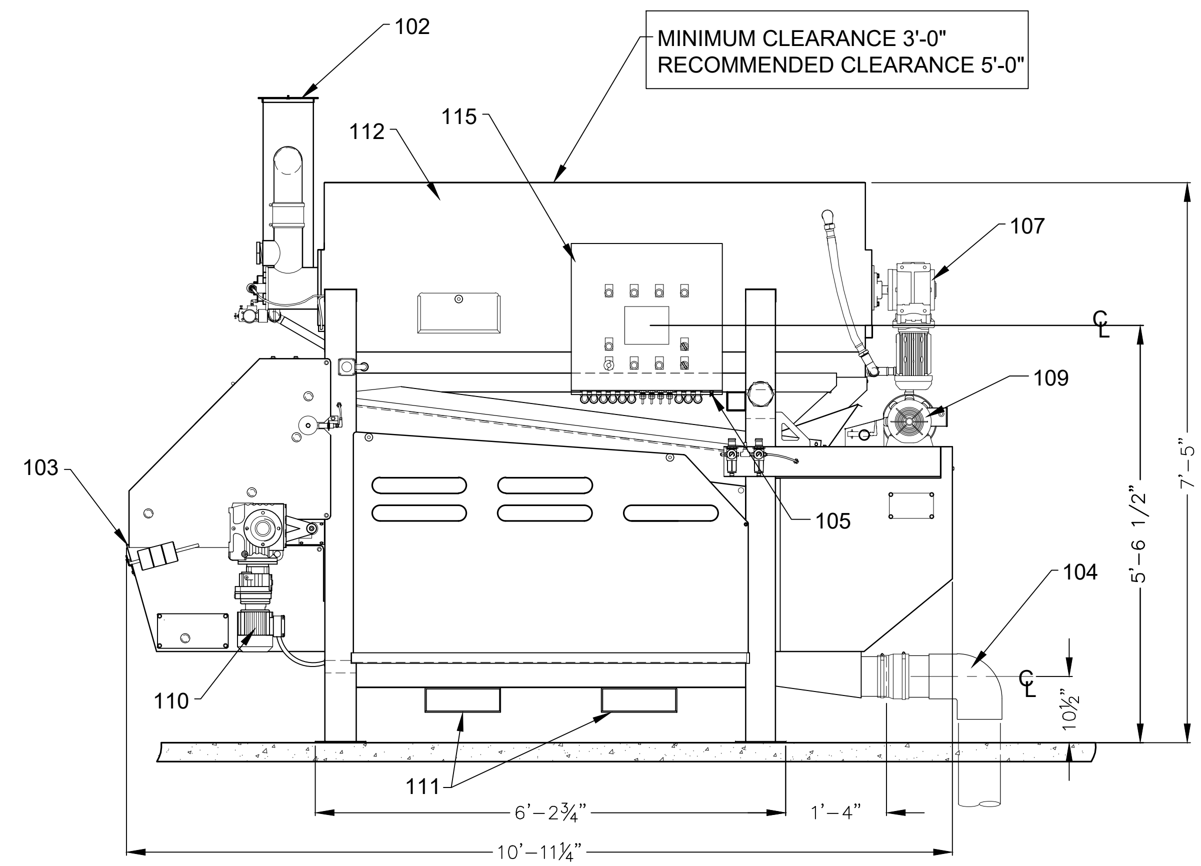
PAD DETAIL



TOP VIEW



END VIEW



SIDE VIEW

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Manhattan, Kansas 66502
PHONE: (785) 537-4995
FAX : (785) 537-0813

Drawn by:
Chk by:
Scale: NTS
Date: 2-10-17
Title: TRITAN FILTER PRESS MODEL 1500 SERIES

AEROMOD
Wastewater Process Solutions

TRITAN™ Belt Filter Press Solids Dewatering Technology

The Tritan™ dewatering belt press provides three belt performance with single belt tracking.

Simplicity is the Tritan™ BFP. The Tritan™ is a cost effective solution combining a rotary drum pre-thickener with a belt press in one unit. This streamline design of the pre-thickener above the belt press reduces the equipment footprint. The belt press offers three belt performance while providing excellent dewatering and a dry cake comparable to traditional equipment. Stainless steel fabrication, two drive motors, five rollers, and a seamless moving belt make this press reliable, operator friendly and low maintenance.

Initial thickening occurs with the first belt on the rotary drum pre-thickener, increasing sludge solids concentration to 4 - 8%. Following pre-thickening, the belt press section of the Tritan™ further removes water from the sludge by uniformly spreading it onto the seamless belt via a series of baffles to promote further gravity dewatering. Final dewatering occurs as the sludge is pressed between the seamless belt and a hollow perforated cylinder covered with the third belt. During this final step in the dewatering process, the discharged sludge cake can reach solids concentrations of 14 to 18%. Dewatering percentages vary depending upon sludge characteristics. A doctor blade scrapes the sludge from the seamless belt. The seamless belt is then washed prior to returning to the gravity zone area.

The alignment and tension of the seamless belt are automatically controlled using pneumatic actuators. Sensors monitor the operation of the system and send signals to halt operation in the event of a malfunction.

The main control panel provides automatic operation of the sludge pump, polymer dosing subsystems, and often times the sludge cake conveying system. The result is an integrated solution with Ethernet IP communication between the feed pump, polymer system, belt press and cake conveying system.

Three models with different belt widths are offered:

500 Series - .50 meters
1000 Model - 1.0 meters
1500 Model - 1.50 meters

Aero-Mod, Inc. • 7927 US Highway 24, Manhattan, KS 66502 • Phone (785) 537-4995
wwww.aeromod.com • Email: aeromod@aeromod.com

TRITAN Advantages

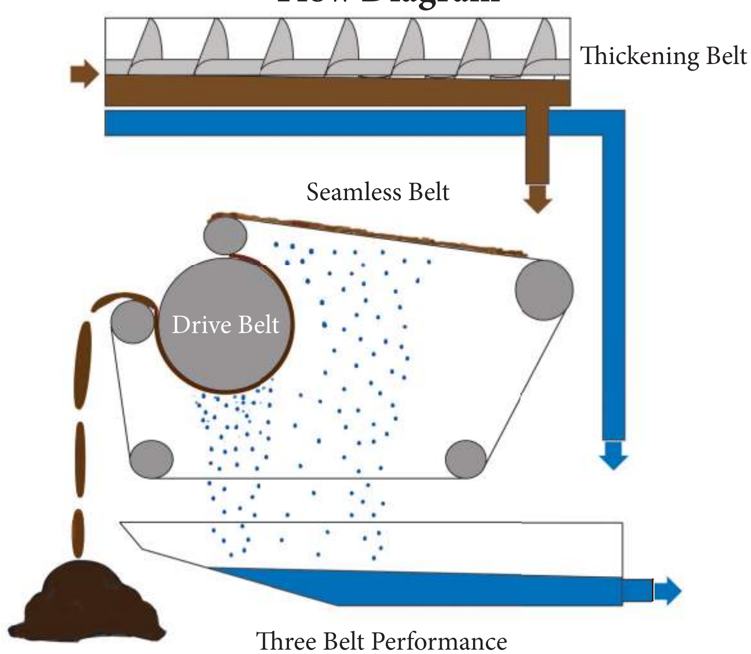
- Simple design reduces maintenance
- Provides economical dewatering
- Seamless belt design reduces risk of breakage (and accompanying downtime)
- Compact design reduces footprint
- Pre-thickening
- Three belt performance

The Tritan discharges a biosolids cake with a solid concentration of 15-20%.

TRITAN Features

- Five Rollers
- Two Drives
- Three belt performance with single belt tracking
- Common collection to a single drain filtrate
- Long life seamless belt
- Stainless Steel fabrication

Flow Diagram



March 15, 2022

To: All Bidding Contractors

Project: Grass Valley
Humboldt County, Nevada

Quote No.: 2022-2500

Legacy Environmental Process, LLC
45 Kelly Creek Drive
Odenville, Alabama
35120

In USA 1-205-640-1035
Fax: 1-205-640-1039

www.legacyenvpro.com

BUDGETARY PROPOSAL

This proposal is confidential. It was prepared by Legacy Environmental Process based on request for quotation. It is being furnished solely for the confidential use of the individual/organization named above, who agrees that it shall not be reproduced, copied, lent, or otherwise transmitted, directly or indirectly, to any other individual or organization, except for the purpose for which it was specifically furnished.

We are pleased to propose two (2) Legacy Environmental Process model LEP-135M24-SHMCUV prefabricated steel extended aeration/complete mix activated sludge wastewater treatment system as manufactured by Legacy Environmental Process, LLC, Odenville, Alabama. This proposal has been prepared based on preliminary design parameters and request for quotation dated March 2022, the wastewater treatment system will have a design flow of up to 270,000 gallons per day of domestic wastewater and will include all necessary vessels, internal piping, weirs, baffles, and items of equipment as indicated below:

March 15, 2022

Basis of Design Phase I

Average Daily Flow Rate:	269,900 (GPD)
Peak Daily Flow Rate:	405,000 (GPD)

Parameters	Unit	Influent	Daily Average Discharge Limit
BOD_5:	(mg/L)	240	≤ 25 mg/L
TSS:	(mg/L)	200	≤ 30 mg/L
TKN:	(mg/L)	40	≤ 10 mg/L
Phosphorus-P	(mg/L)	8	N/A
Ammonia-N:	(mg/L)	25	≤ 3 mg/L
pH:		6.0 - 9.0	

Scope of Supply

Primary Screening Devices

One (1) 304 stainless steel influent manual bar screen complete with inclined with drying rack, integral with the aeration chamber #1 & 2
One (1) Manual bar screen rakes

Sludge Holding Chamber / Aerobic Digester

Two (2) 22,500 gallon sludge chamber, aerated with air from the main blowers
Two (2) 3 inch diameter supernatant decant airlift assembly
Two (2) Schedule 40 Galvanized fine bubble diffused aeration system designed for 90 scfm

Aeration Chamber

Two (2) 135,000 gallon aeration chamber
Four (4) Main Aeration blower motor units, model BM-680-6M-5.2, each with the capacity of 680 SCFM @ 5.2 psig, dual splash lubrication, 50 hp, 1800 rpm, 460 volt, 3 phase, 60 Hz. TEFC, Nema premium efficiency, V-Belt drive enclosed OSHA style drive guard, motor slide base, elevated steel table base, 5” inlet filter silencer with paper element, 5” inlet silencer, packed with mounts, 5” discharge silencer packed with mounts, two spool type flexible connectors, 3” weight loaded pressure relief valve with weights and instrument spool, 5” check valve with cast iron body, aluminum & EPDM internals, discharge pressure gauge, inlet filter differential pressure gauge with tubing, initial fill of lubricants, finish paint applicable components with Excelsior standard enamel paint system, Sound enclosure Aluminum exterior with acoustical foam, perforated steel liner, and exhaust fan, louvers as required.
Two (2) Schedule 40 Galvanized Coarse bubble diffused aeration system designed for 541 scfm

Mechanical Clarifier

Two (2)	10 inch diameter inlet piping
Two (2)	24'-0" diameter circular mechanical clarifier
Two (2)	60 inch diameter inlet stilling well with 10 inch inlet feed pipe
Two (2)	Structural steel support bridge
Two (2)	Clarifier drive unit, consisting of a helical gear speed reducer coupled to 1/2 hp, 480 volt, 60 Hz, 3 phase motor
Two (2)	4 inch diameter schedule 80 torque tube, to mount scum skimmer arm and rake arms
Two (2)	scum trough and (2) Scum skimmer arms
Four (4)	Rake arm assemblies, with neoprene squeegee blades
Two (2)	4 inch diameter airlift sludge return pump and piping
Two (2)	3 inch diameter airlift scum return pump and piping
Two (2)	Scum baffles
Two (2)	Clarifier outlet trough, equipped with adjustable S.S. v-notched weir plates
Two (2)	6 inch diameter 150# outlet flange

Disinfection Equipment

One (1)	Complete UV system consisting of two banks in series supplied with 304 stainless steel channel, module support rack, level control weir, transition boxes, monitoring system, spare parts package, operators kit and maintenance rack.
One (1)	Lot of twenty (20) type 316 stainless steel modules supplied, containing 4 UV lamps each module-Total 80 UV lamps, each module weighs 38 lbs. and easily handles by one person, each module has a standard 120 volt plug and 10 ft. (3.0 m) weatherproof cable for connection to GFI receptacles, each lamp consumes 88 watts-Total system power requirements of 7 Kilowatts, lamp on/off status indicated on each module using LED indicators
Ten (10)	Outdoor rated GFI power distribution receptacles supplied (one (1) for two (2) modules
One (1)	Monitoring system provided for local indication of UV intensity, lamp age and alarms, remote indication of UV intensity and low UV intensity alarm available, monitoring system requires 120 volt, 1 phase, 2 wires plus ground, 5 amp power supply

Corrosion Prevention

One (1)	Interior surface sandblast SSSP-SP10, near white
One (1)	Exterior surface sandblast SSSP-SP6, commercial blast
Two (2)	Coats of interior surface protection, Tnemec series N-69 Hi-Build Epoxy, 12-14 mils TDFT
Two (2)	Coats of exterior surface protection, Tnemec series N-69 Hi-Build Epoxy, 12-14 mils TDFT

Service Walkway

Two (2) Lot of grating to cover 3' walkway down the length of the tank and service areas, 1-1/2" FRP (fiberglass reinforced plastic), non-skid, approximately 809 ft^2.
Two (2) Lot of painted steel schedule 40 pipe handrail 2 rail with kick-plate, to enclose grating, approximately 310 linear ft.
Two (2) 45 degree access stairway with FRP stair treads, and painted steel handrail

Treatment Plant Control Panel

Two (2) Treatment Plant Control Panel, NEMA 4X Stainless Steel (36x30x12) w/3-Point latching handle, 12" Stainless Steel leg kit, 480 Volt, 3 Phase, 60Hz., Two (2) 50 HP Main Blowers, Main power circuit breaker, with interlocking door handle, Individual circuit breakers, inner door operable, Soft Starters with at speed contactors, ATS22, 120 Volt control transformer, circuit breaker protected, 2KVA, 120 volt circuit breakers for remote GFI & site lighting, Blower running indicating lights, inner door mounted, Hand-Off-Auto selector switches, inner door mounted, Elapsed time meters, inner door mounted, Volt/ammeters, inner door mounted, Overtemp sensors wired in series with starter coil, Smart Alternator relay, 24-Hour Time clock, Terminals for field connections, UL 508A Listed,

Notes, Clarifications & Exceptions

1. All Items below are EXCLUDED from this proposal and are the responsibility of the CUSTOMER. These are to be completed by others or specifically agreed to in writing by LEGACY and included in the pricing section of the final version of the proposal.

2. Price Validity and Steel Cost: Due to the current volatility in the steel market, material escalation (if any) will be based on AMM (American Metal Markets) published price index for hot rolled carbon steel and on the North American Stainless published price index stainless steel. Pricing included in this proposal is based on today's published index. Any increase in steel cost between date of proposal and material procurement above this benchmark will be customer's account. (Example: if steel increases $0.03/per pound, this would increase the cost of a 30,000 lb. tank as follows: 30,000 X $0.03 = $900.00). (Note: Steel is typically procured 2 weeks after submittal drawings are returned as "Approved as Noted").

The following equipment and services are not provided as part of this proposal

1. Excavation (if required), crane off-loading, touch-up paint, plumbing to the plant, field welding, installation of grating, handrail and component equipment, electrical wiring, and filling of the tank for testing are to be done by the general contractor.

2. All field wiring is to be done by the installing contractor.

3. There is no provision included in this quoted price, unless noted, for field erection supervision, tests, inspections or adjustments of equipment. If factory representative is

required for any of these services, please refer to "Service Terms" enclosed. The equipment offered by Legacy Environmental Process, LLC is our standard design, materials and manufacture. In the event that these items of equipment are subject to any alteration in design or materials or manufacture by the contractor, owner, owner's agent or engineer, such alterations shall be subject to change in the contract price and/or delivery schedule.

4. Detail civil engineering, mechanical and electrical design are excluded from the above proposal.

5. All piping outside of the reactor basins is to be done by the installing contractor.

6. Cost of performance testing and analytical work associated with start-up, commissioning and testing are excluded from the above proposal.

7. The equipment offered by Legacy Environmental Process, LLC is our standard design, materials and manufacture. In the event that these items of equipment are subject to any alteration in design or materials or manufacture by the contractor, owner, owner's agent or engineer, such alterations shall be subject to change in the contract price and/or delivery schedule.

8. Power Requirements: 230/480 volt, 3 phase, 60 Hz.

9. Dimensions and Weights (Approximate):
   - Length x Width x Height: 107'-9" x 24'-0" x 12'-0" Aeration Tanks, which will require approximately 400 linear ft. of field welding for reconnection (by others).
   - Empty Weight (shipping): 96,000 lbs. shipped in four (4) major sections
   - Length x Width x Height: 24'-0" x 24'-0" x 12'-0" Mechanical Clarifier
   - Empty Weight (shipping): 24,000 lbs. shipped in two (2) major sections, which will require approximately 115 linear ft. of field welding for reconnection (by others).

Pricing:

Budgetary Price, F.O.B. factory, with freight allowed to project site, Nevada, off-loading to be by others	**$2,209,256.00 USD**

March 15, 2022

Customer Acceptance Page

If you have any questions or need any additional information, please do not hesitate to call your local representative.

James Goldhardt
The Coombs-Hopkins Co.
8706 S. 700 E., Suite 201
Sandy, Utah 84070
Office: (801) 305-4231
Cell: (801) 674-2177
email: james@chcwater.com
www.chcwater.com

Sincerely,

Michael Combs
Vice President
Legacy Environmental Process, LLC

Attachments: Drawing, operations cost

March 22, 2022

David Pulley, PE
Farr West Engineering
421 Court St.
Elko, NV 89801

Grass Valley – Winnemucca, NV

Proposal Number: ASI-009808-2022-03-22

Dear David,

Fluence USA is pleased to provide you with a proposal for one (1) above grade AG-270-EQSHAXCC-C prefabricated A-36 grade steel extended aeration packaged wastewater treatment systems as manufactured by Fluence USA in Minneapolis, Minnesota, USA. This proposal has been prepared based on the request for proposal per parameters provided on March 9, 2022. The Fluence TIPTON Series packaged wastewater treatment plant will have an average design flow of 270,000 gallons per day of domestic wastewater, and will include all vessels, internal piping, weirs, baffles, and items of equipment as indicated in this proposal.

Feel free to contact us with any questions you may have.

Thank you and have a nice day!

Dina Palumbo
Product Sales Manager, USA

Value from Water

fluencecorp.com
Direct +1 763.746.9271
Main +1 800.879.3677
7135 Madison Avenue West
Minneapolis, MN 55427

Table of Contents

1. Technical Data

Parameters	Unit	Influent	Projected Effluent
Average Daily Flow Rate	**(GPD)**	**269,900**	**X**
Peak Hourly (2-hour) Flow Rate	(GPD)	674,750	X
BOD_5:	(mg/L)	240	25
TSS:	(mg/L)	240	30
TKN:	(mg/L)	40	10
Ammonia as N	(mg/l)		3
Alkalinity	(mg/l)	200	X
Typical Ambient Temperature	(F)	60	

Wastewater characterization is an important element in the evaluation and construction of facilities for optimizing performance and available treatment capacity. Without comprehensive wastewater characterization, facilities may either be under-or overdesigned, resulting in inadequate or inefficient treatment.

2. Scope of Supply

2.1 Flow Equalization Chamber

One (1)	56,230-gallon flow equalization chamber constructed as integral to the main system structure
One (1)	Manual Bar Screen
One (1)	Flow proportioning chamber with cover
Two (2)	Submersible flow equalization pumps, ¾ HP, 460 volts, 3 Phase, 60 Hz.
Four (4)	Liquid level sensors for flow equalization pump control
One (1)	Lot of CYCLONE Coarse Bubble Diffusers (304SS)
One (1)	Blower motor unit, 281 SCFM @ 5 psi, 10 HP, 460 volts, 3 Phase, 60 Hz. mounted within a fiberglass enclosure
One (1)	Electrical control console CP-2 for flow equalization pumps and blower unit with the necessary motor starters, timers, circuit breakers, etc. housed within an enclosure.

2.2 Sludge Holding Chamber

One (1)	27,000-gallon aerated sludge holding chamber with air supplied from the main blower motor units

One (1)	Supernatant decant assembly
One (1)	Lot of CYCLONE Coarse Bubble Diffusers (304SS)

2.3 Anoxic Chamber

One (1)	45,000 gallon pre-anoxic chamber
Four (4)	Slow mixer with controls, 3/4 hp; 460 volts, 3 Phase, 60 Hz.

2.4 Aeration Chamber

One (1)	Aeration chamber with a volume of 270,000 gallons
Four (4)	Blower motor units each with a capacity of 551 SCFM at 5.0 PSI, equipped with 20 HP, 460 volts, 3 Phase, 60 Hz. motor mounted in 4 fiberglass enclosures
One (1)	Air manifold with diffuser drop assemblies
One (1)	Lot of 24” CYCLONE coarse bubble air diffusers
One (1)	Lot piping painted steel, schedule 40
One (1)	Pre-wired electrical control system Model CP-1 complete with enclosure with the necessary Motor starters, circuit breakers, programmable 24/7 timers, selector switches all designed to operate on 460 volts, 3 Phase, 60 Hz.
Two (2)	MLSS recycle pump 1 hp; 460 volts, 3 Phase, 60 Hz

2.5 Clarifier Chamber

One (1)	Gravity hopper type clarifier with a volume of 44,938 gallons
Eight (8)	4" sludge return assemblies, airlift type
Eight (8)	2" skimmer return assemblies, airlift type

2.6 Disinfection

One (1)	Chlorine Contact Chamber with a volume of 5,623 gallons
One (1)	Chemical feed hypochlorinator
One (1)	Effluent V-notch with staff gauge.

2.7 Service Walkway

One (1)	Lot of non-skid galvanized grating over the service area only
One (1)	Lot of handrail, around the perimeter of the service area only
One (1)	Access Stairway

2.8 Corrosion Prevention (Above Grade Plants)

One (1)	Interior surface sandblast SSPC-SP10

One (1)	Exterior surface sandblast SSPC-SP6
One (1)	Interior surface protection, Tnemec N69 epoxy, 2 coats, 12-16 TDFT
One (1)	Exterior surface protection, Tnemec N69 epoxy, 2 coats, 12-16 TDFT

2.9 Manufacturer's Service

One (1)	Trip for system startup and operator training, consisting of a maximum of 2 days onsite.

2.10 Notes, Clarifications & Exceptions

A. The following equipment and services are NOT provided as part of this proposal:

- Monitoring system
- Installation of ancillary components including but not limited to blowers, control panels, pumps, grating, handrails, access stairs, platforms, ladders, etc.
- Startup and Operator Training (Available upon request at additional charge)
- Stamped Drawings
- Installation and Field Erection Supervision
- Structural calculation and loads
- Seismic calculations
- Main electrical power connection to plant and field wiring to the control panels.
- All interconnecting piping outside plant walls including:
    - Piping to inlet of plant
    - Blower piping from the blower units to the tank structure (field piping)
    - Effluent piping
- All field welding and conduit.
- All plant lighting.
- Supply and installation of clarifier grout.
- The package wastewater treatment system proposed is for the purpose of treating the domestic wastewater from the site facilities. This is not to be used as a food disposal. No provisions have been included to treat an excessive amount of food waste.
- Performance and Payment Bonds

B. Dimensions and Weights (Approximate):

Advanced Treatment System (12 total truck loads):

- 70'-4"W x 116'-6"L x 11'-0"H Approximate overall dimensions
- Empty Weight (shipping) of heaviest section: 35,000LBS
- Total Tank Weight 375,000LBS

C. Foundation Pad, Crane off-loading at destination, touch-up paint, plumbing to the plant, installation of grating, handrail and component equipment, electrical wiring, and filling of the tank for testing are to be done by the general contractor.

D. The equipment offered by Fluence is our standard design, materials and manufacture. If this equipment is subject to any alteration in design or materials of manufacture by the contractor, owner, owner's agent or engineer, such alterations shall be subject to change in the contract price and/or delivery schedule.

E. Detail civil engineering, mechanical and electrical design are excluded from this proposal.

F. Cost of performance testing and analytical work associated with start-up, commissioning and testing is excluded from the above proposal. Performance testing is in scope of OTHERS.

G. Power Requirements: 480 volts, 3 Phase, 60 Hz.

H. Performance and payment bonds are by OTHERS.

3. Commercial Section

3.1 Selling pricing

Selling Pricing, FOB Factory, Freight allowed to Project Site in Winnemucca, NV, not offloaded. Offloading and installation is by OTHERS

ITEM	Selling Price (USD, $)
Base Price for Wastewater Treatment Plant: **One (1) Tipton Series Model AG-270-EQSHAXCC-C prefabricated A-36 grade steel advanced extended aeration packaged wastewater treatment system**	**$2,888,500.00**

3.2 Submittal Drawings

Submittal drawings on the preceding equipment will be submitted within four (4) to six (6) weeks after receipt of a firm purchase order. Drawing timeline may increase or decrease with volume production at the time of receipt of approved order.

3.3 Manufacturing of Equipment

Manufacturing of equipment listed above will be twelve (12) to fourteen (14) weeks after receipt of approved submittals, down payment and progress payment. Please lead times are subject to change based on availability of materials due to a world wide supply chain shortage.

3.4 Proposal Acceptance

This proposal is offered for acceptance within sixty (60) days from date of this quotation or date of bid opening, whichever is the later date. Prices are subject to review thereafter. Prices are firm, based upon receipt of a Letter of Intent or Purchase Order and notice to proceed within this sixty (60) day period and the review and for return of submittal drawings to Fluence within sixty (60) days. Delays caused by slow return of submittals or other manufacturing delays caused by the contractor, owner, owner's agent or engineer may result in additional charges of 1% per month for such delays or part thereof.

3.5 Fluence Standard Terms and Conditions

1. Applicable Terms. Aeromix Systems Inc. dba Fluence USA. ("**Fluence**") provides the following Standard Terms and Conditions of Sale ("**T&Cs**"), which apply to all quotations and sales of Fluence's products and services (collectively, the "**Systems**"), whether these terms are explicitly included in Fluence's quotation, proposal, acknowledgment, invoice or any other document (collectively "**Fluence's Documentation**") or not. For the avoidance of doubt, all purchases are expressly limited and conditioned upon acceptance of these T&Cs, and no provision contained in any order, acceptance, confirmation or acknowledgement which is inconsistent with, different from, or in addition to these T&Cs is accepted by Fluence unless specifically agreed to in writing. All quotations are valid for a period of thirty (30) days, unless otherwise specified.

2. Delivery. Delivery terms are Ex-Works Fluence warehouse unless Fluence's Documentation provides otherwise, and the purchaser (whether end-user, integrator or whatsoever) (the "**Purchaser**") agrees that risk of loss with respect to the Systems passes to the Purchaser at the time that the Systems are delivered to the applicable common or private carrier. The property rights in the Systems, however, shall pass to the Purchaser only after Fluence has received payment in full. Until such time as the property rights in the Systems passes to the Purchaser, the Purchaser shall hold the Systems as Fluence's fiduciary agent and bailee. The carrier shall be selected by Fluence unless the Purchaser designates a carrier preference. Delivery date(s) quoted by Fluence are based on Fluence's best estimate and Fluence shall not be responsible for early or late delivery or partial shipments. If the Purchaser fails to take delivery of the Systems or fails to give Fluence adequate delivery instructions then without prejudice to any other right or remedy available to Fluence, Fluence may (i) store the Systems until and charge the Purchaser for the reasonable costs (including insurance) of storage; (ii) sell the Systems at the best price readily obtainable and (after deducting all reasonable storage and selling expenses) account to the Purchaser for the excess over sum paid in advance or charge the Purchaser for any shortfall below the sum received upon the sale thereof.

3. Payment. The Purchaser shall pay Fluence the full amount set forth in Fluence's Documentation. Payment terms shall be as follows: **Thirty percent (30%) down payment required at time of signed purchase order. Thirty percent (30%) due with approval and release to manufacture. No work will be started until payment is received. Forty percent (40%) due prior to shipment.** No equipment will leave the facility until proof of payment has been provided. Freight, storage, insurance and all taxes, duties or other governmental charges relating to the Systems shall be paid by the Purchaser. Federal, state or local indirect taxes, including but not limited to sales and/or use taxes, VAT, GST, transfer taxes or any similar tax are not included in prices quoted. If Fluence is required to pay any such charges, the Purchaser shall reimburse Fluence upon first demand. The Purchaser shall be charged the lower of 1 ½% interest per month or the maximum rate permissible by law, on all amounts not received by the due date and shall pay all of Fluence's reasonable costs (including attorneys' fees) associated with collecting amounts due but unpaid. Failure to make payment when due is a material breach of an order and without incurring any liability, Fluence may suspend performance until such time as the overdue payment is made. All orders are subject to credit approval and the applicable export licenses (to the extent required) being in force at such time.

4. Intellectual Property. Fluence retains all right, title and interest in any patent right, copyright, mask work right, sui generis database right, know-how, trade secret or other intellectual or industrial property right of any sort throughout the world (including any application therefor associated with its business including but not limited to the intellectual property rights associated with the Systems (the “Intellectual Property”), whether used in the past, currently being used or that will be used in the future, including without limitation (i) the proprietary original design of the Systems whether pursuant patent, copyright, industrial design or whatsoever, (ii) the technology, know-how, show-how, specifications and trade secrets with regard to amongst others the manufacture, marketing, sale and distribution of the Systems or other proprietary products and services, and (iii) trademarks, trade names (including but not limited to the name “Fluence” and the brand name, under which the Systems are currently marketed (collectively the “Brand”), slogans and marketing intangibles, and the Purchaser shall make no claim of any interest therein. The Purchaser shall not alter or remove any of Fluence’s trademarks from the Systems. At no time during or after the term of this agreement shall Purchaser challenge or assist others to challenge Fluence’s Intellectual Property or attempt to register any trademarks, marks or trade names similar to those of the Fluence. Any and all goodwill associated with the Fluence’s Intellectual Property will inure exclusively to the benefit of Fluence. Fluence shall own all rights, title and interest in any ideas, designs, concepts, techniques, inventions, discoveries, improvements, results, data, know-how, reports and/or outcome relating to the Intellectual Property and the manufacture and functioning of the Systems, whether developed or conceived of by Fluence and/or the Purchaser or both. All devices, designs (including drawings, plans and specifications), estimates, prices, notes, electronic data and other documents or information prepared or disclosed by Fluence, and all related intellectual property rights, shall remain Fluence’s property. Subject to payment in full, Fluence grants Purchaser a non-exclusive, non-transferable license solely for the Purchaser’s use of the Systems purchased. For the removal of doubt, it is hereby noted that other than aforementioned rights, no rights are granted to the Purchaser with regard to the Systems or the Intellectual Property.

5. Confidential Information. All information, drawings, plans, designs and specifications furnished to the Purchaser by Fluence have been developed at Fluence’s expense and shall not be disclosed by the Purchaser or used for any purposes other than to install, operate and maintain the Systems.

6. Warranty. Fluence warrants that under normal usage and subject to appropriate installation and suitable infrastructure, the Systems, except for membranes, will, for a period of twelve (12) months from startup or eighteen(18) months from delivery EX-Works (the earlier of the foregoing), be free from defects in material and workmanship, subject to the exclusions set forth below (the "**Warranty Period**"). The foregoing warranty shall not apply to any equipment furnished or specified by the Purchaser. This warranty excludes any damage or deficiencies caused by or resulting from accident, fire, other hazards or acts of God; or alteration, modification, misuse, tampering, negligence, improper installation, improper storage, maintenance conducted by unauthorized personnel, misapplication, mishandling or abuse of the Systems. Fluence’s warranty is conditioned upon the Purchaser (a) operating and maintaining the Systems in accordance with Fluence’s instructions, (b) not making any unauthorized repairs or alterations, and (c) not being in default of any payment obligation to Fluence. Fluence’s warranty does not cover damage caused by chemical action or abrasive material, misuse, improper installation or unsuitable infrastructure. Fluence shall, at its sole and exclusive discretion and as the Purchaser’s sole remedy, repair or replace the subject parts FOB port of manufacture, or refund the purchase price therefor, at its sole and exclusive discretion. If Fluence determines that any claimed breach is not, in fact, covered by this warranty, Purchaser shall pay Fluence its then customary charges for any repair or replacement made by Fluence. Membranes and designs are sold “AS IS”. EXCEPT AS EXPRESSLY STATED IN THIS WARRANTY SECTION, SELLER PROVIDES PRODUCTS "AS IS" AND MAKES NO OTHER EXPRESS WARRANTIES, WRITTEN OR ORAL, AND ALL OTHER WARRANTIES ARE SPECIFICALLY EXCLUDED, INCLUDING, BUT NOT LIMITED TO THE IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT, AND ANY WARRANTY ARISING BY STATUTE, OPERATION OF LAW, COURSE OF DEALING OR PERFORMANCE, OR USAGE OF TRADE.

7. Force Majeure. Fluence shall not be liable for any loss, damages or breach caused by circumstances beyond its reasonable control including but not limited to extreme weather or other act of God, strike or other labor shortage or disturbance, fire, accident, war or civil disturbance, delay of carriers, failure of normal sources of supply, act of government including inability to obtain appropriate regulatory approval such as export license or other government or institutional approval required, or any other cause beyond its reasonable control, whether similar or dissimilar to those listed.

8. Cancellation or Alteration of Order. No order which has been accepted by Fluence may be cancelled by Purchaser except with Fluence's agreement in writing and subject to the Purchaser indemnifying Fluence in full against all loss, costs, damages, charges and expenses incurred by Fluence as a result of such cancellation. No order which has been accepted by Fluence may be changed or altered by the Purchaser except with Fluence's agreement in writing and an adjustment of appropriate price, if required. If the Purchaser cancels or suspends its order for any reason other than Fluence's breach, Purchaser shall promptly pay Fluence for work performed prior to cancellation or suspension, and for any other direct costs incurred by Fluence as a result of such cancellation or suspension.

9. LIMITATION OF LIABILITY. NOTWITHSTANDING ANYTHING ELSE TO THE CONTRARY, FLUENCE SHALL NOT BE LIABLE FOR ANY LOST PROFITS, CONSEQUENTIAL, INCIDENTAL, SPECIAL, PUNITIVE OR OTHER INDIRECT DAMAGES, WHETHER ARISING UNDER WARRANTY, CONTRACT, NEGLIGENCE, STRICT LIABILITY, INDEMNIFICATION, OR ANY OTHER CAUSE OR COMBINATION OF CAUSES WHATSOEVER. FLUENCE'S TOTAL LIABILITY ARISING AT ANY TIME FROM THE SALE OR USE OF THE SYSTEMS SHALL NOT EXCEED THE PURCHASE PRICE PAID FOR THE SYSTEMS.

10. Installation, Field Service. Installation of goods furnished hereunder shall be the responsibility of Purchaser, unless otherwise agreed to in writing. The Purchaser shall be responsible for all infrastructure modifications that may be required. Field service may be provided, upon prior written authorization by Fluence and will be charged at the rates in effect at the time such services are provided, unless otherwise agreed. In addition, purchaser will be required to cover costs of travel, lodging and *per diem* for field staff.

11. Export Sales. No provision of this agreement will be construed to require Fluence to export or deliver any technical information, data and/or equipment if such export or delivery is prohibited or restricted by any applicable law or regulation. Purchaser will not, directly or indirectly, sell, export, re-export or otherwise dispose of the Systems or any other technology or services received in connection with this order to any person, entity, or destination without obtaining prior written authorization from Fluence.

12. Governing Law and Venue. This agreement shall be subject to and interpreted under the laws of the USA. The Purchaser hereby consents to the exclusive jurisdiction of the courts of New-York for the adjudication of any dispute arising under this agreement. Both sides may jointly elect to resolve any dispute by arbitration. In such case, the arbitration laws existing in the USA will bind the parties. All disputes arising out of or in connection with this agreement shall be finally settled under the Rules of Arbitration of the International Chamber of Commerce by one arbitrator appointed in accordance with the said Rules. The place of the arbitration shall be New York, and the language of the arbitration shall be English.

13. Description**.** Fluence will furnish only those items listed on our proposal or order. The use of specification section numbers, model numbers, and headings is for descriptive purposes only and does not imply that proposal or order covers more than what is specifically listed on it.

14. Returned Goods. Goods may be returned only after receiving a returned material order number, shipping instructions, and identification procedure from Fluence. Goods must be packaged properly to avoid damage and returned FOB Fluence factory unless otherwise authorized by Fluence. Buyer will be invoiced for all charges resulting from rework required to place goods in salable condition plus a restocking charge and any transportation charges we might pay. Custom goods manufactured for this order are not returnable. Any credit issued will be at the discretion of Fluence. No refunds will be issued for returned goods, only credit against future purchases.

15. Approvals. When necessary, all equipment proposed is subject to the approval of the Purchaser. Fluence shall not be liable for any costs or damages should equipment not be approved, regardless of the reason.

16. Miscellaneous. These terms, together with any quotation, purchase order or acknowledgement issued or signed by Fluence, comprise the complete and exclusive statement of the agreement between the parties (collectively, the "**Agreement**") and supersede any terms contained in the Purchaser's documents, unless separately signed by Fluence. No part of the Agreement may be changed or cancelled except by a written document signed by Fluence and Purchaser. No course of dealing or performance, usage of trade or failure to enforce any term shall be used to modify the Agreement. If any of these terms is unenforceable, such term shall be limited only to the extent necessary to make it enforceable, and all other terms shall remain in full force and effect. Purchaser may not assign or permit any other transfer of the Agreement without Fluence's prior written consent.

4. Customer Acceptance

Submitted By:	Accepted By:
Dina Palumbo Product Sales Manager, US Operations AEROMIX Systems Inc, dba Fluence 7135 Madison Avenue West Minneapolis, MN 55427-3601 USA Direct: 763-746-9271 Fax:763-746-8408	Authorized Purchaser Name and Title, Company/Organization, Complete Address, Phone Number, Email address
Authorized Signature	*Authorized Signature*
Authorized Printed Name	*Authorized Printed Name*
Date: March 22, 2022	Date

Submitted to: Farr West Engineering

Submitted by: Sarah Spivey
Applications Engineer

Date: March 21, 2022

Water Technologies

This document is confidential and may contain proprietary information.
It is not to be disclosed to a third party without the written consent of Veolia Water Technologies

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www.veoliawatertech.com

Introduction

Kruger is pleased to present this budgetary proposal for our D-Ditch system, a Phased Isolation Ditch (PID), for biological nutrient removal for the first phase.

For this proposal, Kruger has included a potential solution for the expansion sequence of the Grass Valley, NV WasteWater Treatment Plant (WWTP). Kruger has assumed that the wastewater composition becomes more concentrated following the first phase because the new sewage system will be a separate system. Refinements to the ditch volumes can be made based on further definition of the future influent loads. One possible sequence is as follows.

- For the first phase, Kruger is proposing our D-Ditch system that eliminates the need for secondary clarifiers. The two ditches operate in phases with one of them providing the duties of clarification while the other is reacting.
- For the second phase, Kruger proposes to convert the D-Ditch into a BIO-DENITRO system by adding secondary clarifiers. By removing settling duties from the ditch, they gain significant loading capacity.
- For the expansion to the third phase, an additional ditch can be added to the existing BIO-DENITRO system and the system becomes a Triple BIO-DENITRO System.
- For the fourth phase, the system can be converted into two BIO-DENITRO trains by adding a fourth ditch that will be operated in series with the existing third ditch added in phase 3.

If the strength of the wastewater does not increase; the system can still be expanded in the above order with a D-Ditch for the first phase, a single BIO-DENITRO system for the second and third phase, and a Triple Ditch BIO-DENITRO for the fourth phase.

If fewer construction mobilizations are desired, there are other options that could be considered. For example, two construction phases could install sufficient capacity for Phases 1-2 and 3-4, thereby reducing the number of construction periods.

We appreciate the opportunity to provide this proposal to you. If you have any questions or need further information, please contact our local Representative, JBI , or our Regional Sales Manager, Rodrigo Lara, at 503-380-3995 (rodrigo.lara@veolia.com).

cc: AW, AJS, GT, TMJ, project file (Kruger)
JBI

Revision	Date	Process Eng.	Comments
0	03/21/2022	PP	Initial, budgetary proposal.

We Know Water

Kruger is a water and wastewater solutions provider specializing in advanced and differentiating technologies. Kruger provides complete processes and systems ranging from biological nutrient removal to mobile surface water treatment. The ACTIFLO® Microsand Ballasted Clarifier, BioCon® Dryer, BIOSTYR® Biological Aerated Filter (BAF) and NEOSEP™ MBR are just a few of the innovative technologies offered by Kruger. Kruger is a subsidiary of Veolia Water, a world leader in engineering and technological solutions in water treatment for industrial companies and municipal authorities.

Veolia Water Technologies, the fully-owned subsidiary of **Veolia**, is the world leader in water and wastewater treatment with over 155 years of experience. As an experienced design-build company and a specialized provider of technological solutions in water treatment, Veolia combines proven expertise with unsurpassed innovation to offer technological excellence to our industrial customers. Based on this expertise, we believe that we have developed the best solution for your application. Below is a brief description of the proposed project.

Energy Focus

Kruger, along with Veolia is dedicated to delivering sustainable and innovative technologies and solutions.
We offer our customers integrated solutions which include resource-efficient technology to improve operations, reduce costs, achieve sustainability goals, decrease dependency on limited resources, and comply with current and anticipated regulations.

Veolia's investments in R&D outpace that of our competition. Our focus is on delivering

- neutral or positive energy solutions
- migration towards green chemicals or zero chemical consumption
- water-footprint-efficient technologies with high recovery rates

Our carbon footprint reduction program drives innovation, accelerates adoption and development of clean technologies, and offers our customers sustainable solutions.

Kruger is benchmarking its technologies and solutions by working with our customers and performing total carbon cost analysis over the lifetime of the installation.

By committing to the innovative development of clean and sustainable technologies and solutions worldwide, Kruger and Veolia will continue to maximize the financial benefits for every customer.

Process Description

Double Ditch

Kruger is pleased to present designs utilizing a dual oxidation ditch treatment system. The proposed dual oxidation ditch treatment system will operate in the Double Ditch (D-Ditch) mode of phased isolation ditch technology. The D-Ditch process is a continuous flow activated sludge process in which the main treatment phases of the treatment process are isolated into separate oxidation ditches. A distinguishing feature of this process is the alternating flow pattern and process conditions (aerobic or sedimentation) occurring within the oxidation ditches. The D-Ditch process functions by phasing the conditions within each ditch between aerated and settling conditions. This operating strategy allows nitrification, BOD and suspended solids removal to occur within the active process volume, eliminating the need for final clarifiers and return sludge pumping stations.

View of a rotor from inside the ditch.

A submersible mixer in the ditch.

BIO-DENITRO® Phased Isolation Ditch

The proposed ditch system will operate in the BIO-DENITRO mode of Phased Isolation Ditch (PID) technology. A distinguishing feature of this process is the alternating flow pattern and process conditions (aerobic and anoxic) occurring within the oxidation ditches. This operating strategy allows nitrogen and carbonaceous BOD removal to occur within the active process volume, eliminating the need for internal recycle pumping.

Oxidation ditch systems that incorporate PID technology share several common features. These treatment systems typically include multiple interconnected oxidation ditches to allow the isolation of a ditch for a specific treatment objective. To enable the alternating flow pattern between the oxidation ditches, these treatment systems include influent and effluent hydraulic controls. The influent controls typically consist of either an influent distributor or motor actuated influent weirs. Aeration equipment typically includes brush aerators but can incorporate jet aeration systems. Motor actuated effluent weirs control the hydraulic flow between the ditches and the discharge from the oxidation ditches. Besides permitting the series flow pattern of the process, the weirs function to maintain a constant water level within the oxidation ditches. This results in the rotors operating at their optimum transfer efficiency. Inherent to all phased isolation ditch systems is a time based treatment strategy.

A PID operation strategy imparts tremendous process flexibility. The time-based operational strategy provides the ability to effectively vary the process volumes (e.g. aerobic, anoxic or settling), unlike conventional processes where these volumes are fixed. By adjusting the specific phase lengths of the process, the volume allocated to a specific treatment objective can be adjusted, thereby enabling the treatment process to accommodate a wide range in influent flow and character. This capability provides an extremely flexible treatment solution that allows the facility to accommodate the actual loading, as opposed to treating flows with a treatment strategy designed for 20 year projected loadings. For example, during start-up conditions a greater fraction of the process volume could be allocated to settling (anoxic in the case of other PID processes), thereby decreasing the run-time and energy consumption of the aeration equipment.

The PID operation is executed by a PLC-based control system that coordinates the operation of the mechanical process equipment and controls the phase lengths within each ditch. The PLC control system can allow both manual and automatic control of the treatment process. The PLC-based control panel also includes pre-programmed operational modes, such as the storm water mode to address I/I concerns. For example, automatic or manual activation of the storm water mode extends the settling phases of the D-Ditch process to prevent solids washout during severe rain events.

To ensure economical and efficient treatment, the control system also controls the aeration equipment by automatic dissolved oxygen control. Dissolved oxygen probes continuously monitor and report residual dissolved oxygen levels within the oxidation ditches to a PLC-based control panel that controls the aeration equipment to meet, but not exceed, the current oxygen demand. This control eliminates costly and wasteful over-aeration that can comprise process stability and operational budgets. The D-Ditch process with its built-in flexibility offers the most cost-effective treatment solution available.

Design Summary

The design assumes that the raw influent wastewater is biodegradable, no toxic compounds are present, sufficient alkalinity is available to avoid pH depressions, that the COD/BOD ratio is between 1.7 and 2.3, and that none of the equipment provided would be used in a classified area (e.g. Class 1, Division 1 or Class 1, Division 2).

Influent Design Basis

Parameter	Phase 1	Phase 2	Phase 3	Phase 4
Influent Flow, Average Design (MGD)	0.27	0.474	0.673	0.88
Influent Flow, Max Day (MGD)	0.405	0.71	1.015	1.320
BOD_5 (mg/L)	240	300	300	300
TSS (mg/L)	240	300	300	300
TKN (mg/L)	40	50	50	50
NH_4-N (mg/L)	25	31	31	31
TP (mg/L)	8	8	8	8
Elevation (ft AMSL)	4,300			
Min/Max Temperature (°C)	12/30			

a - Phase 2-4 concentrations are assumed values.

Effluent Objectives

Parameter	Value
$CBOD_5$ (mg/L)	< 25
TSS (mg/L)	< 30
TN (mg/L)	< 10 (Yearly AVG)
NH_4-N (mg/L)	< 3.0

1. Listed values represent anticipated performance; any performance guarantees may be different
2. Non-biodegradable soluble organic nitrogen is assumed to be less than 1.5 mg/L

Design Summary

Parameter	Phase 1	Phase 2	Phase 3	Phase 4
Process Configuration	D-Ditch	Bio-Denitro	Triple Ditch	Bio-Denitro
Number of Trains	1	1	1	2
Total Number of Oxidation Ditches	2	2	3	4
Internal Length per Ditch (ft)	79	79	79	79
Internal Width per Ditch (ft)	35	35	35	35
Internal Channel Width per Ditch	17.5	17.5	17.5	17.5
Average Side Water Depth (ft)	10	10	10	10
Total System Volume (MG)	0.38	0.38	0.57	0.76
Design Aerobic / Anoxic / Settling / Anoxic Operating Time (%)	38 / 0 / 62	80 / 20 / 0	80 / 20 / 0	80 / 20 / 0
System HRT (hrs)	~33	~19	~20	~21
System SRT (days)	~21	~10	~10.5	~11
MLSS at 12˚C (mg/L)	3,500	3,500	3,500	3,500
System F/M Ratio (days^{-1})	0.07	0.14	0.14	0.13
Design Sludge Yield (lbs MLSS/lb BOD_5 applied)	0.94	0.94	0.94	0.94
Waste Activated Sludge (lb WAS/day)	500	1,100	1,600	2,100

Aeration Summary

Parameter	Phase 1	Phase 2	Phase 3	Phase 4
AOR BOD Basis (lbs O_2/lb BOD_5 applied)	1.2			
AOR TKN Basis (lbs O_2/lb TKN nitrified)	4.6			
AOR Denite Basis (lbs O_2/lb NO_3-N denitrified)	-2.85			
Total System AOR (lbs O_2/day)	817	1,750	2,500	3,255
Design Residual DO during Aerobic Phase	2.0	2.0	2.0	2.0
Design Alpha / Beta	0.85 / 0.95			
Diurnal Peaking Factor	1.3	1.3	1.3	1.3
Total System Design SOR[1] (lbs O_2/day)	5,736	5,856	8,350	10,870
Total System Design SOR (lbs O_2/hr)	239	244	348	453
Installed SOTE (lbs O_2/hr)	258	258	386	515
Number of MIDI Rotors per Ditch	2	2	2	2
Nameplate Power per MIDI (HP)	20	20	20	20

1: The wastewater load is typically received according to a diurnal flow pattern resulting in organic and nitrogen loads that exceed the average load during limited periods of the day. Kruger recommends a safety factor be in place in determining the design AOR that accounts for the diurnal characteristics of the influent wastewater.

Scope of Supply

Kruger is pleased to present our scope of supply which includes process engineering design, equipment procurement, and field services required for the proposed treatment system, as related to the equipment specified. The work will be performed to Kruger's high standards under the direction of a Project Manager. All matters related to the design, installation, or performance of the system shall be communicated through the Kruger representative giving the Engineer and Owner ready access to Kruger's extensive capabilities.

Process and Design Engineering

Kruger provides comprehensive process engineering and design support for our D-Ditch system, including but not limited to:

- Provision of drawings and specifications for use by the consulting engineer in developing the detailed plant design.
- Provision of calculations and other data and attendance at meetings as necessary during state approval processes.
- Shop drawing submittal for Engineer's review and approval. Includes detailed equipment information for all equipment supplied by Kruger.
- Equipment installation instructions for all equipment supplied by Kruger, as well as detailed Operations and Maintenance Manuals.

Double Ditch System Equipment - Phase 1 and 2 System

Mechanical Equipment Items	Qty	Description	Est. HP
Influent Flow weirs	2	2.5 meter automated HDG Weir	1/2
Effluent Flow Control Weirs	2	2.5 meter automated HDG Weir	1/2
Ditch Mixers	2	TR90 submersible mixers with guide rail and hoist	7.4
Brush Rotors	4	4.0 meter MIDI Rotor Assembly with HDG Rotor Blades	20
Rotor Accessories	4	Splash Plate, Painted Steel Flow Directional Baffle, Aluminum Access Grating,	N/A

Instrumentation and Controls Equipment Items*	Qty	Description
Submersible Pressure Transducer	2	Ditch Liquid Level Measurement
Dissolved Oxygen Probe	2	Hach LDO w/ SC200 Transmitter
PLC Control Cabinet	1	NEMA 12; ControlLogix PLC; Panelview HMI; 120V Feed

Field Services

Kruger provides very comprehensive support of our systems throughout the installation and start-up period. Our experienced staff of field service personnel will inspect the installation of each component and assist in mechanical start-up, and will typically include direct manufacturer assistance for key pieces of equipment. Our dedicated team of instrumentation and controls engineers will provide calibration and start-up of all instrumentation and onsite verification of proper functioning of our PLC programming and operator interface systems. Process Engineers will assist in verification of program functions, start-up of the process, any process performance testing and optimization of the process. Kruger personnel will also provide onsite instruction of the operations staff in the proper operation of the Kruger supplied equipment and systems. Together, Kruger's estimate of on-site field service for this project includes:

- Four (4) Total Trips to the Project Site
- Sixteen (16) Total Man-Days of Service (Travel Time Inclusive)

Scope of Supply BY INSTALLER/PURCHASER

The following items are NOT included in the scope of supply for the system and should be provided for by the Installing Contractor/Purchaser of the system *unless explicitly stated as included in the above scope of supply*. These items include, but are not necessarily limited to, the following items:

- Concrete foundations, pads, tanks, structural components, walkways, handrail, grating and covers,
- Equipment installation, piping to and from the system, interconnecting piping, manual isolation valves or gates, anchor bolts, epoxy/adhesive for anchors,
- Raw influent wastewater pumping, influent screening and grit removal facilities,
- Solids handling/disposal system, WAS pumps, digester equipment,
- Effluent holding tanks/equipment, disinfection equipment, outfalls,
- Chemical addition systems, containment, odor control equipment, laboratory systems or equipment,
- Overhead gantries or cranes,
- Motor control center, motor starters, adjustable frequency drives, main disconnects, breakers, generators, or power supply,
- Field wiring, interconnecting wiring, conduit, wiring terminations at equipment, local equipment disconnects, local equipment control panels, and wiring terminations at control panels,
- All electrical and mechanical hardware with the exception of the equipment that is identified above,
- All work associated with buildings or other structures used for housing any part of the system provided, including HVAC and electrical work.

Schedule

- Drawings and Specifications for use in preparation of Engineer's Bidding Documents can be provided following completion of Kruger P&S Questionnaire and follow-up design discussions to confirm materials, equipment preferences, overall scope of supply, controls requirements, etc. Drawings and specifications typically require 1-2 weeks following questionnaire completion and confirmation of scope.
- Shop drawings will be submitted within 6-8 weeks of receipt of an executed contract by all parties.
- All equipment will be delivered within 18-20 weeks after receipt of written approval of the shop drawings.
- Installation manuals will be furnished upon delivery of equipment.
- Operation and Maintenance Manuals will be submitted within 90 days after receipt of approved shop drawings.

Pricing

The price for the Kruger Double Ditch system, as defined herein, including process and design engineering, field services, and equipment supply is:

D-Ditch with Rotor System: $775,000

Pricing is FOB shipping point, with freight allowed to the job site. This pricing does not include any sales or use taxes. In addition, pricing is valid for thirty (30) days from the date of issue. The proposed goods may be affected by the ongoing market fluctuations impacting material and shipping costs. Kruger reserves the right to re-evaluate the Proposal price prior to order acceptance.

Please note that the above pricing is expressly contingent upon the items in this proposal and are subject to Kruger Standard Terms of Sale detailed herein.

Kruger Standard Terms of Payment

The terms of payment are as follows:

- 10% on receipt of fully executed contract
- 15% on submittal of shop drawings
- 75% on the delivery of equipment to the site

Payment shall not be contingent upon receipt of funds by the Contractor from the Owner. There shall be no retention in payments due to Kruger. All other terms per our Standard Terms of Sale are attached.

All payment terms are net 30 days from the date of invoice. Final payment not to exceed 120 days from delivery of equipment.

STATEMENT REGARDING COMPETITIVE TRANSPARENCY

Veolia takes all issues surrounding probity and confidentiality very seriously in all of its dealings with competitors and stakeholders. In this spirit and for the sake of transparency, we inform you that the publicly traded parent company Veolia Environnement S.A., recently acquired a 29.9% interest in Suez S.A ("Suez") and launched a public bid for the remainder of Suez' share capital.

Consistent with our commitment to competition law compliance, Veolia will continue to act entirely independent of Suez until all relevant antitrust approvals of Veolia's acquisition of Suez have been obtained and we will of course let you know if this would change before the end of the tender proceedings.

Specifically, none of Veolia's representatives sit on the board of Suez, Veolia has no influence over the strategy or operations of Suez, and Veolia has no access to competitively sensitive information about Suez's operations. Accordingly, Veolia's ongoing project to acquire Suez will have no effect on our participation in, or response to, this tender.

Kruger Standard Terms of Sale

1. Applicable Terms. These terms govern the purchase and sale of the equipment and related services, if any (collectively, "Equipment"), referred to in Seller's purchase order, quotation, proposal or acknowledgment, as the case may be ("Seller's Documentation"). Whether these terms are included in an offer or an acceptance by Seller, such offer or acceptance is conditioned on Buyer's assent to these terms. Seller rejects all additional or different terms in any of Buyer's forms or documents.

2. Payment. Buyer shall pay Seller the full purchase price as set forth in Seller's Documentation. Unless Seller's Documentation provides otherwise, freight, storage, insurance and all taxes, duties or other governmental charges relating to the Equipment shall be paid by Buyer. If Seller is required to pay any such charges, Buyer shall immediately reimburse Seller. All payments are due within 30 days after receipt of invoice. Buyer shall be charged the lower of 1 ½% interest per month or the maximum legal rate on all amounts not received by the due date and shall pay all of Seller's reasonable costs (including attorneys' fees) of collecting amounts due but unpaid. All orders are subject to credit approval.

3. Delivery. Delivery of the Equipment shall be in material compliance with the schedule in Seller's Documentation. Unless Seller's Documentation provides otherwise, Delivery terms are F.O.B. Seller's facility.

4. Ownership of Materials. All devices, designs (including drawings, plans and specifications), estimates, prices, notes, electronic data and other documents or information prepared or disclosed by Seller, and all related intellectual property rights, shall remain Seller's property. Seller grants Buyer a non-exclusive, non-transferable license to use any such material solely for Buyer's use of the Equipment. Buyer shall not disclose any such material to third parties without Seller's prior written consent.

5. Changes. Seller shall not implement any changes in the scope of work described in Seller's Documentation unless Buyer and Seller agree in writing to the details of the change and any resulting price, schedule or other contractual modifications. This includes any changes necessitated by a change in applicable law occurring after the effective date of any contract including these terms.

6. Warranty. Subject to the following sentence, Seller warrants to Buyer that the Equipment shall materially conform to the description in Seller's Documentation and shall be free from defects in material and workmanship. The foregoing warranty shall not apply to any Equipment that is specified or otherwise demanded by Buyer and is not manufactured or selected by Seller, as to which (i) Seller hereby assigns to Buyer, to the extent assignable, any warranties made to Seller and (ii) Seller shall have no other liability to Buyer under warranty, tort or any other legal theory. If Buyer gives Seller prompt written notice of breach of this warranty within 18 months from delivery or 1 year from beneficial use, whichever occurs first (the "Warranty Period"), Seller shall, at its sole option and as Buyer's sole remedy, repair or replace the subject parts or refund the purchase price therefore. If Seller determines that any claimed breach is not, in fact, covered by this warranty, Buyer shall pay Seller its then customary charges for any repair or replacement made by Seller. Seller's warranty is conditioned on Buyer's (a) operating and maintaining the Equipment in accordance with Seller's instructions, (b) not making any unauthorized repairs or alterations, and (c) not being in default of any payment obligation to Seller. Seller's warranty does not cover damage caused by chemical action or abrasive material, misuse or improper installation (unless installed by Seller). THE WARRANTIES SET FORTH IN THIS SECTION ARE SELLER'S SOLE AND EXCLUSIVE WARRANTIES AND ARE SUBJECT TO SECTION 10 BELOW. SELLER MAKES NO OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE.

7. Indemnity. Seller shall indemnify, defend and hold Buyer harmless from any claim, cause of action or liability incurred by Buyer as a result of third party claims for personal injury, death or damage to tangible property, to the extent caused by Seller's negligence. Seller shall have the sole authority to direct the defense of and settle any indemnified claim. Seller's indemnification is conditioned on Buyer (a) promptly, within the Warranty Period, notifying Seller of any claim, and (b) providing reasonable cooperation in the defense of any claim.

8. Force Majeure. Neither Seller nor Buyer shall have any liability for any breach (except for breach of payment obligations) caused by extreme weather or other act of God, strike or other labor shortage or disturbance, fire, accident, war or civil disturbance, delay of carriers, failure of normal sources of supply, act of government or any other cause beyond such party's reasonable control.

9. Cancellation. If Buyer cancels or suspends its order for any reason other than Seller's breach, Buyer shall promptly pay Seller for work performed prior to cancellation or suspension and any other direct costs incurred by Seller as a result of such cancellation or suspension.

10. LIMITATION OF LIABILITY. NOTWITHSTANDING ANYTHING ELSE TO THE CONTRARY, SELLER SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, SPECIAL, PUNITIVE OR OTHER INDIRECT DAMAGES, AND SELLER'S TOTAL LIABILITY ARISING AT ANY TIME FROM THE SALE OR USE OF THE EQUIPMENT SHALL NOT EXCEED THE PURCHASE PRICE PAID FOR THE EQUIPMENT. THESE LIMITATIONS APPLY WHETHER THE LIABILITY IS BASED ON CONTRACT, TORT, STRICT LIABILITY OR ANY OTHER THEORY.

11. Miscellaneous. If these terms are issued in connection with a government contract, they shall be deemed to include those federal acquisition regulations that are required by law to be included. These terms, together with any quotation, purchase order or acknowledgement issued or signed by the Seller, comprise the complete and exclusive statement of the agreement between the parties (the "Agreement") and supersede any terms contained in Buyer's documents, unless separately signed by Seller. No part of the Agreement may be changed or cancelled except by a written document signed by Seller and Buyer. No course of dealing or performance, usage of trade or failure to enforce any term shall be used to modify the Agreement. If any of these terms is unenforceable, such term shall be limited only to the extent necessary to make it enforceable, and all other terms shall remain in full force and effect. Buyer may not assign or permit any other transfer of the Agreement without Seller's prior written consent. The Agreement shall be governed by the laws of the State of North Carolina without regard to its conflict of laws provisions.