Elk Point Sanitation District

Lift Station Rehabilitation Project

Preliminary Engineering Report

July 2024

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Prepared for:

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1 Project Planning

The Elk Point Sanitation District (EPSD or District), located in Zephyr Cove, Nevada, was created in June 1969 by Ordinance #EP-3 as a General Improvement District under Nevada Revised Statutes (NRS) 318. EPSD was formed for the sole purpose of furnishing sanitary sewer collection facilities to serve the residential lots within the Elks Subdivision. Their charter more specifically defines the purpose, as follows:

a. "To acquire, construct, reconstruct, improve, extend, better, operate, maintain, and repair a sanitary sewer system or any part thereof, including, without limiting the generality of the foregoing, mains, laterals, wyes, tees, meters and collection, treatment and disposal plants.

b. To sell any product or by-product thereof, and to acquire appropriate outlets and rights of disposal within or without the District and to extend the sewer lines of the District thereto.

c. In connection with the said basic power, the Board shall have and exercise all rights and powers necessary or incidental to or implied from said basic power, including, without limiting the generality of the foregoing."

The lower sections of sewer collection system consist of gravity sewer collection pipes that discharge to two lift stations, Lift Station #1 and Lift Station #2. Lift Station #1 pumps raw sewage to a gravity line that then discharges to a manhole upstream of Lift Station #2. Lift Station #2 pumps raw sewage to the existing gravity sewage collection system that drains to sewer collection facilities owned, operated, and maintained by DCLTSA. EPSD's two lift stations are located within 200 feet of Lake Tahoe's water edge.

Shortly after formation, EPSD entered a contract for service with Douglas County Sewer Improvement District (now known as Douglas County Lake Tahoe Sewer Authority (DCLTSA)) with a term of 50 years. The term of that agreement has expired and DCLTSA has given notice that the contract for sewer service is not renewable. Unfortunately, while being serviced by DCLTSA, the Board of Directors for EPSD essentially abdicated their fiscal duties to plan for and set aside monies needed to operate, maintain, and replace capital facilities when needed. What's more, since being informed of DCLTSA's decision not to renew the agreement, and with the assistance of DCLTSA's maintenance personnel, the current Board of Directors have undertaken an operational assessment of their system and its major components only to learn that the two existing lift stations are antiquated, do not meet current standards, and have no meaningful redundancy or emergency storage capacity. Furthermore, they are advised by DCLTSA's maintenance personnel that replacement parts for the components for the existing lift stations are difficult and time consuming to locate and obtain. The other portions of the existing collection system have recently been assessed and found to be in serviceable condition.

For these reasons, EPSD's Board members have determined that these lift stations must now be removed and replaced with equipment and components that meet today's standards for pumping raw sewage and afford the community adequate emergency storage as well as serviceable emergency alarms. Given the very close proximity to Lake Tahoe, the condition of the existing lift stations and the potential of catastrophic failures represent a very real threat to public health and safety.

Additionally, DCLTSA requires that the flows from all districts contributing to their collection system be metered.

1.1 Location

As noted above, the service area of Elk Point Sanitation District is within Zephyr Cove, Nevada. By its statutory charter, the service area of the district is limited to the homes and residences within the boundaries of The Elks Subdivision. **Figure 1.1** is a Location Map that provides the location of the project in a regional context.

1.2 Environmental Resources Present

Based on an initial review of publicly available mapping, together with the fact that the list stations are existing, and the new lift stations are planned to be constructed within the existing public rights-of-way(s), there are no known environmental constraints, protected, listed or endangered plants or species present at the two sites that would preclude or otherwise effect construction of the proposed project.

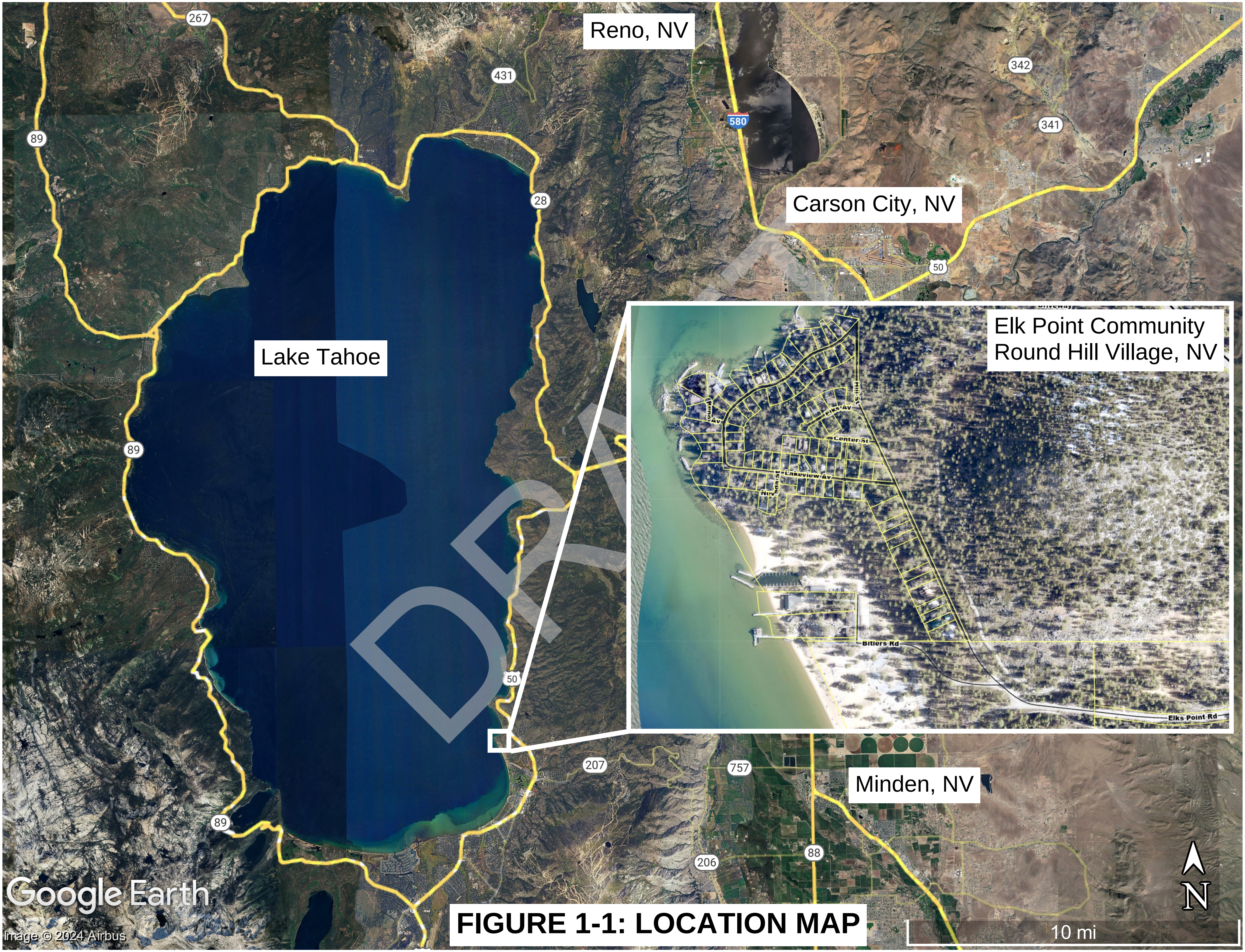

FIGURE 1-1: LOCATION MAP

1.3 Population Trends

The Elk Point subdivision, which is the service area of EPSD, is completely built out and would be considered a mature development. That is, the population is essentially fixed and there is virtually no opportunity for the community to grow through further development.

1.4 Community Engagement

The Board of Directors for this small community meet regularly and both their meeting agendas and their meeting minutes are publicly available. Under the terms of the charter, the Board of Directors has the full authority to take actions reasonably necessary to ensure the public health and safety are not jeopardized by actions or inaction by the Board. Beyond these measures, no separate public or community engagement is deemed necessary until such time as funding obligations become more refined.

2 Existing Facilities

The Elks Subdivision is fully built out and has approximately 100 connections to the existing sanitary sewer collection system. Generally, the existing collection system consists of 6-inch and 8-inch diameter gravity sewer mains. Due to site topography, for those properties located along Lakeside avenue and lying west of Nevada Street, the gravity collection system flows to two sere lift stations that are referred to simply as Lift Station #1 and Lift Station #2. Both pump stations utilize pneumatic ejector pumps. Fundamentally, a pneumatic ejector pump includes a tank for holding fluids – in this case raw sewage. Once the volume within the tank reaches a predetermined level, the contents are ejected by compressed air. This pumping mechanism is unique because there are few mechanical parts involved in the process. Despite the simplicity of pneumatic sewage pumps, currently they are rarely used in municipal sewage pump station applications.

Raw sewage collected at Lift Station #1 is pumped through a relatively short 4-inch diameter steel force main up to a sewer manhole (#818)[1] that flows by gravity to Lift Station #2. Sewage flows collected at Lift Station #2 are discharged through a 4-inch diameter steel force main to Sewer Manhole #809[2], which is located east of the intersection of Lakeview Avenue and Nevada Street. After Sewer Manhole #809, sewage flows by gravity to existing gravity collection system operated and maintained by DCLTSA within Elks Point Road. Based on collection system mapping prepared for DCSID, there is about 2,445 feet of 6-inch diameter and 2,055 feet of 8-inch gravity mains within EPSD's collection system.

Approximately 53 to 58 of the connections flow directly to either Lift Station #1 or Lift Station #2. EPSD is advised by DCLTSA's operations personnel that the operating conditions of the two lift stations are 50 gallons per minute (GPM) at 20 feet of total dynamic head (TDH), and 50 GPM at 70 feet of TDH, respectively.

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[1] See Figure 2-1: Elk Point Collection System, which was derived from Map 8 of the "Sewer Line Location Map" prepared for DCSID by JWA.

[2] Ibid.

2.1 Existing Facilities Map

Figure 2.1: Elk Point Collection System is an exhibit depicting the relative location of these existing sewage collection facilities.

2.2 History

As noted above, EPSD was formed in 1969. From available mapping records, it appears that the sewage collection system was designed in 1971 and probably constructed shortly thereafter. No records have been identified that suggest there have been any significant modifications to the collection system since originally installed more than 50 years ago.

2.3 Condition of Existing Facilities

While the existing pump stations remain operational and appear to be well maintained, replacement parts for the existing pumps and mechanical systems are increasingly difficult to source from suppliers due to the fact that the pneumatic sewage pumps are no longer used in municipal lift station applications.

Neither Lift Station #1 or Lift Station #2 is equipped with back-up power supply (e.g., stand-by generator). Additionally, neither lift station has any meaningful volume of storage capacity available in the instance of a pump failure.

Given the difficulty in sourcing replacement parts, the relative age of the existing facilities, the fact that the system has minimal storage capacity (<25 gallons for Lift Station #1), plus the proximity to the shoreline of Lake Tahoe, these existing lift stations are not suitable for continued use.

2.4 Financial Status of any Existing Facilities

Recent (June 2022 – May 2024) power meter usage records have been reviewed and considered. During this period, Lift Station #1 (Lakeview Avenue) used 2,735 kWh or

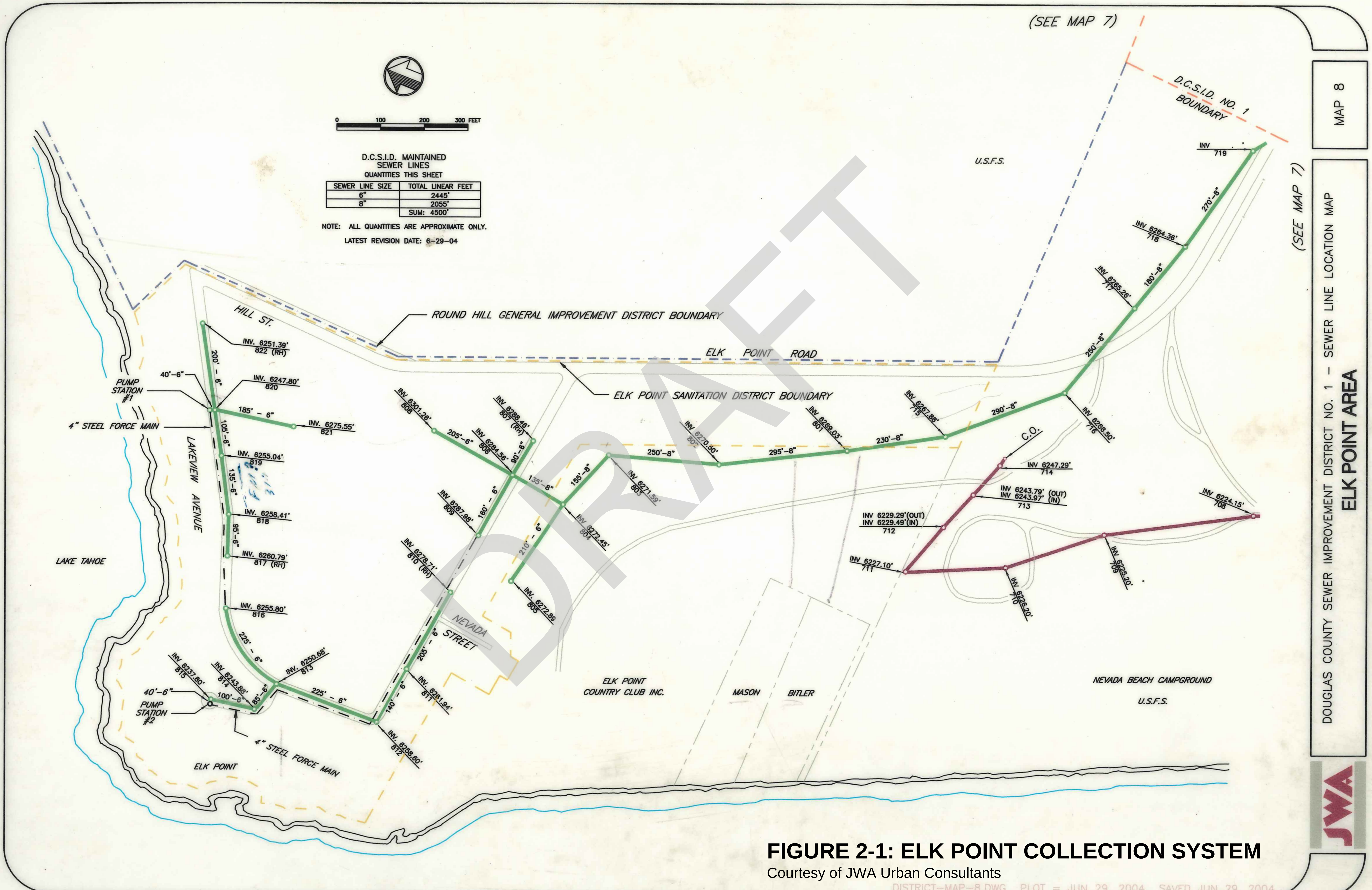

FIGURE 2-1: ELK POINT COLLECTION SYSTEM

Courtesy of JWA Urban Consultants

about 114 kWh per month. For the same 24 month period, Lift Station #2 used 5,490 kWh, or about 229 kWh. Based on current energy costs, the combined power cost for both lift stations is less than $150 per month.

(Note: Need input from EPSD to complete. Some agencies require the owner to submit the most recent audit or financial statement as part of the application package.) Provide information regarding current rate schedules, annual O&M cost (with a breakout of current energy costs), other capital improvement programs, and tabulation of users by monthly usage categories for the most recent typical fiscal year. Give status of existing debts and required reserve accounts.

3 Need for Project

The existing lift stations for the project area are inadequately sized to handle peak flow conditions, utilize outdated equipment that is extremely costly to find replacement parts for, and, at over 50-years of age, have reached the ends of their useful lives. Maintaining the lift stations is proving to be costly to the owner and keeping them in service poses health and safety risks to the general public.

3.1 Health, Sanitation, and Security

As described in the previous sections, both Lift Station #1 and #2 are currently located within 200-feet of Lake Tahoe's shoreline and are deemed to be inadequate to handle peak flows observed over the past 50-years of operation. Given the proximity to Lake Tahoe, any failure or overflow caused by the aging conditions or inadequate storage of the Lift Stations would result in direct contamination of Lake Tahoe with raw sewage. Water from Lake Tahoe is used to provide drinking water to many of the adjacent communities in both California and Nevada and provides municipal water to much of the Reno-Sparks metropolitan area, which has a population of over 500,000 people. Therefore, contamination of Lake Tahoe would pose very serious health and sanitation concerns to the public, risking exposure to waterborne diseases such as Cryptosporidiosis, Gastroenteritis, Giardiasis, Hepatitis A, Dysentery, and more. Furthermore, allowing these Lift Stations to continue to age and threaten contamination of Lake Tahoe would be in direct violation of state and federal statutes.

3.2 Aging Infrastructure

Lift Stations #1 and #2 were installed in 1971 using Ejector Station technology manufactured by CAN-TEX industries, which has shifted to primarily produce PVC pipe and conduit in recent years. As described above, the Ejector Stations use compressed air to lift sewage from a receiving tank into gravity sanitary sewer lines. The equipment is housed in a dry sump and is fed from a nearby manhole. The industry has long-since moved away from using Ejector Stations, making procurement of replacement parts and equipment costly with increasingly long-lead times.

Not only is the equipment and associated infrastructure reaching the end of its useful life, the lift stations have also proven to have inadequate capacity. During peak flow events, such as holidays, sewage flows have been observed to be high enough to nearly overflow the lift stations, where contractors were called on-site with vacuum trucks on standby in case of an overflow event into Lake Tahoe[3]. Events such as these have been catalyzed prioritizing replacement of these lift stations to ensure health and safety standards of the public are met.

3.3 Reasonable Growth

The Elk Point Community is completely built out, with approximately 100 sanitary sewer connections and no plans for future growth. However, as detailed in previous sections, the current lift stations are antiquated and undersized to handle peak flows of the community and need to be upsized or replaced in the near future.

[3] JWA Consultants, Engineers, Inc., 2004 – Elk Point #1 Sewer Lift Station Memorandum

4 Alternatives Considered

The alternatives considered as part of this assessment factored initial capital costs, operating costs, public health and safety, and overall effectiveness and modernization of technologies. The following feasible alternatives are considered:

Alternative 1: No Action

Alternative 2: Replace Lift Stations #1 and #2 with updated technology (new wet well, submersible pumps, backup power, and addition of a flow meter)

4.1 Alternative 1 – No Action

4.1.A Description

For this alternative, no action would be taken to modify the existing lift stations and collection system, and the system would operate as it does today.

4.1.B Design Criteria

There are no current design criteria or standards that support this alternative.

4.1.C Map

A map of the project area, showing the existing sewer collection system is shown in **Figure 1.1.**

4.1.D Environmental Impacts

No construction related impacts would occur with this alternative, as no construction would take place. However, this alternative assumes the same risk to public health, safety, and the environment as is present today.

4.1.E Land Requirements

There are no land requirements for this alternative.

4.1.F Potential Construction Problems

No construction would take place with this alternative.

4.1.G Sustainability Considerations

Sustainable utility management practices including environmental, social, and economic benefits that aid in creating a resilient utility are not available in this alternative.

4.1.G.1 Water and Energy Efficiency

Not applicable.

4.1.G.2 Green Infrastructure

Not applicable.

4.1.G.3 Other

Not applicable.

4.1.H Cost Estimates

There are no construction costs, non-construction costs, or operation and maintenance costs associated with this alternative. The Elk Point Sanitation District would continue to be responsible for maintaining equipment as it does today.

4.2 <u>Alternative 2</u> – Replacement of Lift Stations #1 and #2

4.2.A Description

<u>Alternative 2</u> consists of constructing two new lift stations to replace Lift Stations #1 and #2. For this alternative each lift station will consist of a pre-cast wet well with access hatch, two submersible pumps, a check valve, a plug valve, air release valve, and associated 4-inch steel piping to connect to the existing force main. This alternative also includes the installation of a new flow meter to totalize flows leaving the Elk Point community, as well as backup power supply for each lift station.

Due to the lack of redundancy and storage in the existing system, construction of the new lift stations will need to be completed with existing lift station operational and will require a method of planned outage (MOPO) to switch operation to the proposed facilities. Once the proposed facilities are put into operation, the existing facilities will be demolished.

4.2.B Design Criteria

Standard engineering and construction practices will be used in the design of this alternative. The preliminary wet well design meets the criteria established by the Nevada Division of Environmental Protection – Bureau of Water Pollution Control (NDEP-BWPC) and the Nevada Administrative Code (NAC). Primary considerations during design include:

- equipment sizing based on buildout flow rates;
- wet well retention times and odor control provisions;
- pump operation times (i.e. lead-lag programming);
- force main velocities for odor control / scour (2.5 fps minimum);
- friction losses in pipe and fittings;
- wet well storage calculations are sufficient to provide enough response time for emergency response;
- generator system designed to start immediately upon power failure(e.g. automatic transfer switch), and can operate for at least 24-hours

Table 4.1 below summarizes the design criteria for Lift Stations #1 and #2.

Design Criteria	L.S. #1	L.S. #2
Design Flow Rate (gpm)	100	100
Average TDH at Design Flow Rate (ft)	46	76
Depth of Wet Well (ft.)	19	19
Influent Invert Elevation (ft.)	6,248	6,238

Table 4.1: Lift Station Design Criteria

4.2.C Map

A conceptual map of Alternative 2 is provided on **Figure 4.1**.

4.2.D Environmental Impacts

This alternative is expected to have minimal environmental impacts. The proposed lift stations will be installed adjacent to existing lift stations and easements in previously disturbed areas. All work will be performed within existing easements or right-of-way.

4.2.E Land Requirements

No additional land acquisition is required, as all new facilities will be placed within existing right-of-way.

4.2.F Potential Construction Problems

The following list identifies the potential construction problems with this alternative:

- This alternative involves maintaining operation of existing facilities during construction, and will include a MOPO when switching operation from the existing

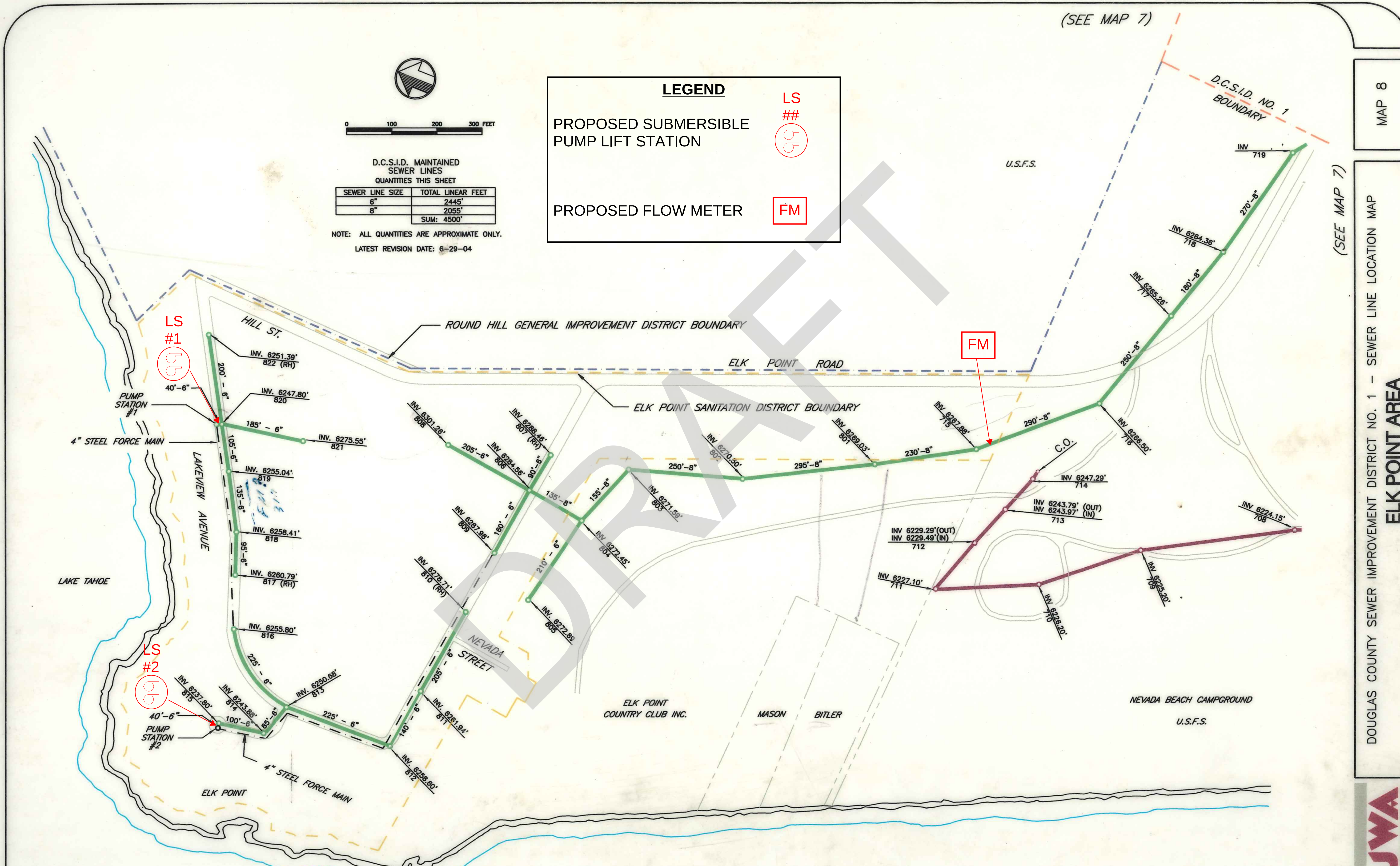

FIGURE 4-1: PROPOSED ELK POINT COLLECTION SYSTEM UPGRADES

Courtesy of JWA Urban Consultants

to the proposed lift stations, which requires careful coordination and cooperation between the Owner, Contractor and maintenance personnel.

- Existing utilities and unforeseen subsurface conditions (such as rock) could slow construction.

4.2.G Sustainability Considerations

The Elks Point Subdivision is fully built out and, therefore, does not need to consider population growth for sustainability. From an economic and management perspective, replacement of antiquated and aging infrastructure to provide greater storage capacity and redundancy would prove to be a resilient solution that would allow the community to allocate funds and time to other infrastructure needs.

4.2.G.1 Water and Energy Efficiency

Replacing the Ejector Stations with energy-efficient submersible pumps would provide the EPSD with long-term energy savings, due to the increased efficiency of motors since 1971. The preliminary design also shows a decrease in the motor power required at Lift Station #2, with the existing Ejector Station motor at 7.5 HP and the proposed pump motors at 5 HP.

4.2.G.2 Green Infrastructure

No green infrastructure is planned for this alternative.

4.2.G.3 Other

This alternative provides the EPSD with increased redundancy with regards to both pumping capacity and power supply, increased storage capacity, and greater overall resiliency of their collection system. Furthermore, the proposed pump stations are in-line with the current industry standards, meaning operators are more familiar with maintenance and parts are more readily available. This provides further operational simplicity that will translate into savings by reducing O&M hours.

4.2.H Cost Estimates

The cost estimate for this alternative is considered a conceptual, planning level estimate, provided with a Class 4 level construction estimate per Association for the Advancement of Cost Estimating International ranging from -20% to +30%. **Table 4.2** below summarizes the engineer's opinion of probable costs for Alternative 2.

Elk Point Sanitation District Capital Costs (Alternative 2) July 2024			
Item	**Item Description**		**Total Cost**
1	Construction Costs	$	718,400
2	Tax *(7.75% of Construction Cost)*	$	54,300
3	Bond / Insurance *(2.5% of Construction Cost)*	$	55,700
4	Contractor's Fee *(10% of Construction Cost)*	$	71,900
5	Construction Contingency *(15% of Construction Cost)*	$	108,000
6	Permits and Right of Way	$	3,000
7	Planning and Design *(10% of Construction Cost)*	$	72,000
	TOTAL CAPITAL COST	**$**	**1,083,300**
	ANNUAL COSTS	**$**	**41,000**
	TOTAL CAPITAL ESTIMATE LOWER RANGE1 (-20%)	$	758,300
	TOTAL CAPITAL ESTIMATE UPPER RANGE1 (+30%)	$	1,408,300
Notes: 1. Estimate is considered a ***Class 4 Construction Estimate per AACE International to support project feasibility analysis***. Per AACE International 18R-97, Expected Accuracy Range: (Low: -20%; High: +30%)			

Table 4.2: Engineer's Estimate Alternative 2

Appendix A, following this report, provides a detailed breakdown of the capital costs for Alternative 2.

5 Selection of an Alternative

This section evaluates each of the alternatives based on both monetary (life-cycle cost) and non-monetary factors.

5.1 Life Cycle Cost Analysis

The life cycle cost analysis is determined from the Net Present Value (NPV) of each alternative based on a 30-year planning period and a discount rate of 2% (Whitehouse Circular A-4, November 2023). The NPV of each alternative is calculated as the sum of the capital cost (C) plus the Present Worth of the uniform series of annual O&M costs minus the single payment present worth of the salvage value (SPPW(S)) as follows:

NPV = C + USPW (O&M) – SPPW (S)

It is expected that the salvage value of the constructed project will be zero at the end of the project life.

O&M costs for the two alternatives were calculated with the help of the following estimated parameters:

- Power
  - The power costs for each option assumes $0.09 per KWh of electricity consumed.
  - Assumes operation of a duplex constant speed drive pump (1 Duty + 1 Stand-by) for each alternative.
- Equipment Replacement
  - Due to the age of the pumping systems, Alternative 1 assumes an equipment replacement cost of 30% of the pump cost per year
  - 2.5% of the purchasing cost was used as an estimate to calculate replacement costs for Alternative 2.

- Labor Estimates
  - Due to the age of the pumping systems, Alternative 1 assumes 5 man-hours per week per pump station of maintenance time needed for optimal functioning.
  - Alternative 2 assume one man-hour per week per pump station of maintenance time needed for optimal functioning.

The sum of these costs is the Annual O&M cost.

The life cycle costs for each alternative are summarized in **Table 5.1**. The details of the cost estimates are provided in Appendix A, following this report.

	Option 1: **Operate Exisitng System**	**Option 2:** **Install New Pumps, Generator at Pump Stations #1 & #2**
Pump Stations #1 & #2 Cost ($)	$ -	$ 1,195,200
Total Construction Cost (2024$)	**$ -**	**$ 1,195,200**
AACE Class 4 Range (2024$) (3)	$ -	*$837k to $1.79M*
Power Costs ($/Yr)	$ 8,000	$ 7,100
Equipment Repair / Spare Parts Costs ($/Yr)	$ 16,800	$ 4,400
Labor Costs ($/Yr)	$ 41,800	$ 16,700
Total O&M Costs ($/yr)	$ 66,600	$ 28,200
30 Year Life Cycle Cost ($)	**$ 1,492,000**	**$ 632,000**
Net Present Value (2024$)	**$ 1,492,000**	**$ 1,827,200**
Total Construction Cost (2025$)(4)	**$ -**	**$ 1,231,000**
Total Capital Cost (2025$) (6) **(AACE Class 4 Lower Range, mid-2025$) (3)**	*$ -*	*$ 862,000*
Total Capital Cost (2025$) (6) **(AACE Class 4 Upper Range, mid-2025$) (3)**	*$ -*	*$ 1,847,000*
AACE Class 4 Range (2025$) (4)	-	*$862k to $1.84M*

Notes:

(1) All construction costs include General Requirements (8%)

(2) Total Capital Cost includes General Conditions (10%), Construction Contingency (10%), Bond / Insurance (3%), Taxes 7.75% of the total), and CMAR Fee (10%) as a percentage of the total construction cost.

(3) The costs presented correspond to American Associations of Cost Engineers (AACE) Class 4. The associated accuracy

(4) Costs projected using an inflation rate of 2% per year to anticipated mid-point of construction date (mid-2025).

(5) Costs are rounded up to nearest thousand dollars.

Table 5.1: Life Cycle Costs

5.2 Non-Monetary Factors

Non-monetary factors considered as part of this report include public health and safety impacts, sustainability/reliability considerations, and operations and maintenance requirements. One of EPSD's primary concerns is the insufficient capacity of the existing system, which poses serious health and safety risks to the public if an overflow event were to occur. The EPSD also aims to improve the reliability and sustainability of the antiquated and aging system. Furthermore, the EPSD would also like to decrease the O&M costs and efforts related to maintaining a system that is costly and difficult to procure replacement parts for.

Table 5.2 below depicts the weighted score for each alternative considered.

Alternative	**Criterion / Weight**				**Weighted Score**	**Overall Rank**
	Life Cycle Cost	Health and Safety	Sustainability / Reliability	O&M		
	40%	20%	20%	20%		
1. No Action	2	1	1	1	1.4	**2**
2. Replace Lift Stations	1	2	2	2	1.6	**1**

Table 5.2: Alternative Decision Matrix Scoring

6 Proposed Project (Recommended Alternative)

Based on the analyses conducted, it is recommended to proceed with the design and construction of Alternative 2. Replacement of the antiquated lift stations imposes more up-front capital costs to the owner, but provides the EPSD with essential flexibility, reliability, and redundancy that it severely lacks today. Furthermore, Alternative 2 provides greater resiliency for public health and safety, and is more sustainable for both the owner and the public served by the new infrastructure.

6.1 Preliminary Project Design

6.1.A Collection System Layout

There are no modifications proposed to the existing sewage collection system for the Elk Point Sanitation District. The system will remain unchanged, as illustrated in **Figure 2.1**

6.1.B Pumping Stations

The proposed project includes the installation of two new package lift stations directly adjacent to the existing Lift Stations #1 and #2 as shown in **Figure 4.1**. Each pump station consists of a six-foot pre-cast manhole and an adjacent four-foot vault to access the associated valves. **Figure 6.1** illustrates a typical plan and section view of the proposed Lift Stations and appurtenances. Each wet well will be fitted with duplex submersible pumps, rated for 100-gpm at 46-ft and 76-ft TDH for Lift Station #1 and #2, respectively. The pumps will be installed on a guide rail for ease of removal from the wet well for maintenance purposes.

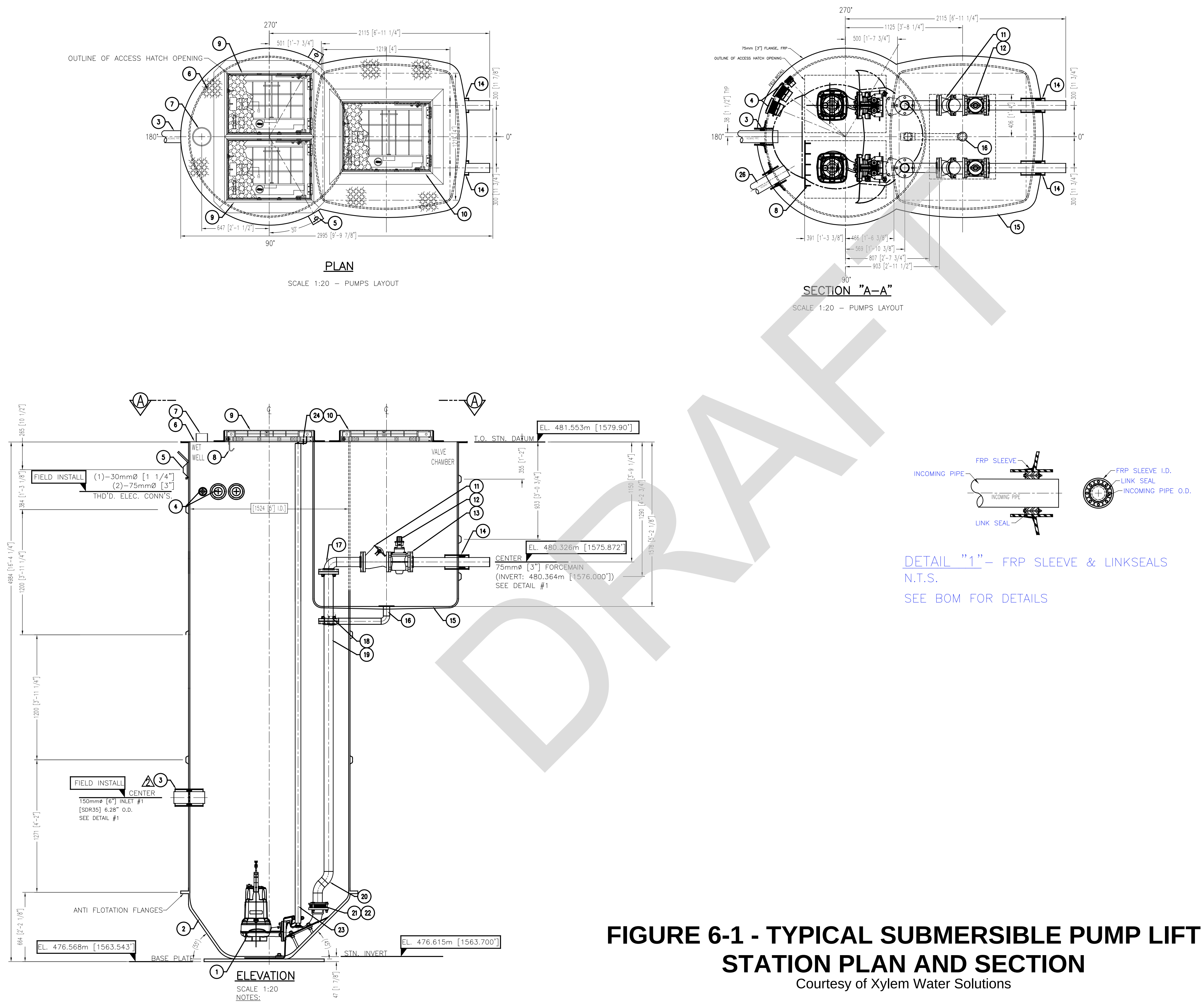

FIGURE 6-1 - TYPICAL SUBMERSIBLE PUMP LIFT STATION PLAN AND SECTION

Courtesy of Xylem Water Solutions

BILL OF MATERIALS

#	DESCRIPTION	QTY
1	FLYGT PUMPS NP6020HT, DN80 [3"] (BY XYLEM)	2
2	FLYGT T.O.P STYLE BASE c/w FRP REINFORCED BOTTOM & INTEGRAL ANTI–FLOTATION FLANGE	1
3	150ø INLET #1, c/w 200mm [8"] I.D. FRP SLEEVE, LINSEAL LS300–15 LINK	1
4	(1)–30mmØ [1.25"], (2)–75mmØ [3"] NPT BULHEAD ELECTRICAL CONNECTION, PVC	3
5	LIFTING LUGS, M.S.	2
6	CUSTOM ALUMINUM CHECKERPLATE TOP	1
7	100mmØ [4"] NPT COUPLER, CAPPED	1
8	CABLE HANGER, 316SS	1
9	XYLEM SAFETY HATCH, MODEL 13–43 00 80	2
10	XYLEM SAFETY HATCH, MODEL 13–43 00 81	1
11	75mmØ [3"] HDL 5087 BALLCHECK VALVE	2
12	75mmØ [3"] VALMATIC 5603FN PLUG VALVE	2
13	75mmØ [3"] #150 FLANGE, 316SS	8
14	75mmø [3"] FORCEMAIN #1& SCH.10 316SS, c/w 127mmø [5"] I.D. FRP SLEEVE, WL– 300 8 LINK	2
15	1219mm [4'] x 1219mm [4'] x 1655mm [5.42'] VALVE VAULT, FRP	1
16	50mmØ [2"] VAULT DRAIN TO WET WELL c/w 50mmØ [2"] SS SWINGCHECK VALVE	1
17	75mmø [3"] 90° SR ELBOW, SCH.10 316SS	2
18	75mmØ [3"] #150 FLANGE, FRP	4
19	75mmØ [3"] RISER PIPE, SCH.10 316SS	2
20	75mmø [3"] 45° ELBOW, SCH.10 316SS	4
21	TOP DISCHARGE ELBOW – 619 99 10 (R) DN80 [3"]	1
22	TOP DISCHARGE ELBOW – 620 00 10 (L) DN80 [3"]	1
23	50mmø [2"] GUIDE BARS, 316SS	4
24	50mmø [2"] UPPER GUIDE BAR SUPPORT BRACKET	2
25	20mmø [3/4"] PUMP BASE BOLTS, 304 SS (NOT SHOWN)	4
26	150ø INLET #2, c/w 200mmø [8"] I.D. FRP SLEEVE, LINSEAL LS300–15 LINK	1
27	100mmø [4"] INLET #3, c/w 150mmø [6"] I.D. FRP SLEEVE, LINSEAL 300–10 LINK, CONNECTION FOR WAGER ODOR UNIT	1

FABRICATION DESIGN STANDARDS

1. XYLEM SPECIFICATION GE–1008–04, REVISION MAY 2002
2. AMEC 4S–10.01 MANUFACTURE AND INSTALLATION FOR FRP STRUCTURES
3. AMEC 4S–10.02 FRP PRESSURE PIPE, FITTINGS AND FLANGES

GENERAL NOTES

1. WINDING ANGLE – 75°
2. TANK WALL – VARIES WITH ELEVATION
3. LINER – C–GLASS VEIL AND (2)–1 1/2 oz. MATT
4. RESIN – ISOPHTHALIC
5. INTERIOR FINISH – WHITE ISOPHTHALIC NPG GELCOAT
6. EXTERIOR (ABOVE GRADE) TO HAVE DARK GREEN GELCOAT
7. DIMENSIONS ARE IN MILLIMETERS U.N.O.
8. APPROX. SHIPPING WEIGHT: 2727.00 kg (6,000LBS.)

INSTALLATION PROCEDURES

THE FOLLOWING RECOMMENDATIONS ARE IN NO WAY MEANT TO REPLACE THE ENGINEERS INSTRUCTIONS OR SPECIFICATIONS AND MUST BE USED IN CONJUNCTION WITH THE EXISTING AND ANTICIPATED CONDITIONS AT THE JOBSITE.

1. USE SLINGS FOR VERTICAL AND HORIZONTAL HANDLING.
2. ENSURE UNIT IS STANDING VERTICAL ON CONCRETE PAD OR HARD PACKED GROUND.
3. LEVEL THE STATION.
4. MAINTAIN A DRY SITE UNTIL BACKFILLING OPERATIONS COMMENCE.
5. USE A GOOD QUALITY SCREENING OR SAND AS BACKFILL MATERIAL TO 90% COMPACTION.
6. PLACE THE BACKFILL IN EQUAL INCREMENTS NOT EXCEEDING 300mm THICK AROUND THE STATION TO PREVENT UNBALANCED LOADS BEING IMPOSED DURING BACKFILLING OPERATIONS. PROGRESSIVELY TAMP BACKFILL AROUND STATION TO FULL HEIGHT TO REDUCE SETTLEMENT TO AN ABSOLUTE MINIMUM.

REV	DATE	DESCRIPTION	BY
2	2022/11/22	UPDATED INLETS SIZES, LINKESEAL DETAILS	TB
1	2022/07/29	ADDED INLET FOR VENT, UPDATED BOTTOM ELEVATION	TB
0	2022/07/25	ISSUED FOR APPROVAL	TB

TOLERANCES (U.N.O.)

LINEAR	ANGULAR
X ± 1.5	X.X ± 1/2°

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KELOWNA, B.C.
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CLIENT: XYLEM, CHARLOTTE, NC
ENGINEER:

PROJECT: **ELK POINT SANITATION DISTRICT**

TITLE: LIFT STATION #1 AND #2 REPLACEMENT - PLAN AND SECTION

ENG BY:	DATE:	CAD FILE: WH–1	PROJECT:
CAD BY:	DATE:	SCALE: AS SHOWN	
APP BY:	DATE:	DRAWING NUMBER 22–193	REV 2
ISSUED BY:	DATE:		

Flows will be conveyed from the wet well submersible pumps through two four-inch discharge headers which connect prior to discharging to the existing four-inch force main. A four-inch flanged ductile iron swing check valve with lever arm will be located on each pump discharge header just after the pipe transitions out of the wet well. The swing check valve is provided to prevent flow reversal into the wet well, protecting the pump and preventing system cycling in the event an isolation valve is accidentally closed. Eccentric plug valves will be provided to isolate the portions of discharge piping. The eccentric plug valves will be four inches in diameter and constructed of ductile iron. As shown in **Figure 6.1**, the plug valves will be located directly after the ball check valve.

As shown in **Figure 4.1,** an electromagnetic flow meter will be included on the eight-inch gravity sewer line within the Elk Point Community property lines. This meter will be used to measure the total flow from both lift stations and all downstream private connections that are fed to the Douglas County Lake Tahoe Sewer Authority's collection system for treatment and disposal. **Figure 6.2** below illustrates an example flow meter appropriate for use in gravity sewer lines for pipes flowing partially full.

Figure 6.2: Krohne Tidalflux 2300 F Electromagnetic Flow Meter

Figure 6.3 illustrates the Process and Instrumentation Diagram showing the power supply and the controls of the proposed Lift Stations. Additionally, each lift station will be equipped with a backup generator to add protection against loss of power.

6.1.C Storage

Table 6.1 below describes the design criteria used to achieve the required wet well storage capacities and establish pump set point elevations.

Design Criteria	Design
Influent Invert Elevation	6,237.8 ft.
High-High Water Level (Alarm)	6,236.8 ft.
High Water Level (Pump On)	6,235.8 ft.
Low Water Level (Pump Off)	6,232.8 ft.
Low-Low Water Level (Alarm)	6,232.3 ft.
Wet Well Floor Elevation	6,230.8 ft.
Minimum Required Working Volume	413 gallons
Actual Working Volume	1,058 gallons
Retention Time	19.2 minutes

Table 6.1: Preliminary Wet Well Design Criteria

Using the above criteria at the designed flow rate, the pumps will run for approximately 19 minutes, and will have 38 minutes between starts.

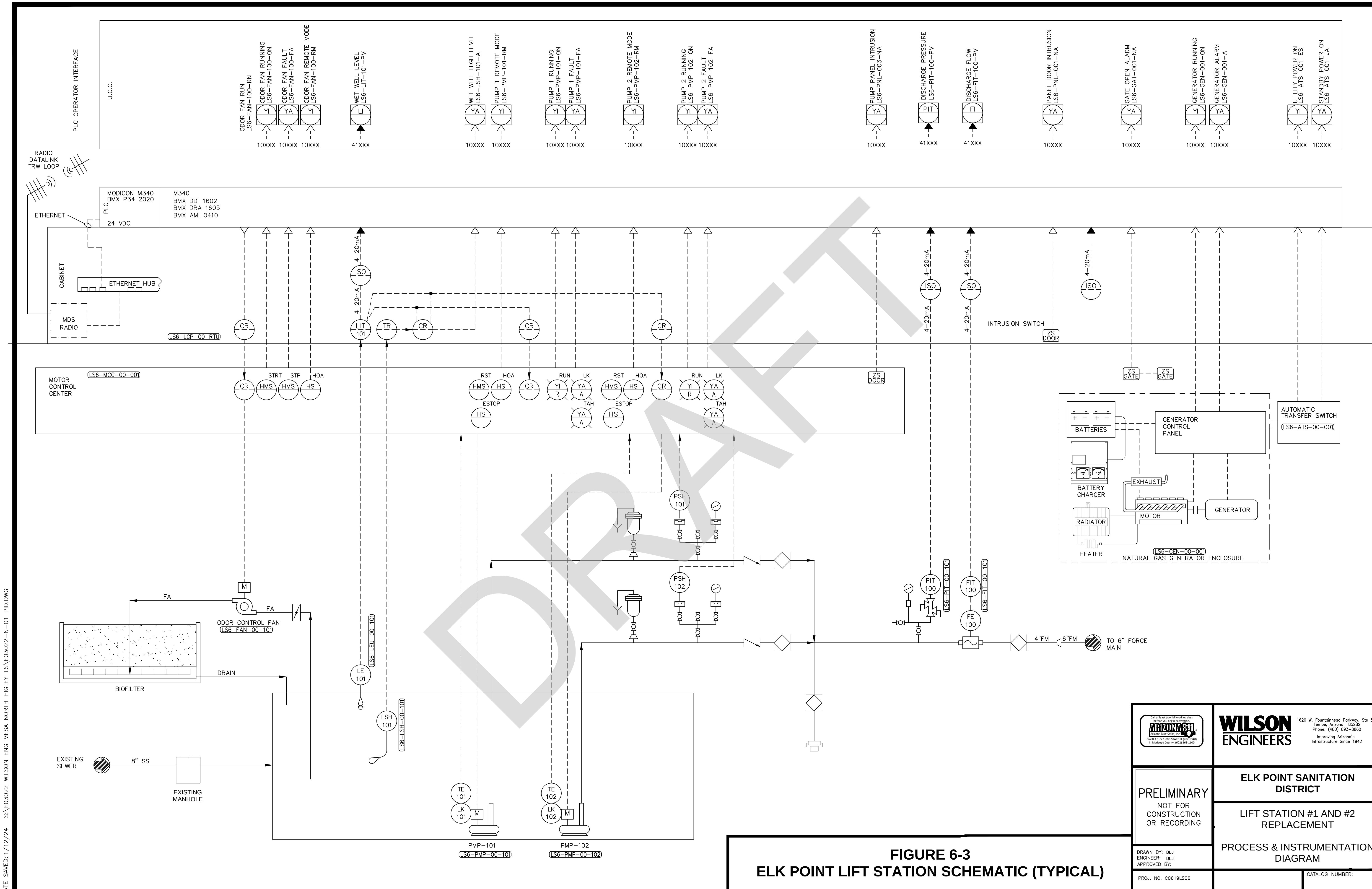

FIGURE 6-3
ELK POINT LIFT STATION SCHEMATIC (TYPICAL)

6.1.D Treatment

This project does not contain any treatment technologies. The collections system conveys untreated sewage off-site for treatment by DCLTSA.

6.2 Project Schedule

The proposed project schedule shown in **Table 6.2** below is dependent on the project owner's priorities and funding availability. It is estimated that once the project is implemented, the design phase of the project will require approximately 3 months and the construction phase may take approximately 2 months.

Activity	Duration
Submit Funding Applications for Design	2 months
Engineering Design	3 months
Obtain Design Approval	2 months
Submit Funding Applications for Construction	3-4 months
Construction	4-5 months
Final Inspection and Project Closeout	2 months
Total Estimated Project Duration	**16-18 months**

Table 6.2: Proposed Project Schedule

6.3 Permit Requirements

There are a series of plan reviews and permits that will be required prior to commencing construction of the project. Specific permits include:

- Douglas County Building Permit
- Douglas County Site Improvement Permit
- Nevada Division of Environmental Protection – Bureau of Water Pollution Control
- Tahoe Regional Planning Association.

In addition to the plan review and construction permits, depending on the funding agency, additional environmental reviews (e.g., National Environmental Protection Act (NEPA)) may be required prior to commencing construction.

6.4 Total Project Cost Estimate (Engineer's Opinion of Probable Cost)

The cost estimates for this Proposed Project are considered conceptual, planning level estimates. Accuracy ranges per American Association of Cost Engineers (AACE) Class 4 have been added for uncertainty associated with conceptual design level in this PER.

No cost was developed for Alternative 1.

Table 6.3 summarizes the engineer's cost for Alternative 2. A complete breakdown for this alternative is provided in **Appendix A**.

Elk Point Sanitation District Capital Costs (Alternative 2) July 2024		
Item	**Item Description**	**Total Cost**
1	Construction Costs	$ 772,400
2	Tax *(7.75% of Construction Cost)*	$ 58,400
3	Bond / Insurance *(2.5% of Construction Cost)*	$ 59,900
4	Contractor's Fee *(10% of Construction Cost)*	$ 77,300
5	Construction Contingency *(15% of Construction Cost)*	$ 116,000
6	Permits and Right of Way	$ 3,000
7	Planning and Design *(10% of Construction Cost)*	$ 78,000
	TOTAL CAPITAL COST	**$ 1,165,000**
	ANNUAL COSTS	**$ 41,000**
	TOTAL CAPITAL ESTIMATE UPPER RANGE1 (-20%)	$ 815,500
	TOTAL CAPITAL ESTIMATE LOWER RANGE1 (+30%)	$ 1,514,500
Notes: 1. Estimate is considered a ***Class 4 Construction Estimate per AACE International to support project feasibility analysis***. Per AACE International 18R-97, Expected Accuracy Range: (Low: -20%; High: +30%)		

Table 6.3: Alternative 2 Engineer's Estimate

6.5 Annual Operating Budget (information required from EPSD)

Provide itemized annual operating budget information. The owner has primary responsibility for the annual operating budget, however, there are other parties that may provide technical assistance. This information will be used to evaluate the financial capacity of the system. The engineer will incorporate information from the owner's accountant and other known technical service providers.

6.5.A Income

Provide information about all sources of income for the system including a proposed rate schedule. Project income realistically for existing and *proposed new users separately, based on existing user billings, water treatment contracts, and other sources of income. In the absence of historic data or other reliable information, for budget purposes, base water use on 100 gallons per capita per day. Water use per residential connection may then be calculated based on the most recent U.S. Census, American Community Survey, or other data for the state or county of the average household size. When large agricultural or commercial users are projected, the Report should identify those users and include facts to substantiate such projections and evaluate the impact of such users on the economic viability of the project.*

6.5.B Annual O&M Costs

Provide an itemized list by expense category and project costs realistically. Provide projected costs for operating the system as improved. In the absence of other reliable data, based on actual costs of other existing facilities of similar size and complexity. Include facts in the Report to substantiate O&M cost estimates. Include personnel costs, administrative costs, water purchase or treatment costs, accounting and auditing fees, legal fees, interest, utilities, energy costs, insurance, annual repairs and maintenance, monitoring and testing, supplies, chemicals, residuals disposal, office supplies, printing, professional services, and miscellaneous as applicable. Any income from renewable energy generation which is sold back to the electric utility should also be included, if applicable. If applicable, note the operator grade needed.

6.5.C Debt Repayments

Describe existing and proposed financing with the estimated amount of annual debt repayments from all sources. All estimates of funding should be based on loans, not grants.

6.5.D Reserves

Describe the existing and proposed loan obligation reserve requirements for the following:

Debt Service Reserve – For specific debt service reserve requirements consult with individual funding sources. If General Obligation bonds are proposed to be used as loan security, this section may be omitted, but this should be clearly stated if it is the case.

Short-Lived Asset Reserve – A table of short lived assets should be included for the system (See Appendix A for examples). The table should include the asset, the expected year of replacement, and the anticipated cost of each. Prepare a recommended annual reserve deposit to fund replacement of short-lived assets, such as pumps, paint, and small equipment. Short-lived assets include those items not covered under O&M; however, this does not include facilities such as a water tank or treatment facility replacement that are usually funded with long-term capital financing.

7 Conclusions and Recommendations

The proposed project will provide EPSD with necessary reliability, redundancy, and flexibility to operate their collection systems safely and efficiently. Increasing storage capacity and updating technology after operating a system for over 50 years would benefit both the owner and the public that the system serves. This project includes two new submersible pump lift stations, backup generators, a new flow meter, and associated appurtenances, all installed while the existing system is in operation. As shown in the previous decision matrix, which weighs factors such as life cycle cost, operations and maintenance requirements, public health and safety, and sustainability, replacement of the Lift Stations is the optimal alternative.

Further evaluation may be required to determine the condition of the surrounding soils, as well as the existing infrastructure being tied into.

8 Appendices

Appendix A: Example list of Short-Lived Asset Infrastructure

Appendix A: Example List of Short-Lived Asset Infrastructure

Estimated Repair, Rehab, Replacement Expenses by Item within up to 20 Years from Installation)	
Drinking Water Utilities	**Wastewater Utilities**
Source Related	**Treatment Related**
Pumps	Pump
Pump Controls	Pump Controls
Pump Motors	Pump Motors
Telemetry	Chemical feed pumps
Intake/ Well screens	Membrane Filters Fibers
Water Level Sensors	Field & Process Instrumentation Equipment
Pressure Transducers	UV lamps
Treatment Related	Centrifuges
Chemical feed pumps	Aeration blowers
Altitude Valves	Aeration diffusers and nozzles
Valve Actuators	Trickling filters, RBCs, etc.
Field & Process Instrumentation Equipment	Belt presses & driers
Granular filter media	Sludge Collecting and Dewatering Equipment
Air compressors & control units	Level Sensors
Pumps	Pressure Transducers
Pump Motors	Pump Controls
Pump Controls	Back-up power generator
Water Level Sensors	Chemical Leak Detection Equipment
Pressure Transducers	Flow meters
Sludge Collection & Dewatering	SCADA Systems
UV Lamps	**Collection System Related**
Membranes	Pump
Back-up power generators	Pump Controls
Chemical Leak Detection Equipment	Pump Motors
Flow meters	Trash racks/bar screens
SCADA Systems	Sewer line rodding equipment
Distribution System Related	Air compressors
Residential and Small Commercial Meters	Vaults, lids, and access hatches
Meter boxes	Security devices and fencing
Hydrants & Blow offs	Alarms & Telemetry
Pressure reducing valves	Chemical Leak Detection Equipment
Cross connection control devices	
Altitude valves	
Alarms & Telemetry	
Vaults, lids, and access hatches	
Security devices and fencing	
Storage reservoir painting/patching	