SOUTH TAHOE PUBLIC UTILITY DISTRICT

Recycled Water Strategic Plan

October 2024

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The Purpose

The objective of the South Tahoe Public Utility District (District or STPUD) Recycled Water Strategic Plan (Plan) is to develop a 50-year strategy for the District's recycled water. The District began exporting recycled water to Alpine County in 1967 to comply with state and federal laws such as the Porter-Cologne Act and Public Law 96-551. This requirement is unique to the Tahoe region and requires an enormous amount of energy to pump recycled water over mountain passes. Since export began, the District has continually improved the treatment plant and export infrastructure. However, the overall intent and function of the system—providing recycled water for irrigation in Alpine County—has not changed in the past 50+ years.

There have been significant advances in and acceptances of water reuse over the last 50 years. As such, the purpose of the Plan is to re-evaluate current operations and practices to identify the best ways to process and use recycled water in the future. The evaluation includes both existing recycled water practices and potential alternative recycled water practices and points of use that may be implemented in the future. These alternatives would be triggered for implementation by existing or future drivers, constraints, or opportunities.

Benefits of the Existing System

Decades of planning and improvements have resulted in a system that:

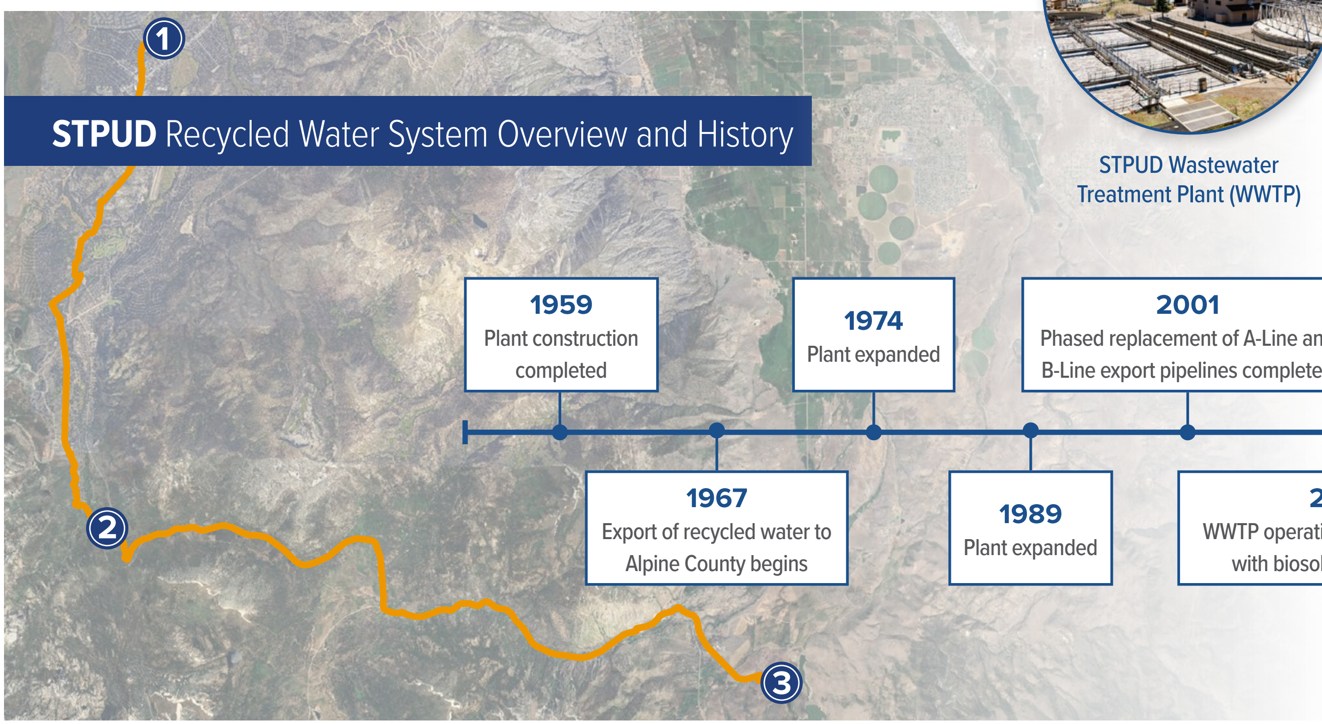
- COMPLIES WITH ALL LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS
- REUSES 100 PERCENT OF WASTEWATER FROM THE DISTRICT'S SERVICE AREA
- RECYCLES 100 PERCENT OF THE BIOSOLIDS PRODUCED IN THE TREATMENT PROCESS

STPUD Wastewater Treatment Plant (WWTP)

Luther Pass Pump Station

Harvey Place Reservoir and Recycled Water Distribution System

STPUD Recycled Water System Overview and History

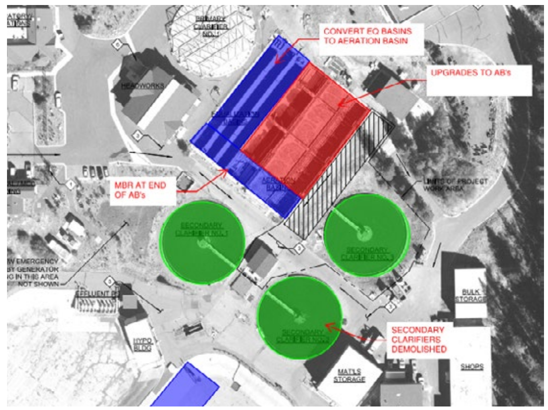


- **1959** Plant construction completed
- **1967** Export of recycled water to Alpine County begins
- **1974** Plant expanded
- **1989** Plant expanded
- **2001** Phased replacement of A-Line and B-Line export pipelines completed
- **2004** WWTP operations 100% recycled with biosolids composting
- **2012** New headworks building
- **2017** Luther Pass Pump Station improvements
- **2024** Completed secondary clarifier upgrades

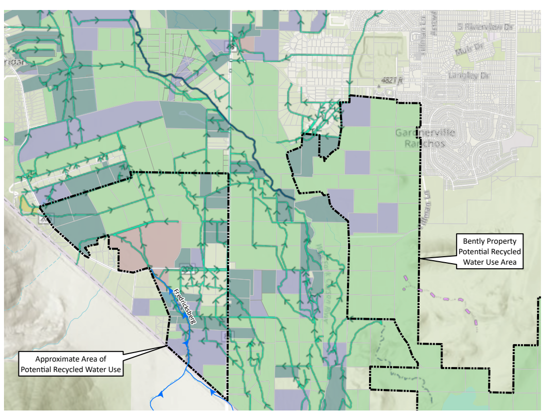
The Process

Looking forward 50 years requires not only detailed technical and regulatory analysis, but also careful coordination with the public, affected agencies, native tribes, and other stakeholders. The District followed the process shown at right to “filter” options down to the most feasible suite of alternatives for inclusion in the Plan. Throughout the process, detailed analysis and stakeholder advisory group (SAG) outreach informed the development of the Plan.

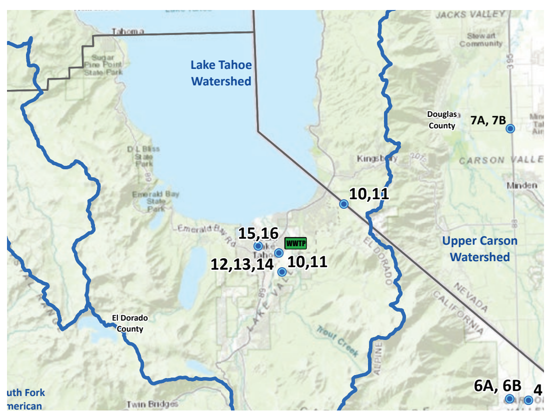
Public Outreach and Stakeholder Workshops
Photo: SAG and Public Meeting, May 2023



Treatment Analysis
Image: Conceptual STPUD WWTP layout for nutrient removal and higher water quality



End-Use Analysis
Image: Potential additional recycled water users in Nevada



Legal and Regulatory Analysis
Image: Locations of some of the initial 16 alternatives analyzed for legal and regulatory feasibility

Plan Development Process Summary

Identified existing and future regulatory constraints/opportunities

Brainstormed wide range of alternatives

Identified the most feasible suite of options through screening process

Additional detail on the suite of alternatives

Multi-criteria ranking of alternatives

The End Result

- ☑ Decision diagram to support consideration of the alternatives based on changing conditions
- ☑ Process for using these tools (evaluation and decision diagram) into the future (iterative)

The Path Forward

A plan is only as good as its implementation strategy. The District analyzed and ranked nine alternatives, the first of which represents the "status quo" approach. The other eight represent a variety of improvements to the treatment process, different uses of recycled water, and connections to other recycled water customers. Over the next 50 years, the District will follow a trigger-based decision diagram to periodically re-evaluate and implement the most beneficial and cost-effective alternative(s) based on both opportunities and constraints that arise.

Decision-making for the next 50 years. As shown in detail on page 48 and in Appendix C, a Decision Diagram will aid the District in evaluating all the feasible alternatives. This diagram, along with the multi-criteria decision analysis process, can be used to make decisions and score alternatives at a future date.

Alternative 1: Status Quo

If Rancher contracts are renewed in 2028 and recycled water demand continues to account for all the District's recycled water, a status quo or "no project" alternative would continue to benefit both the District and its customers.

Alternatives 2-7A: A Suite of Solutions

If Rancher contracts are **not** renewed, the District's evaluation of additional alternatives showed that Alternative 2 was the most feasible and beneficial based on current knowledge. The other alternatives evaluated are all feasible and can be re-ranked as the economic, regulatory, and water demand conditions continue to evolve.

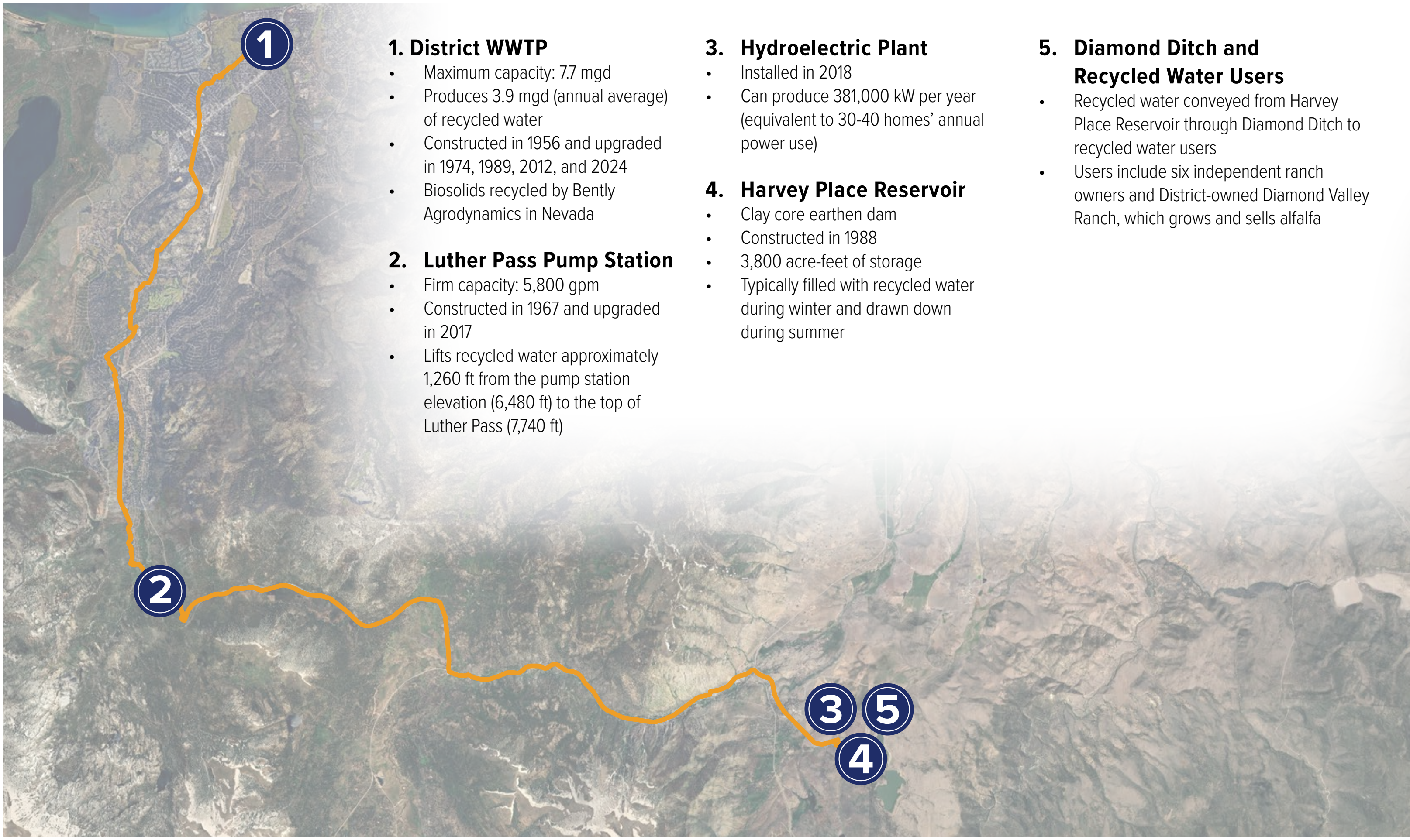
Existing System

The District's existing wastewater treatment plant (WWTP) processes an annual average of 3.9 million gallons per day (mgd), or 4,370 acre-feet per year (AFY) of treated effluent. The treated effluent meets CA Title 22 regulations for disinfected secondary-23 recycled water. The recycled water is exported out of the Lake Tahoe Watershed and into Harvey Place Reservoir, which is within the Carson River Watershed. Recycled water is stored in Harvey Place Reservoir and used in the summer months for irrigation supply. The end uses of recycled water include:

- Irrigation of hay and alfalfa on the District's Diamond Valley Ranch (DVR) property.
- Irrigation supply for contract irrigators (Ranchers) in Alpine County.

Export Pipeline Route

The export pipeline is approximately 27 miles of cement mortar lined and coal tar epoxy-coated steel pipe. It was constructed in the late 1960s, and major segment replacements were completed in the late 1990s and early 2000s.



1. District WWTP

- Maximum capacity: 7.7 mgd
- Produces 3.9 mgd (annual average) of recycled water
- Constructed in 1956 and upgraded in 1974, 1989, 2012, and 2024
- Biosolids recycled by Bently Agrodynamics in Nevada

2. Luther Pass Pump Station

- Firm capacity: 5,800 gpm
- Constructed in 1967 and upgraded in 2017
- Lifts recycled water approximately 1,260 ft from the pump station elevation (6,480 ft) to the top of Luther Pass (7,740 ft)

3. Hydroelectric Plant

- Installed in 2018
- Can produce 381,000 kW per year (equivalent to 30-40 homes' annual power use)

4. Harvey Place Reservoir

- Clay core earthen dam
- Constructed in 1988
- 3,800 acre-feet of storage
- Typically filled with recycled water during winter and drawn down during summer

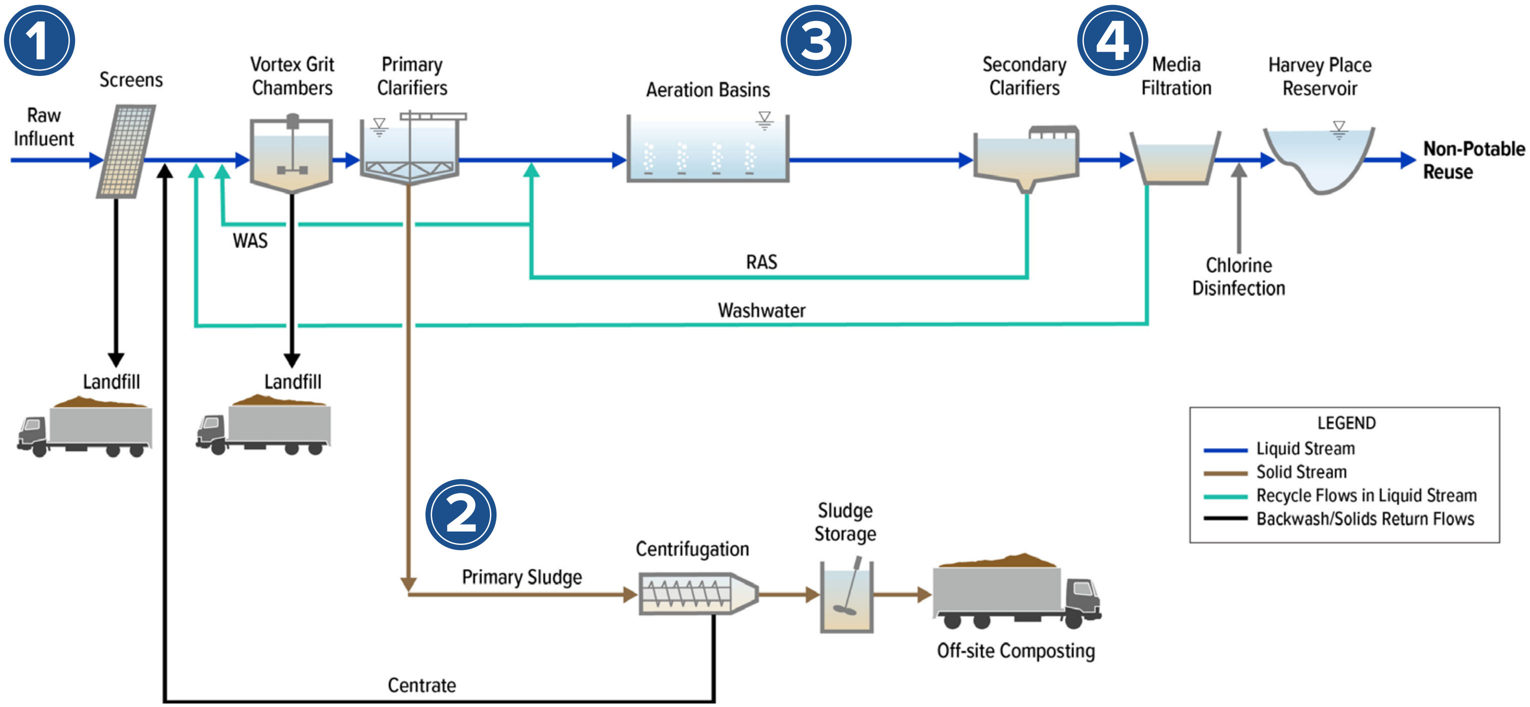
5. Diamond Ditch and Recycled Water Users

- Recycled water conveyed from Harvey Place Reservoir through Diamond Ditch to recycled water users
- Users include six independent ranch owners and District-owned Diamond Valley Ranch, which grows and sells alfalfa

Wastewater Treatment Plant

The District's WWTP is a 7.7 mgd maximum daily flow advanced secondary treatment facility. It produces a daily average of 3.9 mgd (4,370 AFY) of treated effluent, which meets the California Title 22 regulations for disinfected secondary-23 recycled water. All of the WWTP's effluent is exported out of the Lake Tahoe Watershed, as required by the Porter-Cologne Act of 1969. All of the facility's biosolids are recycled as fertilizer for agricultural land at Bently Agrodynamics in Douglas County, Nevada.

STPUD WWTP Process Flow Diagram



1. Large objects like wood and rocks, as well as smaller solid particles like sand and gravel, are removed and sent to a landfill.
2. Primary sludge, or biosolids, consists of organic and inorganic matter, which is settled out in primary clarifiers and sent off-site to be used as fertilizer.
3. Remaining contaminants are broken down into harmless by-products by bacteria in the aeration basins.
4. Excess bacteria is removed in secondary clarifiers and filter media. The effluent is then disinfected with chlorine and exported out of the Lake Tahoe Watershed.

WWTP Design Parameters, Performance, and Flows

The WWTP currently treats an average daily flow of 3.9 mgd (4,370 AFY), and the estimated future flow is 5.4 mgd (6,050 AFY). The recycled water demand and treatment plant upgrades associated with the alternatives are based on the future flow.

The disinfected secondary-23 effluent produced by the WWTP is the second of four levels of non-potable reuse per California regulations. Disinfected secondary-23 is approved for use in some landscape irrigation applications, as well as non-recreational landscape impoundment and application to pastures used by milking animals.

Treating the recycled water to a higher standard would allow additional approved uses, including irrigation of food crops. Several of the alternatives considered in this Plan require treatment upgrades to meet higher levels of recycled water in California or Nevada. The existing effluent water quality provides a baseline for evaluating treatment processes to meet more stringent limitations associated with some alternatives.

Summary of WWTP Effluent Water Quality

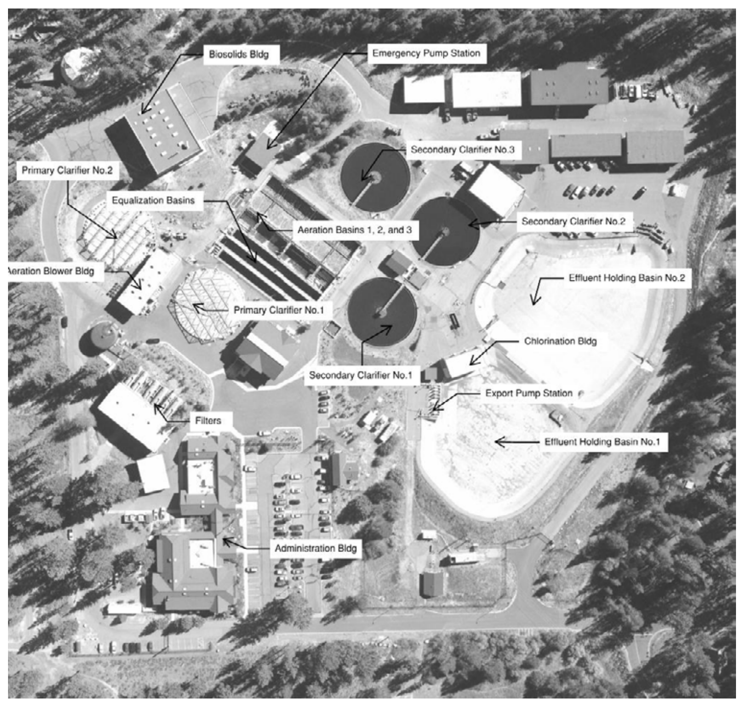
Parameter	Units	Average Value (Based on 2019 to 2020 Data)
Total Dissolved Solids	mg/L	269
Electrical Conductivity	µS/cm	647
Chloride	mg/L	58
Total Nitrogen	mg/L	30
Ammonia	mg/L - N	29
Nitrate	mg/L - N	0.29
Total Phosphorus	mg/L	3.6

California Title 22 Treatment Levels

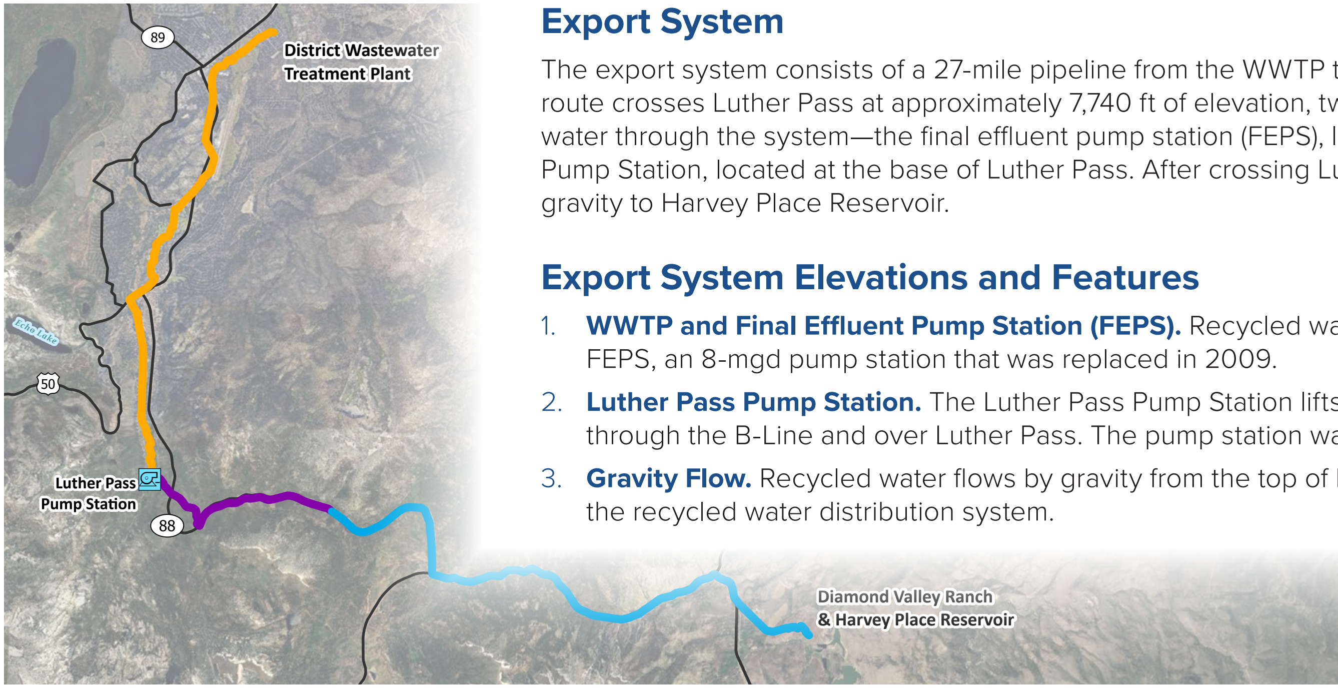
Treatment Level	Approved Uses
Title 22 Disinfected Tertiary Recycled Water	▪ Spray Irrigation of Food Crops ▪ Landscape Irrigation[1] ▪ Non-restricted Recreational Impoundment
Title 22 Disinfected Secondary – 2.2 Recycled Water	▪ Surface Irrigation of Food Crops ▪ Restricted Recreational Impoundment
CURRENT DISTRICT TREATMENT LEVEL	
Title 22 Disinfected Secondary – 23 Recycled Water	▪ **Pasture for Milking Animals** ▪ **Landscape Irrigation[2]** ▪ **Landscape Impoundment**
Undisinfected Secondary Recycled Water	▪ Surface Irrigation of Orchards and Vineyards[3] ▪ Fodder, Fiber, Seed Crops

Notes:

1. Includes unrestricted access golf courses, parks, playgrounds, school yards, and other landscaped areas with similar access.
2. Includes restricted access golf courses, cemeteries, freeway landscapes, and landscapes with similar public access.
3. Provided no fruit is harvested that has come in contact with irrigating water or the ground.



Existing WWTP Layout

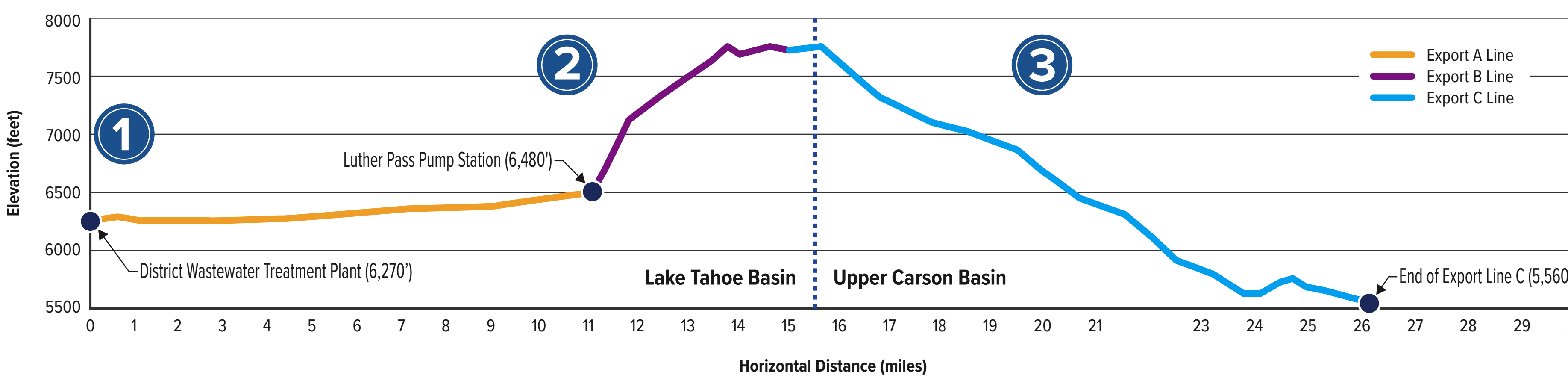


Export System

The export system consists of a 27-mile pipeline from the WWTP to Harvey Place Reservoir. Because the route crosses Luther Pass at approximately 7,740 ft of elevation, two pump stations are required to lift recycled water through the system—the final effluent pump station (FEPS), located at the WWTP, and the Luther Pass Pump Station, located at the base of Luther Pass. After crossing Luther Pass, the recycled water flows by gravity to Harvey Place Reservoir.

Export System Elevations and Features

1. **WWTP and Final Effluent Pump Station (FEPS).** Recycled water is pumped through the A-Line by the FEPS, an 8-mgd pump station that was replaced in 2009.
2. **Luther Pass Pump Station.** The Luther Pass Pump Station lifts recycled water approximately 1,260 ft through the B-Line and over Luther Pass. The pump station was most recently upgraded in 2017.
3. **Gravity Flow.** Recycled water flows by gravity from the top of Luther Pass to Harvey Place Reservoir and the recycled water distribution system.



A-Line

- 10.5 miles
- 30-inch diameter
- Replaced between 1996 and 2000

B-Line

- 4.9 miles
- 24-inch diameter
- Majority replaced in 2001

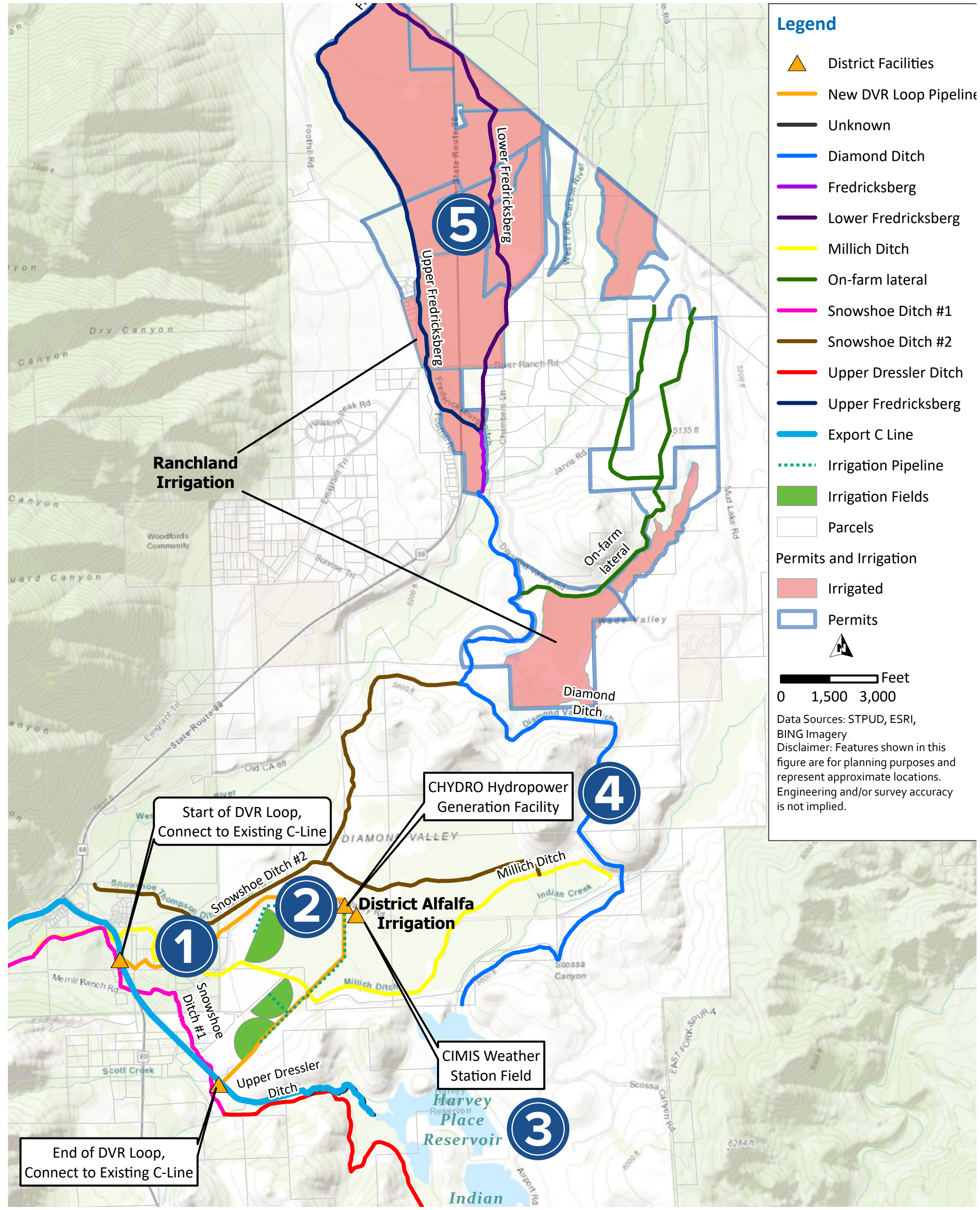
C-Line

- 12 miles
- 18-inch and 21-inch diameter
- Constructed in 1968

Recycled Water Facilities

The export system C-Line ends in the Upper Carson Watershed in Alpine County, California. At the end of the C-Line, recycled water is distributed to District-owned alfalfa fields and privately owned ranchland via the distribution systems described below.

1. **Diamond Valley Ranch Loop.** The District owns the 1,400-acre Diamond Valley Ranch property and uses a portion of the site to grow and sell alfalfa. The alfalfa is irrigated by recycled water from the Diamond Valley Ranch Loop, a pipeline that connects directly to the C-Line.
2. **Hydropower Facility.** The District's CYHDRO facility is located on the Diamond Valley Ranch Loop and generates 381,000 kW per year, which the District sells back to the electric grid.
3. **Harvey Place Reservoir.** The export system ends at Harvey Place Reservoir, a clay core, earthen dam constructed in 1988. The reservoir is typically filled during winter months and drawn down during summer months to supply water to recycled water users via Diamond Ditch.
4. **Diamond Ditch.** Diamond Ditch is used to convey recycled water from Harvey Place Reservoir to ranchland irrigators. It consists of open channels, a section of pipeline, and a double-barrel inverted siphon where it crosses Diamond Valley Road and Indian Creek. Choke points currently limit the capacity of Diamond Ditch to 11 mgd.
5. **Ranchland Irrigation.** Several irrigation laterals distribute water from Diamond Ditch to recycled water application areas on privately owned ranchland. This recycled water use is governed by individual contracts the District has signed with landowners, as well as permits obtained by landowners with the Lahontan Regional Water Quality Control Board. The recycled water is permitted for irrigation of fodder, fiber, and seed crops, as well as pasture irrigation for animals.



Recycled Water System Photos

STPUD Wastewater Treatment Plant

Luther Pass Pump Station

Harvey Place Reservoir Area

Rancher Irrigation Canal

District Alfalfa Fields

Recycled Water Distribution Infrastructure

Existing System Regulations

The District's existing system is subject to regulatory requirements associated with the treatment and reuse of domestic sewage. In addition, the District must comply with laws and contractual agreements associated with the end uses of recycled water in Alpine County. There are several laws, regulations, and agreements that have directly or indirectly influenced the configuration and operation of the existing treatment and export system. These are summarized below.

Agency	Statute / Regulation / Agreement	Description	Appendix A Section Reference
State of California	Porter-Cologne Act	▪ Required for export of effluent outside the Lake Tahoe Basin.	III.B.1.A IV.A.1
Tahoe Regional Planning Agency	Tahoe Regional Planning Agency Code of Ordinances Chapter 60, and Tahoe Regional Planning Agency Regional Plan	▪ Prohibitions on the discharge of effluent (surface waters, groundwater, and land) in the Lake Tahoe Basin.	IV.A.2.a,b,c
Lahontan Regional Water Quality Control Board	Water Quality Control Plan	▪ Basis for the Lahontan Regional Water Quality Control Board regulatory program. Requires export of wastewater from the Lake Tahoe Watershed.	III.B.1.A
Lahontan Regional Water Quality Control Board	Waste Discharge Requirements and Water Reclamation Requirements	▪ Specifies that the effluent must meet disinfected secondary-23 standards, per California Code of Regulations Title 22, Section 60301.225. ▪ Specifies District effluent disposal locations and use of recycled water for irrigation on District-owned property. ▪ Specifies non-District water recycling permit holders (total of six), approximate use of recycled water, and acreage of irrigated area.	IV.B.1.a
Federal, States of California and Nevada	Public Law 101-618, Truckee-Carson-Pyramid Lake Water Rights Settlement Act, California-Nevada Interstate Compact	▪ Governs the allocation of water rights between California and Nevada.	IV.A.4
States of California and Nevada	Alpine Decree	▪ Adjudicated water rights on the California and Nevada portions of the Carson River.	IV.A.4
State Water Resources Control Board	Title 22 Code of Regulations	▪ Approved recycled water uses and associated treatment requirements.	III.B.1.b
Ranchers in Alpine County	Recycled Water Use Contracts	▪ Contracts with individual Ranchers describing type of use and quantity of recycled water.	IV.B.4

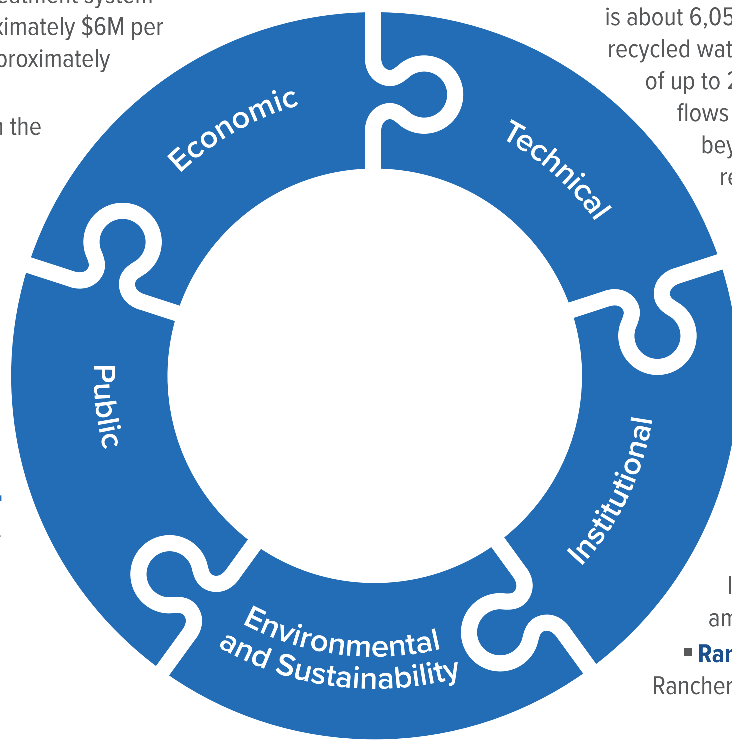
Existing System Challenges

The existing system has served the District well for decades. The system complies with all local, state, and federal regulations, and it recycles 100 percent of the District's wastewater and biosolids. The drivers for this Plan and for considering alternatives to the existing system stem from a handful of challenges associated with the existing system, which are summarized below.

Notes: Abbreviations: M - million; MWh - megawatt hours; O&M - operations and maintenance.

- **Annual O&M** – Annual O&M cost for the wastewater treatment system (collection, treatment, export, recycled water) is approximately $6M per year. Annual cost for energy for export accounts for approximately $1.2M per year of the total annual O&M cost.
- **Revenue** – The District generates limited revenue from the sale of hay and alfalfa.
  - » The District does not generate any revenue from the recycled water provided to the Ranchers. This is based on existing agreements between the District and the Ranchers, where a fee for recycled water is not included.

- **Cost of Service** – General public concern with the cost of service to treat and export effluent out of the Lake Tahoe Watershed.



- **Aging Infrastructure** – Continued operation of the existing WWTP, export system, and recycled water system will require continued investment for repair and replacement to maintain District established level of service.
- **Recycled Water Use Capacity** – The total recycled water use capacity is about 6,050 AFY. This is the combination of maximum delivery of recycled water to the Ranchers of 5,800 AFY, and an approximate use of up to 250 AFY by the District in DVR. Projected future effluent flows are 5.4 mgd (6,050 AFY). If future effluent flows increase beyond 6,050 AFY, then there would be no available buffer of recycled water end use capacity.

- **Agreement with Alpine County** – There is ongoing legal action over the provisions of 1967 Agreement (and amendments) between the District and Alpine County.
- **Rancher Contracts** – The agreements between the District and Ranchers will expire in 2028.

- **Energy Consumption** – The annual energy demand for the export system is 6,680 MWh.
- **Alternative Approaches** – Internal and external stakeholders have provided input on potential alternatives approaches to recycled water treatment and use.

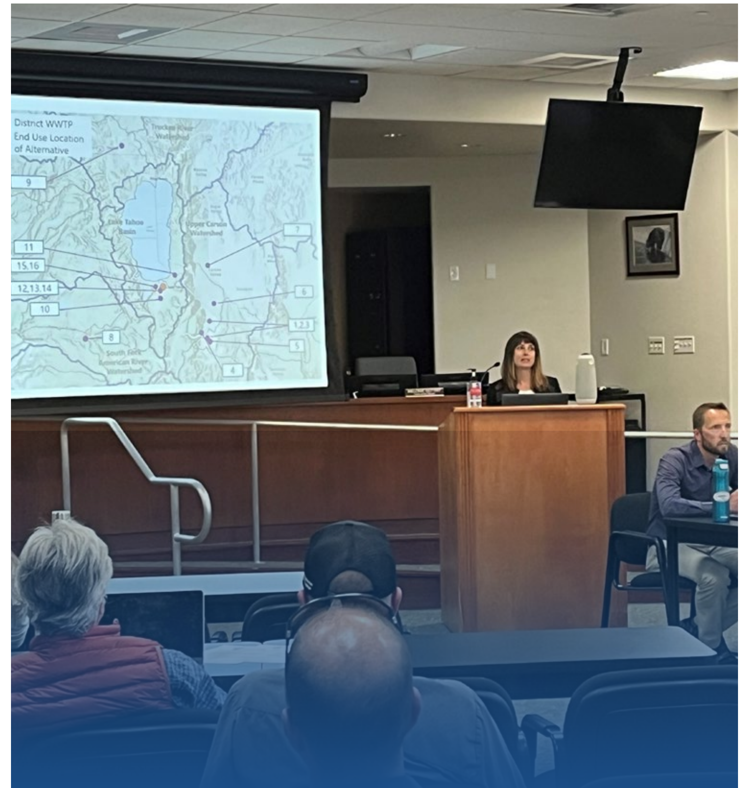
Public Outreach

The District conducted public outreach as part of the Plan activities, milestones, and decision points. The objectives of that outreach were:

- Build trust and confidence in the District and its departments as a provider of high quality, safe, and reliable recycled water.
- Achieve public understanding of recycled water.
- Explain the District's efficiency in handling recycled water and utilizing ratepayers' funds to find solutions.
- Receive stakeholder and public feedback.
- Be inclusive and transparent in sharing information through stakeholder and public workshops and posting information on the project webpage.

To facilitate inclusivity and transparency, the District formed a Stakeholder Advisory Group (SAG) and held 17 meetings between 2022 and 2024 with SAG members, additional stakeholders, and the public to gather feedback. SAG members included:

- Alpine Watershed Group.
- California Tahoe Conservancy.
- Carson Water Subconservancy District (CWSD).
- City of South Lake Tahoe.
- Douglas County Lake Tahoe Sewer Authority (DCLTSA).
- El Dorado County.
- Incline Village General Improvement District.
- Lahontan Regional Water Quality Control Board (LRWQCB).
- League to Save Lake Tahoe.
- Lukins Brothers (also representing Tahoe Keys Water).
- Nevada Division of Environmental Protection (NDEP).
- Nevada Division of Water Resources (NDWR).
- Sierra-at-Tahoe.
- Sierra Nevada Alliance.
- Tahoe Environmental Research Center.
- Tahoe Regional Planning Agency (TRPA).
- Tahoe Resource Conservation District.
- Tahoe Water Suppliers Association.
- United States Forest Service (USFS).
- Washoe Tribe of Nevada and California (Washoe Tribe).



Outreach activities included public meetings/workshops, FAQs, social media posts, a project webpage, and one-on-one communications. These activities yielded valuable feedback, which was incorporated into the Plan. For example, outreach activities resulted in two significant additions to the Plan:

1. Alternatives 6C and 6D, both related to reuse in Nevada, were added to the Plan and evaluated.
2. The District created a process to incorporate other alternatives in the future, even if they were screened out for the current Plan. These other alternatives would be in response to changing conditions, technologies, or triggers.

Identification and Screening of Alternatives

Identification

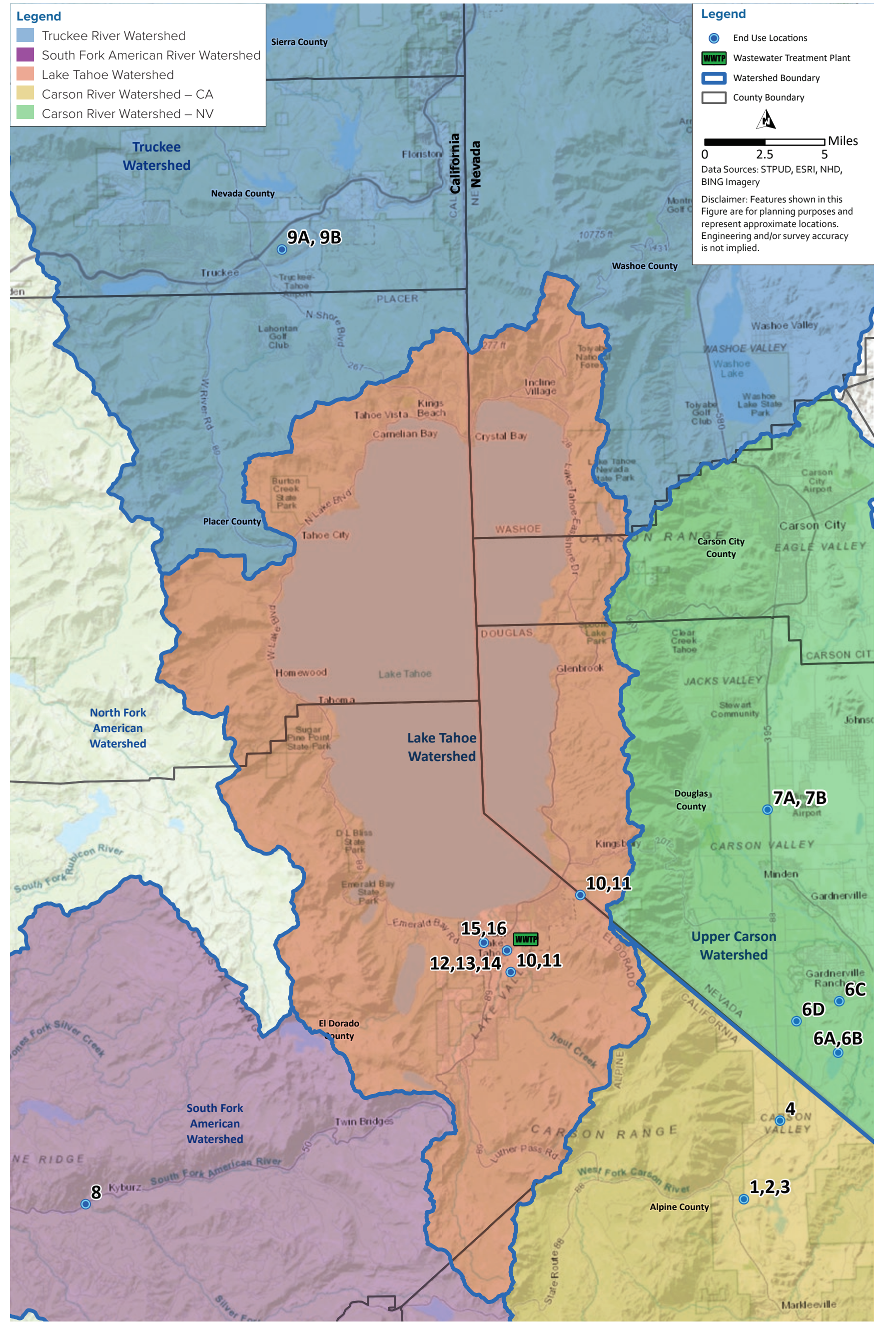
The alternatives identification and screening analysis was conducted by the District's project team. In addition, throughout the process, the District engaged the SAG and the general public to provide information and to solicit feedback. Sixteen alternatives (some with sub-alternatives) were initially developed. The alternatives are shown on the map at right and include a range of recycled water discharge and end use locations. The recycled water end use locations are in California and Nevada, and within four watersheds.

Screening Approach

The alternatives screening analysis consisted of a high-level, relative comparison of the justification/benefits and key issues/challenges of each alternative. The qualitative assessment was based on six screening criteria.

1. **Technical:** Pertaining to the technical challenges with implementing and operating treatment processes and infrastructure.
2. **Watershed and Regional Regulatory and Legal:** Regulatory and legal issues associated with the broader watershed/State location of the discharge and end use of recycled water.
3. **Alternative Specific Regulatory and Institutional:** Related to the specific regulatory and institutional requirements for an alternative based on the specific discharge location, end use location, and end use type.
4. **Environment and Sustainability:** Pertaining to environmental impacts of construction and operation, as well as sustainability issues with a specific focus on energy demands.
5. **Economic:** Qualitative assessment of capital and O&M costs associated with treatment and infrastructure.
6. **Public Acceptance:** Pertaining to general concerns the public may have about any of the topics listed above and others.

Initial Sixteen Alternatives



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Identified Alternatives

Alt. No.	Name	Description
2	Expanded Disinfected Secondary-23 Delivery in Alpine County	Transmission over Luther Pass to Harvey Place Reservoir. Existing treatment would allow use for irrigation of landscape or pastureland. This alternative would serve new users or expand use with additional District facilities.
3	Expanded Disinfected Tertiary Reuse in Alpine County	Transmission over Luther Pass to Harvey Place Reservoir. Additional treatment would allow use for landscape and agricultural irrigation. This alternative would serve new users or expand use with additional District facilities.
4	Discharge to West Fork of Carson River and Use in Nevada	Transmission over Luther Pass to Harvey Place Reservoir with new discharge piping to the West Fork Carson River in California. Additional treatment would allow water to travel in the river to Nevada for potential utilization by downstream users.
5	Groundwater Recharge for Disposal in Alpine County	Transmission over Luther Pass to inject effluent into the Carson Valley Groundwater Basin in Alpine County. This alternative is a disposal mechanism and there is not technically an end use associated with it. Additional treatment of water would be required.
6A	Expanded Class A or B Reuse in Nevada via Indian Creek	Transmission over Luther Pass to Harvey Place Reservoir to Indian Creek. Additional treatment would allow transmission to Nevada via Indian Creek for potential utilization by downstream users.
6B	Expanded Class A or B Reuse in Nevada via Pipeline Conveyance	Transmission over Luther Pass to Harvey Place Reservoir, then to Mud Lake. From Mud Lake, transmission to Nevada via a new transmission pipeline for potential utilization by downstream users. Additional treatment of water would be required.
7A	Treated Effluent Conveyance to DCLTSA	Transfer of treated wastewater to DCLTSA. DCLTSA has existing effluent piping to land-applied irrigation sites and reservoir storage. Additional treatment of water would be required.
7B	Raw or Partially Treated Effluent to DCLTSA	Transfer of raw or partially treated wastewater to DCLTSA. Water would be treated at the DCLTSA WWTP and sent via their existing effluent piping to land applied irrigation sites and reservoir storage.
8A	Recycled Water for Irrigation in South Fork American River Watershed	Transmission to recycled water users in the South Fork American River watershed, via a new conveyance pipeline. Additional treatment of water would be required.
8B	Discharge to South Fork American River	Transmission to South Fork American River via a new conveyance pipeline. Water could potentially be utilized by downstream users. Additional treatment of water would be required.
9A	Treated Effluent Conveyance to T-TSA	Transfer of treated wastewater to T-TSA. Water would ultimately be discharged into the Truckee River for potential downstream use. Additional treatment of water would be required.
9B	Raw or Partially Treated Effluent Conveyance to T-TSA	Transfer of raw or partially treated wastewater to T-TSA. Water would be treated at the T-TSA WWTP and would ultimately be discharged into the Truckee River for potential downstream use.
10	Land Application (Landscape Irrigation) in Lake Tahoe Basin	Reuse in the Tahoe Basin for urban irrigation. Additional treatment of water would allow irrigation by major customers, including local parks and golf courses.
11	Land Application (Snowmaking) in Lake Tahoe Basin	Reuse in the Tahoe Basin for snowmaking at local ski resorts. Additional treatment of water would be required.
12	Discharge to Waters in Lake Tahoe Basin (Heavenly Valley Creek)	Transmission of treated water to Heavenly Valley Creek for potential utilization by downstream users. Additional treatment of water would be required.
13	Discharge to Waters in Lake Tahoe Basin (Trout Creek)	Transmission of treated water to Trout Creek for potential utilization by downstream users. Additional treatment of water would be required.
14	Discharge to Waters in Lake Tahoe Basin (Upper Truckee River)	Transmission of treated water to the Upper Truckee River for potential utilization by downstream users. Additional treatment of water would be required.
15	Indirect Potable Reuse (IPR) in Lake Tahoe Basin	Advanced treatment and injection into the Tahoe Valley South Groundwater Subbasin. Water would be reused as a source of drinking water supply for the existing domestic and municipal wells in the basin.
16	Direct Potable Reuse (DPR) in Lake Tahoe Basin	Advanced treatment for a DPR supply within the District water supply system.

Screening of the Alternatives

Screening was based on an assessment of the relative degree of challenge, on a relative scale of 1 to 4, where:

1 = low level of difficulty (green)

2 = moderate level of difficulty (yellow)

3 = moderately high level of difficulty (orange)

4 = high level of difficulty (red)

One of the most important criteria in the alternatives screening/evaluation process is the watershed/regional scale regulatory and legal constraints. As the location (i.e., watershed) of the end use of recycled water significantly influences the feasibility of implementation, this screening criteria was considered very important relative to the other criteria.

1. High
Key Issues include a requirement to modify the Porter-Cologne Act, a Basin Plan Amendment, and modification of TRPA Code of Ordinances.

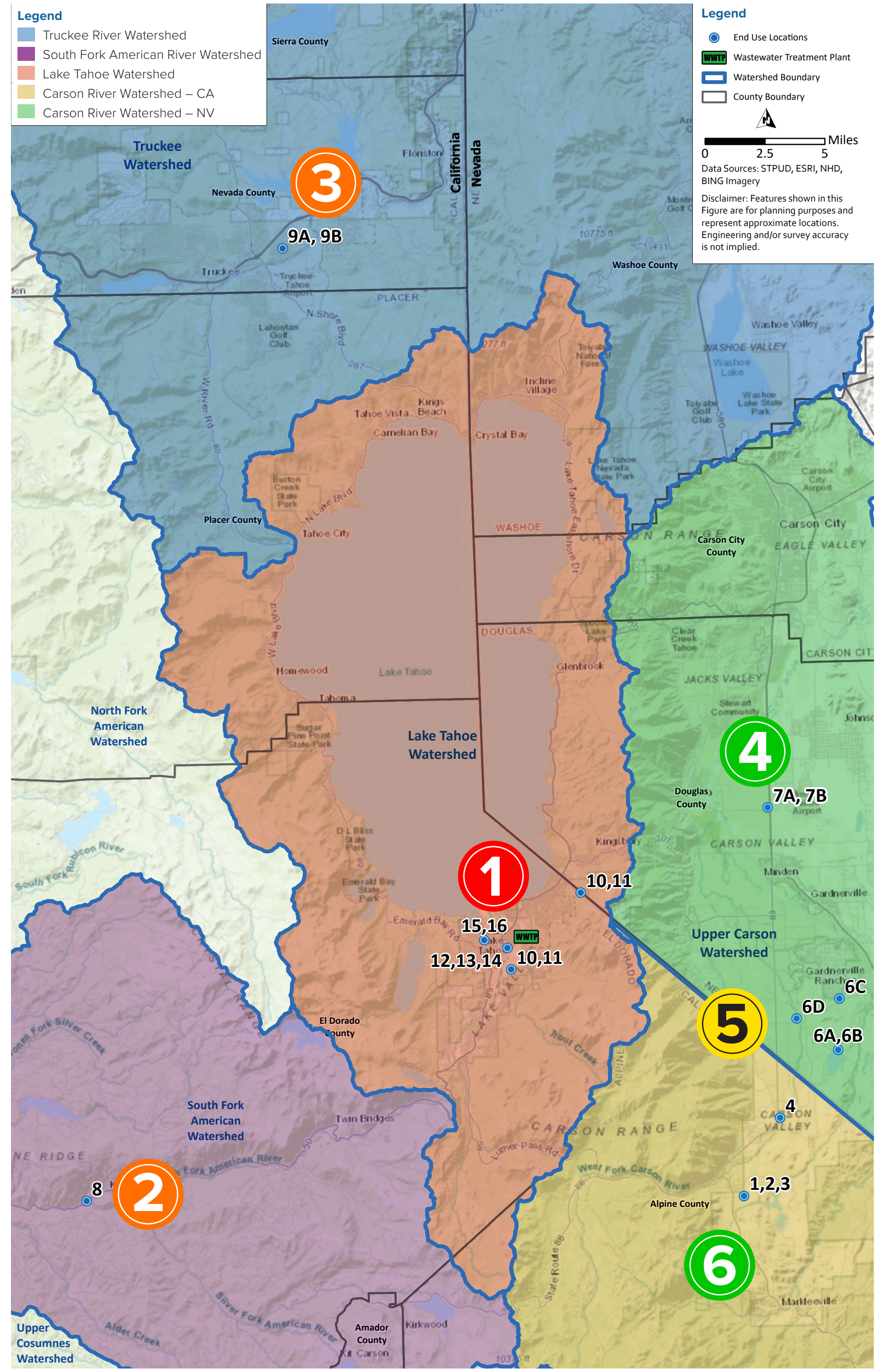
2. Moderately High
Key Issues include interstate water rights and agreements, stringent water quality objectives for the South Fork American River, and limitations on discharge locations.

3. Moderately High
Key Issues include interstate water rights and agreements, and stringent water quality objectives for the Truckee River.

4. Low
Key issues include interstate water rights and agreements.

5. Moderate
Key Issues include West Fork Carson River total maximum daily loads (TMDLs), and stringent water quality objectives.

6. Low
Key issues include ordinances and agreements associated with recycled water use in Alpine County.



Screening Results

The alternatives were screened by the District project team, with input from the SAG and the public. The qualitative screening was based on the potential benefit/justification of an alternative, along with the anticipated challenges and issues associated with implementing that alternative. Alternatives were screened into two general categories:

- **Low Potential Alternatives** – No significant additional evaluation of this alternative is included as part of the Plan.
- **High Potential Alternatives** – Additional evaluation of this alternative is included as part of the Plan.

		Level of Challenge								
No.	Alternative Name	Watershed and Regional Regulatory and Legal	Alternative-Specific Regulatory and Institutional	Technical-Treatment Level	Technical-Infrastructure (Conveyance and Treatment Facility Capacity)	Environmental/ Sustainability	Public Perception	Economic	Recycled Water Capacity Limitation	Included in Evaluation Phase (Y/N)
1	Existing System									Y
2	Expanded Disinfected Secondary-23 Delivery in Alpine County									Y
3	Expanded Disinfected Tertiary Reuse in Alpine County									Y
4	Discharge to West Fork of Carson River and Use in Nevada									Y
5	Groundwater Recharge for Disposal in Alpine County									N
6A	Expanded Class A or B Reuse in Nevada via Indian Creek									Y
6B	Expanded Class A or B Reuse in Nevada via Pipeline Conveyance									Y
7A	Treated Effluent Conveyance to DCLTSA									Y
7B	Raw or Partially Treated Effluent to DCLTSA									N
8A	Recycled Water for Irrigation in South Fork American River Watershed									N
8B	Discharge to South Fork American River									N
9A	Treated Effluent Conveyance to T-TSA									N
9B	Raw or Partially Treated Effluent Conveyance to T-TSA									N
10, 11	Landscape Irrigation and Snowmaking in Lake Tahoe Basin									N
12, 13, 14	Discharge to Waters in Lake Tahoe Basin									N
15	Indirect Potable Reuse in Lake Tahoe Basin									N
16	Direct Potable Reuse in Lake Tahoe Basin									N

Descriptions of High-Potential Alternatives

The alternatives screening process reduced the number of alternatives from the initial list of 16 to the six most feasible alternatives. A more detailed evaluation of the six alternatives was conducted. As part of that process, two additional alternatives were identified by the SAG for more detailed evaluation. The following pages include fact sheets for the eight alternatives, listed below.

Alternative 1: Existing System / “No Project”

Description

Alternative 1 is currently in use and is therefore considered the “No Project” alternative. The District’s existing system consists of primary and advanced secondary treatment of wastewater at the District Wastewater Treatment Plant (WWTP). The WWTP processes an annual average of 3.9 mgd of treated effluent. The treated effluent meets CA Title 22 regulations for disinfected secondary 23 recycled water (disinfected secondary-23). The recycled water is then exported out of the Lake Tahoe Watershed over Luther Pass through the export pipeline and discharged into Harvey Place Reservoir, which is in Alpine County and within the Carson River Watershed. Recycled water is stored in Harvey Place Reservoir and used in the summer months for irrigation supply.

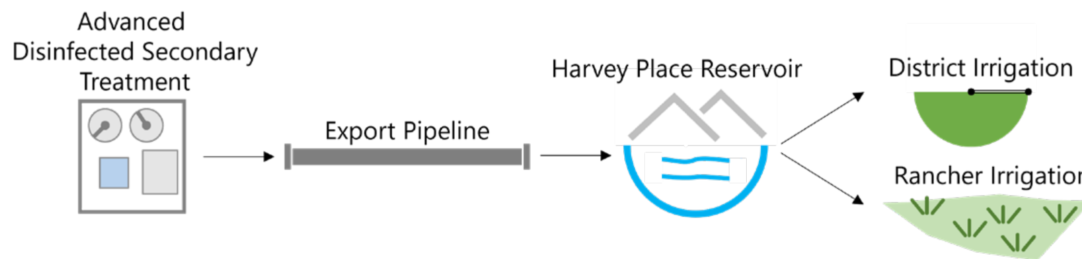
The end uses of recycled water include:

- Irrigation of hay and alfalfa on the District’s Diamond Valley Ranch (DVR) property.
- Irrigation supply for Ranchers in Alpine County.

Alternative 1 Potential Users

Users/Areas	Estimated Demand (AFY)
Diamond Valley Ranch (District-owned)	200
Six Privately Owned Ranches	5,800

Alternative 1 Schematic (Existing System)



Alternative 1 Costs

Component	Capital Costs ($M)	O&M Costs ($M/yr)[(1)]
Existing Treatment at WWTP	$0	$3.9
Export System	$0	$1.6
TOTAL COSTS	**$0**	**$5.5**

Notes:

1. These costs are based on the District’s current adopted FY 24/25 budget as well as energy costs associated with these facilities.

Triggers to Implement Alternative 1

The following triggers may give the District reason to continue implementing this alternative:

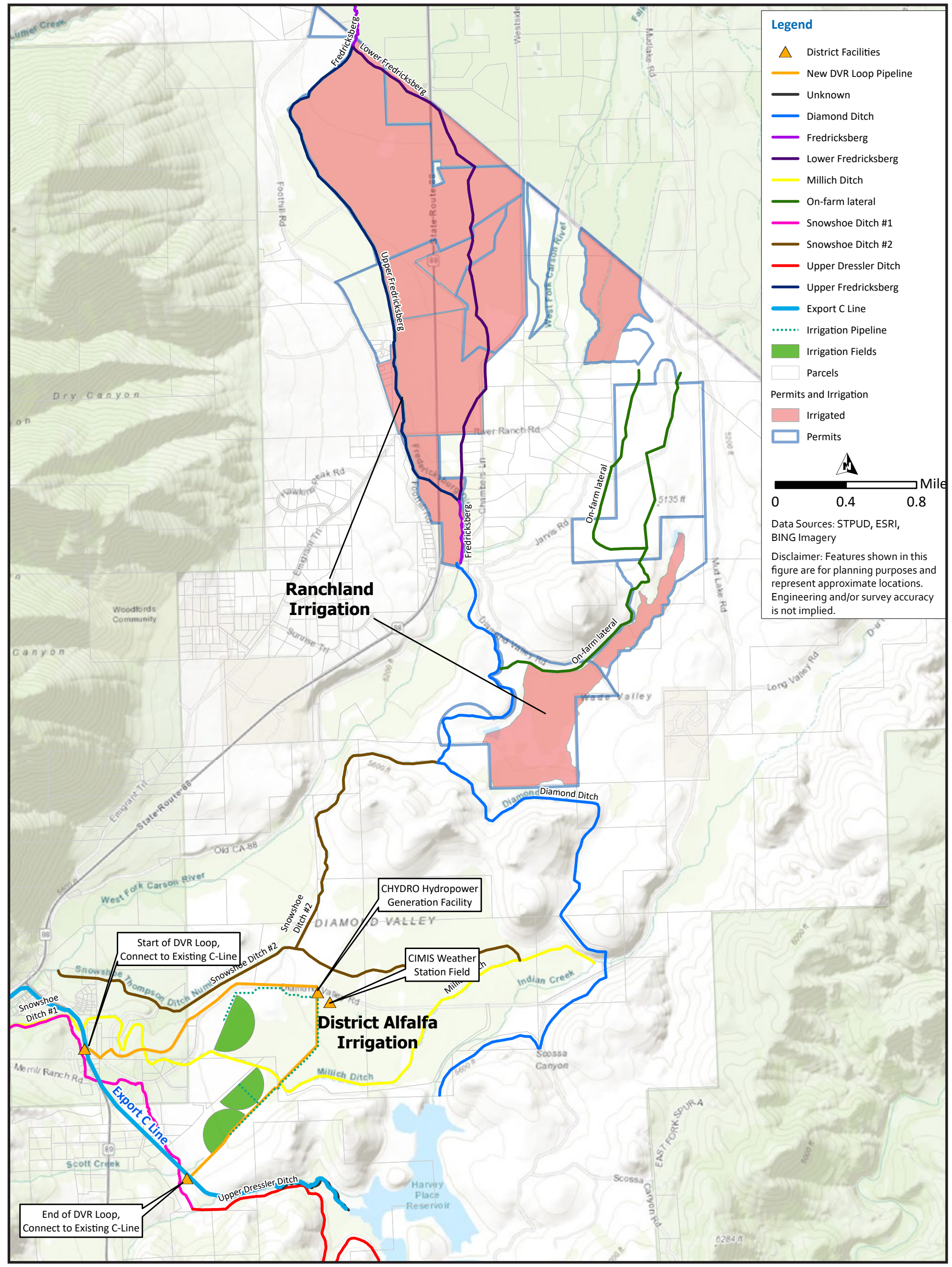
- Rancher contracts are renewed in 2028.
- Recycled water production does not exceed demands from Ranchers and District DVR irrigation.

Alternative 1 Export and End Use Infrastructure Key Components

Key components of this alternative include:

- Continued use and maintenance of export system, including potential investment in aging pipeline segments. The A-Line segment was replaced between 1996 and 2000, the B-Line segment was replaced between 1996 and 2005, and the C-Line segment has not been improved, although the District has found some deficiencies based on a 2012 condition assessment, which have not yet been addressed.
- Continued use and maintenance of the Harvey Place Reservoir, Diamond Ditch, and District irrigation infrastructure.

Alternative 1 Existing System Recycled Water End Use

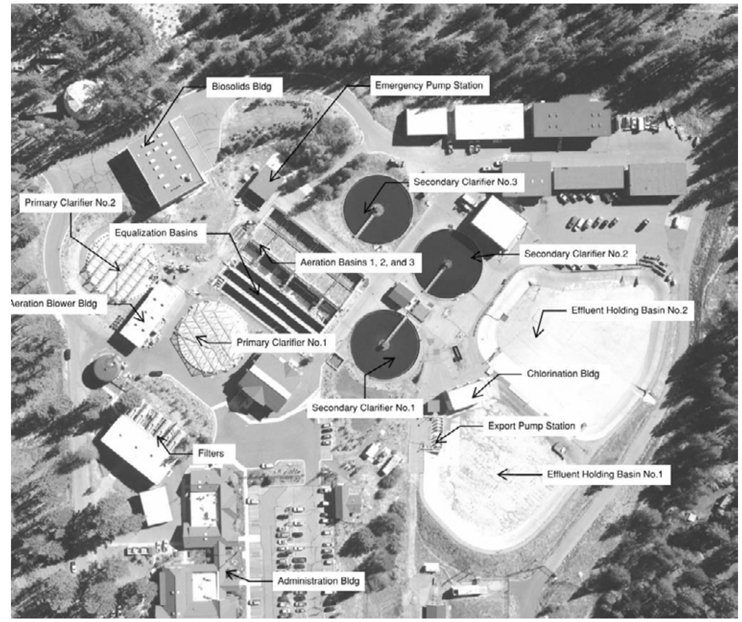


Alternative 1 Recycled Water Treatment Key Components

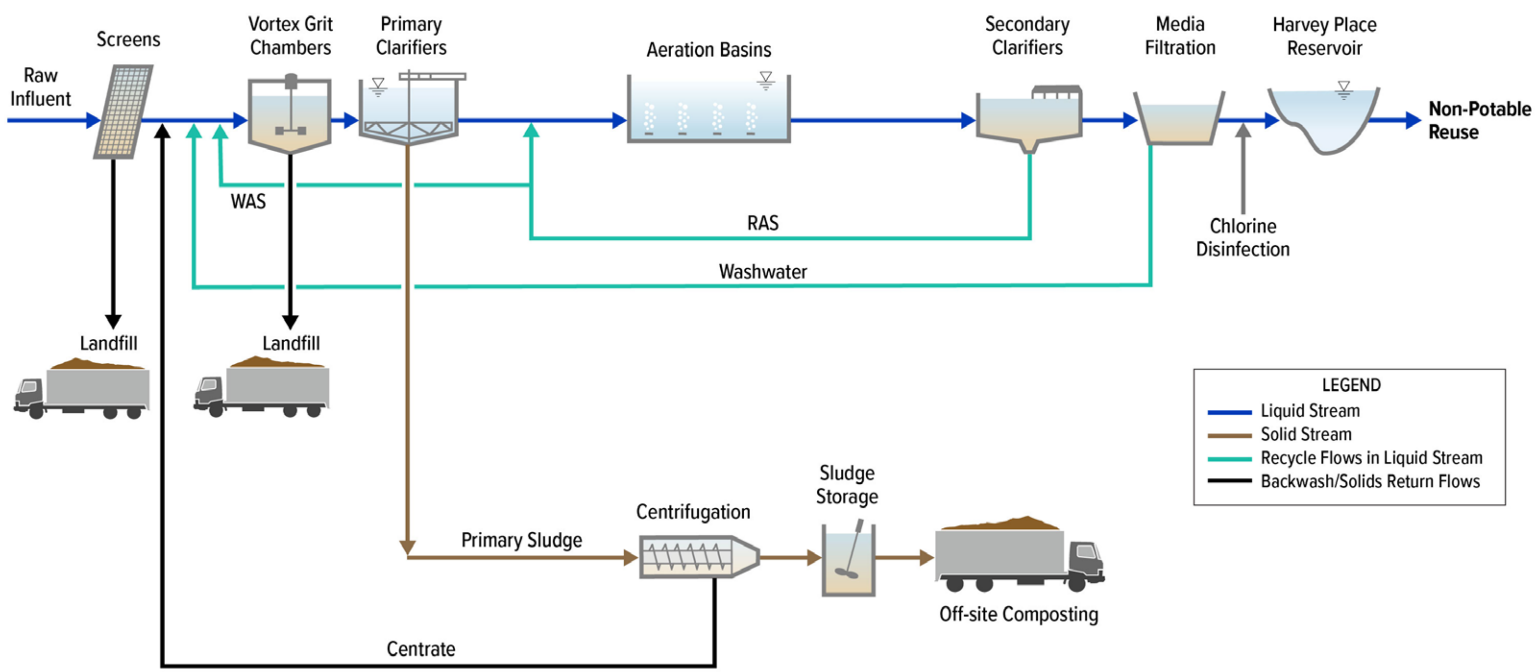
Key components of this alternative include:

- Continued use and maintenance of the existing WWTP in its current configuration.

Alternative 1 Recycled Water Treatment Layout (Existing)



Alternative 1 Recycled Water Treatment Process (Existing)



Alternative 2: Expanded Disinfected Secondary-23 Delivery in Alpine County

Description

Alternative 2 builds off the existing recycled water system with expanded reuse in Alpine County. Both the discharge and end uses of recycled water would be in the California portion of the Carson River Watershed. This alternative would involve providing disinfected secondary-23 to existing users, along with either providing recycled water to new users in the vicinity of the existing operations, and/or expanding recycled water use on District-owned properties. Disinfected secondary-23 is limited to the following approved uses:

- Pastureland for milking or non-milking animals.
- Restricted landscape irrigation.
- Landscape impoundment (i.e., water storage, not for recreational use).

Alternative 2 Potential Users

Users/Areas	Estimated Demand (AFY)
Four new privately owned users and additional District irrigation	3,774
Washoe Tribe	1,424(1)

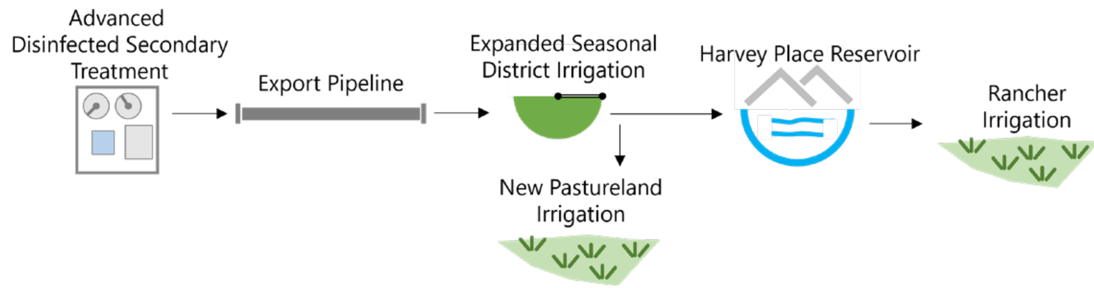
Notes:
1. Demand is theoretical. Amount of acreage that might be able to utilize recycled water is uncertain at this time.

Alternative 2 Costs

Component	Capital Costs(1) ($M)
New District irrigation fields at DVR	$13.6
Distribution pipelines	$4.2
TOTAL COSTS	**$17.8**

Notes:
1. Level 5 cost estimates are considered to be accurate within plus 50 percent to minus 30 percent.

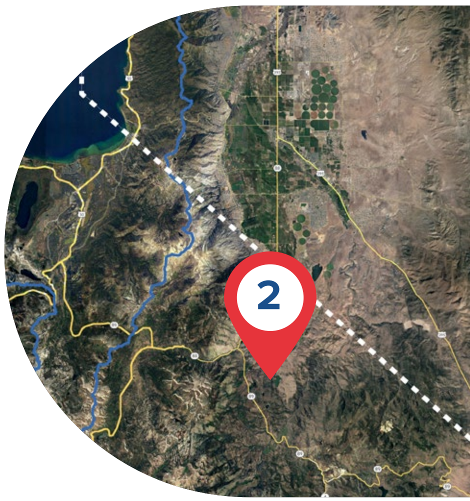
Alternative 2 Schematic



Triggers to Implement Alternative 2

The following triggers may give the District reason to implement this alternative:

- Recycled water production exceeds existing demands from Ranchers and District DVR irrigation.
- The District expands irrigation operations at DVR to increase revenue or for another reason.
- The District wishes to generate revenue by selling disinfected secondary-23 water.
- The District desires additional flexibility and capacity for recycled water uses.
- New users for disinfected secondary-23 water are identified.



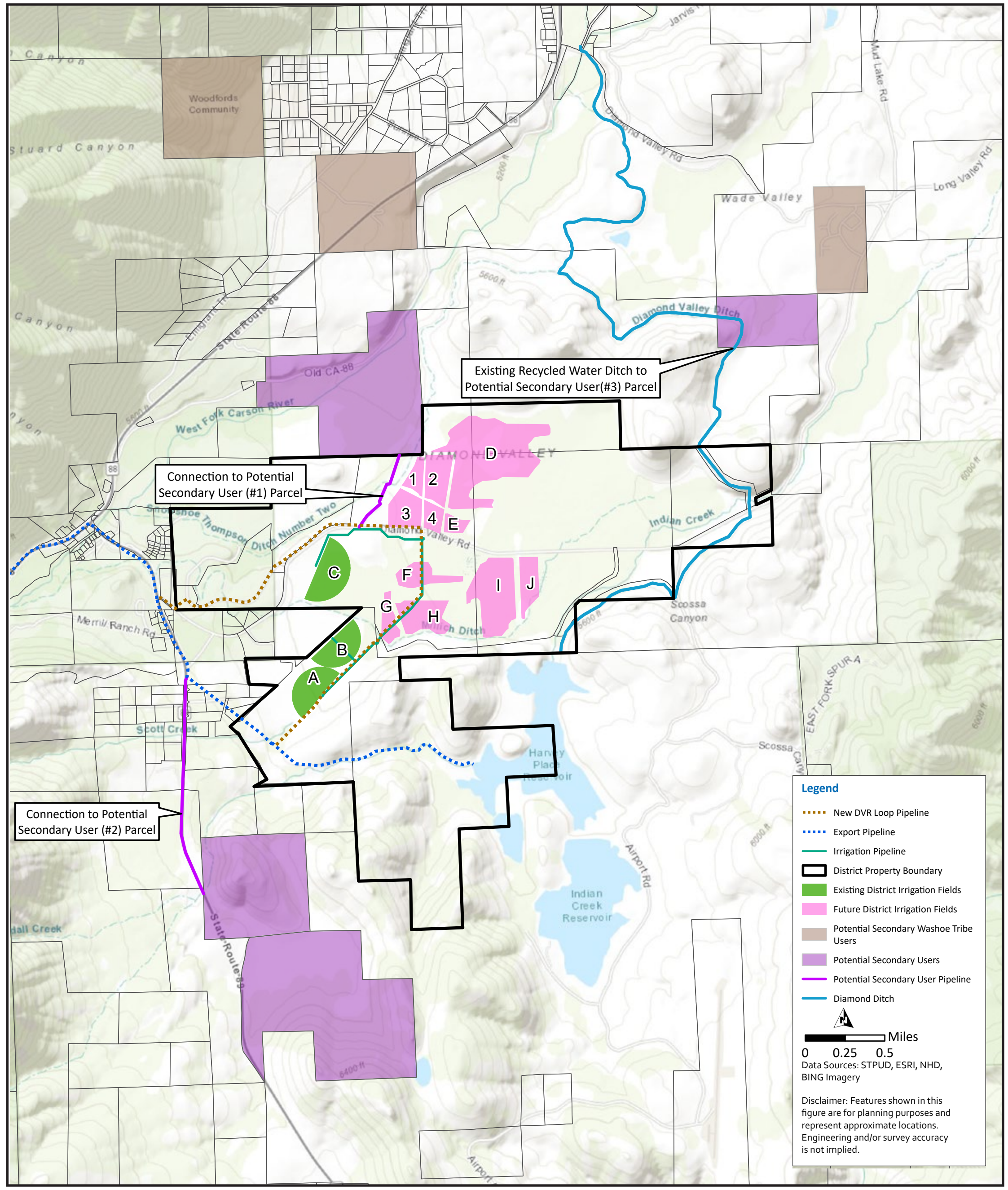
Alternative 2 Export and End Use Infrastructure Key Components

Key components of this alternative include:

- Continued maintenance and investment in existing aging export system infrastructure.
- Additional infrastructure to expand District recycled water use in DVR.
- Recycled water could be delivered either via the existing ditch system at DVR or through direct delivery via new irrigation pipelines off the new DVR Loop Pipeline or the C-Line. Delivery to water users from the C-Line is dependent on whether the LPPS is pumping, and whether the C-Line has water in it.
- Expansion of the ditch system may be required to deliver recycled water to one of the new users.
- New conveyance infrastructure to deliver recycled water to new users would also be required. Approximately 1.53 miles of new irrigation piping would be required to serve these two users.
- New conveyance infrastructure to the Washoe Tribe parcels would also be required. Given the elevation of the western-most Washoe Tribe parcels, pumping may also be required. Due to the uncertainty of recycled water use for these parcels, conceptual infrastructure alignments and cost estimates have not been prepared at this time.

Alternative 2 does not require treatment modifications to the existing WWTP.

Alternative 2 Potential Recycled Water Users



Alternative 3: Expanded Disinfected Tertiary Reuse in Alpine County

Description

Alternative 3 would expand recycled water reuse in Alpine County through the use of disinfected tertiary recycled water. The discharge and end uses of recycled water would be in the California portion of the Carson River Watershed.

By upgrading the treatment process to produce disinfected tertiary recycled water, the District would be able to implement unrestricted non-potable reuse. The disinfected tertiary recycled water could be used for the existing uses (currently served by disinfected secondary-23) as well as the following additional uses:

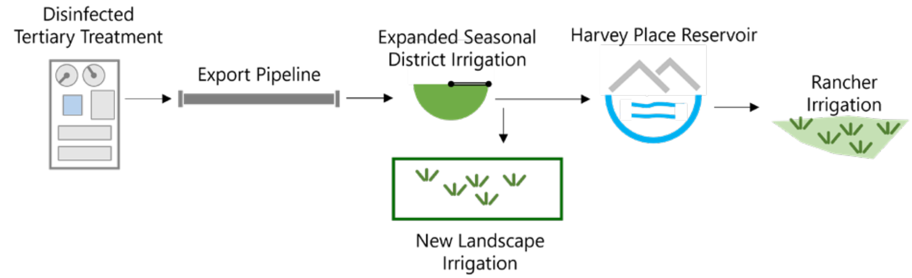
- Landscape irrigation.
- Surface and spray irrigation of food crops.
- Non-restricted recreational impoundment (i.e., water storage, appropriate for recreational use).

In this alternative, disinfected tertiary recycled water would be conveyed to Harvey Place Reservoir via the existing export system for Rancher irrigation and new landscape irrigation. Provided that 100 percent of the recycled water conveyed to Harvey Place Reservoir was treated to disinfected tertiary standards, then it would be possible for the reservoir to be used for recreational activities.

Alternative 3 Costs

Component	Capital Costs[1] ($M)	O&M Costs ($M/yr)[2]
Cost Estimate for Treatment at WWTP		
Treatment at WWTP	$86.0	$0.8
Distribution Pipelines	$1.7	-
TOTAL COSTS	**$87.7**	**$0.8**
Cost Estimate for Split Treatment at DVR[3]		
Split Treatment at DVR	$13.0	$0.1
Distribution Pipelines [4]	$1.7	-
TOTAL COSTS	**$14.7**	**$0.1**

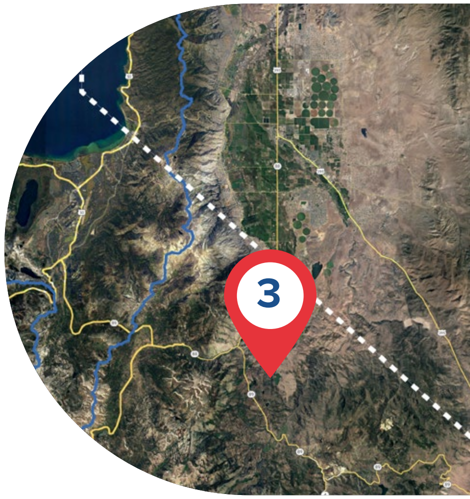
Alternative 3 Schematic



Triggers to Implement Alternative 3

The following triggers may give the District reason to implement this alternative:

- Recycled water production exceeds existing demands from Ranchers and District DVR irrigation.
- The District wishes to generate revenue by selling disinfected tertiary water.
- The District desires additional flexibility and capacity for recycled water uses.
- The District identifies new users for disinfected tertiary water.
- The District is required to revise its existing treatment system to meet disinfected tertiary treatment requirements for another reason.



Alternative 3 Potential Users

Users/Areas	Estimated Demand (AFY)
Three privately owned users of disinfected tertiary recycled water	79
Four new privately owned users and additional District irrigation of secondary-23 recycled water	3,774
Washoe Tribe (secondary-23 recycled water identified in Alternative 2)	1,424[5]

Notes:

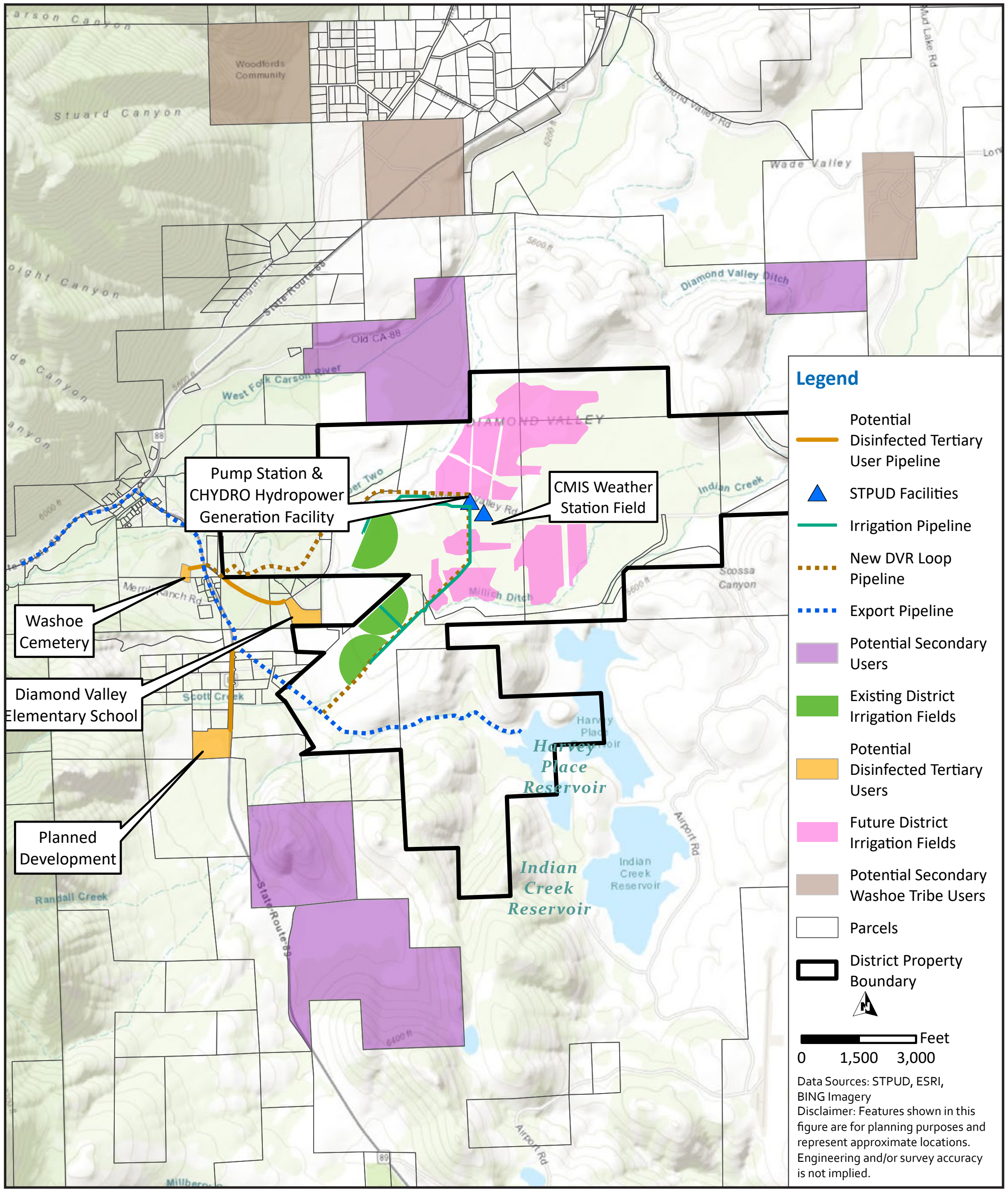
1. Level 5 cost estimates are considered to be accurate within plus 50 percent to minus 30 percent.
2. O&M associated with new recycled water distribution system infrastructure is assumed to be minimal.
3. This cost estimate is for a 0.25 mgd facility, which would meet the demands associated with the disinfected tertiary parcels, plus irrigation on the District's existing and future fields.
4. This cost estimate is based on treatment at the WWTP. If the split treatment option is pursued, additional small diameter and longer distribution pipelines and possibly pump stations would be required.
5. Demand is theoretical. Amount of acreage that might be able to utilize recycled water is uncertain at this time.

Alternative 3 Export and End Use Infrastructure Key Components

Key components of this alternative include:

- Continued maintenance and investment in existing aging export system infrastructure.
- New conveyance infrastructure to deliver recycled water to new users. The map at right shows potential future users. Approximately 0.84 miles of new irrigation piping would be required to serve these three users.
- If the split treatment option at DVR is pursued instead of treatment upgrades at the WWTP, additional small diameter and longer distribution pipelines, and possibly pump stations, would be required.
- New conveyance infrastructure to the Washoe Tribe parcels would also be required. Given the elevation of the western-most Washoe Tribe parcels, pumping may also be required. Due to the uncertainty of recycled water use for these parcels, conceptual infrastructure alignments and cost estimates have not been prepared at this time.

Alternative 3 Potential Users

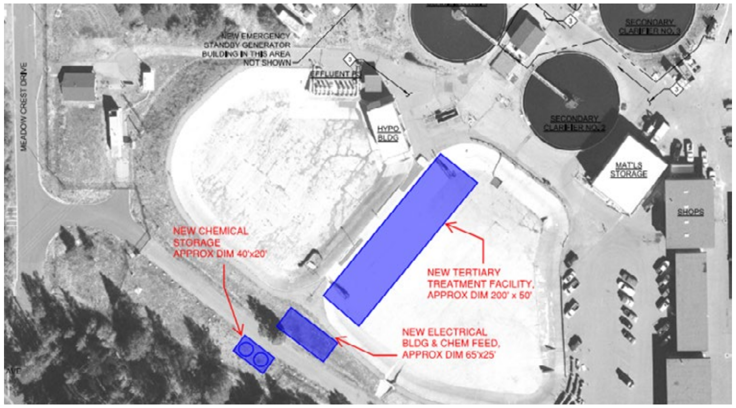


Alternative 3 Recycled Water Treatment Key Components

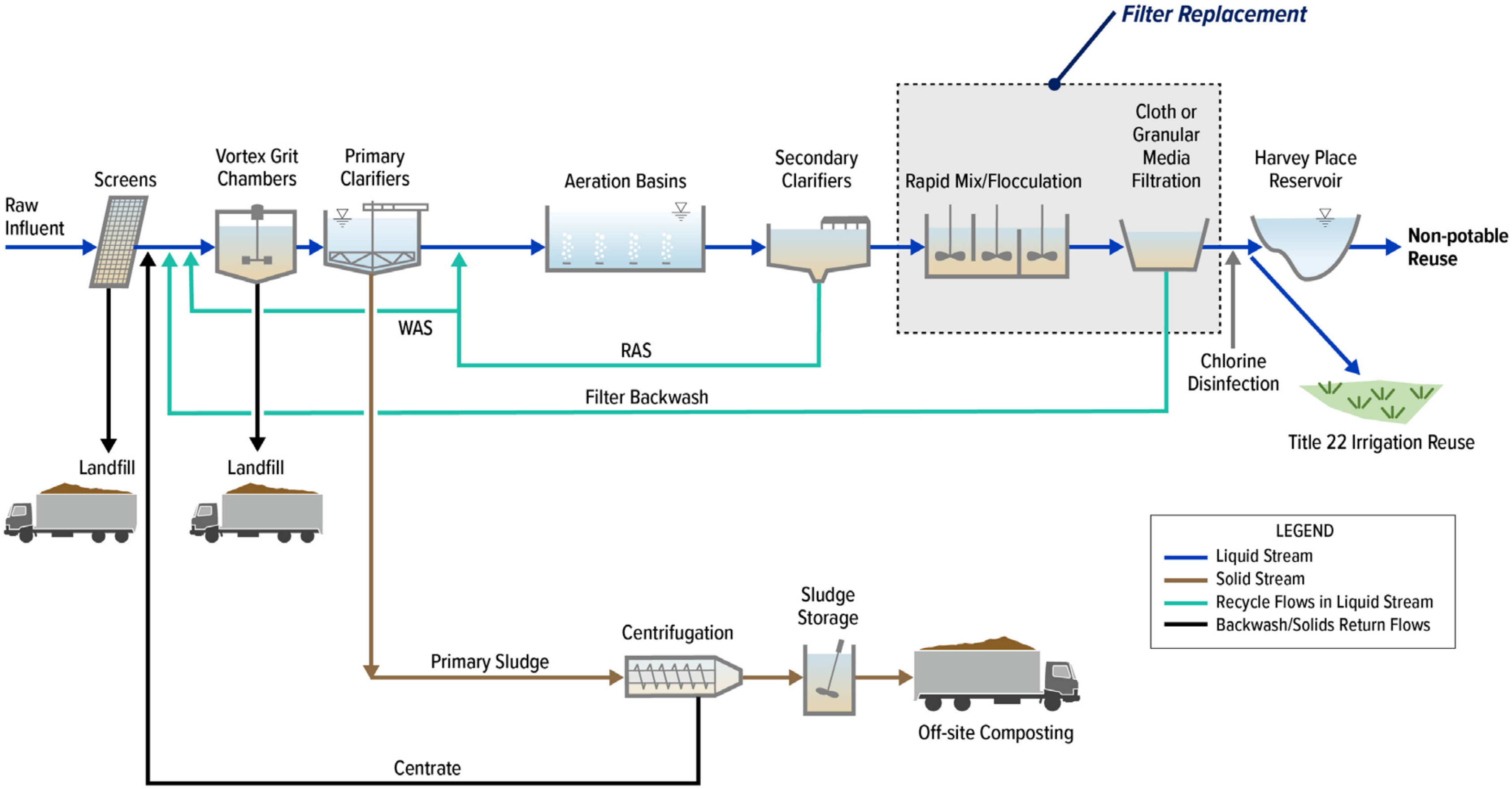
Key components of this alternative include:

- Upgrades to the existing WWTP to meet disinfected tertiary standards.
- An alternative approach, split treatment at DVR, is shown on the following page.

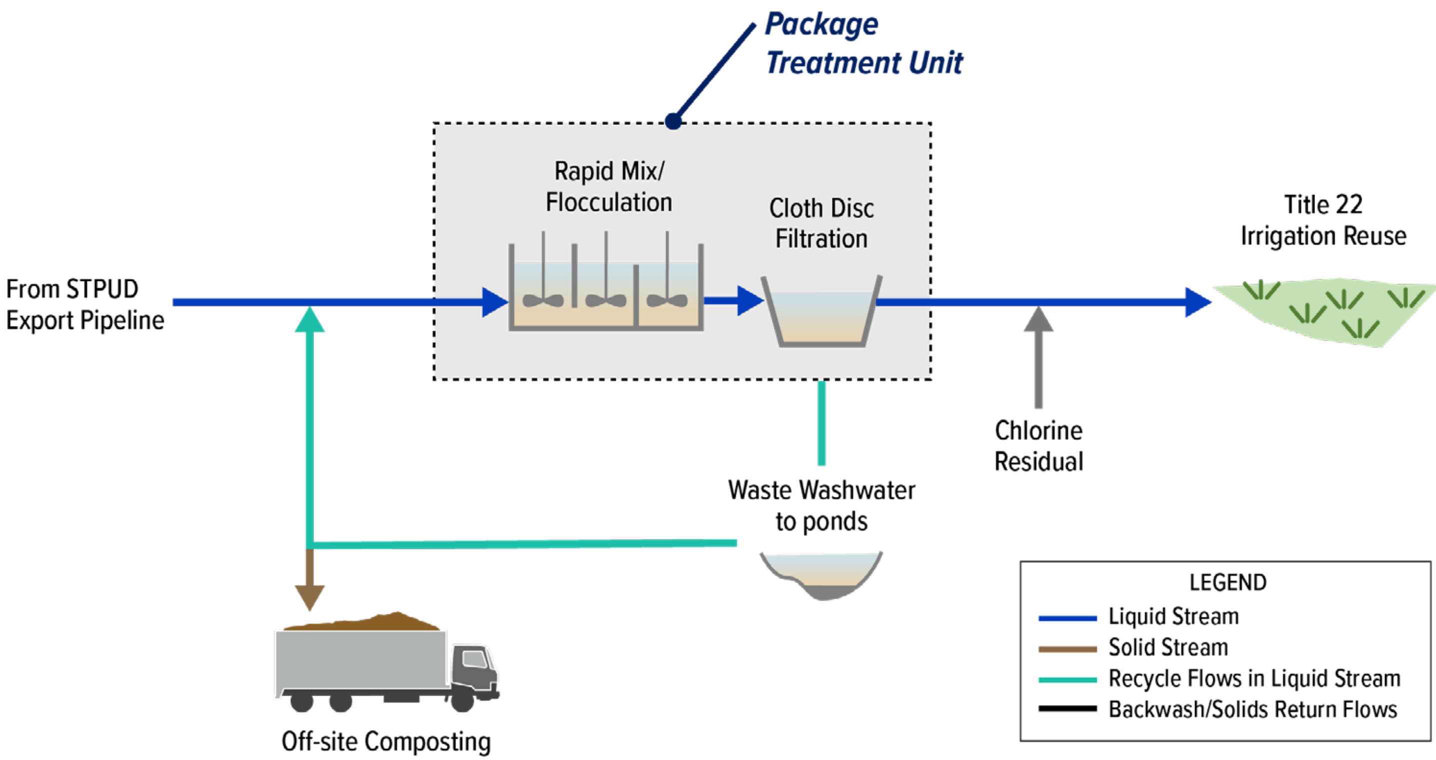
Alternative 3 Recycled Water Treatment Conceptual Layout (WWTP Treatment)



Alternative 3 Recycled Water Treatment Process (WWTP Treatment)



Alternative 3 Split Treatment at DVR Treatment Process



Alternatively, a separate 0.25-mgd split treatment facility at DVR could be constructed to produce disinfected tertiary recycled water only for new users that require this higher quality effluent.

Alternative 4: Discharge to West Fork Carson River and Use in Nevada

Description

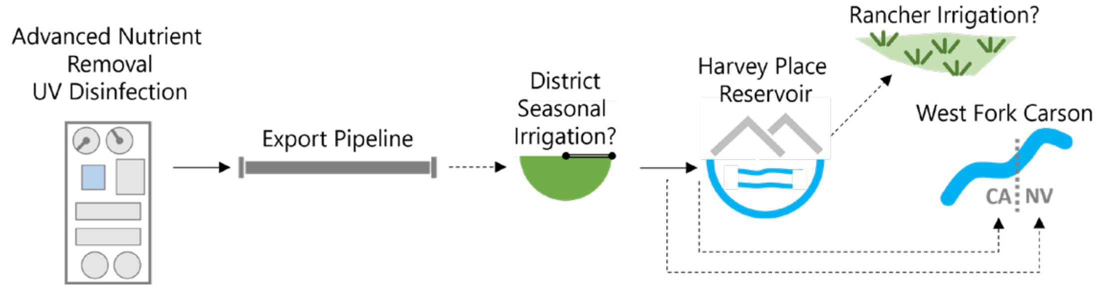
Alternative 4 consists of direct surface water discharge to the West Fork Carson River. The water, once discharged to the West Fork Carson River, could potentially be utilized by downstream users. The amount of flow discharged to the West Fork Carson River in this location would depend on regulatory approval and permitting requirements. Any water in excess of the permitted discharge could be used for District irrigation and/or conveyed to Harvey Place Reservoir for downstream use by Ranchers.

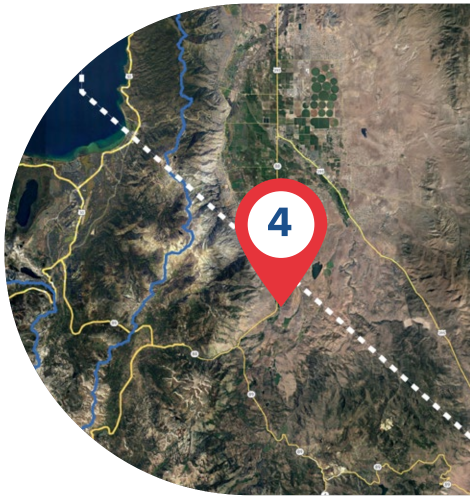
Water quality is also a significant consideration for Alternative 4, given that the West Fork Carson River is an impaired water body on the State of California's 303(d) List. Water quality issues in the river include bacteria, metals, murky water, nitrogen (N) and/or phosphorus (P), and salts. For this reason, the Alternative 4 evaluation considers the most conservative regulatory scenario, where the discharge would be required to meet the water quality objectives of the West Fork Carson River at the point of discharge, in absence of studies/permit negotiations that would allow a mixing zone, allowance for a seasonal discharge, and/or modifications to the West Fork Carson River water quality objectives.

Alternative 4 Potential Users

No specific potential users have been identified. Generally, water right holders in the Carson Valley could potentially benefit from additional flow in the West Fork Carson River.

Alternative 4 Schematic





Alternative 4 Costs

Component	Capital Costs[1] ($M)	O&M Costs ($M/yr)[2]
Treatment at WWTP	$224.0	$3.1
Conveyance pipeline and outfall to West Fork Carson River	$21.2	-
TOTAL COSTS	**$245.2**	**$3.1**

Notes:
1. Level 5 cost estimates are considered to be accurate within plus 50 percent to minus 30 percent.
2. O&M associated with new recycled water distribution system infrastructure is assumed to be minimal.

Triggers to Implement Alternative 4

The following triggers may give the District reason to implement this alternative:

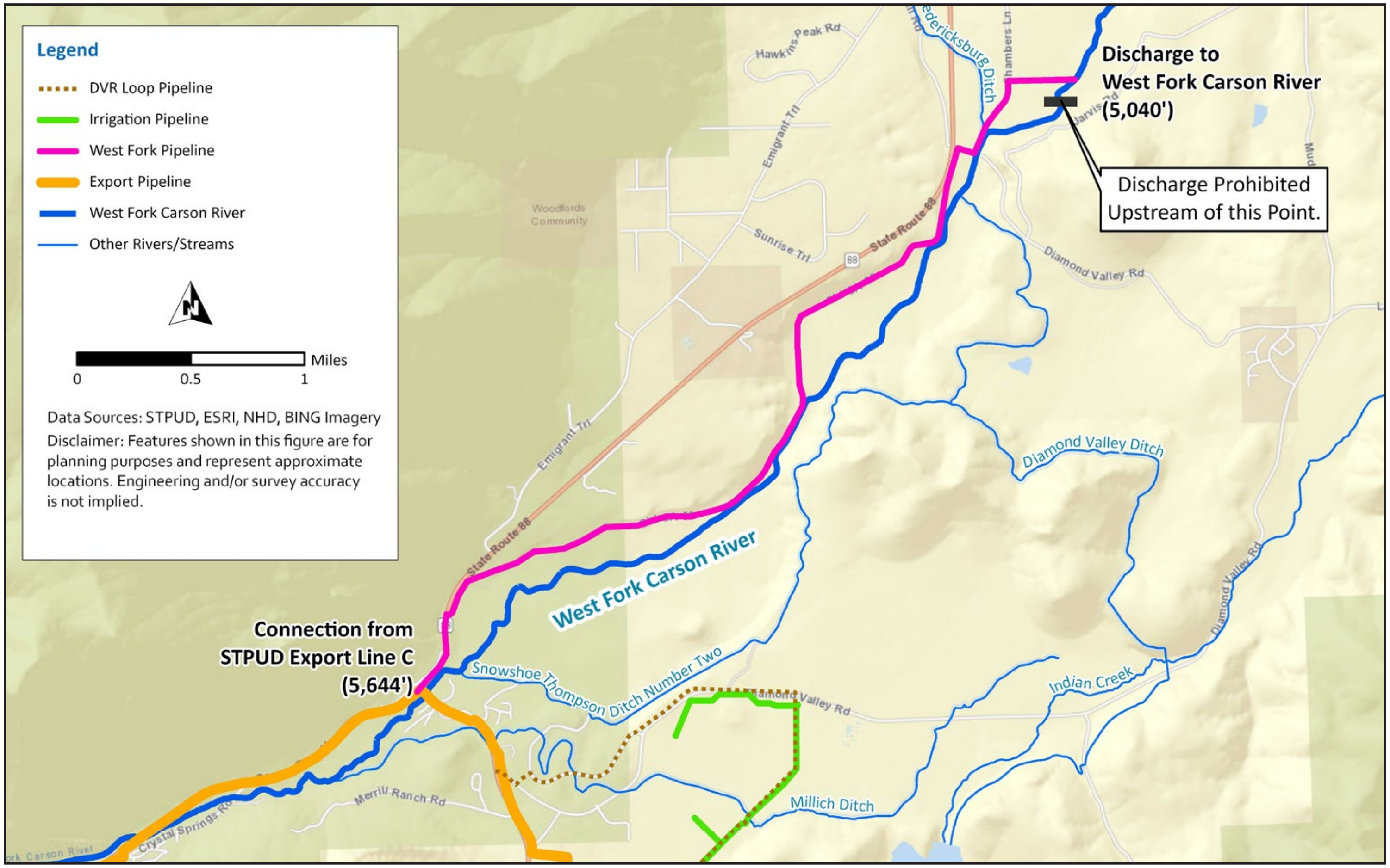
- Recycled water production exceeds existing demands from Ranchers and District DVR irrigation.
- The District wishes to reduce or eliminate the existing recycled water system in DVR and Alpine County.
- Carson River Watershed water right holders or water users express interest in obtaining additional supplies.

Alternative 4 Export and End Use Infrastructure Key Components

Key components of this alternative include:

- Continued maintenance and investment in existing aging export system infrastructure.
- Construction and maintenance of approximately 4.58 miles of recycled water transmission piping from the existing Export C-Line to a new outfall on the West Fork Carson River. The location of the outfall is based on compliance with the Alpine County 1965 Ordinance for Recycled Water. A conceptual alignment is shown at right.
- Construction and maintenance of a new outfall structure to discharge to the West Fork Carson River.

Conceptual Alternative 4 Pipeline Alignment



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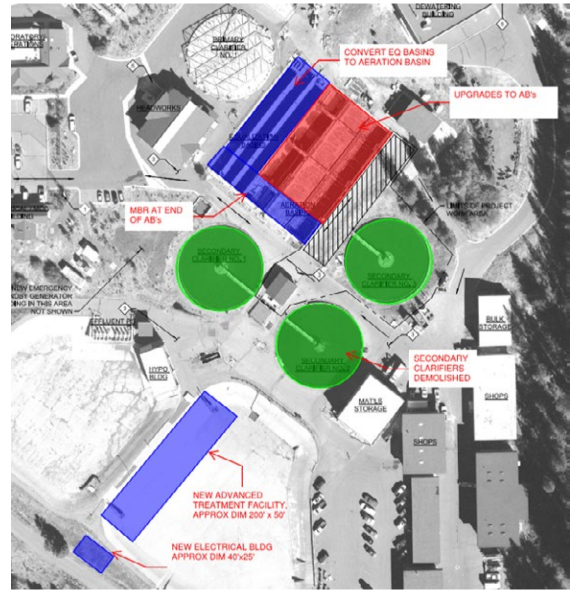
Alternative 4 Recycled Water Treatment Key Components

Key components of this alternative include:

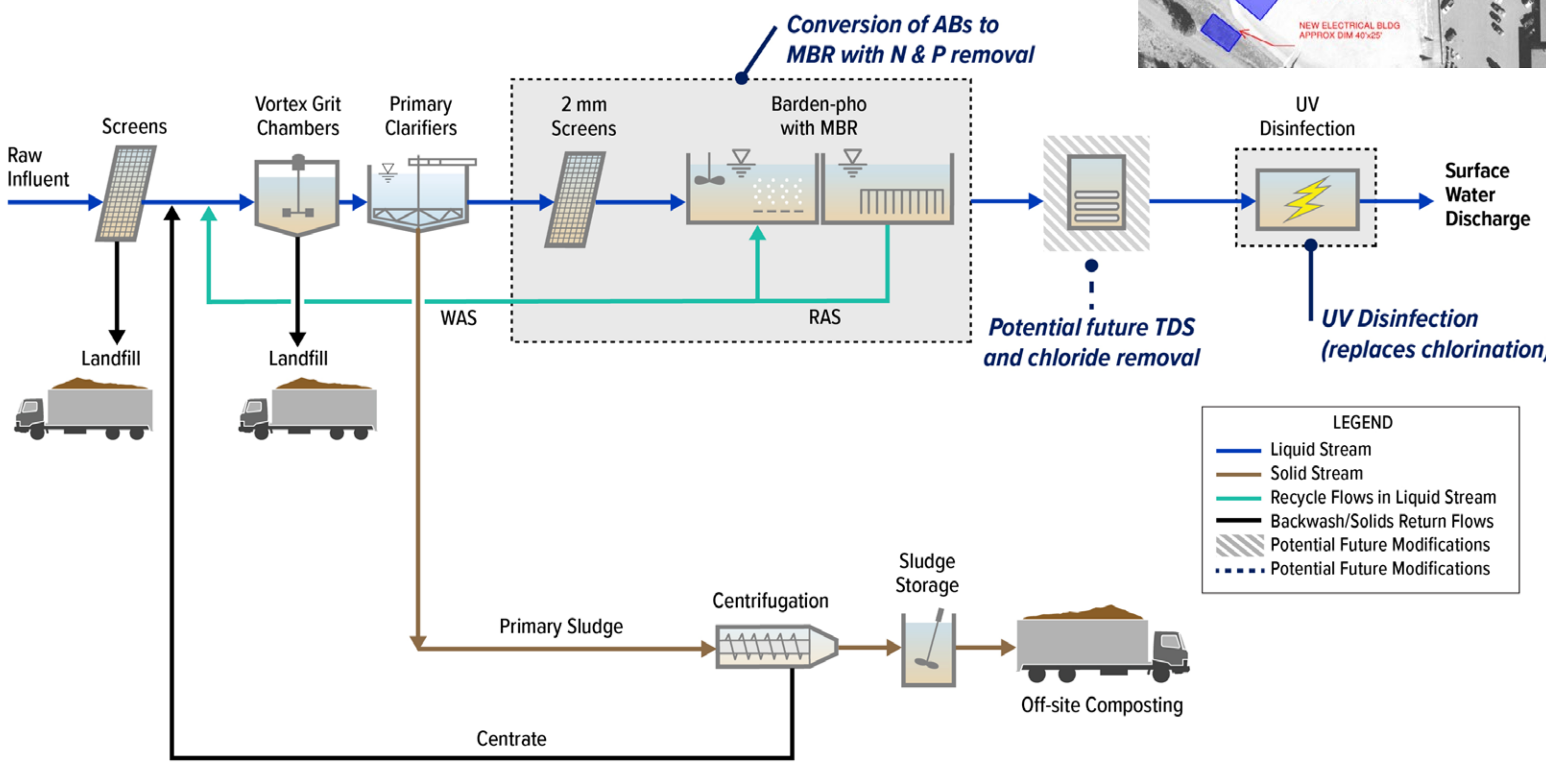
- Significant upgrades of the existing WWTP facility to meet future discharge permit requirements, which are assumed to require best available technologies for (N and P) removal.
- Conversion of chlorine disinfection to UV disinfection.
- Potential (future) TDS and chloride removal.

Note: Alternative 4 treatment requirements are the same as those for Alternative 6A and Alternative 6B.

Alternative 4 Recycled Water Treatment Conceptual Layout



Alternative 4 Recycled Water Treatment Process



Alternative 6A: Expanded Class A or B Reuse in Nevada via Discharge to Indian Creek

Description

Alternative 6A involves discharge to Indian Creek, which flows across the California/Nevada border, past Mud Lake and ultimately joins the East Fork Carson River. Treated water discharged into Indian Creek could be subsequently used via direct use off Indian Creek or further downstream use off the East Fork Carson River. This alternative would include the existing export infrastructure over Luther Pass and new conveyance pipelines to Indian Creek, at the location of the infrastructure that allows Harvey Place Reservoir to release into Indian Creek. The water, once discharged to Indian Creek, could potentially be utilized by downstream users in the Carson River Watershed.

Alternative 6A Potential Users

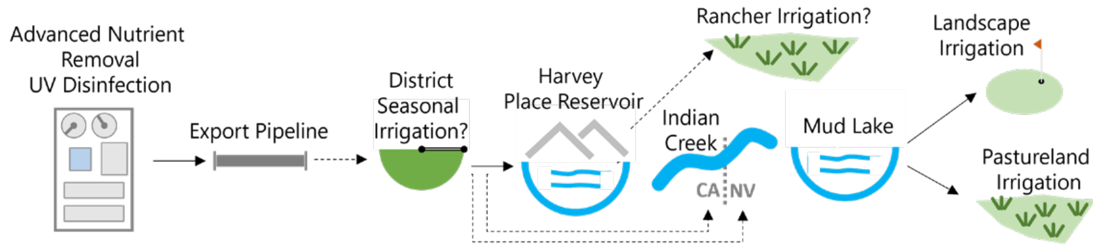
No specific potential users have been identified. Generally, water right holders in the Carson Valley could potentially benefit from additional flow in Indian Creek and the East Fork Carson River.

Alternative 6A Costs

Component	Capital Costs[1] ($M)	O&M Costs ($M/yr)[2]
Treatment at WWTP	$224.0	$3.1
Conveyance Pipeline	$2.9	-
TOTAL COSTS	**$226.9**	**$3.1**

Notes:
1. Level 5 cost estimates are considered to be accurate within plus 50 percent to min us 30 percent.
2. O&M associated with new recycled water distribution system infrastructure is assumed to be minimal.

Alternative 6A Schematic



Triggers to Implement Alternative 6A

The following triggers may give the District reason to implement this alternative:

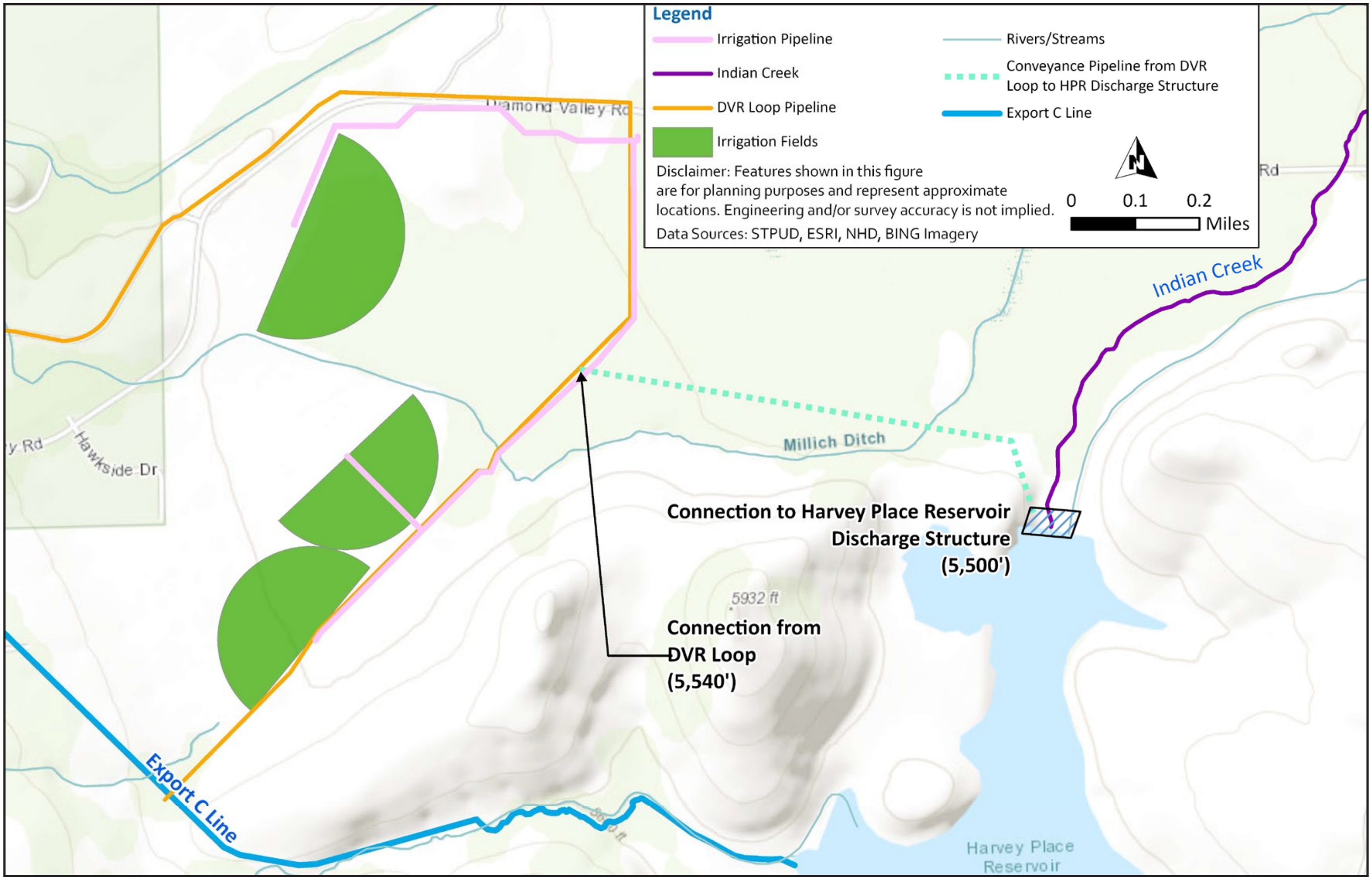
- Recycled water production exceeds existing demands from Ranchers and District DVR irrigation.
- The District wishes to reduce or eliminate the existing recycled water system in DVR and Alpine County.
- Carson River Watershed water right holders or water users express interest in obtaining additional supplies.

Alternative 6A Export and End Use Infrastructure Key Components

Key components of this alternative include:

- Continued maintenance and investment in existing aging export system infrastructure.
- Construction and maintenance of approximately 0.74 miles of recycled water transmission piping from the DVR Loop Pipeline to the existing Harvey Place Reservoir outfall structure to Indian Creek. A conceptual alignment is shown to the right.

Alternative 6A Conceptual Alignment



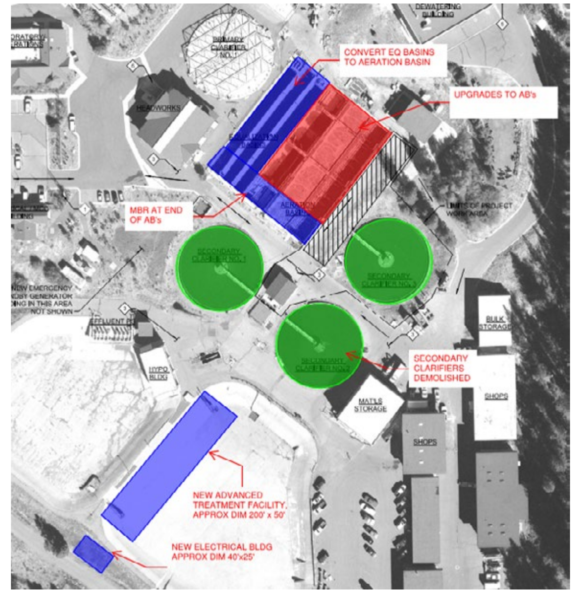
Alternative 6A Recycled Water Treatment Key Components

Key components of this alternative include:

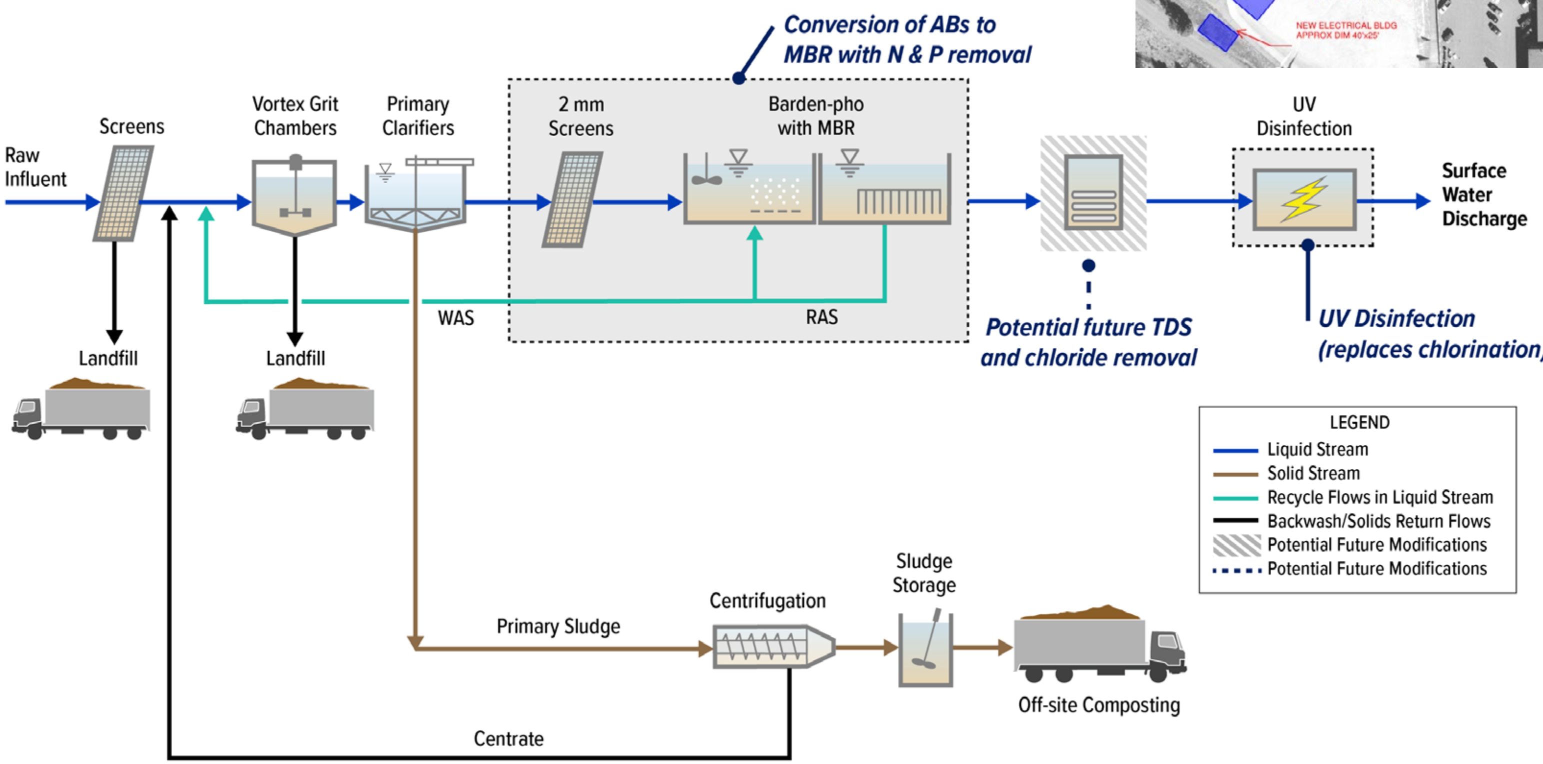
- Significant upgrades of the existing WWTP facility to meet future discharge permit requirements, which are assumed to require best available technologies for (N and P) removal.
- Conversion of chlorine disinfection to UV disinfection.
- Potential (future) TDS and chloride removal.

Note: Alternative 6A treatment requirements are the same as those for Alternative 4 and Alternative 6B.

Alternative 6A Recycled Water Treatment Conceptual Layout



Alternative 6A Recycled Water Treatment Process



Alternative 6B: Expanded Class A or B Reuse in Nevada via Discharge to Mud Lake

Description

Alternative 6B involves export of District effluent for beneficial reuse in the Nevada portion of the Carson River Watershed. This alternative would include the existing export infrastructure over Luther Pass, storage in Harvey Place Reservoir, and conveyance into Nevada and storage in Mud Lake for recycled water use in Nevada.

The alternative includes a new pipeline to convey stored water from Harvey Place Reservoir across the Nevada state line, with direct discharge to Mud Lake. The water would then be diverted from Mud Lake for use in Nevada. The amount of flow discharged to Mud Lake would depend on regulatory approval and permitting requirements. Any water in excess of the permitted discharge could be used for District irrigation and/or conveyed to Harvey Place Reservoir for downstream use by Ranchers. Mud Lake is owned by Bently Properties, so use of Mud Lake for storage would need to be coordinated with the property owner.

Alternative 6B Potential Users

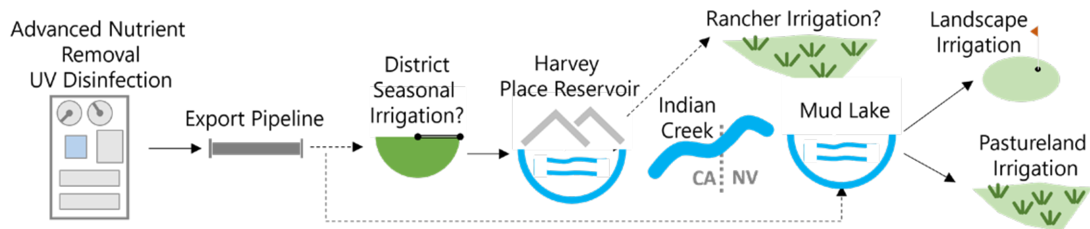
Any users with water rights to Mud Lake, including Bently Properties, which owns Mud Lake, could potentially benefit from this alternative. Also, irrigators in the Carson Valley currently using surface water could benefit from this alternative.

Alternative 6B Costs

Component	Capital Costs(1) ($M)	O&M Costs ($M/yr)(2)
Treatment at WWTP	$224.0	$3.1
Conveyance Pipeline and Outfall to Mud Lake	$38.2	-
TOTAL COSTS	**$262.2**	**$3.1**

Notes:
1. Level 5 cost estimates are considered to be accurate within plus 50 percent to min us 30 percent.
2. O&M associated with new recycled water distribution system infrastructure is assumed to be minimal.

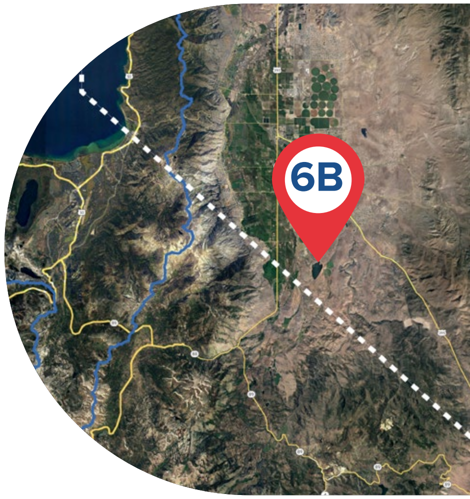
Alternative 6B Schematic



Triggers to Implement Alternative 6B

The following triggers may give the District reason to implement this alternative:

- Recycled water production exceeds existing demands from Ranchers and District DVR irrigation.
- The District wishes to reduce or eliminate the existing recycled water system in DVR and Alpine County.
- Carson River Watershed water right holders or water users express interest in obtaining additional supplies.

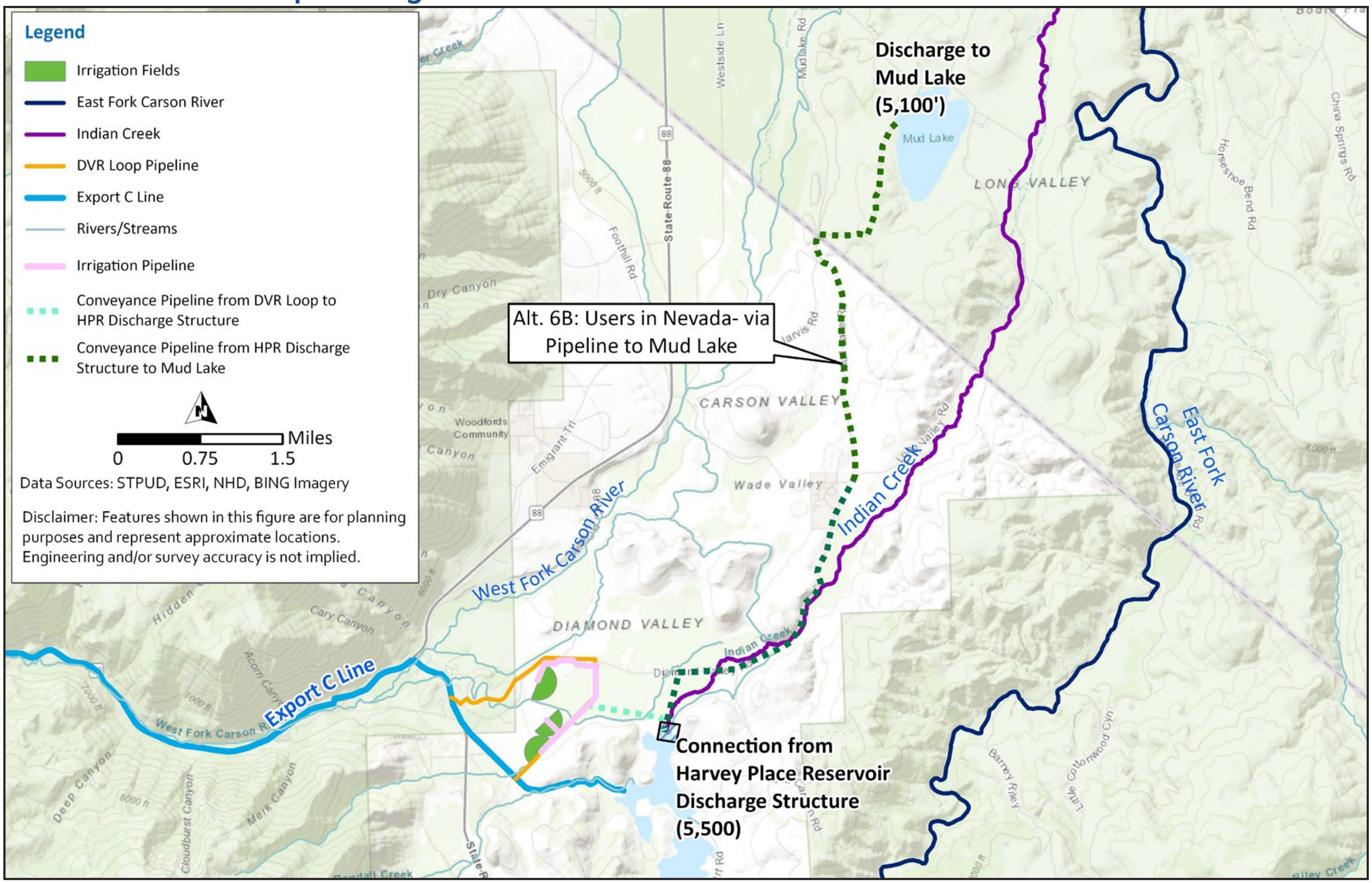


Alternative 6B Export and End Use Infrastructure Key Components

Key components of this alternative include:

- Continued maintenance and investment in existing aging export system infrastructure.
- Construction and maintenance of approximately 12.69 miles of recycled water transmission piping from the DVR Loop Pipeline to the existing Harvey Place Reservoir outfall structure to Mud Lake. A conceptual alignment of this conveyance piping is shown to the right.
- Construction and maintenance of a new outfall structure to Mud Lake.

Alternative 6B Conceptual Alignment



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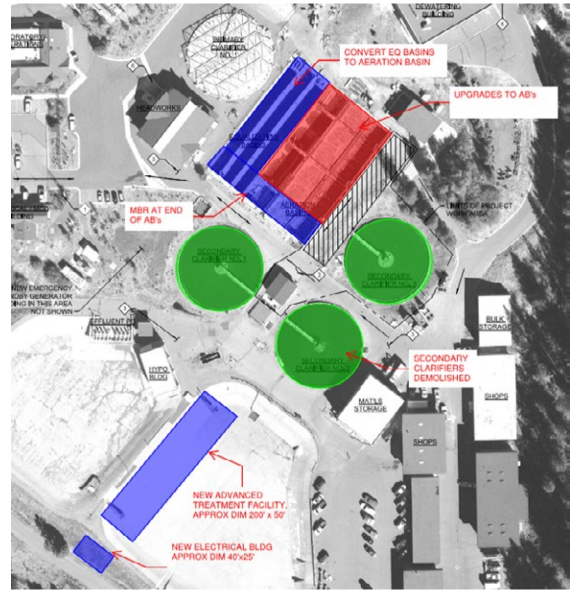
Alternative 6B Recycled Water Treatment Key Components

Key components of this alternative include:

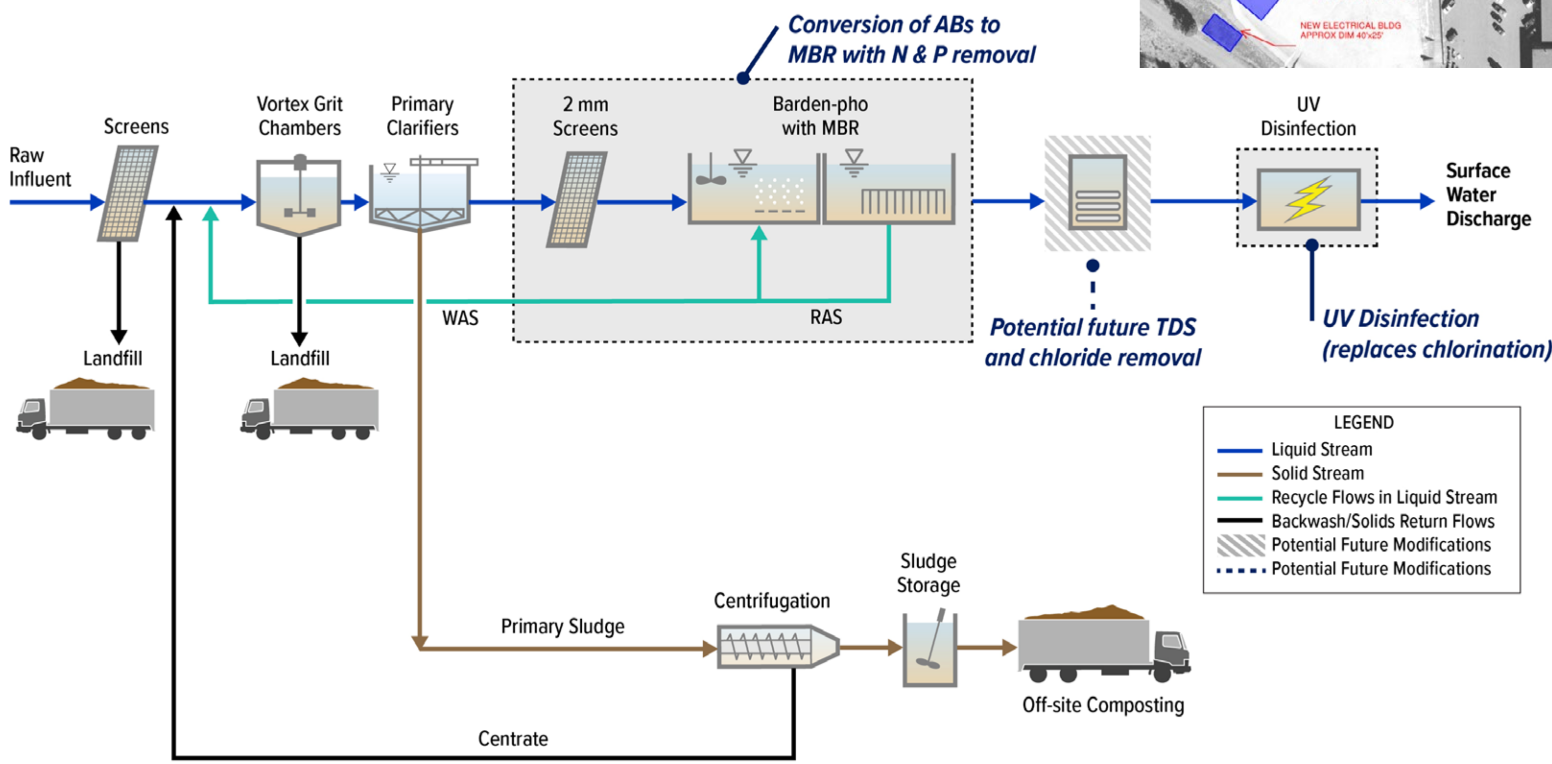
- Significant upgrades of the existing WWTP facility to meet future discharge permit requirements, which are assumed to require best available technologies for (N and P) removal.
- Conversion of chlorine disinfection to UV disinfection.
- Potential (future) TDS and chloride removal.

Note: Alternative 6B treatment requirements are the same as those for Alternative 4 and Alternative 6A.

Alternative 6B Recycled Water Treatment Conceptual Layout



Alternative 6B Recycled Water Treatment Process



Alternative 6C: Indirect Potable Reuse in Nevada

Description

Alternative 6C consists of treating the District's WWTP effluent to Nevada A+ standards for indirect potable reuse (IPR) in Nevada. This alternative would include the existing treatment at the District's WWTP followed by conveyance to Nevada for further treatment at an advanced water treatment facility (AWTF). The existing export line would provide a portion of the conveyance between the District's WWTP and an AWTF in Nevada. Following treatment, the purified water would be injected into the ground via injection wells, providing residence time in the aquifer before being extracted for municipal drinking water use.

District irrigation operations at DVR, Harvey Place Reservoir, and irrigation by Ranchers would be eliminated, although Harvey Place Reservoir would remain in operation to provide storage, depending on how this supply would be used in Nevada The concept for this alternative is that it would be implemented to take all the District's future effluent. One potential user is Gardnerville Ranchos General Improvement District (GRGID), however, because GRGID's currently identified demands of 5,054 AFY are less than the District's 6,050 AFY of effluent flows, additional recycled water demands would need to be identified. Another potential user is the Washoe Tribe, but demands have not been quantified at this time. Those additional demands may influence the location of the treatment facilities and infrastructure.

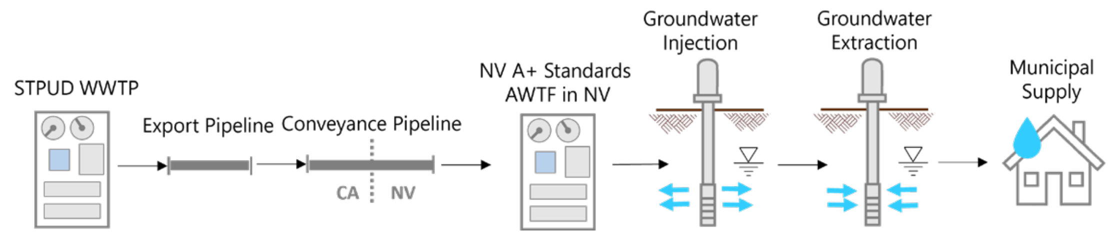
Alternative 6C Potential Users

Users/Areas	Estimated Demand (AFY)
Gardnerville Ranchos General Improvement District (GRGID)	5,054
Washoe Tribe	Unknown[1]

Notes:

1. The Washoe Tribe has expressed interest in potentially using recycled water, although that amount has not yet been quantified.

Alternative 6C Schematic



Alternative 6C Costs

Component	Capital Costs[3] ($M)	O&M Costs ($M/yr)[4]
Conveyance Pipeline	$54.8	-
A+ Advanced Water Treatment Facility in Nevada[2]	$265.0	$7.5
TOTAL COSTS	**$319.8**	**$7.5**

Notes:

2. Land acquisition is not included in the treatment costs.
3. Level 5 cost estimates are considered to be accurate within plus 50 percent to minus 30 percent.
4. O&M associated with new recycled water distribution system infrastructure is assumed to be minimal.

Triggers to Implement Alternative 6C

The following triggers may give the District reason to implement this alternative:

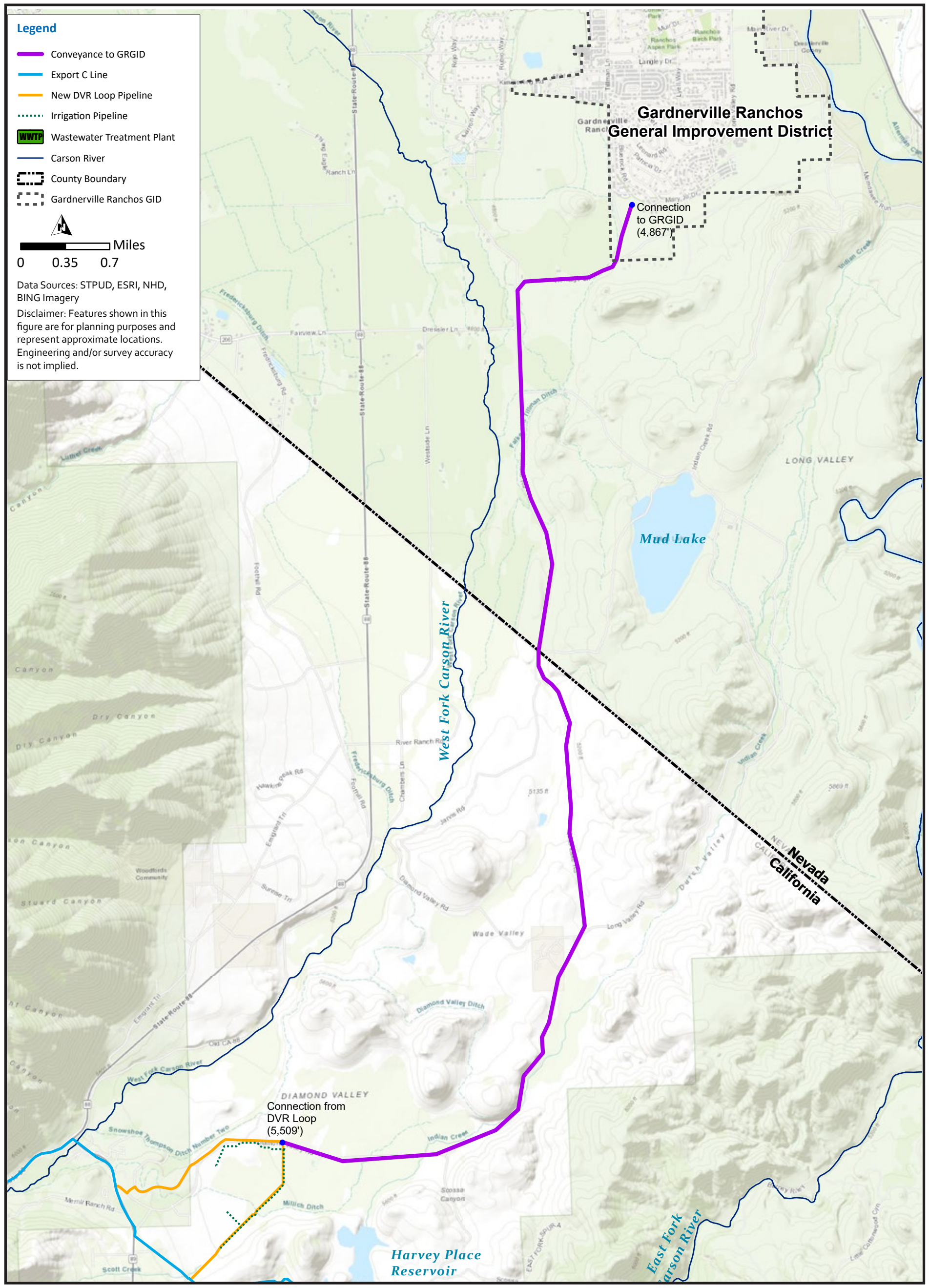
- Recycled water production exceeds existing demands from Ranchers and District DVR irrigation.
- The District wishes to reduce or eliminate the existing recycled water system in DVR and Alpine County.
- GRGID, the Washoe Tribe, or other Nevada water users express interest in purchasing recycled water at Nevada A+ standards for indirect potable reuse or selling water rights to other users.

Alternative 6C Export and End Use Infrastructure Key Components

Key components of this alternative include:

- Continued maintenance and investment in existing aging export system infrastructure.
- Construction and maintenance of approximately 9.98 miles of recycled water transmission piping from the New DVR Loop Pipeline to GRGID. A conceptual alignment of this conveyance piping is shown at right.

Alternative 6C Conceptual Alignment

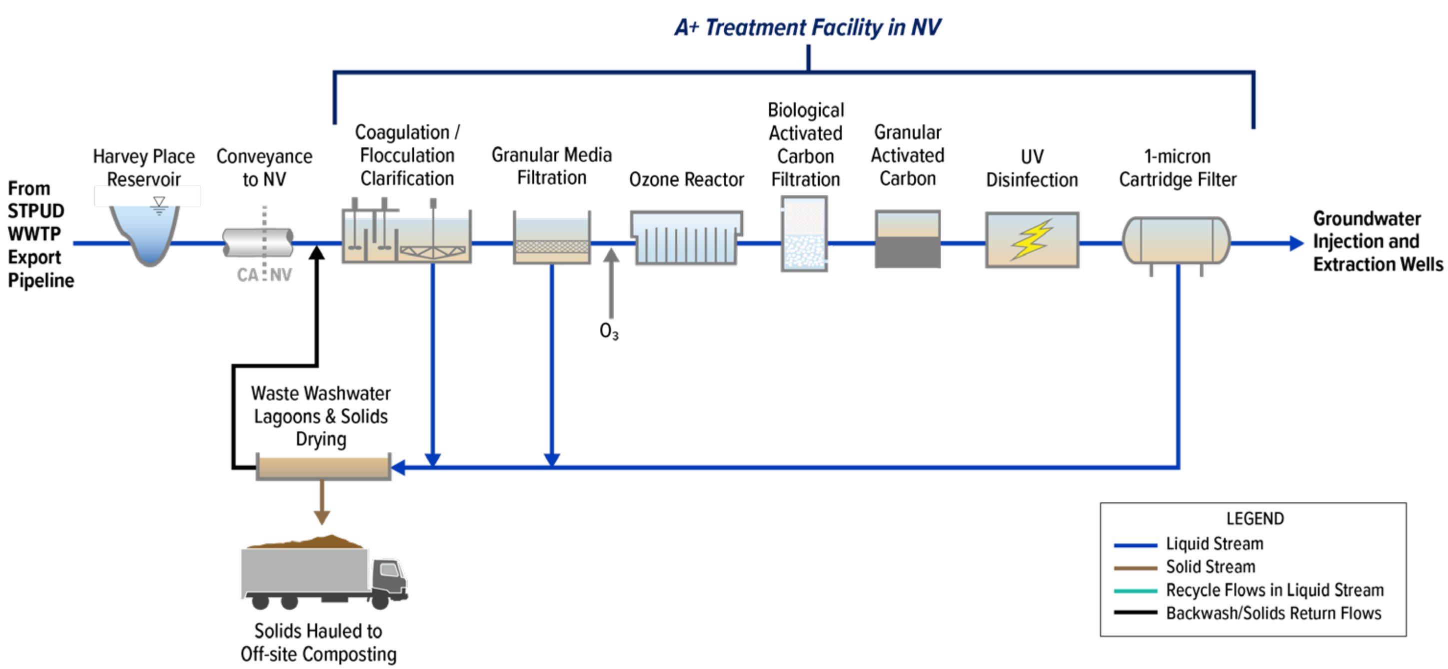


Alternative 6C Recycled Water Treatment Key Components

Key components of this alternative include:

- A new A+ Advanced Water Treatment Facility in Nevada designed to meet drinking water standards. Processes include:
  - » Granular Media Filtration.
  - » Ozonation.
  - » Biological Activated Carbon Filtration.
  - » Granular Activated Carbon.
  - » UV Disinfection.
  - » 1-micron Filtration.
  - » Groundwater Blending.
  - » Solids Handling.
- Approximately five acres of land for the new treatment facility.

Alternative 6C Recycled Water Treatment Process



Alternative 6D: Expanded Reuse in Nevada via Direct Delivery

Description

Alternative 6D consists of conveying water through the existing export pipeline and delivering it to potential new users in Nevada, located north of the location of existing recycled water use by Ranchers. Two general areas of potential recycled water use have been identified; one area is west of State Route 88 and south of Centerville Lane, and the second area is Bently Properties. A third potential area for recycled water use is located west of Mud Lake, within Nevada, but near the California/Nevada state line. In the future, the Washoe Tribe may own land in this region and there could be another potential demand for recycled water. Recycled water would be used for ranchland/pasture or fodder crop irrigation.

It is assumed that a recycled water distribution system would be constructed to deliver water directly to users in Nevada.

Alternative 6D Potential Users

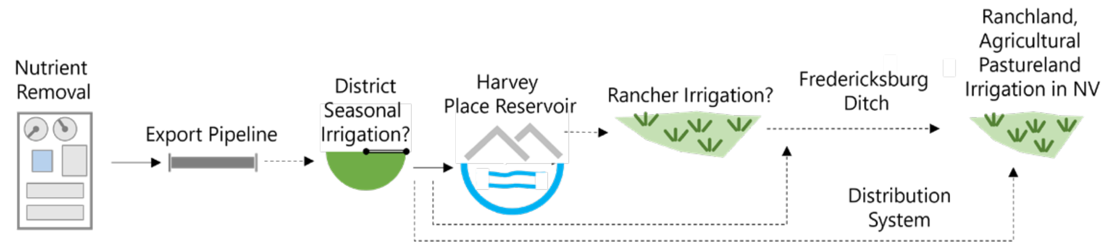
Users/Areas	Estimated Demand (AFY)
West of State Route 88 and South of Centerville Lane	5,075
Bently Properties	14,385

Alternative 6D Costs

Component	Capital Costs(1) ($M)	O&M Costs ($M/yr)(2)
Treatment at WWTP	$32.0	$1.2
Conveyance Pipeline(3)	$87.5	-
TOTAL COSTS	**$119.5**	**$1.2**

Notes:
1. Level 5 cost estimates are considered to be accurate within plus 50 percent to min us 30 percent.
2. O&M associated with new recycled water distribution system infrastructure is assumed to be minimal.
3. This assumes that the conveyance pipeline goes all the way to the Bently Properties.

Alternative 6D Schematic



Triggers to Implement Alternative 6D

The following triggers may give the District reason to implement this alternative:

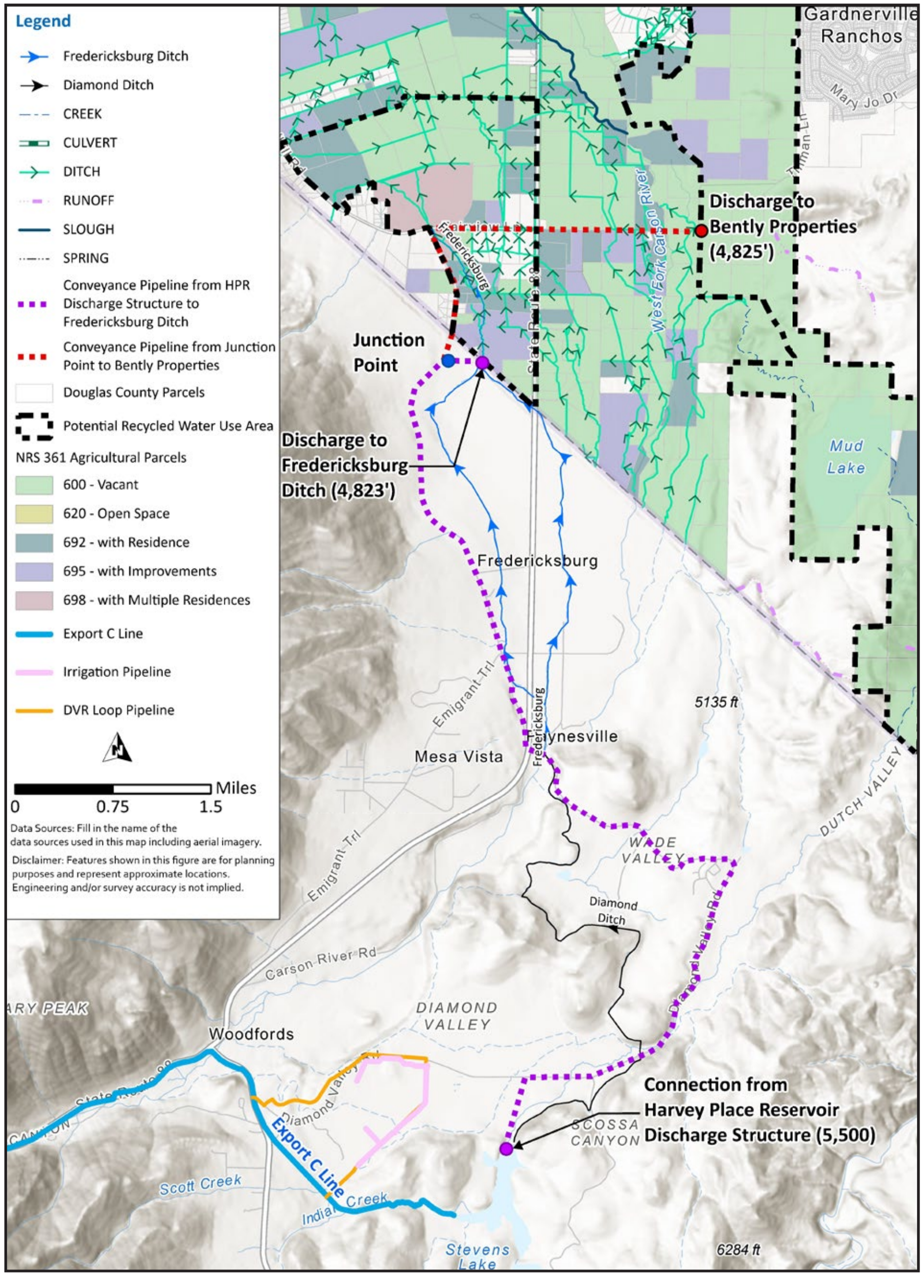
- Recycled water production exceeds existing demands from Ranchers and District DVR irrigation.
- The District wishes to reduce or eliminate the existing recycled water system in DVR and Alpine County.
- Carson River Watershed water users express interest in obtaining additional supplies.

Alternative 6D Export and End Use Infrastructure Key Components

Key components of this alternative include:

- Continued maintenance and investment in existing aging export system infrastructure.
- New recycled water distribution system to deliver water directly to users in NV. One approach would be an 8.87-mile conveyance pipeline that would deliver water from Harvey Place Reservoir into the Fredericksburg Ditch and from there it would get to users via the existing ditch system. Alternatively, if the Bently Properties were the recipients of the recycled water, the conveyance pipeline would be extended by 3.05 miles to convey water to Bently Properties.

Alternative 6D Potential Locations of Recycled Water Use and Conveyance Pipeline Alignment



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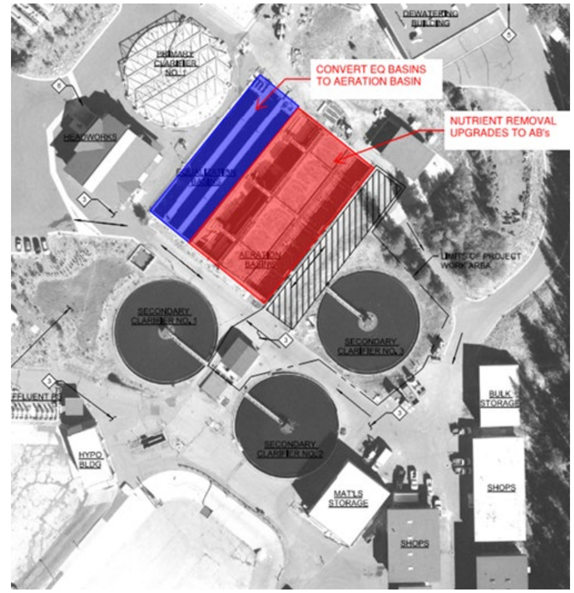
Alt 6D Recycled Water Treatment Key Components

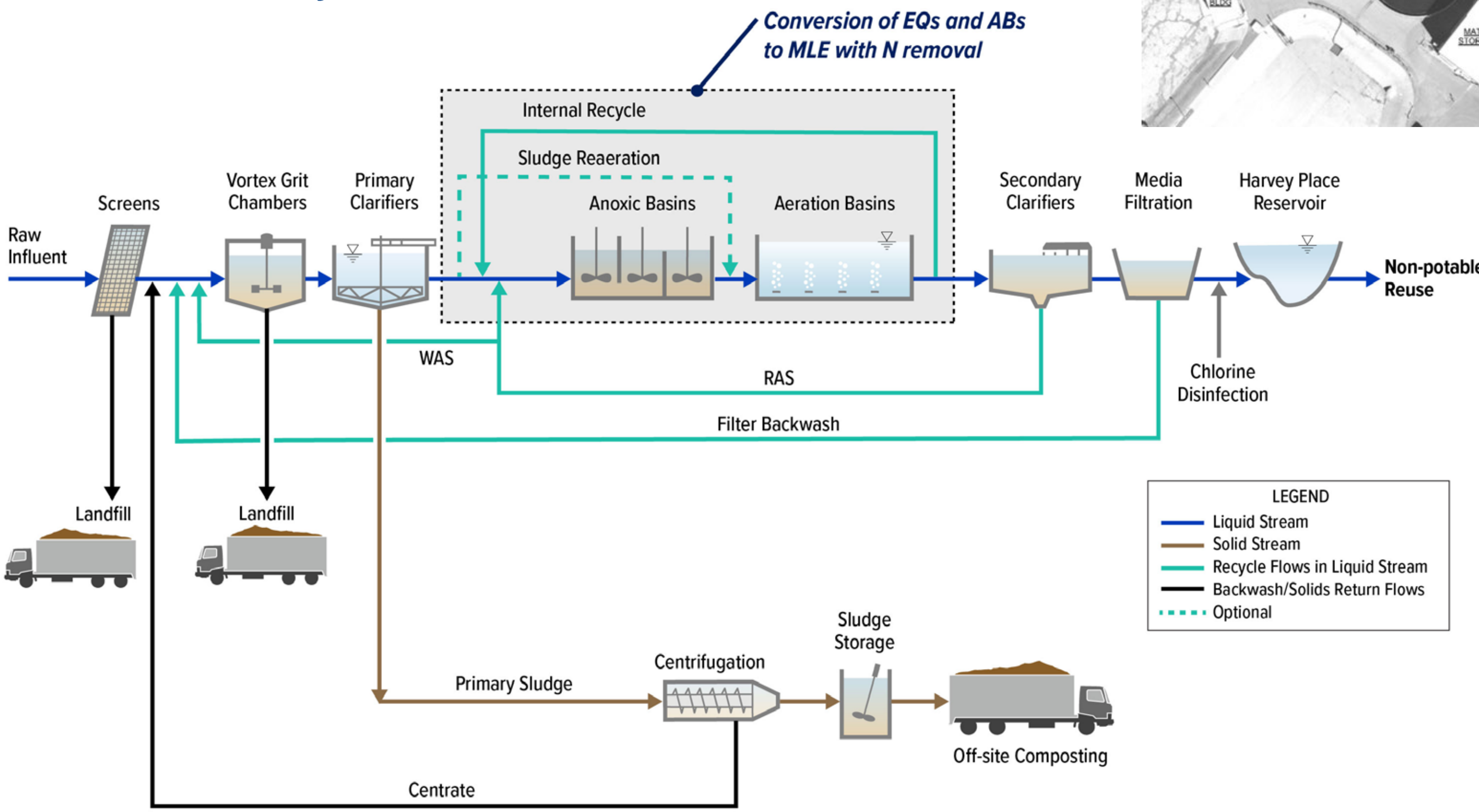
Key components of this alternative include:

- Upgrades to the existing WWTP for nutrient removal to meet anticipated NDEP recycled water permit requirements. The upgrades are based on the treatment requirements for the DCLTSA treatment facility, which delivers recycled water in Carson Valley for similar recycled water uses in Nevada. Processes include:
  - » Biological nutrient removal to meet anticipated permit requirements.
  - » Potentially other processes to meet recycled water requirements.

Alternative 6D Recycled Water Treatment Conceptual Layout



Alternative 6D Recycled Water Treatment Process



Alternative 7A: Treated Effluent Conveyance to DCLTSA with Reuse in Nevada

Description

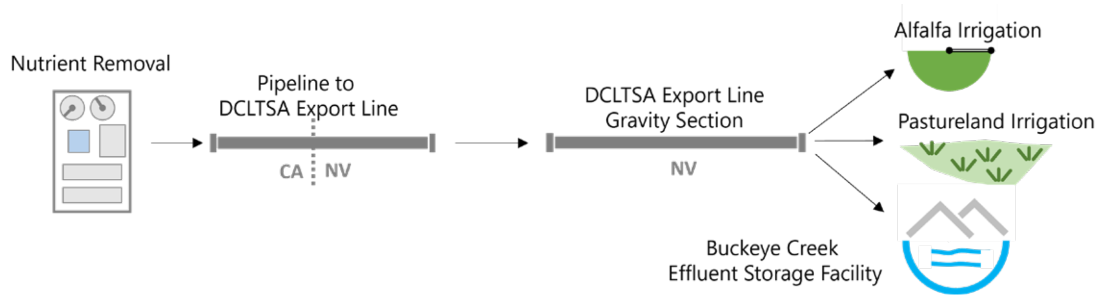
Alternative 7A would involve conveying treated recycled water from the District's WWTP to Douglas County Lake Tahoe Sewer Authority (DCLTSA), downstream of DCLTSA's treatment facility, and into the gravity section of DCLTSA's existing effluent export pipeline. DCLTSA currently provides recycled water to portions of the Park Cattle Ranch and portions of the Bently Ranch in Carson Valley. The recycled water from the District's WWTP would be combined with the DCLTSA recycled water and delivered to users in the NV portion of the Carson River Watershed.

Alternative 7A Costs

Component	Capital Costs[1] ($M)	O&M Costs ($M/yr)[2]
Treatment at WWTP	$32.0	$1.2
Conveyance from District to DCLTSA	$150.6	$1.7[3]
Replacement of DCLTSA pipeline segments	$31.6	-
Distribution pipelines	$13.3	-[4]
Lining of Buckeye Creek Effluent Storage Facility	$15.2	-[4]
Additional Recycled Water Storage Facility	$5.9	-[4]
TOTAL COSTS	**$248.6**	**$2.9**

Notes:
1. Level 5 cost estimates are considered to be accurate within plus 50 percent to minus 30 percent.
2. O&M associated with new recycled water distribution system infrastructure is assumed to be minimal.
3. These costs are associated with the FEPS and the proposed new pump stations.
4. O&M associated with the storage facilities is assumed to be minimal.

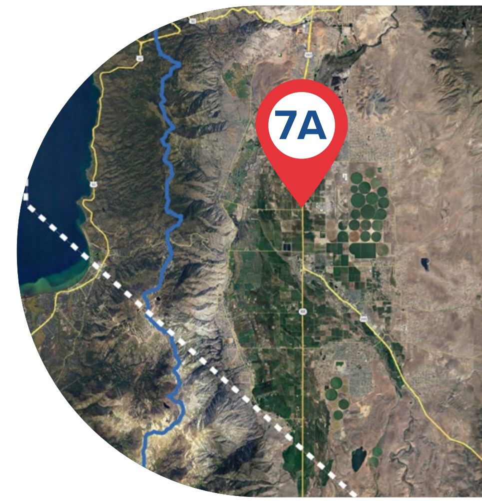
Alternative 7A Schematic



Triggers to Implement Alternative 7A

The following triggers may give the District reason to implement this alternative:

- Recycled water production exceeds existing demands from Ranchers and District DVR irrigation.
- The District wishes to generate revenue by selling recycled water.
- The District wishes to reduce or eliminate the existing recycled water system in DVR and Alpine County.
- The District wishes to partner with DCLTSA to share costs of export infrastructure.
- Carson River Watershed water right holders or water users express interest in obtaining additional supplies.
- The District wishes to reduce pumping costs by seeking an agricultural energy rate from the energy utility (only available in Nevada).



Alternative 7A Potential Users

Users/Areas	Estimated Demand (AFY)
Three potential users identified by DCLTSA	16,650[1]

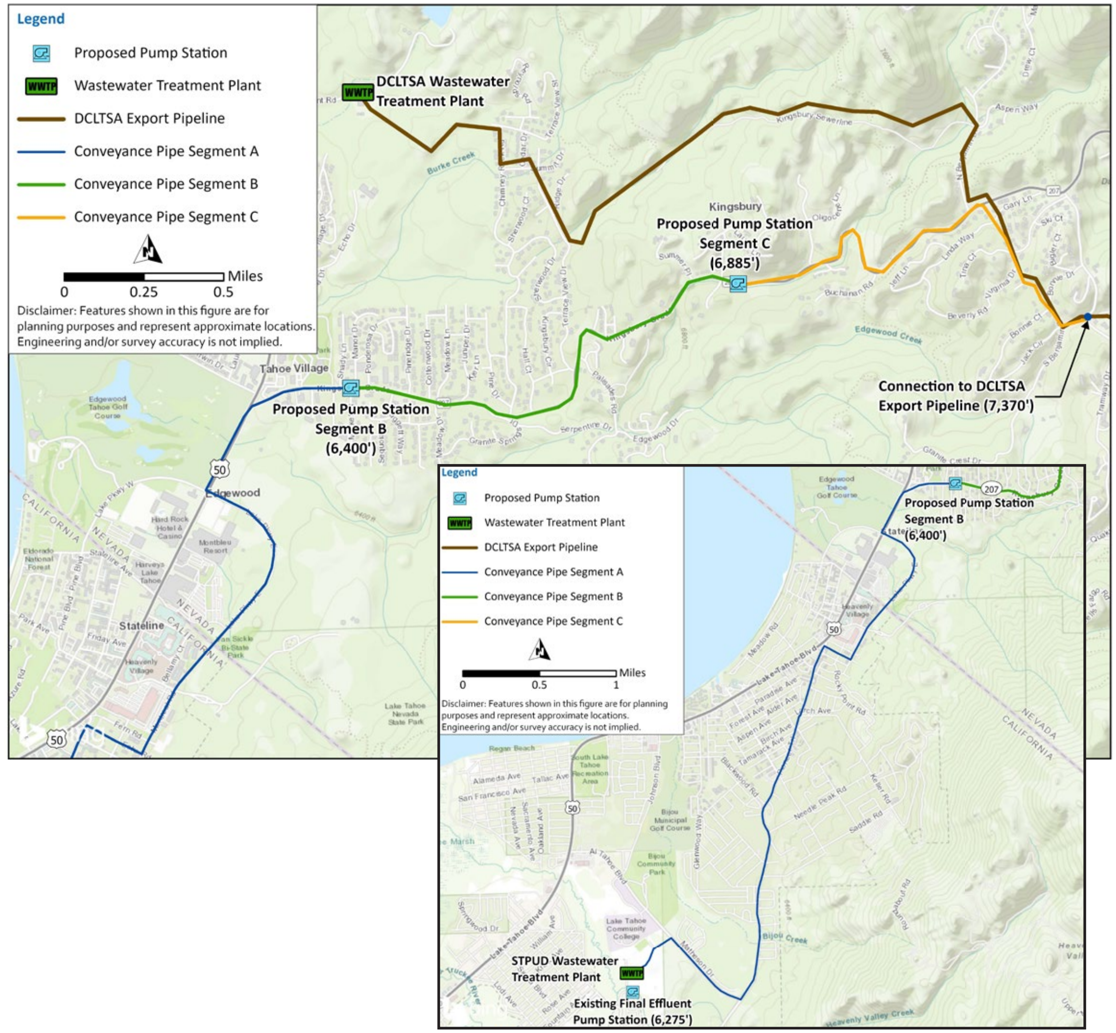
Notes:
1. Demand only used during growing season. Additional storage would need to be identified.

Alternative 7A Export and End Use Infrastructure Key Components

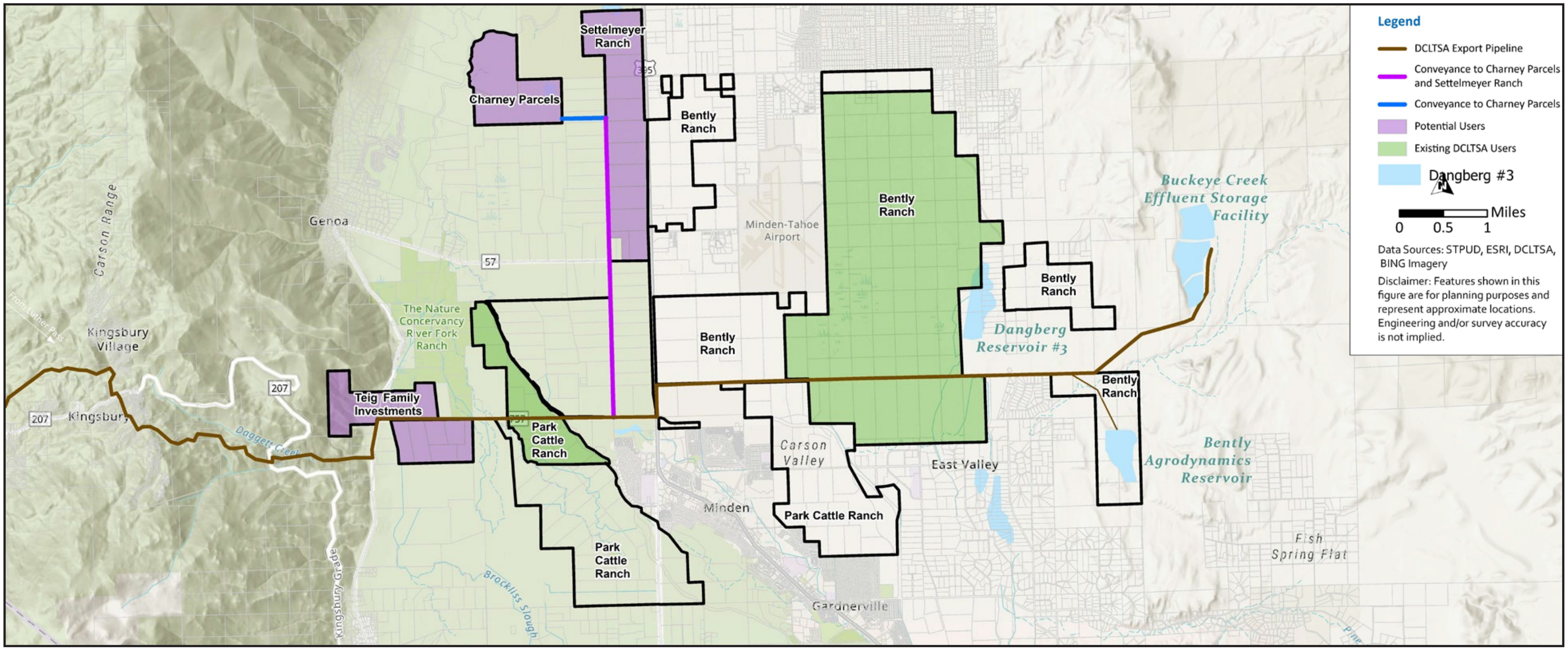
Key components of this alternative include:

- Construction of a new 24-inch, 8.3-mile transmission pipeline and 2 pump stations, within the Lake Tahoe Watershed, from the District's WWTP to the gravity portion of DCLTSA's export line. The District's existing FEPS would be used as well. A conceptual horizontal alignment is shown to the right.
- The gravity section of DCLTSA's existing export pipeline has segments that are 10-inch, 12-inch, and 14-inch diameter. Given the age and size of these segments, they would need to be replaced with approximately 3.64 miles of new 20-inch pipe.
- DCLTSA's Buckeye Creek Effluent Storage Facility would need to be lined for storage of the District's recycled water.
- Development of 1,600 AF of additional storage would likely be required for the District's recycled water.
- Expansion or modification of the ditch system may be required to deliver recycled water to the Tieg Family Investments property.
- To serve the Charney Parcels and Settelmeyer Ranches, approximately 3.91 miles of new irrigation piping would be required, as shown on the following page.

Alternative 7A Conceptual Alignment



Alternative 7A Potential Users

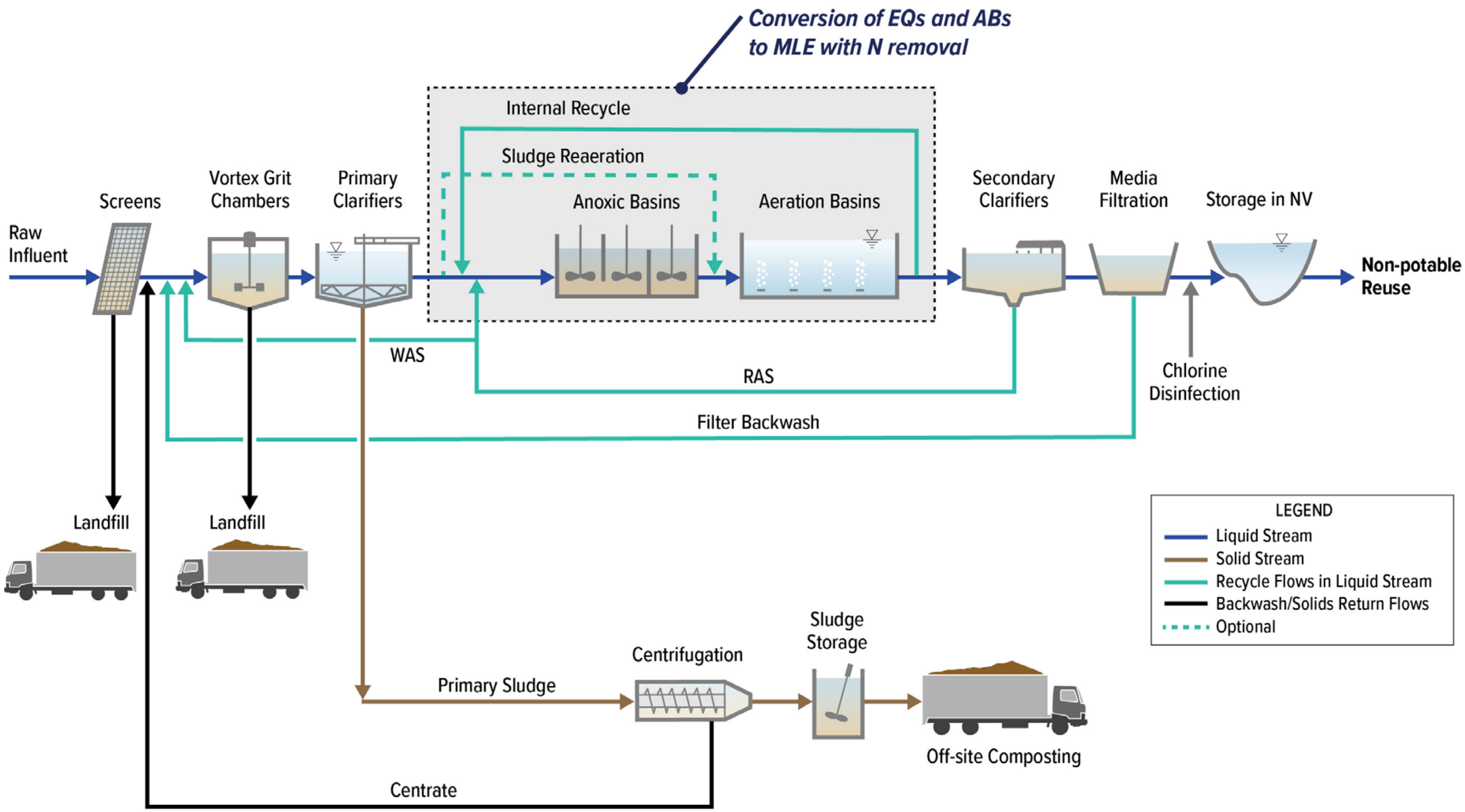


Alternative 7A Recycled Water Treatment Key Components

Key components of this alternative include:

- Upgrades to the existing WWTP for nutrient removal to provide effluent with similar quality to current DCLTSA effluent. DCLTSA recently upgraded their facility to include nitrogen removal in anticipation of future changes to their permit requirements.

Alternative 7A Recycled Water Treatment Process



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System Modifications

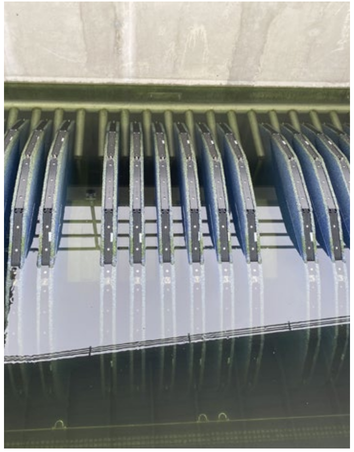
During the alternatives identification process, there was discussion of ideas and concepts that did not represent a standalone alternative that could replace the existing export and use of recycled water. Rather, these concepts were not standalone alternatives for recycled water use, but concepts that may be applicable in implementation of one or more alternatives. These concepts were termed as "system modifications" and may be considered as part of several alternatives. The five system modifications considered included:

1. Urban Fire Protection.
2. Tunneling.
3. Split Treatment.
4. Export System Energy Recovery.
5. Constructed Wetlands.

Based on technical and economic challenges, the development of an urban fire protection system and the use of tunneling to significantly reduce/eliminate the significant elevation gain in the export line were eliminated from consideration. Split treatment, where treatment processes were split between two locations, was considered, where feasible, in Alternative 3 and Alternative 6C. Energy recovery and constructed wetlands were developed to a conceptual level and are described in the following pages.

Urban Fire Protection

Tunneling



Split Treatment

Export System Energy Recovery (photo courtesy of Canyon Hydro)

Constructed Wetlands

Export System Energy Recovery

Energy recovery could be implemented as part of the District's or DCLTSA's export infrastructure. The energy recovery analysis for both systems is based on limited information and assumptions, and a feasibility analysis would need to be conducted to refine the energy recovery system sizing and location, supporting infrastructure improvements, estimated energy recovery and pay-back, use of energy generated, and regulatory approvals/permits. The conceptual analysis for the District and DCLTSA export systems generally included two options for increasing energy recovery:

- A single energy recovery system located at/near the low point of elevation on the downstream side of the export line.
- A series of energy recovery systems located along the export line, downstream of export line peak elevation.

Both of these options require energy recovery equipment, supporting infrastructure, and improvements or replacement to the existing export infrastructure. The options for the District and DCLTSA export systems are summarized in the tables below.

STPUD Energy Recovery Options

Option	Flow Assumption (mgd)	Estimated Energy Recovery (MW)	Cost
A – Pelton Wheel at base of C-Line	5.4	1.23	$123M
B – Series of Pumps as Turbines along the C-Line	5.4	0.91	$52M

Export system energy recovery for the STPUD export system could be combined with any of the alternatives that require conveyance of recycled water to Alpine County, including:

- Alternative 1: Existing System.
- Alternative 2: Expanded Disinfected Secondary-23 Delivery in Alpine County.
- Alternative 3: Expanded Disinfected Tertiary Reuse in Alpine County.
- Alternative 4: Discharge to West Fork Carson River and Use in Nevada.
- Alternative 6A, 6B, and 6D: Expanded Class A or B Reuse in Nevada.
- Alternative 6C: IPR in Nevada.

DCLTSA Energy Recovery Options

Option	Flow Assumption (mgd)	Estimated Energy Recovery (MW)	Cost
A – Pelton Wheel at base of DCLTSA Export Line	7	1.4	$45M
B – Series of Pumps as Turbines along the DCLTSA Export Line	7	1.04	$40M

Export system energy recovery for the DCLTSA export system could be combined with Alternative 7A: Treated Effluent Conveyance to DCLTSA with Reuse in Nevada, since this alternative involves use of the DCLTSA Export Line.

Definitions: mgd = million gallons per day, MW = megawatt(s).

Constructed Wetlands

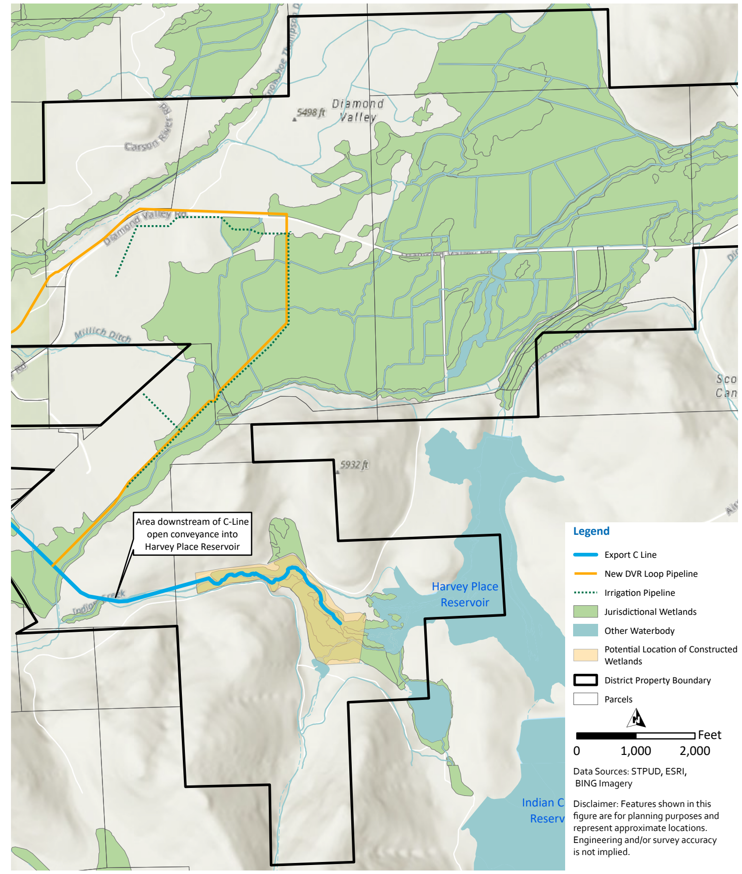
This system modification involves the addition of constructed wetlands in Alpine County on existing District property. The primary purpose of the wetlands would be to provide additional capacity for recycled water storage, in particular during periods when release from Harvey Place Reservoir is prohibited. In addition, wetlands may be designed to also provide water quality polishing, wetland habitat/ecological benefits, and possibly be used as a wetland mitigation bank.

The area located at the end of the C-Line, where there is open channel conveyance into Harvey Place Reservoir, was identified as a potential site for constructed wetlands. There are approximately 30 acres in the identified area. The wetlands would be designed to be supported by flow-through of recycled water under normal conditions. If there was an anticipated need for additional short-term storage, then the wetlands could be temporarily inundated with up to 6 ft of recycled water. Under these circumstances, approximately 180 acre-feet (AF) of additional temporary storage could be provided. At a future flow of 5.4 mgd, the wetlands could provide an additional 10 days of storage. The additional storage may provide the District with the additional time necessary to determine if early release of Harvey Place Reservoir was needed.

Obtaining regulatory approvals and permits may be challenging for constructed treatment wetlands. Field verification and additional analyses would be necessary to assess regulatory/permitting feasibility.

The applicable alternatives include all alternatives that convey effluent to Alpine County, where some portion of the water could be used to flow through wetlands prior to flowing into Harvey Place Reservoir. Applicable alternatives include:

- **Alternative 1:** Existing System.
- **Alternative 2:** Expanded Disinfected Secondary-23 Delivery in Alpine County.
- **Alternative 3:** Expanded Disinfected Tertiary Reuse in Alpine County.
- **Alternative 4:** Discharge to West Fork Carson River and Use in Nevada.
- **Alternatives 6A, 6B, and 6D:** Expanded Class A or B Reuse in Nevada.
- **Alternative 6C:** Indirect Potable Reuse in Nevada.



National wetlands mapping and potential location of constructed wetlands

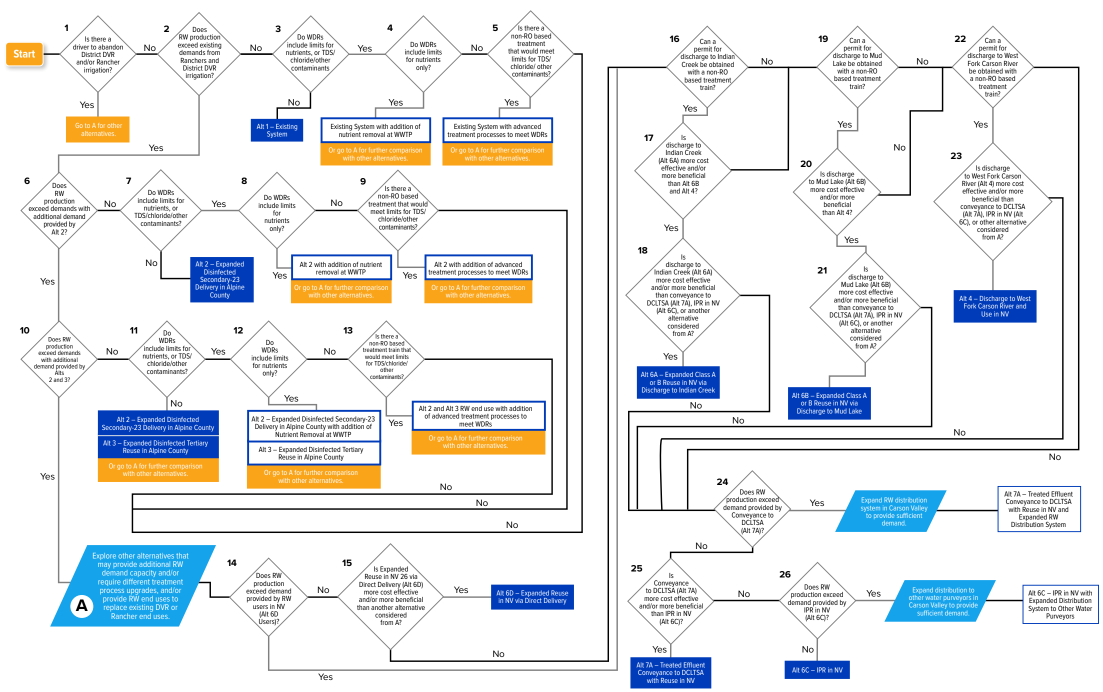
Decision-Making Framework and Tools

The District developed two tools to support selection of a recycled water system alternative:

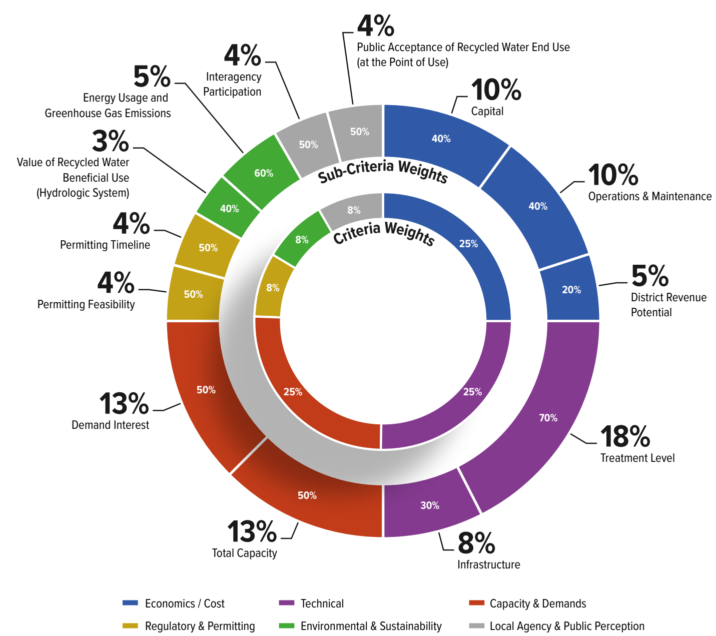
1. A Decision Diagram, which includes potential triggers for implementation and the potential alternatives that may be implemented in response to the trigger
2. Multi-Criteria Analysis, which is a framework for comparing and ranking alternatives.

These tools are intended to be used together and sequentially. The Decision Diagram is used to identify a subset of alternatives that would address a specific trigger, and the Multi-Criteria Analysis is used to select the most beneficial alternative among the subset of alternatives.

Decision Diagram



Multi-Criteria Analysis



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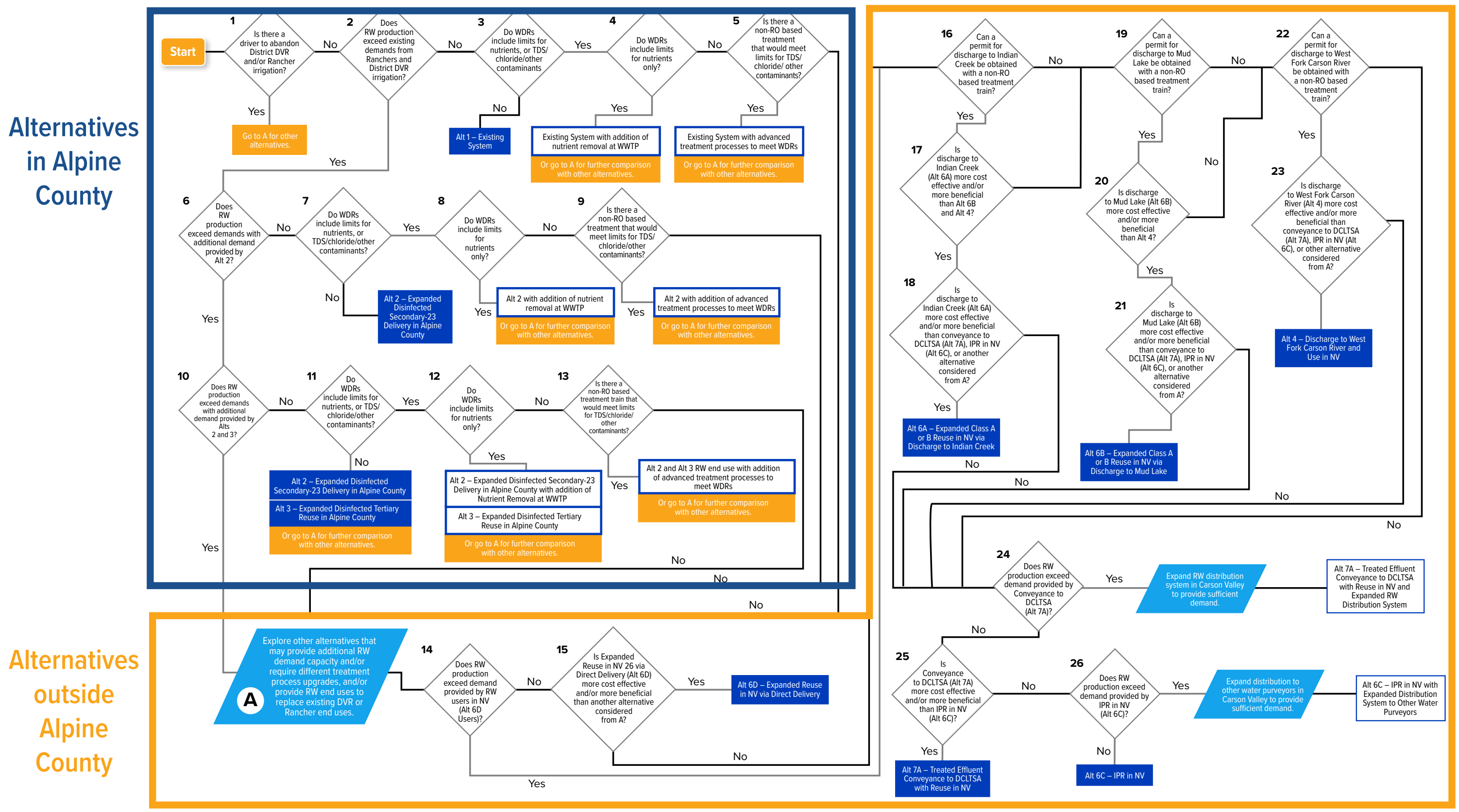
Decision Diagram

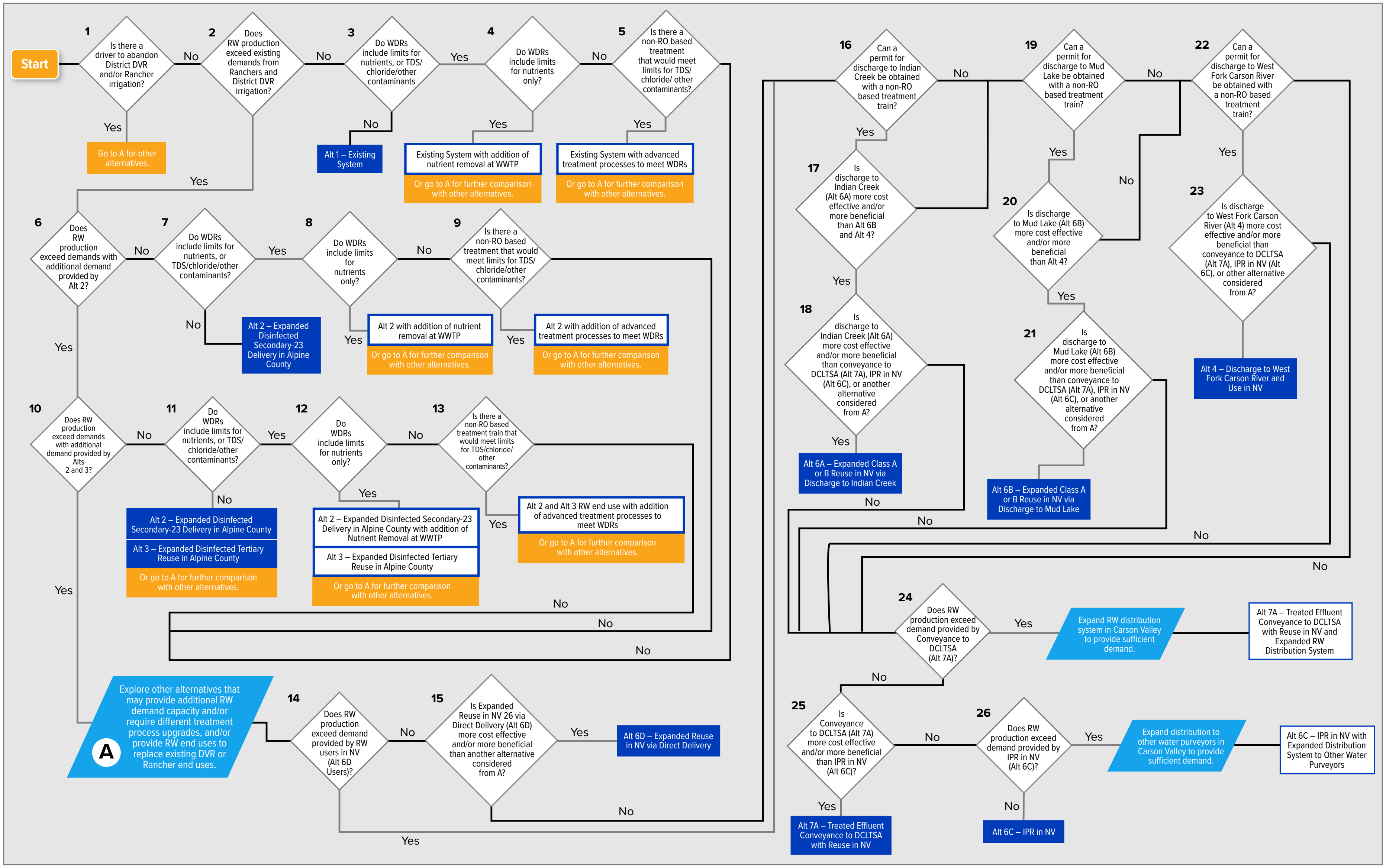
The Decision Diagram includes anticipated triggers (constraints or opportunities) and a sequence of questions to help identify the most applicable alternative(s) for implementation in response to the triggers. Going forward, the District should pay close attention to four main triggers:

1. Anticipated limitations on recycled water capacity.
2. Changes in institutional agreements that would limit recycled water capacity.
3. Changes in permit conditions/requirements.
4. Interest in recycled water by other users.

Generally, these four triggers will determine the alternatives available, and combined with the multi-criteria decision analysis, will support selection of the best alternative. The Decision Diagram provides more specific guidance related to alternatives both within Alpine County and outside Alpine County.



Decision Diagram Detail



Multi-Criteria Analysis

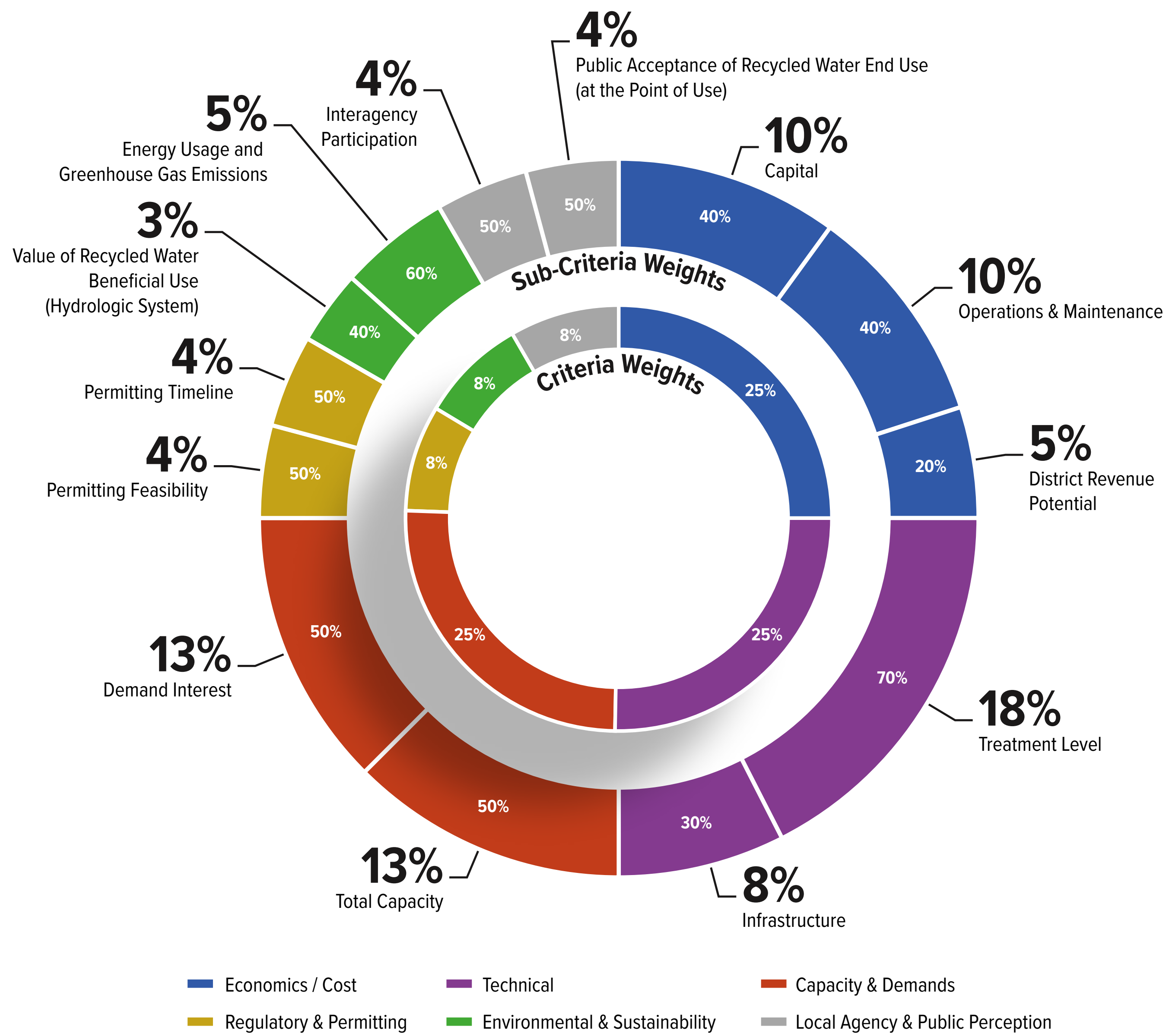
The Multi-Criteria Decision Analysis involves the use of multiple criteria, which each have associated sub-criteria. The criteria and sub-criteria utilized in this analysis are shown at right.

Each of the sub-criteria can be scored from 0 to 10, with 0 being the lowest score and 10 being the highest score. Some criteria and sub-criteria were more important than others, and therefore were weighted differently to reflect that consideration. For example, Economics / Cost, Technical, and Capacity & Demands were all weighted higher than the other criteria. Weighting of the criteria and sub-criteria was refined through feedback from the District and is shown in the graphic at right.

Weighted score = [Sub-Criteria Score x Sub-Criteria Weight] x Criteria Weight

Note: Weighting per July 2024 workshop with the District.

Weighted Scores



Recommendations

Recommended Alternatives

The recommended alternative was selected in a workshopping process with the District in July 2024, which included a ranking of alternatives and consideration of near-term constraints and opportunities (i.e., triggers for implementation). The District is faced with potential changes in the existing Rancher contracts in the next few years, which may impact the recycled water capacity of the system.

It is important to recognize the existing condition was not specifically evaluated in the July 2024 workshop. Under existing conditions, the Decision Diagram would lead to Alternative 1 – Existing System, via the following logic:

QUESTION #1

Is there a driver to abandon District DVR and/or Rancher irrigation?

Under existing conditions, the response is "**No**".

QUESTION #2

Does recycled water (RW) production exceed existing demands from Ranchers and District DVR irrigation?

Under existing conditions, the response is "**No**", which leads to Alternative 1– Existing System.

Therefore, the recommended alternative under the existing conditions is Alternative 1 – Existing System.

In the July 2024 workshop, the potential near-term constraint of reduced recycled water system capacity (if not all current Rancher contracts were renewed) was a key consideration in the process of employing the Decision Diagram and ranking the alternatives. The evaluation was conducted from the hypothetical assumption that additional recycled water capacity would be needed. Under this assumption, the Decision Diagram would lead to the consideration of multiple alternatives, via the following logic:

QUESTION #1

Is there a driver to abandon District DVR and/or Rancher irrigation?

The response is "**No**", as there are no foreseeable drivers.

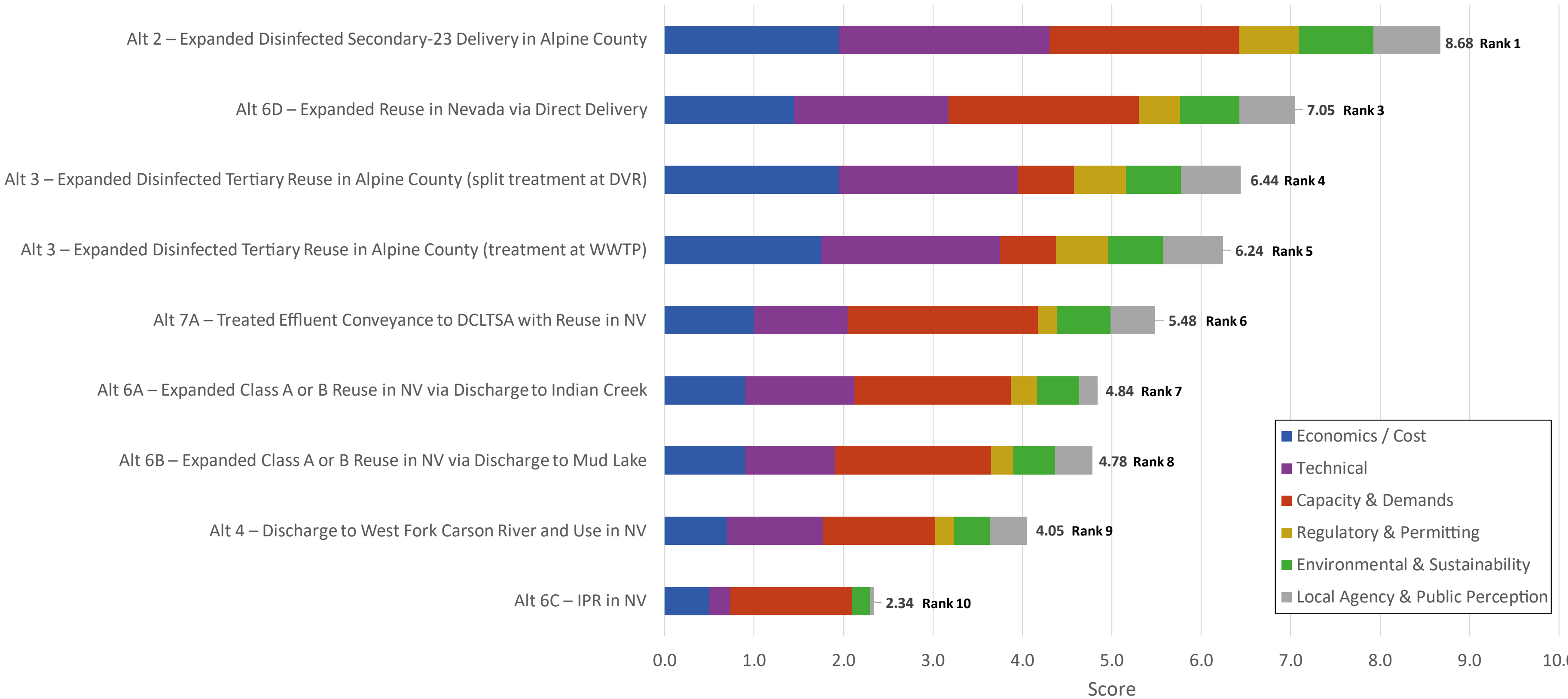
QUESTION #2

Does recycled water (RW) production exceed existing demands from Ranchers and District DVR irrigation?

Under the hypothetical assumption of a capacity need, the response is "**Yes**", which leads to Alternative 2 or several other alternatives.

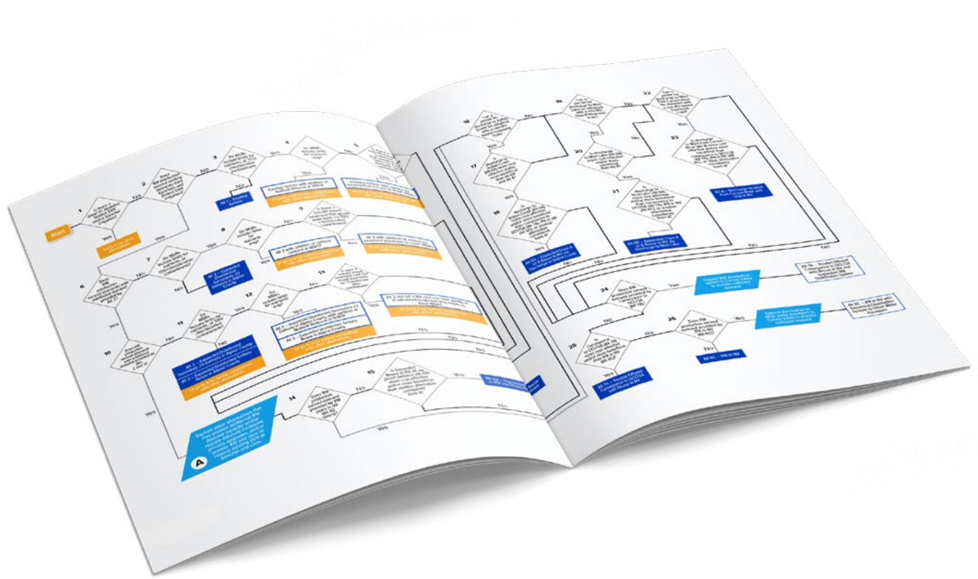
The multi-criteria decision analysis was used to compare and rank the alternatives with consideration of the potential near-term limitation on recycled water system capacity. Under these assumptions, the recommended alternative is Alternative 2 – Expanded Disinfected Secondary-23 Delivery in Alpine County, as shown on the following page.

Multi-Criteria Decision Analysis Results



Adapting to Future Conditions

In the future, threats to the continued use of the existing system may cause the District to revisit the comparison and ranking of alternatives under new assumptions. In this case, the tools created during development of the Recycled Water Strategic Plan can be revisted and updated to support future decision-making. The recommended process for revisting and updating the tools is as follows.



Step 1: Revisit the Decision Diagram	▪ Revisit the Decision Diagram based on the triggers for implementation that reflect the opportunities or constraints at the time of re-evaluation.

Step 2: Update the Multi-Criteria Decision Analysis	▪ Modify (as needed) the list of criteria and associated weights. ▪ Modify (as needed) the list of sub-criteria and associated weights. ▪ Update the alternatives with any new information associated with the scoring metrics. For example, updated costs or new information on potential recycled water users/capacity, etc. ▪ Revise the scoring of alternatives.

Appendices

Appendix A: Technical Memorandum 1, Regulatory and Legal Framework

Appendix B: Technical Memorandum 2, Alternatives Identification

Appendix C: Technical Memorandum 3, Alternatives Evaluation

Appendix D: Meeting Materials and Minutes

Appendix A:

Technical Memorandum 1, Regulatory and Legal Framework

Brownstein

Memorandum

DATE: October 2, 2023

TO: South Tahoe Public Utility District

FROM: Brownstein Hyatt Farber Schreck, LLP

RE: Legal and Regulatory Analysis in support of Alternative Development and Screening for Recycled Water Strategic Plan

I. TABLE OF CONTENTS

II. INTRODUCTION

This memorandum provides an analysis of legal and regulatory considerations in support of the South Tahoe Public Utility District's ("District") Recycled Water Strategic Plan. The objective of the Recycled Water Strategic Plan is to develop a long-term (50-yr horizon) strategy for the District's recycled water[1] disposal and/or reuse based on viable alternatives to the existing system identified by the District and its consultants through consultation with the public. These alternatives would be triggered for implementation by existing or future drivers and constraints. The scope of this legal and regulatory memorandum is limited to analysis of issues relating to transportation, discharge, and use of recycled water and does not include in depth discussion of other environmental regulatory considerations that may be applicable to the identified alternatives.

The next step in the Recycled Water Strategic Plan development process is identification of a narrowed list of alternatives selected for further development, including consideration of cost and implementation. With stakeholder and public input, the remaining alternatives will be ranked and the additional analysis memorialized. Ultimately, any alternative(s) selected for implementation that represent a change to the status quo would undergo a rigorous environmental review and permitting process prior to their adoption and construction, as appropriate based on the scope of the alternative(s) at issue.

III. BACKGROUND

A. Alternatives Under Evaluation

The alternatives under evaluation fall broadly into two categories involving either: (i) recycled water end uses in the Lake Tahoe Basin (the "Basin") or (ii) export out of the Basin for end uses in California or Nevada.

Alternatives within the first category—in-Basin uses—include the use of recycled water for the following purposes:

- Urban landscape irrigation and/or snowmaking;
- Urban fire protection in and around the City of South Lake Tahoe and El Dorado County within the District's service area;

[1] Throughout this memorandum, "recycled water" is used when discussing California regulatory requirements and "reclaimed water" is used when discussing Nevada regulatory requirements, consistent with currently used terminology. Other synonyms, including "effluent" and "treated water", may appear within older statutory language.

- Discharge into a Lake Tahoe tributary, including Heavenly Valley Creek, Trout Creek, or the Upper Truckee River;
- Indirect potable reuse in the Basin (groundwater basin as the environmental buffer); or
- Direct potable reuse in the Basin (via raw water augmentation or treated water augmentation).

The second category—export alternatives—are grouped by the location of the proposed end uses and include the following alternatives:

- End uses in Alpine County:
    - The District's existing secondary 23 reuse in Alpine County;
    - The District's existing secondary 23 reuse in Alpine County with enhanced energy recovery;
    - Expanded secondary 23 reuse in Alpine County;
    - Expanded reuse in Alpine County with disinfected tertiary treatment; or
    - Groundwater injection for disposal in Alpine County.
- End uses in the El Dorado County/the American River watershed
- End uses in Nevada:
    - New reuse in Nevada conveyed via Indian Creek or a pipeline to Mud Lake;
    - Conveyance to Douglas County Lake Tahoe Sewer Authority ("DCLTSA") for conveyance in their export line into the Carson Valley for reuse, with either full treatment at the District or partial or no treatment at the District; or
    - Snowmaking in Nevada outside of the Basin.
- End uses in California and/or Nevada:
    - Discharge in Alpine County with end uses in California or Nevada, including: (i) use of Indian Creek as a potential discharge location or (ii) discharge into the West Fork Carson River; or

- Discharge in Nevada County with end uses in California or Nevada, such as conveyance to the Tahoe City Public Utility District wastewater collection system for conveyance to Tahoe-Truckee Sanitation Agency ("TTSA") and discharge to the Truckee River, with either full treatment at the District or partial or no treatment at the District.

The analysis that follows in this memorandum evaluates key legal and regulatory requirements relating to the transportation and discharge of recycled water from the District's treatment plant to a number of alternative locations, identifying potential obstacles to the implementation of these alternatives to promote informed decision-making. This memorandum does not address in detail the environmental review and permitting processes that could be triggered by specific alternatives. Ultimately, any alternative(s) selected for implementation that represent a change to the status quo would undergo a rigorous environmental review and permitting process prior to their adoption and construction, as appropriate based on the scope of the alternative(s) at issue.

B. Background on Regulation of Recycled Water in California and Nevada

This section provides general background on the legal and regulatory requirements generally applicable to the discharge of wastewater and the use of recycled water in California and Nevada.

1. California

a. Porter-Cologne Act

Under the Porter-Cologne Water Quality Control Act of 1970 ("Porter-Cologne Act"), the regional water quality control boards are authorized to regulate the discharge of waste by any person that could affect the quality of the waters of the state.[2] A regional board, after reviewing the required report and after any necessary hearing, may prohibit the discharge, waive the issuance of discharge requirements authorizing a discharge that could affect the quality of the state's waters, or issue waste discharge requirements ("WDRs").[3]

WDRs must implement relevant water quality control plans,[4] and consider the beneficial uses to be protected, water quality objectives reasonably required for that purpose, other waste discharges, and the need to prevent nuisances.[5] Relevant provisions include effluent limitations, receiving water

[2] Water Code § 13260.
[3] Water Code §§ 13260, 13263.
[4] Water Code § 13241.
[5] Water Code § 13263(a).

standards, monitoring requirements, and time schedules for implementation of standards and requirements.[6]

Each regional board must establish water quality objectives for the waters within its jurisdictional region to ensure the reasonable protection of the designated beneficial uses and the prevention of nuisance.[7] These objectives are the heart of the water quality control plans.

A regional board is authorized to impose administrative civil liability for intentional or negligent discharges that violate WDRs or violate a prohibition and create a condition of pollution of nuisance.[8]

b. State Water Resources Control Board Division of Drinking Water Regulations

Use of recycled water in California must comply with the State Water Resources Control Board ("SWRCB") Division of Drinking Water ("DDW") regulations. Title 22 of the California Code of Regulations establishes the treatment requirements for recycled water as well as the approved uses based on the level of treatment. Title 22 defines four classifications of recycled water determined by the level of treatment provided, total coliform bacteria, and turbidity levels. The table below presents some of the key requirements for the four classifications of recycled water.

Treatment Level	Approved Uses
Title 22 Disinfected Tertiary Recycled Water	Spray Irrigation of Food Crops Landscape Irrigation (1) Non-restricted Recreational Impoundment
Title 22 Disinfected Secondary – 2.2 Recycled Water	Surface Irrigation of Food Crops Restricted Recreational Impoundment
Title 22 Disinfected Secondary – 23 Recycled Water	Pasture for Milking Animals Landscape Irrigation (2) Landscape Impoundment
Undisinfected Secondary Recycled Water	Surface Irrigation of Orchards and Vineyards (3) Fodder, Fiber, Seed Crops

6 See, e.g., Water Code § 13263(c).
7 Water Code § 13241.
8 Water Code § 13350(a).

Notes:
(1) Includes unrestricted access golf courses, parks, playgrounds, school yards, and other landscaped areas with similar access.
(2) Includes restricted access golf courses, cemeteries, freeway landscapes, and landscapes with similar public access.
(3) Provided no fruit is harvested that has come in contact with irrigating water or the ground.

Figure 1: Categories and water quality standards for reuse of recycled water as set by Title 22 of the California Code of Regulations.

Title 22 of the California Code of Regulations also includes regulations for groundwater recharge of recycled water by surface spreading and injection.[9] Any plan to reuse recycled water must comply with these indirect potable reuse regulations. The SWRCB Division of Drinking Water is in process of developing regulations for direct potable reuse of recycled water. Any direct use of recycled water for drinking water purposes will need to comply with these new situation regulations.

2. Nevada

In addition to complying with California law for transmission of recycled water to Nevada, any use of the District's reclaimed water in Nevada must also comply with Nevada law. Reclaimed water[10] use in Nevada is administered by the Bureau of Water Pollution Control within the Nevada Division of Environmental Protection ("NDEP"), and is subject to Chapter 445A of the Nevada Revised Statutes and the regulations set forth in the Nevada Administrative Code.

Specifically, any Nevada irrigator would be required to (1) prepare a reclaimed water management plan and obtain approval from NDEP, and (2) obtain a discharge permit.[11] This section also provides that the reclaimed water must receive at least secondary treatment, defined as the treatment of sewage until the sewage has, calculated as a 30-day average, (1) a 5-day inhibited biochemical oxygen demand concentration of 30 milligrams per liter or less, (2) a total suspended solids concentration of 30 milligrams per liter or less, and (3) a pH of 6.0 to 9.0 SU. In addition to the management plan approval and permitting requirements, the use of reclaimed water must also comply with Nevada's water quality standards. The water quality standards are set forth in Chapter 445A of the Nevada Revised Statutes and in regulations Nevada Administrative Code ("NAC") 445A.11704 through 445A.2234.

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[9] California Code of Regulations, Title 22, Division 4, Chapter 3 (Water Recycling Criteria).
[10] Nevada uses the term "reclaimed water" in lieu of "recycled water."
[11] Nevada Administrative Code ("NAC") § 445A.275 ("A person shall not use reclaimed water unless . . . [t]he person has: (1) Received the approval of the Division of a plan for the management of reclaimed water; and (2) Obtained a permit not undergone pursuant to NAC 445A.228 and 445A.263.").

Other agencies may also have regulatory authority over the use of reclaimed water in Nevada. In planning the use of reclaimed water for irrigation, the irrigator must first contact the NDEP to determine the appropriate regulatory oversight requirements and the permit criteria. The Nevada Division of Water Resources must also be notified of the plan to use reclaimed water in order to address requirements for secondary water rights. Additionally, the NDEP Bureau of Safe Drinking Water ensures the use of reclaimed water is consistent with all water supply protection requirements. Finally, the local government and water purveyor may have rules on reclaimed water usage.

C. Changes to Status Quo Will Require Environmental Review

Implementation of any alternative involving changes to the status quo in the management of recycled water would likely trigger some level of environmental review under federal and/or state law. The greater the potential impact, the greater the depth of required analysis. A brief summary of the potentially applicable environmental review processes is discussed below to provide a general understanding of the processes, but the alternatives have not undergone any environmental review or evaluation at this stage. Once the alternatives are screened and further developed, an initial environmental review would be conducted to further evaluate the selected alternative(s).

1. National Environmental Protection Act ("NEPA")

NEPA is triggered when a federal agency develops a proposal to take a "major Federal action[ ]."[12] A major federal action is defined in the Council on Environmental Quality ("CEQ") implementing regulations to include "actions with effects that may be major and which are potentially subject to Federal control and responsibility."[13]

NEPA compliance is therefore required when state and local projects have a federal "nexus," such as when federal funds are used in whole or in part to fund an action, where an action will occur in whole or in part on federal land, or where an action is implemented through a federal program.[14]

The level of analysis required under NEPA varies according to the project's level of environmental impact. Per the CEQ regulations, federal agencies may comply with NEPA by preparing either an

[12] 42 U.S.C., § 4332(C).
[13] 40 C.F.R. § 1508.18.
[14] See 40 C.F.R. § 1508.18.

environmental impact statement ("EIS"),[15] an environmental assessment ("EA")[16] or by applying a categorical exclusion ("CE").[17] An EIS is the most comprehensive NEPA analysis document; an EA is less in-depth and determines whether an EIS must be prepared or whether a proposed action is not expected to have significant impacts; CEs are simpler evaluations that generally do not require analysis beyond a short decision memorandum or, in some cases, no additional documentation at all.

2. California Environmental Quality Act ("CEQA")

In comparison to NEPA, which has been described as merely "procedural," CEQA imposes a substantive mandate on agencies in California, requiring them to refrain from approving projects with significant environmental impacts where there are "feasible alternatives or feasible mitigation measures."[18]

CEQA is triggered when a public agency in California "approves" a project that is subject to CEQA.[19] "Approval" is defined as any decision that commits the agency to a "definite course of action in regard to a project."[20] A public agency is not committed to a future course of action simply by virtue of being a proponent or advocate of a project.[21] Nor is an agency committed to a future course of action by virtue of issuing a statement of intent to enter into a particular agreement, which would require subsequent formal ratification.[22] The exact time of project approval is a matter determined by each public agency according to its rules, regulations, and ordinances.[23] Legislative action on a project often constitutes approval.[24]All environmental review required under CEQA must occur before such public agency approval.[25]

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[15] An EIS must contain an in-depth discussion of the potential impacts a proposal may have upon the environment. 42 U.S.C., § 4332(2)(C). Typically, an EIS evaluates the purpose of and need for the proposed action, the proposed action and its alternatives, the environment affected by the proposed action, and the environmental consequences of the proposed action. 40 C.F.R. § 1502.10.

[16] Although an EA is less comprehensive and less burdensome to prepare than an EIS, it still represents a considerable analysis of the potential environmental impacts of a proposed action. Generally, an EA includes a brief discussion of 1) the need for the proposal; 2) alternatives to the proposal; 3) environmental impacts of the proposed action and alternatives; and 4) a listing of agencies and persons consulted. 40 C.F.R. § 1508.9(b).

[17] 40 C.F.R. § 1508.4.

[18] Pub. Res. Code, § 21102; Remy, et al., "Guide to CEQA" (2007), pp. 1-2.

[19] Pub. Res. Code § 21080.

[20] CEQA Guidelines § 15352.

[21] Matthew Bender, 1-21 California Environmental Law & Land Use Practice, § 21.03.

[22] Matthew Bender, 1-21 California Environmental Law & Land Use Practice, § 21.03.

[23] CEQA Guidelines § 15352(a).

[24] CEQA Guidelines § 15352(a).

[25] Matthew Bender, 1-21 California Environmental Law & Land Use Practice, § 21.03.

CEQA applies only to "projects." The term "project" is defined broadly to include any activity that: (i) may cause a direct (or reasonably foreseeable indirect) physical environmental change; and (ii) is directly undertaken by a public agency, supported in whole or in part by a public agency, or involves the issuance by a public agency of some form of discretionary entitlement or permit. [26]An activity that does not meet this definition of a project is not subject to CEQA.

As with NEPA, the level of analysis required under CEQA varies according to the project's level of environmental impact and whether it falls within an exemption from CEQA.

A CEQA lead agency must prepare an Environmental Impact Report ("EIR"), whenever substantial evidence in the record supports a fair argument that a project may have a significant effect on the environment—defined as a substantial or potentially substantial adverse change to the physical environment resulting from implementation of the project.[27] The EIR must describe the proposed project, its environmental setting, its objectives, identify and analyze significant effects on the environment, state how those impacts can be mitigated or lessened, and identify alternatives to the project.[28] Mitigation measures may avoid, minimize, or compensate for significant adverse impacts, and need to be fully enforceable through permit conditions, agreements, or other legally binding means.[29] Mitigation measures are not required for effects that are found to be less than significant.

A Negative Declaration ("ND") is a written report by the lead agency that describes the reasons a proposed project will not have a significant effect on the environment.[30] A Mitigated Negative Declaration ("MND") is a document that can be used when the lead agency anticipates that the project may have a significant effect, but that such effect can be eliminated through incorporation of mitigation measures.[31] An MND/ND must include: (a) a brief description of the project; (b) the location of the project, preferably shown on a map, and the name of the project proponent; (c) a proposed finding that the project will not have a significant effect on the environment; (d) an attached copy of the initial study documenting reasons to support the finding; and (e) mitigation measures, if any, included in the project to avoid potentially significant effects.[32]

Additionally, there are two types of exemptions under CEQA: statutory and categorical. Statutory exemptions are created by the legislature for certain classes of projects, regardless of whether such

[26] See Kostka and Zischke, Practice Under the California Environmental Quality Act § 4.5 at 158-159 (hereafter "Kostka & Zischke"), citing Pub. Res. Code, § 21065 and CEQA Guidelines § 15378).
[27] *No Oil, Inc. v. City of Los Angeles* (1974) 13 Cal.3d 68, 75, 82.
[28] *Federation of Hillside and Canyon Assocs. v. City of Los Angeles* (2004) 126 Cal.App.4th, 1180, 1197; CEQA Guidelines §§ 15123–15130.
[29] CEQA Guidelines § 15126.4(a).
[30] Kostka & Zischke, § 7.1.
[31] Kostka & Zischke, § 7.1.
[32] CEQA Guidelines § 15071.

projects create adverse environmental impacts. The statutory exemptions are listed in CEQA Guidelines sections 15260-15263, and include, for example, natural disaster repair, minor infrastructure improvements, planning studies, adoption of timberland preserves, emergency projects, and water management plans.

The categorical exemptions include a list of projects for which the California Natural Resources Agency has determined are not likely to have an adverse effect on the environment.[33] Unlike statutory CEQA exemptions, there are exceptions to the categorical exemptions. Specifically, the categorical exceptions do not apply if they will result in damages to scenic resources, will cause a substantial adverse change in the significance of a historical resource, if there is a reasonable probability of significant individual or cumulative environmental effect due to "unusual circumstances," or if the project will have impacts on a uniquely sensitive environment.[34]

3. Tahoe Regional Planning Agency ("TRPA") Project Impact Assessment Guidelines

Article VII(a)(2) of the Tahoe Regional Planning Compact requires TRPA, when acting upon matters that may have a significant effect on the environment, to prepare and consider a detailed EIS before deciding to approve or carry out any project.[35] The TRPA Code states that an EIS shall identify significant environmental impacts of the proposed project (i.e., proposed action), any significant adverse environmental effects that cannot be avoided should the project be implemented, and mitigation measures that must be implemented to ensure meeting standards of the Lake Tahoe Basin.[36] In addition, an EIS must evaluate growth-inducing impacts of the proposed project[37] and include a discussion of the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity and any significant irreversible and irretrievable commitments of resources that would be involved in the proposed project should it be implemented.[38]

TRPA uses either an initial environmental checklist ("IEC") or EA to determine whether an EIS should be prepared for a project or other matter.[39] If, after the IEC or EA TRPA finds that a project or matter will not have a significant effect, no further environmental documentation is required.[40]

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[33] Pub. Res. Code § 21084.
[34] CEQA Guidelines § 15300.2.
[35] TRPA Code § 3.2.1.
[36] TRPA Code § 3.7.2.
[37] TRPA Code § 3.7.2.
[38] TRPA Code § 3.7.2.
[39] TRPA Code § 3.3.
[40] TRPA Code § 3.3.5.

Additionally, the Tahoe Regional Planning Compact requires TRPA to make findings before taking certain actions, including findings relating to environmental impacts. Specifically, TRPA must find wherever federal, state, or local air and water quality standards apply, the strictest standards shall be attained, maintained, or exceeded pursuant to Article V(d) of the Tahoe Regional Planning Compact.[41] In making the required findings, TRPA must (1) identify the nature, extent, and timing or rate of effects of the project; (2) quantify and record any contribution of the project to any of the cumulative accounts for units of use, resource utilization, and threshold attainment and maintenance; (3) confirm that any resource capacity utilized by the project is within the amount of the remaining capacity available; (4) confirm that the project will not prevent attainment of any adopted target date (subsection 16.5.1) or interim target (subsection 16.5.2); (5) identify adequate means by which to measure project-specific mitigation measures' effectiveness; and (6) confirm that sufficient capacity remains in each of the respective capacities that are utilized by the project to permit development of recreation projects contained in the TRPA Environmental Improvement Program.[42]

D. <u>Permitting</u>

As stated above, any alternative(s) ultimately selected for implementation that represent a change to the status quo would undergo a rigorous environmental review and permitting process prior to their adoption and construction, as appropriate based on the scope of the alternative(s) at issue. Required permits and approvals may include new or amended land use or recycled water permits.

For example, a selected alternative may require land use permits or approvals issued by TRPA or a city or county in which the infrastructure associated with the alternative is located. As discussed below, many alternatives, if implemented, would require the amendment of existing recycled water discharge and use permits. For changes within California, the applications for amendment would be made with the Lahontan Regional Water Quality Control Board ("Lahontan RWQCB"). Any change in location or use of reclaimed water in Nevada would require approval from NDEP.

These examples—and the permitting requirements discussed elsewhere in this memorandum—are not exhaustive. This memorandum focuses on identifying the need for new or amended permits relating to the use and transportation of recycled water, not on land use and construction issues or specific permit application processes. As with environmental review, once the alternatives are screened and further developed, an assessment of permitting requirements can be prepared in order to further determine the preferred alternative(s).

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[41] TRPA Code § 4.4.1(C).
[42] TRPA Code § 4.4.2.

IV. ANALYSIS

The following analyzes the key legal and regulatory requirements applicable to each category of recycled water alternatives being considered as part of the District's Recycled Water Strategic Plan.

A. In-Basin Uses

1. Porter-Cologne Act

The most significant legal barrier to this category of alternatives is that the use of recycled water in the Basin would require an amendment to the Porter-Cologne Act as adopted by the California Legislature and signed into law in 1969.

Specifically, an amendment would be required to Water Code section 13951, which requires the export of wastewater from the Basin, as follows:

> [W]aste from within the Lake Tahoe watershed shall be placed only into a sewer system and treatment facilities sufficient to handle and treat any such waste and transportation facilities sufficient to transport any resultant effluent outside the Lake Tahoe watershed, except that such waste may be placed in a holding tank which is pumped and transported to such treatment and transportation facilities.[43]

Water Code section 13951 provides a limited exception to the requirement of transporting effluent out of the Basin where the Lahontan RWQCB finds that the means of waste disposal will not affect the quality of water of Lake Tahoe and that the sewering of the area would have a damaging effect on the environment.[44] Most of the Basin, however, has long been sewered.

The level of treatment of wastewater is not expressly considered under Water Code section 13951, which mandates that "any resultant effluent" be transported outside of the Basin.

There are some narrow statutory carveouts allowing limited use of recycled water in the Basin. For example, Water Code section 13952 permits pilot reclamation projects within the Basin; however, only projects submitted before January 1, 1984 are allowable under this statute. Water Code section

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[43] Water Code § 13951.

[44] Water Code § 13951 ("This section shall not be applicable to a particular area of the Lake Tahoe watershed whenever the regional board for the Lahontan region finds that the continued operation of septic tanks, cesspools, or other means of waste disposal in such area will not, in-dividually or collectively, directly or indirectly, affect the quality of the waters of Lake Tahoe and that the sewering of such area would have a damaging effect upon the environment.").

13952.1 permits the District to provide recycled water to prevent destruction of its Luther Pass pump station from catastrophic fire.

Lahontan RWQCB staff have indicated that achieving in-Basin uses would be difficult and that even if the use of recycled water were approved in the Basin, the District might still need to maintain its existing export system infrastructure as back-up for wastewater disposal in the event of failure of the recycled water treatment system.

2. Tahoe Regional Planning Agency

TRPA, created in 1980 through Public Law 96-551, 94 Stat. 3233, has authority to regulate wastewater dischargers in the Tahoe Basin.[45] If an exemption under Water Code section 13951 were available for the use of recycled water in the Basin, TRPA approval would likely also be required for any in-Basin use of recycled water.

a. Lake Tahoe Water Quality Management Plan ("WQM" or "208" Plan)

208 Plans are required for certain areas by section 208 of the Federal Clean Water Act. These plans promote efficient and comprehensive programs for controlling water pollution in a defined geographic area. As explained in federal regulation: "WQM plans are used to direct implementation. WQM plans draw upon the water quality assessments to identify priority point and nonpoint water quality problems, consider alternative solutions and recommend control measures, including the financial and institutional measures necessary for implementing recommended solutions."[46]

The Lake Tahoe 208 Plan was updated by TRPA on December 12, 2012 and finalized on June 19, 2013 following certification by Lahontan RWQCB, NDEP, and U.S. Environmental Protection Agency ("USEPA").[47] The Lake Tahoe WQM Plan incorporates by reference those documents listed in Table 2 of the Plan (shown below); however, changes to underlying water quality regulatory authorities or key policy concepts that affect overall implementation requires review and possible update.[48]

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[45] See Public Law 96-551, Art. V(d) ("[TRPA] may . . . adopt air or water quality standards or control measures more stringent than the applicable State implementation plan or the applicable Federal, State, or local standards for the region . . ."); Art. VI(a) (". . . The regulations of [TRPA] shall contain standards including . . . Water purity and clarity . . . and watershed protection."

[46] 40 C.F.R. § 130.6.

[47] TRPA, Lake Tahoe Water Quality Management Plan (Jun. 19, 2013), available at: https://www.trpa.gov/regional-plan/#208.

[48] TRPA, Lake Tahoe Water Quality Management Plan (Jun. 19, 2013).

TABLE 2 – WQMP COMPONENTS AND SUBSEQUENT AMENDMENTS INCORPORATED BY REFERENCE	
AGENCY	**DOCUMENT**
TRPA	July 26, 2012 Bi-State Recommendations
	Regional Plan
	Code of Ordinances
	Regional Plan EIS
	BMP Handbook
Lahontan Regional Water Quality Control Board	Water Quality Control Plan for the Lahontan Region (Lahontan Basin Plan)
	Lake Tahoe TMDL for the California portion of the Region
	Lake Tahoe TMDL Substitute Environmental Document
	Other TMDLs for California 303d listed waters in the Region
Nevada Division of Environmental Protection	Lake Tahoe TMDL for the Nevada portion of the Region
	Other TMDLs for Nevada 303d listed waters in the Region
The Counties, City of South Lake Tahoe, and State Departments of Transportation	Load Reduction Plans
	Conforming Area Plans
U.S. Forest Service	U.S. Forest Service Forest Plan for the Lake Tahoe Region
	Conforming Area Plans
	U.S. Forest Service Soil and Water Conservation Handbook in California
	U.S. Forest Service BMP Manual in Nevada

Figure 2: Water Quality Management (208) Plan Table 2, showing plan components and subsequent amendments incorporates by reference into the plan.

b. TRPA Code of Ordinances

Water Quality ordinances are located in TRPA Code of Ordinances Chapter 60.[49]

TRPA Code section 60.1.3 describes discharge limitations for various pollutants. TRPA's concentration-based standards are not directly comparable with the more contemporary particle number- and mass-based standards used to assess water quality compliance with the Lake Tahoe Total Maximum Daily

[49] The TRPA Code of Ordinances is available at: https://www.trpa.gov/wp-content/uploads/TRPA-Code-of-Ordinances.pdf.

Load ("TMDL"). They are based on two different approaches to measuring water quality. Hence, when a TMDL load reduction plan and program is in place, the TMDL plan and program supersede the TRPA requirements.[50] Where a TMDL load reduction plan and program are not in place, however, the TRPA concentration-based standards remain in effect.[51]

TRPA prohibits discharge of "domestic, municipal, or industrial wastewater to Lake Tahoe, its tributaries, the ground waters of the Tahoe region, or the Truckee River within the Tahoe region."[52] TRPA Code section 32.5 references the prohibition: "all projects described in Section 32.2 that generate wastewater shall be served by facilities for the treatment and export of wastewater from the Lake Tahoe Basin." As in the Porter-Cologne Act, the TRPA Code permits recycled wastewater to be used for emergency fire protection.[53] These sections would require amendment in the event of any in-Basin use of recycled wastewater.

c. TRPA Regional Plan

The TRPA Regional Plan includes goals to "reduce or eliminate point sources of pollutants which affect, or potentially affect, water quality in the Tahoe region" (Goal WQ-2) and "prevent liquid and solid wastes from degrading Lake Tahoe and the surface and groundwaters of the region" (Goal PS-3).[54] In support of these goals, the plan describes the prohibition on in-Basin discharge of "wastewater" and "sewage".[55] Policies WQ-2.1 and PS-3.1 prohibit discharge of "municipal or industrial wastewater" to Lake Tahoe, its tributaries, or the groundwaters of the Tahoe region.[56] Policy WQ-2.1 states that the region's surface and groundwaters cannot accept "waste waters" and still meet thresholds and state water quality standards.[57] Similarly, policy PS-3.1 reiterates state law and existing TRPA policy "to prevent degradation of the water quality of the Region."[58] Policy WQ-2.2 prohibits discharge of "sewage" to Lake Tahoe, its tributaries, or the region's groundwater and notes such discharges would contribute to nutrient loads in Lake Tahoe and could cause public health

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[50] TRPA, Lake Tahoe Water Quality Management Plan (Jun. 19, 2013), § 3.3, available at: https://www.trpa.gov/regional-plan/#208.
[51] TRPA, Lake Tahoe Water Quality Management Plan (Jun. 19, 2013), § 3.3, available at: https://www.trpa.gov/regional-plan/#208.
[52] TRPA Code § 60.1.3(C). Nevada implemented similar restrictions by Executive Order by the Governor of Nevada dated January 27, 1971.
[53] TRPA Code § 60.1.3(C)(4).
[54] TRPA, Threshold Standards and Regional Plan Regional Plan: Lake Tahoe (amended Apr. 28, 2021) ("TRPA Regional Plan"), pp. 2-36; 6-3, available at: https://www.trpa.gov/wp-content/uploads/Adopted-Regional-Plan.pdf.
[55] TRPA Regional Plan, pp. 2-36; 6-3.
[56] TRPA Regional Plan, p. 2-36; 6-3.
[57] TRPA Regional Plan, p. 2-36.
[58] TRPA Regional Plan, p. 6-3.

concerns.[59] Discharge of wastewater within the Tahoe Basin is prohibited by the TRPA Regional Plan; therefore, the TRPA Regional Plan would need to be amended to permit in-Basin discharge of recycled water.

3. Lahontan RWQCB

The SWRCB was created by the Legislature in 1967 and sets statewide policy for the implementation of state and federal laws and regulations. There are nine regional water quality control boards, including Lahontan Regional Water Quality Control Board ("Lahontan RWQCB"), which implement water quality control plans, referred to as "basin plans," that recognize the regional differences in natural water quality, beneficial uses, and water quality issues associated with human activities. The Lahontan RWQCB's jurisdiction extends from the Oregon border to the northern Mojave Desert and includes all of California east of the Sierra Nevada crest, which encompasses the Tahoe Basin and Alpine County.[60]

a. Water Quality Control Plan for the Lahontan Region ("Basin Plan")

The Basin Plan, which took effect in 1995, contains the water quality standards and control measures for surface and ground waters in the Lahontan region. The Basin Plan designates beneficial uses for water bodies and establishes water quality objectives, waste discharge prohibitions, and other implementation measures to protect those beneficial uses.

Another regulatory barrier to all in-Basin alternatives is that the use of recycled water in the Basin would likely require an amendment to the Basin Plan, as discussed below.

(1) Outstanding National Resource Waters Designation

The Basin Plan identifies Lake Tahoe as Outstanding National Resource Waters ("ONRW").[61] Federal anti-degradation policy directs that "No permanent or long-term reduction in water quality is allowable in areas given special protection as [ONRW]" (Tier III waters).[62] Even if no formal designation has been made, the Basin Plan states "lowering of water quality should not be allowed for waters that, because of their exceptional recreational and/or ecological significance, should be given the special protection assigned to ONRWs."[63]

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[59] TRPA Regional Plan, p. 2-36.
[60] See Wat. Code § 13200(h). More information on Lahontan RWQCB can be found at: https://www.waterboards.ca.gov/lahontan/.
[61] Basin Plan at p. 3-2.
[62] Basin Plan at p. 3-15.
[63] Basin Plan at p. 3-15.

"No permanent or long-term reduction in water quality" means that no waste streams can be discharged to a ONRW (Tier III waters).[64] Under the Basin Plan, waste cannot be discharged to any surface waters in the Lake Tahoe Hydrologic Unit ("HU"), as discussed further below.

These restrictions are in addition to the prohibitions imposed by Water Code section 13951, discussed in Section III.B.1., above.

(2) Limitations on Discharges

(a) Limitations on Discharges to Surface and Ground Waters

Section 5.2 of the Basin Plan prohibits "[t]he discharge attributable to human activities of any waste or deleterious material to surface waters of the Lake Tahoe HU," "land below the highwater rim of Lake Tahoe or within the 100-year floodplain of any tributary," and "Stream Environment Zones (SEZs)."[65] The Lahontan RWQCB may grant an exemption to the surface water prohibition only where it makes each of three findings:

- (1) "The discharge of waste will not, individually or collectively, directly or indirectly, adversely affect beneficial uses;"
- (2) "There is no reasonable alternative to the waste discharge;" and
- (3) "All applicable and practicable control and mitigation measures have been incorporated to minimize potential adverse impacts to water quality and beneficial uses."[66]

Further, the Basin Plan prohibits:

- "Discharges that cause violation of any narrative or numerical water quality objective;" and
- Discharges caused by "controllable human activities" that "cause further degradation of water quality in either surface or ground waters" when "other factors result in the degradation of water quality beyond the limits established by [the] water quality objectives." [67]

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[64] Basin Plan at p. 3-15.
[65] Basin Plan at 5.2-1.
[66] Basin Plan at 5.2-1. Narrow exemptions to prohibitions against discharge to land below the highwater rim of Lake Tahoe, the 100-year floodplain, and Stream Environment Zones that are not applicable to discharge of treated wastewater.
[67] Basin Plan at 5.1-5. These prohibitions generally reflect the regionwide prohibitions 1, 2, and 3 included in section 4.1 of the Basin Plan. Basin Plan at 4.1-1. Regional prohibitions 4 and 5 are unlikely to apply to discharge of treated wastewater. The regional prohibitions are discussed in greater detail in section IV.B.2 of this memorandum and are subject to the same exception criteria as those applicable to the surface water discharge prohibition discussed in this section,

The prohibitions summarized above apply to tributaries to Lake Tahoe within the Lake Tahoe HU, including Heavenly Valley Creek, Trout Creek, Upper Truckee River.

The Basin Plan's antidegradation policy applies to groundwater, prohibiting discharges "caused by controllable human activities" that "cause further degradation of water quality in either surface or ground waters" when "other factors result in the degradation of water quality beyond the limits established by [the] water quality objectives."[68] Further, the Basin Plan prohibits discharges "that cause violation of any narrative or numerical water quality objective."[69] The water quality objectives applicable to groundwater regulate levels of bacteria/coliform, chemical constituents, radionuclides, and taste and odor-producing substances.[70]

When undertaking an antidegradation analysis, the Lahontan RWQCB must compare the baseline water quality (the best quality that has existed since 1968) to the water quality objectives. If the baseline water quality is equal to or less than the objectives, the objectives set forth the water quality that must be maintained or achieved. In that case, the antidegradation policy is not triggered. However, if the baseline water quality is better than the water quality objectives, the baseline water quality must be maintained in the absence of findings required by the antidegradation policy.[71] The determination of water quality for antidegradation is made on "a constituent by constituent basis."[72] If even one criteria is of better quality than the water quality standards, the water may be "high quality" and subject to the antidegradation policy.[73]

(b) Limitations on Discharges to Land

Similar prohibitions apply to discharges to land (e.g., urban irrigation or snowmaking) within the Basin below the highwater rim of Lake Tahoe, within the 100-year floodplain of any tributary to the Lake, and within any Stream Environmental Zone ("SEZ") in the Lake Tahoe HU.[74] The Lahontan RWQCB may also grant an exemption to these prohibitions in limited circumstances defined in Section 5.2 of the

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[68] Basin Plan at 5.1-5.
[69] Basin Plan at 5.1-5.
[70] Basin Plan at 5.1-9 to 5.1-10.
[71] *Asociacion de Gente Unida por el Agua v. Cent. Valley Reg'l Water Quality Control Bd.* (2012) 210 Cal. App. 4th 1255, 1270.
[72] *Asociacion de Gente Unida por el Agua*, 210 Cal. App. 4th at 1271.
[73] See *Asociacion de Gente Unida por el Agua,* 210 Cal. App. 4th at 1270–71 ("The parties do not indicate when water quality standards were established for the groundwater in question or whether the existing water quality was better than those standards, but there is evidence in the record that for at least one constituent (nitrate), the baseline water quality in some areas was better than water quality objectives. Therefore, at least some of the water affected by the Order is high quality water.").
[74] Basin Plan at 5.2-1.

Basin Plan.[75] Therefore, the Basin Plan imposes significant barriers to the use of recycled water for snowmaking or urban irrigation.

b. Salt and Nutrient Management Plan ("SNMP")

Presently, the Basin does not have a SNMP. However, a draft SNMP for the Lahontan region, including the Lake Tahoe area, Carson Valley, and Truckee Valley, was prepared and reviewed by Lahontan RWQCB staff in or around 2018.[76] Although it is unclear exactly why this process was abandoned, the State Water Quality Control Policy for Recycled Water explains SNMPs may be needed for some groundwater basins that (1) contain salts and nutrients that exceed or threaten to exceed water quality objectives in the Basin Plan and (2) have inadequate implementation procedures for achieving or ensuring compliance in the Basin Plan.[77]

The Lahontan RWQCB will reevaluate the need for an SNMP no later than April 8, 2026.[78] According to Lahontan RWQCB staff, any new uses or changes to the District's recycled water and discharge permits would likely trigger the requirement for an SNMP. Changing the location of discharge or use of recycled water to within the Tahoe Basin could trigger a SNMP for the Basin. Alternatively, or in addition, the permits could be amended to add nutrient and salt limits.

c. Lake Tahoe TMDL

To combat declining clarity in Lake Tahoe since the 1960s[79] and restore transparency to annual averages recorded in 1967 to 1971,[80] the Lahontan RWQCB and NDEP cooperatively developed the Lake Tahoe TMDL.[81] The Lahontan RWQCB adopted the Lake Tahoe TMDL in November 16, 2010 and

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[75] Circumstances for exemption are highly fact-specific to the particular project. General themes throughout the findings required for exemption include lack of feasible alternatives, necessity, and complete mitigation. For example, for public outdoor recreation facilities and private piers, Lahontan RWQCB must find that: (1) the project by its nature must be sited below the high water rim of Lake Tahoe, within the 100-year floodplain, or within the SEZ; (2) there is no feasible alternative; (3) impacts are fully mitigated; (4) SEZs are restored in an amount 1.5 times the area of SEZ disturbed or developed for the project; and (5) wetlands are restored in an amount at least 1.5 times the area of wetland disturbed or developed. Basin Plan at 5.2-1.

[76] https://www.waterboards.ca.gov/lahontan/water_issues/programs/snmp/docs/snmp_table_april2018.pdf.

[77] State Water Quality Control Policy for Recycled Water, Section 6.1.1, available at: https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2018/121118_7_final_amendment_oal.pdf

[78] State Water Quality Control Policy for Recycled Water, Section 6.1.3.

[79] Lahontan RWQCB and NDEP, Final Lake Tahoe TMDL Report (Nov. 2010) (hereafter "Lake Tahoe TMDL Report"), p. 1-1, available at: https://www.waterboards.ca.gov/lahontan/water_issues/programs/tmdl/lake_tahoe/docs/tmdl_rpt_nov2010.pdf.

[80] Lake Tahoe TMDL Report, p. 1-1.

[81] Lake Tahoe TMDL Report, p. 1-2.

submitted it to USEPA. NDEP approved and submitted a slightly modified TMDL report correcting minor errors, clarifying Nevada's regulatory structure, and emphasizing that implementation timelines may need to be adjusted in the future.[82] USEPA approved the Lake Tahoe TMDL on August 16, 2011.[83]

Lake Tahoe is listed as an impaired water body under Section 303(d) because of impairment by nitrogen, phosphorus, and sediment.[84] The goal of the Lake Tahoe TMDL is to outline a plan to restore Lake Tahoe's deep water transparency to 29.7 meters annual average Secchi depth, which is also expected to result in attainment of the clarity standard as well.[85] The Lake Tahoe TMDL includes an interim standard of 24.0 meters annual average Secchi depth within the first 20-year implementation period.[86]

Table 8-3 of the Final Lake Tahoe TMDL Report (shown in Appendix A) lists the fine sediment particle and nutrient load reductions needed to achieve both the interim standard (referred to as the "Clarity Challenge") and transparency standard based on the load reduction.[87]

Urban uplands runoff, atmospheric deposition, forested upland runoff, and stream channel erosion were determined to be the primary sources of fine sediment particle, nitrogen, and phosphorus loads discharging to Lake Tahoe.[88] The Final Lake Tahoe TMDL Report allocates total load by pollutant source to achieve the targets identified in the table shown in Appendix A (see Appendix B).[89] The Final Lake Tahoe TMDL Report also converts the load allocations into daily concentration maximum loading estimates (see Appendix C).[90]

Notably, the Lake Tahoe TMDL does not prescribe specific limitations for any one discharger. Instead, the TMDL sets the water quality objectives for the water body, leaving discharge permits to set specific limits.

4. Interstate Water Rights and Issues

Public Law 101-618, the Truckee-Carson-Pyramid Lake Water Rights Settlement Act ("Settlement Act"), and the California-Nevada Interstate Compact ("Compact") govern the allocation of water rights

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[82] NDEP Submission letter to USEPA (Aug 3, 2011), available at: https://ndep.nv.gov/uploads/water-tmdl-docs/LTTMDL_NDEP_Final.PDF. NDEP's submission also excludes Chapter 16, dedicated to CEQA. Id.
[83] Lake Tahoe TMDL, California Water Boards: Lahontan – R6, https://www.waterboards.ca.gov/lahontan/water_issues/programs/tmdl/lake_tahoe/ (last visited Dec. 23, 2022).
[84] Lake Tahoe TMDL Report, p. ES-1.
[85] Lake Tahoe TMDL Report, p. ES-1.
[86] Lake Tahoe TMDL Report, p. 8-4.
[87] Lake Tahoe TMDL Report, p. 8-7.
[88] Lake Tahoe TMDL Report, p. ES-1.
[89] Lake Tahoe TMDL Report, p. 10-4.
[90] Lake Tahoe TMDL Report, pp. 10-6 to 10-7.

between California and Nevada. The Alpine Decree adjudicated rights on both the California and Nevada portions of the Carson River, which are administered by the Federal Watermaster. Nothing in the Settlement Act, the Compact, or the Alpine Decree requires the District to continue delivering recycled water to Alpine County or obligates the District to take any compensatory action (e.g., providing make-up water or financial compensation) should the District cease to export recycled water to Alpine County.

There are accounting provisions in the Settlement Act and the Compact that may be triggered if the District ceases or reduces its recycled exports to Alpine County and which would grant California an additional 2,000 acre-feet ("AF") of water on the Carson River ("Replacement Water"). Because this adjustment occurs within the Carson River system, the Alpine Decree may influence, or is implicated in, this change in inter-state allocation.[91] These provisions are discussed in section IV.A.5.

a. Nothing in the Alpine Decree, Settlement Act, or Compact Requires Continued Delivery of Recycled Water

In 1925, the United States filed for the right to divert water from the Truckee and Carson Rivers, resulting in the 1944 Orr Ditch Decree for the Truckee River and the 1980 Alpine Decree[92] for the Carson River.[93]

The Alpine Decree was entered into on October 28, 1980 and established the Carson River surface water rights of the parties in both California and Nevada. The Alpine Decree attaches to "the waters of the Carson River or its tributaries, or the waters of any of the creeks or streams or other waters mentioned [in the Decree]" and does not apply to developed or imported water.[94] The Alpine Decree

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[91] Irrigation in Alpine County is designed to avoid return flows into the Carson River per the Lahontan RWQCB permits; however, the District's recycled water seeps into the groundwater and supports the watershed generally even if tailwater does not directly flow into the Carson River itself.

[92] The 1905 Anderson-Bassman Decree and the 1921 Price Decree are incorporated into the Alpine Decree as exhibits. Additionally, the Alpine Decree recognizes and incorporates certain "historic practices". See e.g., Alpine Decree, p. 158 ("All claimants or potential claimants mentioned in the above paragraph are as well hereby,
until otherwise ordered by the Court, restrained and enjoined from diverting, taking or interfering in any way with the waters of the Carson River or its tributaries, including creeks, streams and springs, so as to in any way prevent or interfered with the diversion, use and enjoyment of the water of any of the persons or parties as allowed by this Decree, having due regard to the relative priorities and historic practices recognized in this Decree.").

[93] In 1925, the Federal government, realizing that the waters of the Carson River would not fulfill the expectations of the Newlands Project, filed a lawsuit against the water users of the Carson River to establish the Newlands Project's water rights (U*.S. v. Alpine Land and Reservoir Company, et. al*.). The action involved conflict between water users in upper Carson River Basin and proponents of the Newlands Project on the lower river.

[94] Alpine Decree, p. 157. See also Alpine Decree, pp. 12 ("That the parties, intervenors, grantees, successors in interest and assigns are , and each of them hereby is, as against every party to this action, adjudged to be the owners of the water rights hereafter specified and set forth and entitled to divert, store and use from the Carson River and its tributaries and

is administered by a Federal Watermaster appointed by the U.S. District Court. The Alpine Decree divided the Carson River into eight segments, with three of the eight in California. Segment 1 includes all of the East Fork within California.[95] Segments 3 and 4 include all of the West Fork within California, splitting the West Fork at the gauge at Woodfords, CA.[96] Segment 4 (California) and Segment 5 (Nevada) rotate diversion weekly governed by the Anderson-Bassman Decree. The Price Decree and 1941 Agreement control rotation among the Segment 4 users during the week that Segment 4 may divert under the Anderson-Bassman Decree. The District presently delivers its recycled water to ranchers who own certain water-righted parcels on Segment 4 of the Carson River and other nearby parcels. See map of locations of recycled water use and water-righted parcels attached as Appendix D. The ranchers apply the District's treated recycled water both to portions of those parcels that are not entitled to receive Carson River water and those that are so entitled.

No provision in the Settlement Act or Compact requires the District to continue to export recycled water to Alpine County. The Settlement Act explicitly states that "use of such wastewater shall not be deemed to create any new or additional water rights."[97] Therefore, downstream users cannot claim interests in the recycled water as a Carson River right. Additionally, the Settlement Act specifically clarifies that it "shall [not] be construed as prohibiting the use of all or any portion of such recycled water on any lands within the State of California."[98]

b. Possible Impacts on Downstream Users

The District and the ranchers are not permitted to discharge recycled water to surface waters in Alpine County. Nonetheless, the use of recycled water in Alpine County likely contributes indirectly to the total quantity of water available in the Carson River system (e.g., by displacing demand for surface water). If the District ceases to discharge recycled water to these lands, that augmented supply would be lost from the system. Similarly, if the District ceases delivery of recycled water and the ranchers do not obtain alternate water sources (e.g., their Carson River rights or Replacement Water), there may be a reduction in the amount of tailwater received by downgradient lands.[99]

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from the streams and springs hereafter mentioned . . ."), 158 ("All claimants or potential claimants mentioned in the above paragraph are as well hereby, until otherwise ordered by the Court, restrained and enjoined from diverting, taking or interfering in any way with the waters of the Carson River or its tributaries, including creeks, streams and springs . . .").

[95] Alpine Decree, pp. 3-4.

[96] Alpine Decree, pp. 3-4.

[97] Settlement Act, § 204(a)(4).

[98] Settlement Act, § 204(a)(4).

[99] See Opinion, *United States of America v. Alpine Land and Reservoir Company, et al.* (Nev. Dec. 18, 1980) Civ. No. D 183 BRT, pp. 29-30 ("[L]arge portions of the Alpine County and Carson Valley lands are irrigated by so-called return flows. This practice occurs because water is diverted into large ditches or canals and the water is run over the second appropriator's lands and so on until eventually the water returns to the river or to another diversion canal. The evidence specifically

c. Change in Discharge May Trigger Provisions for Replacement Water

If the District ceases exporting recycled water or changes the discharge location, this may trigger a Settlement Act provision compensating California with 2,000 AF of West Fork Carson River water,[100] as described in section IV.A.5. This Replacement Water is currently being used downstream in Nevada, but would be reallocated to California upon the District's cessation of discharge of recycled water.[101]

5. Interstate Accounting Adjustments Resulting from Changes in Location of Discharge

As noted in the preceding section, the accounting provisions triggered by the District's cessation of deliveries of recycled water into Alpine County do not limit the District's ability to change the place of discharge or use of its wastewater. However, depending on the alternative selected, Replacement Water may become available to California.

a. Settlement Act

Section 204 of the Settlement Act describes interstate allocations of the Carson River, Lake Tahoe, and Truckee River. The Settlement Act provides California with up to 2,000 AF of Replacement Water in the event that the District discontinues discharging wastewater to the Carson River watershed. Subdivisions (a)(3) and (a)(4) of section 204 of the Settlement Act read as follows:

> (3) If, on or after the date of enactment of this title, all or any portion of the effluent imported from the Lake Tahoe basin into the watershed of the Carson River in California is discontinued by reason of a change in the place of the disposal of such effluent, including underground disposal, to the Truckee River basin or the Lake Tahoe basin, in a manner which results in increasing the available supply of water in the Nevada portion of the Truckee River basin, the allocation to California of the water of the West Fork of the Carson River and its tributaries for use in the State of

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showed that all appropriators could irrigate their lands by direct diversions but that it is much more efficient to use a large canal and the return flow method.").

[100] The Settlement Act does not identify any segments (as defined in the Alpine Decree) from which the Replacement Water shall be sourced. The West Fork Carson River constitutes Segments 3 and 4 in California and Segment 5 in Nevada.

[101] Settlement Act, § 204(a)(3). See also Statement of Barry M. Hartman, Deputy Assistant Attorney General, Department of Justice, Land and Natural Resources Division United States Department of Justice for Submission to the Subcommittee on Water and Power, United States Senate Regarding S. 1554, TBS Truckee-Carson-Pyramid Lake Water Rights Settlement Act (Feb. 6, 1990).

> California shall be augmented by an amount of water which may be diverted to storage, except that such storage:
>
>> (A) shall not interfere with other storage or irrigation rights of Segments 4 and 5 of the Carson River, as defined in the Alpine decree;
>>
>> (B) shall not cause significant adverse effects to fish and wildlife;
>>
>> (C) shall not exceed 2,000 acre-feet per year, or the quantity by which the available annual supply of water to the Nevada portion of the Truckee River basin is increased, whichever is less; and
>>
>> (D) shall be available for irrigation use in that or subsequent years, except that the cumulative amount of such storage shall not exceed 2,000 acre-feet in any year.
>
> (4) Storage specified by paragraph (3) of this subsection shall compensate the State of California for any such discontinuance as referred to in such paragraph: Provided, That the augmentation authorized by such paragraph shall be used only on lands having appurtenant Alpine decree rights. Use of effluent for the irrigation of lands with appurtenant Alpine decree rights shall not result in the forfeiture or abandonment of all or any part of such appurtenant Alpine decree rights, but use of such wastewater shall not be deemed to create any new or additional water rights. Nothing in this title shall be construed as prohibiting the use of all or any portion of such effluent on any lands within the State of California. Any increased water delivered to the Truckee River shall only be available to satisfy existing rights under the Orr Ditch decree or, as appropriate, to augment inflows to Pyramid Lake."[102]

Subdivisions (a)(3) considers what should happen if the District (1) ceases to deliver recycled water to the Carson River watershed in California and (2) instead delivers or disposes of such recycled water to the Truckee River basin or the Lake Tahoe basin (3) in a manner that results in increasing the water supply in the Nevada portion of the Truckee River basin. If each of the three conditions are satisfied, California's allocation of West Fork Carson River water (Segments 3 and 4 of the Carson River as

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[102] Settlement Act, § 204(a)(3)-(4) (emphasis added).

defined in the Alpine Decree) shall be augmented by an amount of water (up to 2,000 AF) which may be diverted to storage to compensate California for any loss to Nevada.[103]

b. California-Nevada Interstate Compact

The California-Nevada Interstate Compact expressly provides "to the State of California the right to store 2,000 AF of water per annum within Alpine County for supplemental use on presently irrigated lands within said county adverse to Lahontan Reservoir but subject to all other existing uses in Nevada. Water stored pursuant to this section remaining at the end of the year shall be deemed to have been stored in the succeeding year."[104]

Pursuant to the Compact, any change in point of diversion or manner, purpose, or place of use of the waters of the Carson, Truckee or Walker River Basins must not adversely affect the allocation of water to the other state.[105] Such a change may be made in either state pursuant to state law or applicable decree.[106]

The Compact was ratified and approved by each of California and Nevada, but never approved by Congress and thus is not effective pursuant to Article XXII of the Compact.[107] The states of California and Nevada, however, have used the draft Compact to guide actions in the Basin.

c. Logistical Challenges in Delivery and Storage of Replacement Water

Diversion and storage of Replacement Water may present practical challenges. Diversion of Replacement Water may be limited by the requirements to avoid injury to downstream users, including "storage or irrigation rights of Segments 4 and 5" and to avoid "significant adverse effects to fish and wildlife."[108] Moreover, at certain times of year, storage reservoirs and canals may not have sufficient capacity to convey or store an additional 2,000 AF of Replacement Water in addition to existing supplies. Movement and storage of Replacement Water in existing infrastructure may therefore be limited to times when the Carson River is not on regulation.[109]

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[103] Settlement Act, § 204(a)(4).
[104] Wat. Code § 5976 (Compact), Art. VII, § A.3. "[A]dverse to Lahontan" means that the right to Replacement Water is senior to the United States' rights in Lahontan Reservoir.
[105] Wat. Code § 5976 (Compact), Art. XVI.
[106] Wat. Code § 5976 (Compact), Art. XVI.
[107] Wat. Code § 5976 (Compact), Art. XXII.
[108] Settlement Act, § 204(a)(3)(A),(B).
[109] The Carson River goes on regulation when the Watermaster "determines there is not enough water in the Upper Carson River to serve the most junior priority." (Alpine Decree, p. 5.) When on regulation, each segment operates independently in accordance with "established practices, customs, segments and decrees" including the Anderson-Bassman Decree (rotation between California and Nevada) and the Price Decree (California rotation). (Alpine Decree, p. 5.)

d. Administration and Beneficiary

The Settlement Act states that "[s]torage specified by paragraph (3) of this subsection shall compensate the State of California for any such discontinuance" but does not specify any particular beneficiary.[110] Neither does the Compact provide any additional clarity.

The Compact states that the California-Nevada Compact Commission has the power to administer the provisions of the Compact, including this 2,000 AF of Replacement Water.[111] The Compact, however, was not ratified, and thus no Compact Commission exists. The Settlement Act describes the 2,000 AF of Replacement Water as an augmentation to "the allocation to California of the water of the West Fork of the Carson River and its tributaries," which suggests the supply comes from the West Fork Carson River (Segments 3 and 4).[112] If the augmented supply is Carson River water, then the Alpine Decree Court and the Federal Watermaster may have jurisdiction.

6. Relative Difficulty of Implementing In-Basin Alternative

There are significant legal and regulatory hurdles to reusing recycled water within the Tahoe Basin. Any alternative involving in-Basin use of recycled water would require amendment of long-standing statutes and regulations.

B. <u>Export Within California to Alpine County</u>

1. Lahontan RWQCB

a. Existing Permits –WDRs and Water Reclamation Requirements ("WRRs")

The District currently delivers recycled water to several ranchers in Alpine County, California. The District treats sewage to advanced secondary standard at its wastewater treatment plant and delivers the recycled water to the ranchers, where the ranchers use the recycled water for irrigation. The District holds waste discharge permits (i.e., WDRs) for its treatment and discharge of recycled water to the conveyance ditch, but each rancher is subject to WRRs (i.e., recycled water permits). WDRs and WRRs limit discharge or use to specific locations or parcels.

The rancher WRRs require recycled water to remain in California; however, the ranchers entered into a Tailwater Operating Agreement with the Nevada Division of Environmental Protection allowing

[110] Settlement Act, § 204(a)(3).
[111] Wat. Code § 5976 (Compact), Art. IV, § D.
[112] Settlement Act, § 204(a)(3).

tailwater to cross the state line.[113] The primary irrigators in California, with the exception of the Bruns, Celio and Ace Hereford ranches, and the tailwater users in Nevada entered in to an agreement in 2003 with the NDEP to continue the use of tailwater that originated as recycled water from Harvey Place Reservoir.[114] This agreement makes it the responsibility of the water user to properly sign and notify the operational personnel with potential contact and the public of the presence of recycled water use.

Furthermore, the agreement mandates a water quality sampling program. The District is not a direct party to this agreement but is involved insofar as providing water quality sampling collection and analysis. Direct parties to this agreement are the primary California irrigators and those land owners that have traditionally benefited from a mixed recycled water tailwater inflow from California.

(1) Indian Creek Water Quality Objectives

The Basin Plan includes water quality objectives that "apply to all surface waters of the Indian Creek watershed" related to algal growth potential, biostiumulatory substances, color, dissolved oxygen, pH, species composition, and taste and odor.[115] Additionally, the Basin Plan provides: "[f]or ground waters under the Indian Creek Watershed . . . the taste and odor shall not be altered."[116]

The Basin Plan, however, states that the water quality objectives for TDS, Cl, P, and N apply to "Indian Creek Res.," as opposed to all surface waters in the Indian Creek watershed.[117] Lahontan RWQCB staff have suggested that the water quality objectives applicable to Indian Creek Reservoir also apply to Indian Creek.

b. Vision Project for West Fork Carson River

In 2013, the USEPA announced a new collaborative framework for implementing the Clean Water Act ("CWA") Section 303(d) program with states called the Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program[118] (the "Vision"). The Vision focuses attention on priority waters and acknowledges that states have flexibility in using available tools in

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[113] South Tahoe Public Utility District, Recycled Water Facilities Master Plan (October 2009), p. 6-45; Letter from Leo M. Drozdoff Deputy Administrator of NDEP to Hal Bird, Alpine County Land Application Manager, South Tahoe Public Utility District, dated June 18, 2003, Attachment: Tailwater Operating Agreement, June 19, 2003.
[114] South Tahoe Public Utility District, Recycled Water Facilities Master Plan (October 2009), p. 6-45; Letter from Leo M. Drozdoff Deputy Administrator of NDEP to Hal Bird, Alpine County Land Application Manager, South Tahoe Public Utility District, dated June 18, 2003, Attachment: Tailwater Operating Agreement, June 19, 2003.
[115] Basin Plan, at 3-10.
[116] Basin Plan, at 3-14.
[117] Basin Plan, at 3-40.
[118] USEPA, *A Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program* (Dec. 2013), available at: https://www.epa.gov/sites/production/files/2015-07/documents/vision_303d_program_dec_2013.pdf.

addition to TMDLs to attain water quality restoration and protection. The USEPA Vision is not a regulation or rulemaking, but lays out goals for improving water quality for impaired bodies.[119]

In 2015, Lahontan RWQCB staff identified the West Fork Carson River to be addressed through the Vision Program ("Vision Project").[120] The West Fork Carson River Vision Project will focus on TMDL alternatives and adaptive management.[121] Lahontan RWQCB engaged in groundwork and outreach between 2017 and 2020.[122] It has also hosted four Alpine Watershed Group forums.[123] The Draft West Fork Carson River Vision Plan ("Draft WFCR Vision Plan") was released for public comment in July 2023, with public comments due in late August 2023.[124] Lahontan RWQCB staff will incorporate changes in response to comments and plan to bring the Plan to the Lahontan Board for approval in October 2023.[125]

c. Analysis of Permit Modifications Needed Under Various Alpine County Alternatives and Process for Modification

There are two separate sets of WDRs: (1) for discharge to the ranchers and (2) for discharge on the District's property (Diamond Valley Ranch). For use on the ranchers' property, the District holds WDRs (Lahontan RWQCB Order No. R6T-2004-0010) and the ranchers have WRRs.[126] In the event the District changes the location of discharge and delivers less or stops delivering recycled water to the ranchers, the ranchers' WRRs will need to be updated or cancelled, accordingly. The District's WDRs will also need to be updated if the District no longer discharges to Harvey Place Reservoir, Diamond Ditch, or the Fredericksburg Ditches. Additionally, the District's WDRs include references to and maps of the

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[119] Ranching for Improved Water Quality - Vision Project Forum #4 (March 8, 2022), available at: https://www.youtube.com/watch?v=SffPohGy56I&t=2514s (hereafter "Vision Project Forum #4").
[120] California Water Boards, *West Fork Carson River Vision Project* (Apr. 2019), available at: https://www.waterboards.ca.gov/lahontan/water_issues/programs/tmdl/docs/west_fork_carson/wfc_fs.pdf.
[121] Vision Project Forum #4.
[122] Vision Project Forum #4.
[123] West Fork Carson River Vision Project, Alpine Watershed Group, https://www.alpinewatershedgroup.org/west-fork-carson-river-vision-proje (last visited Dec. 23, 2022).
[124] California Water Boards, West Fork Carson River Multiple Pollutants Vision Plan, https://www.waterboards.ca.gov/lahontan/water_issues/programs/tmdl/west_fork_carson_river.html (last visited September 5, 2023).
[125] California Water Boards, West Fork Carson River Multiple Pollutants Vision Plan, https://www.waterboards.ca.gov/lahontan/water_issues/programs/tmdl/west_fork_carson_river.html (last visited September 5, 2023).
[126] See e.g., Board Order No. R6T-2004-0010, ¶ 8 ("Authorized Disposal Areas: Harvey Place Reservoir, Diamond Ditch, the Fredericksburg Ditches, and the irrigated lands that are regulated under separate recycled water use requirements are the only authorized wastewater disposal areas. . . . The Regional Board has authorized the use of recycled wastewater on approximately 2,000 acres in Wade Valley and Carson Valley near Fredericksburg, including the On-Farm emergency disposal area, as shown on Attachment B, which is made part of the Order.").

ranchers' properties (and ultimate place of use of the recycled water), which would need to be updated pursuant to any changes.

For the Diamond Valley Ranch, the District holds both WDRs and WRRs (Lahontan RWQCB Order No. R6T-2011-0061). Amendments would not be needed for the orders related to the Diamond Valley Ranch so long as the District intends to continue discharging and using recycled water on the property.

Any material change in the character, location, or volume of the discharge requires a new Report of Waste Discharge to be submitted to the Lahontan RWQCB pursuant to Water Code section 13260.[127] A material change includes:

> (a) Addition of a major industrial waste discharge to a discharge of essentially domestic sewage, or the addition of a new process or product by an industrial facility resulting in a change in the character of the waste.
>
> (b) Significant change in disposal method, e.g., change from a land disposal to a direct discharge to water, or change in the method of treatment which would significantly alter the characteristics of the waste.
>
> (c) Significant change in the disposal area, e.g., moving the discharge to another drainage area, to a different water body, or to a disposal area significantly removed from the original area potentially causing different water quality or nuisance problems.
>
> (d) Increase in flow beyond that specified in the waste discharge requirements.
>
> (e) Increase in area or depth to be used for solid waste disposal beyond that specified in the waste discharge requirements.[128]

[127] Wat. Code § 13260(c) ("Each person subject to subdivision (a) shall file with the appropriate regional board a report of waste discharge relative to any material change or proposed change in the character, location, or volume of the discharge."); Wat. Code § 13264(a) ("No person shall initiate any new discharge of waste or make any material changes in any discharge, or initiate a discharge to, make any material changes in a discharge to, or construct, an injection well, prior to the filing of the report required by Section 13260.").
[128] Cal. Code Regs. Tit. 23, § 2210.

A waste discharge report must be submitted on forms supplied by the Lahontan RWQCB with the required filing fee to the Lahontan RWQCB if the amendment reflects a material change as defined above.[129]

USEPA approval and compliance with federal regulations is required only for discharges from a point source to navigable waters.[130]

d. Salt and Nutrient Management Plan

There is an existing Nutrient Management Plan for the District's Diamond Valley Ranch operations in Alpine County (not including rancher use of recycled water), which may function similarly to an SNMP for the Carson Valley Basin. According to Lahontan RWQCB staff, any new uses or changes to the District's recycled water and discharge permits would trigger the requirement for an SNMP. Alternatively or in addition, the permits could be amended to add nutrient and salt limits.

2. Conveyance within California

To use Indian Creek or the Carson River to transport recycled water, the District likely must meet the applicable water quality objectives or request an adjustment by the Lahontan RWQCB, which would require amendment of the Basin Plan.

a. Discharge into Indian Creek

Historically, the District discharged recycled water pursuant to waste discharge requirements/NPDES permit (Order No. 6-74-23) into Indian Creek Reservoir. The District struggled to meet water quality requirements and regularly exceeded the limits.[131] The District ceased discharging recycled water into

[129] Cal. Code Regs. Tit. 23, § 2205.
[130] See Cal. Code Regs. Tit. 23, § 2235.1.
[131] Lahontan RWQCB, Board Order No. R6T-2008-0009.

Indian Creek Reservoir on January 18, 1989 and the NPDES permit[132] was rescinded, making recycled water requirements no longer applicable.[133]

Indian Creek in Alpine County is an impaired water body section 303(d) listed per the USEPA's website, but does not yet have a TMDL.[134] Under the Clean Water Act, when a waterbody is listed as impaired under Section 303(d), the waterbody needs a TMDL restoration plan.[135] The issues identified on EPA's website include bacteria and microbes, low oxygen, and salts.[136]

To discharge into Indian Creek within California, the District would be required to obtain a NPDES permit/waste discharge requirements. Because Indian Creek is a 303(d) Listed Impaired Water, TMDLs are likely forthcoming. As with the Lake Tahoe TMDL, any future Indian Creek TMDL would not prescribe limitations for any one discharger, but set high level water quality objectives for the water body.

Even if water is rediverted before crossing the state line, the District may also require approval from NDEP. Nevada Revised Statute ("NRS") 445A.465(1) requires a permit issued by the NDEP before discharging a pollutant from any point source into the waters of the State, including discharge "that could be carried into the waters of the State by any means" and discharge that is allowed "to remain in a place where the pollutant or fluids could be carried into the waters of the State by any means."[137] Point sources include "any discernible, confined and discrete conveyance, including any pipe, ditch, channel . . . [but] does not include return flows from irrigated agriculture."[138] Indian Creek is a "discernible, confined and discrete conveyance" or "channel" through which waste could be conveyed

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[132] NPDES permits are required when pollutants are discharged from a point source to a water of the United States. The NPDES Program is a federal program which has been delegated to the State of California for implementation through the SWRCB and the nine Regional Water Quality Control Boards. In California, WDRs that regulate discharges from point sources to waters of the United States also serve as NPDES permits. Both WDRs serving as NPDES permits and other WDRs contain effluent limitations to preserve specific bodies of water above prescribed quality levels. For WDRs serving as NPDES permits, where technology-based controls are insufficient to meet water quality standards, more stringent water quality-based effluent limits ("WQBELs") must be established. The USEPA's NPDES Permit Writers' Manual contains additional information regarding setting WQBELs. USEPA, NPDES Permit Writers' Manual, Chapter 6: Water Quality-Based Effluent Limits, p. 87, available at: https://www3.epa.gov/npdes/pubs/chapt_06.pdf.

[133] Lahontan RWQCB, Board Order No. R6T-2008-0009.

[134] How's My Waterway? Waterbody Report: Indian Creek (Alpine County), USEPA, https://mywaterway.epa.gov/waterbody-report/CA_SWRCB/CAR6322001020011213104836/2022 (last visited Dec. 23, 2022).

[135] 33 U.S.C. § 1313(d).

[136] How's My Waterway? Waterbody Report: Indian Creek (Alpine County), USEPA, https://mywaterway.epa.gov/waterbody-report/CA_SWRCB/CAR6322001020011213104836/2022 (last visited Dec. 23, 2022).

[137] NRS 445A.465(1).

[138] NRS 445A.395.

across the Stateline into the Nevada portion of Indian Creek. Pollutants requiring permits include "sewage, garbage, sewage sludge . . . municipal and agricultural waste".[139] Conveyance of recycled water to users within California using Indian Creek may be deemed to trigger this permit requirement under Nevada statute – i.e., to the extent it is impossible for an end user to divert the exact molecules of recycled water from Indian Creek as the District discharged.

Regionwide, the Lahontan Basin Plan prohibits (1) discharge of waste causing violation of any water quality objective, (2) further degradation where a water quality objective is already being violated, (3) discharge that could affect waters of the state that is not authorized by some regulatory mechanism, (4) discharge of less than secondary treated sewage into surface waters, and (5) discharge of pesticides.[140] Because the District treats its wastewater to secondary standards, neither prohibitions 4 or 5 are applicable. If a NPDES permit and/or WDRs are required independent of the Lahontan Basin Plan, then prohibition 3 will likewise not pose an independent obstacle to discharge into Indian Creek. Prohibitions 1 and 2, however, are likely to pose challenges. The Lahontan Basin Plan also generally prohibits discharge to surface waters within either the East Fork or West Fork hydrologic units, including Indian Creek.[141]

The Lahontan RWQCB may grant an exemption to regionwide prohibitions 1 and 2 or those specifically applicable to the Carson River Hydrologic Units if it finds that all three of the following criteria are met:

- (1) "The discharge of waste will not, individually or collectively, directly or indirectly, adversely affect beneficial uses; and"
- (2) "There is no reasonable alternative to the waste discharge;" and
- (3) "All applicable and practicable control and mitigation measures have been incorporated to minimize potential adverse impacts to water quality and beneficial uses."[142]

Thus, any discharge to the Indian Creek will likely require a Basin Plan amendment.

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[139] NRS 445A.400(1).
[140] Basin Plan, p. 4.1-1.
[141] Basin Plan, p. 4.1-18; Basin Plan, Plate 1a, available at: https://www.waterboards.ca.gov/lahontan/water_issues/programs/basin_plan/docs/plate1a.pdf.
[142] Basin Plan, pp. 4.1-2, 4.1-18 to 4.1-19.

b. Discharge into West Fork Carson River

The West Fork Carson River is divided into three sections by USEPA. All three sections are section 303(d) listed impaired waters, but do not have TMDLs.[143] Alpine Decree Segment 4 (Woodfords to the State line) has issues with bacteria and microbes, metals, murky water, nitrogen and/or phosphorus, and salts.[144] As described in greater detail above regarding discharge to Indian Creek, discharge to the West Fork Carson River would require waste discharge requirements/NPDES permit. Lahontan RWQCB staff have indicated that discharge of recycled water into the West Fork of the Carson River would require a NPDES permit and may require a Basin Plan amendment or exemption and an environmental analysis.

Even if water is rediverted before crossing the state line, the District may also require approval from NDEP. Nevada statute requires a permit issued by the NDEP before discharging a pollutant from any point source into the waters of the State, including discharge "that could be carried into the waters of the State by any means" and discharge that is allowed "to remain in a place where the pollutant or fluids could be carried into the waters of the State by any means."[145] Point sources include "any discernible, confined and discrete conveyance, including any pipe, ditch, channel . . . [but] does not include return flows from irrigated agriculture."[146] Pollutants requiring permits include "sewage, garbage, sewage sludge . . . municipal and agricultural waste".[147] Conveyance of recycled water to users within California using the Carson River may be deemed to trigger this permit requirement under Nevada statute.

As described in the preceding section, the Basin Plan generally prohibits waste discharge to surface water within either the East Fork or West Fork hydrologic units in addition to regional prohibitions regarding exceedances of water quality objectives.[148] The Lahontan RWQCB may grant an exemption when if finds that all three of the following criteria are met:

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[143] How's My Waterway? Waterbody Report: Carson River, West Fork (Woodfords to stateline), USEPA, https://mywaterway.epa.gov/waterbody-report/CA_SWRCB/CAR6331001320011213144544/2022 (last visited Dec. 23, 2022); How's My Waterway? Waterbody Report: Carson River, West Fork (Headwaters to Hope Valley), USEPA, https://mywaterway.epa.gov/waterbody-report/CA_SWRCB/CAR6332001420000207111737/2022 (last visited Dec. 23, 2022); How's My Waterway? Waterbody Report: Carson River, West Fork (Hope Valley to Woodfords), USEPA, https://mywaterway.epa.gov/waterbody-report/CA_SWRCB/CAR6331001320011213134239/2022 (last visited Dec. 23, 2022).

[144] How's My Waterway? Waterbody Report: Carson River, West Fork (Woodfords to stateline), USEPA, https://mywaterway.epa.gov/waterbody-report/CA_SWRCB/CAR6331001320011213144544/2022 (last visited Dec. 23, 2022).

[145] NRS 445A.465(1).

[146] NRS 445A.395.

[147] NRS 445A.400(1).

[148] Basin Plan, pp. 4.1-1, 4.1-18.

- (1) “The discharge of waste will not, individually or collectively, directly or indirectly, adversely affect beneficial uses; and”

- (2) “There is no reasonable alternative to the waste discharge; and”

- (3) “All applicable and practicable control and mitigation measures have been incorporated to minimize potential adverse impacts to water quality and beneficial uses.”[149]

Thus, any waste discharge to the West Fork Carson River may require a Basin Plan amendment.

Developed water could be transmitted, in theory, through the segments of the Carson River similarly to stored water. The Alpine Decree provides:

> The stored water of any reservoir may be turned into and carried in the channel of any natural stream and mingled with the natural waters and diverted therefrom for the proper uses of the persons or parties entitled thereto. The Water Master, upon timely notice, shall so regulate the headgates along the streams and do and direct such other things as may be needful to transport such stored water and deliver the same to the person or persons entitled thereto. All persons are hereby prohibited from in any way interfering with any such stored water while the same is being legally carried to the persons or parties entitled thereto.[150]

However, the Alpine Decree does not specifically discuss developed water. The Alpine Decree does provide that exercise of rights under the decree must “hav[e] due regard to the relative priorities and historic practices recognized in this Decree.”[151] The first Diamond Ditch Agreement to deliver recycled water to ranchers in Alpine County was executed in 1972, pre-dating the Alpine Decree; however, the historical practice of delivery of recycled water is not “recognized in th[e] Decree” as there is no mention of recycled water or use of alternative water sources by the ranchers. Contractual arrangements between the District and ranchers are beyond the scope of the Carson River water adjudicated in the Alpine Decree and are not affected by the Alpine Decree.

Logistically, using the Carson River as a means of conveyance between segments could pose challenges. Physically, portions of the Carson River are dry during portions of the year, precluding delivery. For that reason, conveyance would likely be seasonal and limited to occurrence before the Carson River goes on “regulation.” Accounting for the conveyance of developed water and ensuring

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[149] Basin Plan, pp. 4.1-18 to 4.1-19.
[150] Alpine Decree, p. 163.
[151] Alpine Decree, p. 158.

the water reaches the desired user may also prove difficult, especially in dry years, because water users are not capped at a specific quantity, but by diversion rates. If water is available, it may be diverted. A pipeline conveyance would not incur similar challenges and would likely not implicate the Alpine Decree.

3. Alpine County

a. 1965 Ordinance Regulating Recycled Water

In 1965, Alpine County enacted ordinances regulating the discharge of treated sewage or industrial waste effluent within the unincorporated areas of the County. Chapter 16.12 of the Alpine County Code[152] purports to prohibit the discharge of recycled water in unincorporated areas originating in a basin located entirely outside the boundaries of Alpine County[153] and makes a violation of that provision a nuisance.

Key provisions of the 1965 Ordinance include:

- Section 16.12.010, providing: "It is unlawful for any person, firm, corporation, district or other public agency to discharge in the unincorporated areas of the county sewage or industrial waste or the effluent of treated sewage or industrial waste originating in any water basin or natural surface water drainage area located entirely outside the boundaries of the county."[154]

- Section 16.12.050, providing: "It is unlawful for any person, firm, corporation, district or other public agency operating a sewer system or facility serving more than three thousand inhabitants to discharge any sewage or industrial waste or effluent or any treated sewage or industrial waste, directly or indirectly, by means of percolation from surface reservoirs, sewage wells, or otherwise into the public waters of the unincorporated areas of the county described as follows:

    - A. The west fork of the Carson River and all tributaries thereof upstream from one-half mile below the county highway bridge located on Alpine County Road No. 3 (now Diamond Valley Road) and crossing said west fork of the Carson River in Alpine County, California. (See Appendix E.)

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[152] The Alpine County Code is available here: https://www.codepublishing.com/CA/AlpineCounty/#!/AlpineCounty16/AlpineCounty1612.html#16.12.

[153] Alpine County Code § 16.12.010.

[154] Alpine County Ord. 255 § 1, 1965.

- B. Markleeville Creek and all tributaries thereof upstream from the highway bridge located on State Sign Routes 4 and 89 and crossing said Markleeville Creek at Markleeville, Alpine County, California.

- C. The east fork of the Carson River and all tributaries thereof upstream from that bridge commonly known as Hangman's Bridge located on State Sign Routes 4 and 89 and crossing the east fork of the Carson River in Alpine County, California."[155]

A 1966 Attorney General Opinion ("1966 Opinion") addressed the validity of the 1965 Ordinance (comprised of Ordinance Nos. 255, 256, and 257) and opined that Ordinance No. 255 (sections 16.12.010 through 16.12.040) was invalid since it only prohibited discharge of recycled water originating outside the County. Likewise, Water Code section 13952.5, enacted in 1985, provides the Lahontan RWQCB with exclusive authority to prescribe waste discharge requirements for recycled water transported out of the Basin, including requirements pertaining to the storage of the recycled water, the receiving waters, and the disposal areas.

b. 1967 Agreement – Alpine County and the District

Two years after passage of the 1965 Ordinance, on April 3, 1967, the District entered into an agreement with Alpine County and the Alpine County Water Agency to import tertiary-treated recycled water into Alpine County. This agreement was subsequently amended to reflect operational changes and to address the use of new facilities constructed by the District. The first amendment, signed on August 21, 1972, provided for the use of the Indian Creek Reservoir facilities and restricted the volume of storage available for County use as well as the use of the Diamond Ditch infrastructure. The second amendment dated June 8, 1983 allowed for the secondary advanced treatment of recycled water exported to Alpine County and for the operation of Indian Creek Reservoir for recreation, fire protection, and irrigation. The Second Amendment, which acknowledged the change from tertiary treatment to advanced secondary treatment, also provided the County a number of concessions, including payment of the impact/mitigation fee. The third amendment of March 15, 1984 set the criteria for use of Harvey Place Reservoir and reflected the termination of recycled water application along Indian Creek as directed by the Lahontan RWQCB.[156]

In 2002 the District, County and Agency compiled all of the pertinent and applicable provisions of the original 1967 agreement and the subsequent amendments into a single agreement titled "Agreement Between South Tahoe Public Utility District and the County Of Alpine and the Alpine County Water Agency (contract nos.: WA2002-01/CC2002-69), entered on November 5, 2002" ("Agreement").

[155] Alpine County Ord. 256 § 1, 1965.
[156] There were two additional amendments relating to other minor issues.

The only County obligations provided for in the Agreement were as follows: (1) in the event the Agency uses the District's pipeline or discharge facilities[157], the Agency must pay the District a proportion of maintenance costs based on the ratio of the Agency's actual flow to total pipeline use; (2) any discharge of recycled water or water by the Agency must comply with the Lahontan RWQCB waste discharge requirements; and (3) the County cannot impose any waste discharge requirements "greater than contracted for" by the parties.

As to item (1) above, the County has never used the District's pipeline or discharge facilities. As to item (2) above, the County would be required under state law to comply with applicable Lahontan RWQCB requirements even in the absence of the Agreement. And finally, as to item (3) above, this restriction would remain in place, but for a different reason (AB 914, which enacted Water Code section 13952.5), even if the Agreement were terminated.

The District, on the other hand, had significant obligations under the Agreement. In summary, the District was required to:

1. Assume liability for the construction, operation and maintenance of the pipeline and discharge facilities and for the discharge of wastewater in Alpine County, and was required to hold Alpine harmless from any liability arising from the same. (¶¶ 5, 19.)

2. Maintain liability insurance adequate to protect against liability for claims arising out of the discharge of wastewater into Alpine County. (¶ 20.)

3. Agree to assign its right to the pipeline to the County in the event that the District can retain recycled water within the Lake Tahoe Basin and is no longer required to export, provided such assignment is approved by all relevant agencies and is not barred by any agency, statute or rule. (¶ 8.)

4. Give the County the District's estimated quantities of recycled water to be discharged to Harvey Place Reservoir on or before January 1 of each year. (¶ 11.)

5. Maintain certain water levels in Indian Creek Reservoir according to certain specifications, providing flushing flows from Indian Creek and the West Fork of the Carson River. (¶ 15.)

6. Pay to stock Indian Creek Reservoir through a payment equal to the annual purchase of 15,000 catchable-size trout. (¶15(c).)

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[157] The District and the County have executed an agreement to allow the County to utilize the District's pipeline and, in turn, the County has executed an agreement with a small resort to discharge recycled water into the pipeline but the resort owner has yet to show that it can meet the Lahontan RWQCB discharge requirements.

7. Monitor recycled water as required by the Lahontan RWQCB, California Department of Public Health, and monitor surface water, groundwater and soils. (¶ 15(d).)

8. Pay the County a total impact/mitigation/compensation fee of $100,000 annually, increased annually in an amount equal to the percentage increase in District's sewer system connections. (¶15(e).)

9. Bear the financial responsibility for the County's use of the export pipeline for up to 150,000 gallons per day. (¶15(f).)[158]

10. Pay the County $15,000 annually for independent monitoring of the filtered advanced secondary recycled water at the District's treatment plant and surface water, groundwater and soils recommended for monitoring by the Soil Conservation Service Report. (¶ 15(i).)

11. Provide replacement potable water to the County in the event any domestic water supply source in Alpine County is contaminated as a result of District discharge. (¶ 15(j).)

After over a year of failed negotiations that were initiated by the Alpine County to increase the amount of the payments, the District sent a letter dated October 21, 2019 terminating the Agreement, effective November 30, 2019. The District noted that the Agreement was properly terminated and consistent with a letter from the Alpine County's legal counsel, dated June 18, 2019, neither the original agreement, its amendments, or the Agreement executed in 2002 contained an expiration date and that, by law, the Agreement would only have extended for a reasonable term and could be terminated by either party.

c. 1983 Ordinance titled "South Tahoe Public Utility District"

In 1983, the County added to its code Chapter 13.28, titled "South Tahoe Public Utility District." Section 13.28.020 provides that Indian Creek Reservoir shall be maintained as a quality fishery and recreational area, as provided under prior agreements between the County and the District.

Section 13.28.030 further provides that the District shall comply with Lahontan RWQCB orders and provides that the District shall carry a $1 million bond as assurance of performance and to compensate for any damages. Any attempt by the County to enforce the requirements of this section against the District appear to be preempted by Water Code section 13952.5.

[158] The terms governing Alpine County's use of the pipeline are contained in the Master C-Line Connection Agreement between the District and Alpine County dated December 21, 2004 (specifying that Alpine County's use of the pipeline for the first 150,000 gallons per day is at no cost to the County).

d. 2021 Ordinance Imposing Recycled Water Permit Requirement and Fees

In 2021, Alpine County adopted Chapter 16.24 of the Alpine County Code,[159] purporting to impose recycled water permit requirements and associated fees. This chapter attempts to regulate "the transportation and disposal of treated wastewater effluent for all purposes."[160] The code section states that it is "unlawful for any person to transport treated wastewater effluent into or through the county without a permit issued by the department, regardless of where or within those boundaries such disposal occurs, pursuant to the provisions of this chapter", whether utilizing a conveyance system for the movement of recycled water or to use a vehicle. The ordinance also prescribes permit fees,[161] remedies for violations,[162] civil penalties,[163] and criminal penalties,[164] but the fees themselves have not yet been developed and added. The code section also includes a severability clause which states that if any section of the chapter is found to be invalid, "such decision shall not affect the validity of the remaining portions of this chapter or any part thereof."[165]

These code sections also appear to be preempted under Water Code section 13952.5, as the Chapter 16.24 of the Alpine County Code seeks to restrict the ability to transport recycled water into the County without a permit and allows suspension and revocation of the permits, which gives Alpine County the authority to completely prohibit the importation of wastewater from the Lake Tahoe watershed.

e. Alpine County Litigation

In 2018, Alpine County reached out to the District to renegotiate certain financial aspects of the Agreement. The District and Alpine County met multiple times and at the last meeting in the Fall of 2018, it was decided that the County would develop and present a specific list or proposed revisions. The District did not hear from Alpine County on this issue until the summer of 2019 when their attorney sent a letter threatening litigation. Alpine County told the District that the Agreement could be terminated and they threatened termination if the District did not renegotiate the terms.

The District had previously concluded that the Agreement could be terminated by either party and considered termination of the Agreement appropriate if it no longer served its intended purpose. The District had paid Alpine County $4.6 million for mitigation and the County had not found it necessary

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[159] The Alpine County Code is available here: https://www.codepublishing.com/CA/AlpineCounty/#!/AlpineCounty16/AlpineCounty1624.html#16.24.

[160] Alpine County Code, § 16.24.020.

[161] Alpine County Code, § 16.24.040.

[162] Alpine County Code, § 16.24.070.

[163] Alpine County Code, § 16.24.080.

[164] Alpine County Code, § 16.24.090.

[165] Alpine County Code, § 16.24.100.

to use these funds for mitigation. Therefore, the Agreement was unnecessary. As a result, on October 21, 2019, the District sent Alpine County a letter terminating the Agreement, effective November 30, 2019.

On July 13, 2021, Alpine County filed its original Complaint, and then its July 15, 2021 Amended Complaint, in Alpine County Superior Court. Since then, the case has been transferred to Yolo County Superior Court and is currently being litigated. The District's position, advanced in the litigation, is that Water Code section 13951 mandates the transportation of wastewater out of the Lake Tahoe watershed, "notwithstanding any other provision of law."[166] Likewise, Water Code section 13952.5 provides the Lahontan RWQCB with exclusive authority to prescribe, under existing law, waste discharge requirements for recycled water to Alpine County within the Lahontan region. Therefore, there is no lawful means to prevent the transportation of wastewater out of the Lake Tahoe watershed into the geographic boundaries of Alpine County.

4. Other Agreements

The agreements summarized below are also relevant to the District's operations in Alpine County and may need to be amended, as discussed further below, if the District adopts changes to its current operations.

a. Diamond Ditch Agreement, as Amended, and Rancher Agreements

A contract was entered into between the District and the Diamond Ditch Mutual Water Association ("DDMWA") in 1972.[167] Four ranches comprise the DDMWA including: Gansberg, Ace Hereford, Neddenriep and Bruns.[168] This contract allowed these ranchers the use of recycled water stored in Indian Creek Reservoir in the amount of up to 3,000 AFY.[169] When construction of Harvey Place Reservoir began in 1983, the District entered into a new agreement with DDMWA, effective for 40 years after completion of the direct land application system (November 3, 1988).[170] This new agreement, as modified, specified that from April to October, the District must provide a minimum of 2,000 AFY and a maximum of 3,600 AFY to be divided equally among the ranchers.[171] The agreement allows for the District to lease the Diamond Ditch system, and the District assumes the loan payments

[166] Wat. Code § 13951.
[167] Water Purchase Contract – Diamond Ditch (1972).
[168] Water Purchase Contract – Diamond Ditch (1972).
[169] Water Purchase Contract – Diamond Ditch (1972).
[170] 1983 Agreement re Reclaimed Water. Diamond Ditch Modification Agreement (1986).
[171] 1983 Agreement re Reclaimed Water. Diamond Ditch Modification Agreement (1986).

on the system, which allows the District the right of access for maintenance and operations of the ditch system.[172]

A separate Dressler Agreement with another landowner (formerly Dressler, now Brooke) guarantees delivery of a minimum of 800 AFY and a maximum 2,000 AFY of recycled water to Dressler's land.[173] The District can only deliver recycled water to Dressler through the lands of Hall, Celio, and Bruns.[174] The Dressler Agreement also permits the District to release emergency discharges from Harvey Place Reservoir onto Dressler's lands and allows access for construction and monitoring of monitoring wells.[175]

The District entered into an agreement with Celio to provide a minimum of 100 AFY and a maximum of 200 AFY to Celio in addition to any tailwater Celio's ranch receives from Ace Hereford.[176] Celio granted the District an easement for recycled water operations.[177]

Gansberg granted an easement for District's diversion structure on Indian Creek. In exchange, Gansberg may graze cattle on a portion of Harvey Place land.[178]

The Diamond Ditch Agreement, as amended, and the other rancher agreements expire in 2028.

b. Harvey Place Reservoir Agreement

The 1983 amendment to the 1967 Alpine County Agreement provided for the construction of Harvey Place Reservoir. The District currently uses Harvey Place Reservoir to store 3,800 AF of recycled water during the winter months. During the growing season, the stored recycled water is made available for agricultural irrigation. The 1983 amendment started a series of environmental reviews, geotechnical studies, reservoir and transmission pipeline modification design, and public outreach programs to develop Harvey Place Reservoir.

The need for a new reservoir was twofold: increased treatment plant outflow deemed Indian Creek Reservoir too small for seasonal storage needs, and the District decided to revert to secondary treatment at the South Lake Tahoe wastewater treatment facility. Together these changes made storage of recycled water in Indian Creek Reservoir infeasible. The water quality of the inflow to Indian

[172] 1983 Agreement re Reclaimed Water. Diamond Ditch Modification Agreement (1986).
[173] Dressler Agreement (1984). The Dressler Agreement also includes terms unrelated to the delivery of recycled water. These specific terms are therefore not discussed herein.
[174] Dressler Agreement (1984).
[175] Dressler Agreement (1984).
[176] Celio Agreement (1983).
[177] Celio Agreement (1983).
[178] 1986 Cattle Raising Agreement.

Creek Reservoir could not be degraded by the addition of secondary-treated recycled water because Indian Creek Reservoir had developed into a freshwater fishery.[179]

5. Alpine Decree

For Carson River water rights, "[a]pplications for changes in the place of diversion, place of use or manner of use as to California or as to both California and Nevada shall be made directly to this Court in accordance with the regular rules of procedure and notice must be served on all affected interests."[180] As discussed in section IV.B.2, *supra*, the recycled water delivered to Alpine County ranchers is not a Carson River water right; therefore, the Court should have no jurisdiction over the recycled water and no amendment is necessary to the Alpine Decree.

Under the Alpine Decree, the recycled water is "supplemental" to the rights on the West Fork of the Carson.[181] "The use of this supplemental water is limited to not exceed the water duties described in the Alpine Decree."[182] This limits the use of supplemental water (i.e., recycled water) with respect to Carson River water and water-righted lands, but does not impose restriction on where, when, or how the District may deliver recycled water. The Alpine Decree does govern, however, the District's freshwater rights on the West Fork Carson River, which it uses to fill and improve the quality of Indian Creek Reservoir and apply directly on Diamond Valley Ranch.[183]

6. Relative Difficulty of Implementing Alpine County Alternatives

Continued export of recycled water to ranchers in Alpine County is likely the alternative with the fewest implementation barriers, given that it represents a continuation of the status quo. However, alternatives involving modifications to existing deliveries within Alpine County, including an expansion of deliveries to other areas within Alpine County, are also likely to be relatively easy to implement compared to other alternatives that would require export to a different region (or in-Basin use). Amending existing discharge permits, or obtaining new discharge permits, is not nearly as difficult as amending existing law, as would be required under other alternatives. The Alpine County alternative

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[179] Harvey Place Reservoir is part of the District's recycled water facilities and is not considered a water of the State. (Board Order No. R6T-2004-0010, WDID No. 6A095900700, Updated Waste Discharge Requirements for South Tahoe Public Utility District Wastewater Recycling Plant, pp. 2–5.)
[180] Alpine Decree, p. 162.
[181] USGS, River-Operations Model for Upper Carson River Basin, California and Nevada, Water-Resources Investigations Report 98-4240, p. 16 ("Supplemental water is available to help meet irrigation demands. . . . The sources of this water may include . . . (3) treated effluent.").
[182] USGS, River-Operations Model for Upper Carson River Basin, California and Nevada, Water-Resources Investigations Report 98-4240, p. 16.
[183] South Tahoe Public Utility District, Recycled Water Facilities Master Plan (October 2009), pp. 3-15, 3-16.

involving discharge into Indian Creek would likely be more difficult to implement than Alpine County alternatives involving new discharges to land, due to permitting requirements.

C. Export Within California to El Dorado County in the American River Watershed

In the 1960s, the District explored the possibility of discharging recycled water to the South Fork American River ("American River") in El Dorado County.[184] At the September 28, 2022 Stakeholder Advisory Group meeting, stakeholders requested that the District consider an alternative involving end uses in El Dorado County within the American River watershed. Further discussions identified that recycled water could be used for snowmaking at Sierra-at-Tahoe. Other potential end uses may include other land applications (e.g. agricultural or landscape irrigation), injection to the groundwater, or direct discharge to the South Fork American River or one of its tributaries.

1. District's Prior Evaluation of Possible Discharge to American River

a. 1964 District Application for Discharge to the South Fork American River

In April 1964, the District applied to discharge recycled water of "near drinking water quality" into the American River.[185] The Central Valley Regional Water Quality Control Board ("Central Valley RWQCB") held a hearing, with many agencies and individuals protesting the discharge.[186] One newspaper article headline stated "Everyone's Against It" and characterized the Central Valley RWQCB as "skeptical" of the District's plan to export recycled water into the American River.[187] The California Department of Fish and Game expressed doubt that allowing discharge would adequately protect fish, wildlife, and recreation.[188] The El Dorado Water Agency feared exported water would be lost to the Tahoe Basin, adversely affecting California's interstate allocation.[189] The El Dorado Irrigation District also feared that if the Central Valley RWQCB announced high standards for recycled water discharge that similar standards would be imposed for the recycled water that irrigation district discharged to the American River, which was not subject to as high of a degree of treatment as the District.[190] Ultimately, the

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[184] Pagter, Carl R. & Wolfe, Jr., Cameron W., *The Future of a National Asset. Land Use, Water, and Pollution*, CAL. L. REV., Vol. 52, No. 3, (Aug., 1964), 563, 609.
[185] Facility Plan for District Wastewater Treatment System (May 1978), p. V-16.
[186] Facility Plan for District Wastewater Treatment System (May 1978), p. V-16.
[187] Tom Brien, *Effluent Export Plan Rejected At Hearing*, Tahoe Daily Tribune, April 17, 1964.
[188] Pagter & Wolfe, Jr. at 609; Tom Brien, *Effluent Export Plan Rejected At Hearing*, Tahoe Daily Tribune, April 17, 1964, p. 1.
[189] Pagter & Wolfe, Jr. at 609; Tom Brien, *Effluent Export Plan Rejected At Hearing*, Tahoe Daily Tribune, April 17, 1964, p. 1.
[190] Pagter & Wolfe, Jr. at 609-10; Tom Brien, *Effluent Export Plan Rejected At Hearing*, Tahoe Daily Tribune, April 17, 1964, p. 1.

Central Valley RWQCB prohibited direct and indirect discharge into the American River at any point above Placerville.[191]

b. 1960s Decision Not to Discharge to the American River Watershed

When it was considered in the 1960s, the alternative to discharge recycled water to the American River watershed in El Dorado County was considered one of the more simple alternatives.[192] However, the water quality requirements and geographic limitations described above for direct discharge to the American River and the lack of suitable sites for agricultural reuse "within a reasonable distance of Echo Summit" made land or direct discharge within El Dorado County cost prohibitive.[193] Additionally, ardent opposition to export of recycled water to the American River made the political process difficult.[194]

c. El Dorado Water Agency Recycled Water Export Standards

The El Dorado Water Agency opposed export of recycled water into the American River. Ahead of a hearing before the Central Valley RWQCB to consider the District's discharge of recycled water to the American River, the El Dorado County Board of Supervisors took action on Monday, April 11, 1964 "that would permit them to set their own standards for sewage, effluent dumping into the American River, which is a move to stop exportation over Echo Summit."[195]

d. 1977 Letter From Central Valley Regional Water Quality Control Board

Chapter VII of the District's 1978 Facility Plan for the District's Wastewater Treatment System, dated May 1978, quotes a letter to the District dated September 28, 1977, in which the Central Valley RWQCB stated:

> In order to maximize the protection of downstream beneficial uses, we believe probable future requirements for the discharge of South Tahoe P.U.D. recycled water to the South Fork American River would be similar to those for Kirkwood Meadows. Changing the discharge point to below the confluence with the Silver Fork would put it below many of the domestic diversions. However, we do not believe this would substantially influence requirements. . . These requirements are no more

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191 Facility Plan for District Wastewater Treatment System (May 1978), p. V-16; Pagter & Wolfe, Jr. at 610.
192 Facility Plan for District Wastewater Treatment System (May 1978), p. VII-10.
193 Facility Plan for District Wastewater Treatment System (May 1978), pp. VII-11, V-16.
194 Tom Brien, *Effluent Export Plan Rejected At Hearing*, Tahoe Daily Tribune, April 17, 1964, p. 1.
195 *American River Ban Would Boost Daggett*, Tahoe Daily Tribune, April 15, 1964; *Supervisors To Establish Effluent Export Standards*, Tahoe Daily Tribune, April 15, 1964, p. 8.

> than our best estimates at this time. Any such discharge would undoubtedly meet with opposition from many directions.[196]

This letter is not a binding determination and is 45 years old, but it indicates there would be hurdles to permitting a discharge of recycled water directly to the South Fork American River. However, conditions in the state and the American River watershed have changed significantly since 1977. Since this time, the State has experienced significant and repeated drought, begun regulation of groundwater (which is often relied on when surface supplies are limited), and experimented with curtailing even the most senior surface water rights.[197] Specifically, rights on the American River were intermittently curtailed from August 2021 to April 2023 pursuant to emergency SWRCB regulations.[198]

As to the "Kirkwood Meadows permit" referenced in the 1977 letter, the most recent Kirkwood Meadows Public Utility District ("KMPUD") permit (Order No. R5-2007-0125) prohibits KMPUD from discharging "wastes to surface waters or surface water drainage courses."[199] Instead, KMPUD engages

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[196] Facility Plan for District Wastewater Treatment System (May 1978), p. VII-10. The Central Valley RWQCB does have record of these exchanges, as described below. However, the letter's existence and contents are confirmed in a comment in the California Law Review in 1964. (Pagter, Carl R. & Wolfe, Jr., Cameron W., *The Future of a National Asset. Land Use, Water, and Pollution*, CAL. L. REV., Vol. 52, No. 3, (Aug., 1964), 563, 609.).

[197] See Wat. Code § 10726.4(a); *California Water Curtailment Cases* (2022) 83 Cal.App.5th 164; SWRCB, Resolution No. 2022-0028 Revising and Re-Adopting an Emergency Curtailment and Reporting Regulation for the Sacramento-San Joaquin Delta (Delta) Watershed (Jul. 20, 2022), available at https://www.waterboards.ca.gov/drought/delta/docs/2022/rs2022-0028-reg.pdf.

[198] See California Water Boards, State Water Board, Sacramento-San Joaquin Delta Watershed Drought & Curtailment Information, "2022 – Previous Updates to Curtailment Status List" and "2021 – Previous Updates to Curtailment Status List", available at https://www.waterboards.ca.gov/drought/delta/. The emergency regulations regulating the American River watershed were originally adopted effective for one year from the date of filing with the Secretary of State. State Water Board, Resolution No. 2021-0028 to Adopt an Emergency Curtailment and Reporting Regulation for the Sacramento-San Joaquin Delta (Delta) Watershed (Aug. 3, 2021), available at https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2021/rs2021_0028_regs.pdf. In July 2022, the regulations were readopted for an additional year, spanning into August 2023. State Water Board, Resolution No. 2022-0028 Revising and Re-Adopting an Emergency Curtailment and Reporting Regulation for the Sacramento-San Joaquin Delta (Delta) Watershed (Jul. 20, 2022), available at https://www.waterboards.ca.gov/drought/delta/docs/2022/rs2022-0028-reg.pdf. The curtailment and reporting regulation applicable to the Sacramento-San Joaquin Delta (Code Regs., tit. 23, § 876.1 *et seq*.) were rescinded on April 3, 2023. (State Water Board, Curtailment Compliance and Responses: Rescission of Curtailment and Reporting Orders, available at https://www.waterboards.ca.gov/drought/delta/curtailment-compliance-and-responses.html (last visited Jul. 11, 2023).

[199] California Regional Water Quality Control Board, Central Valley Region, *Order No. R5-2007-0125 Waste Discharge Requirements for Kirkwood Meadows Public Utility District Wastewater Treatment Plant Alpine and Amador Counties* (Sept. 14, 2007), p. 19, available at: https://www.waterboards.ca.gov/rwqcb5/board_decisions/adopted_orders/alpine/r5-2007-0125.pdf (hereafter "Kirkwood Meadows WDRs").

in tertiary treatment of wastewater before the treated wastewater is discharged by land application.[200]

KMPUD's permit is instructive as to how the Central Valley RWQCB might approach a permit for land application by the District or a third party recipient of the District's recycled water because surface water drainage near KMPUD's effluent disposal area flows to waterbodies that are tributary to the South Fork American River.[201] If Central Valley RWQCB were to impose the same requirements on the District or a recipient of the District's recycled water, land application would require several potential treatment upgrades including nutrient removal, tertiary filtration, and disinfection. This alternative would require higher treatment standards necessitating a treatment plant upgrade in addition to the transportation facilities required to deliver the water to leach fields in the American River watershed. Potential permit conditions for an end use involving snowmaking at a resort in the American River watershed (e.g., at Sierra-at-Tahoe) are discussed below.

2. Current Considerations

Circumstances have changed since the District's prior consideration of discharge to the American River watershed half a century ago. The following section notes some of these changes.

a. El Dorado County Ordinances

El Dorado County Code requires all wastewater[202] to be disposed of by an approved method and not disposed of in a manner "that may cause pollution of any surface water, groundwater, well, spring, stream, river, lake, or pollution of any other watercourse."[203] Wastewater may not be "discharged into any abandoned or unused well or into any crevice, sinkhole, or other opening, either natural or artificial."[204]

b. Public Concerns

Historically, there was resistance to discharging wastewater to the American River watershed, including due to concerns around exporting water from the Lake Tahoe Basin to meet the water

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[200] Kirkwood Meadows WDRs at pp. 1–3.
[201] Kirkwood Meadows WDRs at p. 11.
[202] The El Dorado County Code does not specifically define "wastewater" or "recycled water" but does include a definition for *onsite wastewater treatment system* which means "a system …handling the liquid waste ..." (El Dorado County Code, § 8.39.070.) Additionally, El Dorado County Code section 110.14.140 defines "recycled water" as a subset of wastewater ("… wastewater (including recycled water)…") in its discussion of exemptions to the general grading, erosion, and sediment control provisions.
[203] El Dorado County Code, § 110.32.090(A).
[204] El Dorado County Code, § 110.32.090(A).

supply demands of agriculture and other downstream users in the Central Valley.[205] It is unknown whether these or other concerns would be triggered by this alternative, given the substantial changes that have occurred in the State since the 1960s and 1970s..

c. Fully Appropriated Status

Fully appropriated stream systems are those streams where there is insufficient supply for new water right applications and diversions. The SWRCB maintains a list of fully appropriated streams. The entire South Fork American River system is fully appropriated annually July through October, but has unappropriated water available November to June.[206] Additionally, many of the tributaries to the South Fork American River are fully appropriated during all or a portion of the remaining five months of the year.[207] Because portions of the American River are fully appropriated during July through October each year, there may be demand for other water resources during that period within the American River watershed.

d. Central Valley RWQCB Basin Plan

The Central Valley RWQCB Basin Plan for the Sacramento and San Joaquin River Basins includes the American River watershed[208] and consists of a designation or establishment for the waters within the Sacramento and San Joaquin River Basins, beneficial uses to be protected, water quality objectives to protect those uses, and a program of implementation needed for achieving the objectives.

The Basin Plan identifies municipal and domestic uses on the South Fork American River from the source to Placerville in addition to power, recreation, and environmental purposes.[209] From Placerville to Folsom Lake, there are municipal and domestic uses in addition to irrigation, power, recreation, and environmental uses.[210]

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[205] See e.g., Gregory Stratz, "*I Had a Lakehouse in Tahoe": The Legal Ramifications of California Tapping Lake Tahoe and how it Affects Homeowners*, 103 Marq. L. Rev. 267 (2019), available at: https://scholarship.law.marquette.edu/mulr/vol103/iss1/9.

[206] State Water Board, Water Right Order 98-08 (Nov. 19, 1998), Exhibit A. See also In the Matter of Applications 20305, 20306, and 20307 of Vahan Eghoian, Elmer D. Miguelgorry, and Owen Jay Masters, Respectively, to Appropriate from Brush Canyon in El Dorado County, Decision D 1211 (Feb. 17, 1965).

[207] State Water Board, Water Right Order 98-08 (Nov. 19, 1998), Exhibit A.

[208] Basin Plan for Sacramento and San Joaquin River Basins, p. 1-2.

[209] Basin Plan for Sacramento and San Joaquin River Basins, p. 2-10.

[210] Basin Plan for Sacramento and San Joaquin River Basins, p. 2-10.

"All water quality objectives are developed to protect the [municipal and domestic] beneficial use unless otherwise stated."[211] The water quality objectives applicable to the South Fork American River upstream of Folsom Lake are as follows:

- Aquatic growth from levels of biostimulatory substances, discoloration, floating material, sediment, settleable material, suspended material, tastes and odors, and turbidity shall not be in concentrations that cause nuisance or adversely affect beneficial uses.[212]

- Municipal supply shall not contain concentrations of chemical constituents, in excess of the maximum contaminant levels (MCLs) specified in Title 22 of the California Code of Regulations.[213]

- "Waters shall not contain oils, greases, waxes, or other materials in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses."[214]

- "The pH shall not be depressed below 6.5 nor raised above 8.5."[215]

- Pesticide concentrations, including those found in bottom sediments or aquatic life, cannot adversely affect beneficial uses and shall not be detectable by EPA-approved methods. Pesticide concentrations cannot exceed the "lowest levels technically and economically achievable," those allowable by antidegradation policies, and applicable MCLs for drinking water.[216]

- "Radionuclides shall not be present in concentrations that are harmful to human, plant, animal or aquatic life nor that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal or aquatic life." At a minimum, municipal supply must not exceed MCLs in Title 22 of the California Code of Regulations.[217]

- Total dissolved solids shall not exceed 125 mg/l in the South Fork American River to Folsom Lake (reaches 48 and 49).[218]

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[211] Basin Plan for Sacramento and San Joaquin River Basins, p. 4-8.
[212] Basin Plan for Sacramento and San Joaquin River Basins, pp. 3-3; 3-6; 3-7; 3-13; 3-15 to 3-16.
[213] Basin Plan for Sacramento and San Joaquin River Basins, p. 3-3 to 3-4.
[214] Basin Plan for Sacramento and San Joaquin River Basins, p. 3-8.
[215] Basin Plan for Sacramento and San Joaquin River Basins, p. 3-8.
[216] Basin Plan for Sacramento and San Joaquin River Basins, pp. 3-8 to 3-9.
[217] Basin Plan for Sacramento and San Joaquin River Basins, p. 3-11.
[218] Basin Plan for Sacramento and San Joaquin River Basins, p. 3-13.

- "The natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Water Board that such alteration in temperature does not adversely affect beneficial uses," but at no time shall the temperature be increased more than 5°F above natural receiving water temperature.[219]

- "All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life. This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances."[220]

Municipal and domestic wastewater dischargers are required to comply with monitoring requirements for pyrethroid pesticides alongside recycled water characterization monitoring described in the Basin Plan.[221] The Central Valley RWQCB "encourages the reclamation and reuse of wastewater . . . and requires as part of a Report of Waste Discharge an evaluation of reuse and land disposal options as alternative disposal methods."[222]

The Basin Plan prohibits direct discharge of waste to the American River downstream of Folsom Dam; this does not include the South Fork American River.[223] However, the Central RWQCB may revise, rescind, or adopt prohibitions as necessary.[224]

e. Snowmaking

In recent years, the use of recycled water for snowmaking has grown throughout the West, including in at least one location in California. In California, the use of recycled water for snowmaking requires compliance with standards in Title 22 of the California Code of Regulations for disinfected tertiary recycled water.

In 2015, Donner Summit Public Utility District ("DSPUD") completed an upgrade of its water treatment facility and entered into a partnership with Soda Springs Mountain Resort under which tertiary

[219] Basin Plan for Sacramento and San Joaquin River Basins, p. 3-14.
[220] Basin Plan for Sacramento and San Joaquin River Basins, p. 3-15.
[221] Basin Plan for Sacramento and San Joaquin River Basins, p. 5-15.
[222] Basin Plan for Sacramento and San Joaquin River Basins, p. 4-21.
[223] Basin Plan for Sacramento and San Joaquin River Basins, p. 4-47.
[224] Basin Plan for Sacramento and San Joaquin River Basins, pp. 4-46 to 4-47.

treated recycled water is used for snowmaking.[225] DSPUD's permit, Order No. R5-2021-0023,[226] imposes conditions on the use of recycled water for snowmaking, including:

- Limiting the use of recycled water for snowmaking to disinfected tertiary recycled water (Title 22, section 60307);
- Installation of perimeter warning signs and marking water infrastructure (e.g., pumps and piping) to differentiate the infrastructure from that used for potable water; and
- Requiring measures to prevent cross-connection between potable water supply and recycled water.

The permit also includes receiving water limitations consistent with the Basin Plan for the Sacramento River Basin and San Joaquin River Basin.

Although recycled water use for snowmaking is not yet ubiquitous in California, the Central Valley RWQCB does have permitting experience in the Tahoe Region gained through issuance of DSPUD's permit.

f. Injection

To the extent the District considers injection of recycled water in the American River watershed, the District must comply with the applicable regulations in Title 22 of the California Code of Regulations. Additionally, if the groundwaters are hydrologically connected to the American River or its tributaries (or any other surface water body), a NPDES permit may be required pursuant to the Clean Water Act and *County of Maui v. Hawaii Wildlife Fund* (2020) 140 S. Ct. 1462.

3. Relative Difficulty of Implementing El Dorado County Alternatives

While the factors discussed above demonstrate that permitting a discharge directly to the American River or its tributaries would be challenging, discharge to land would be relatively easier to permit, as demonstrated by the KMPUD and DSPUD permit examples, but would likely either require the District to implement plant improvements or the end user (e.g., Sierra-at-Tahoe) to construct a tertiary treatment facility.

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[225] See Soda Springs Mountain Resort, Safety & Sustainability: Recycled Water Initiative, available at https://www.skisodasprings.com/culture/playforever/recycled-water-initiative (last accessed Sept. 8, 2023).

[226] California Regional Water Quality Control Board, Central Valley Region, *Order No. R5-2021-0023 National Pollutant Discharge Elimination System (NPDES) CA0081621* (April 22, 2021), available at: https://dspud.com/wp-content/uploads/2021/07/2021-npdes-permit.pdf.

D. Export to Nevada

In the early 1960s, the District considered export by a pipeline over Daggett Pass to the Carson Valley in Douglas County, Nevada.[227] The Chief of the Nevada Bureau of Environmental Health determined the District's reclaimed water was acceptable for export to the Carson Valley for irrigation.[228] This export option was not opposed by the receiving area.[229] The approach required expansion of the Douglas County reclaimed water transport system and plant capacity as existing capacity was committed to approved casino expansions.[230] Moreover, the Lahontan RWQCB stated in a letter dated January 13, 1978 that "Douglas County SID is controlled by casino interests and the political realities of such an arrangement could easily be detrimental" and pointed out that the Douglas County plant had not been upgraded by the July 1, 1977 deadline and thus was in violation of many of its reclaimed water limitations.[231] Finally, new requirements at the time may have required Douglas County to purchase land and develop a land-application system.[232] Following an unsuccessful attempt to negotiate a joint export system over Daggett Pass with the Douglas County Sewer Improvement District No. 1, the District recognized its lack of control in planning and operation of the Nevada-side systems would be challenging logistically as well as in obtaining state funding and inter-state and inter-agency agreements and therefore did not continue to analyze this alternative at that time.[233]

1. Interstate Issues

In order for the District to expand the use of its reclaimed water to include users in Nevada, the District might need SWRCB approval under Water Code section 1211, which provides that "[p]rior to making any change in the point of discharge, place of use, or purpose of use of treated wastewater, the owner of any wastewater treatment plant shall obtain approval of the board for that change."[234] This approval requirement, however, does not apply to "changes in the discharge or use of treated wastewater that do not result in decreasing the flow in any portion of a watercourse."[235] It is therefore unclear whether this statute would be triggered under any alternative (i.e., because the District's recycled water is discharged to land and not into a watercourse, as is done by many other wastewater treatment plants in the State).

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227 Pagter & Wolfe, Jr. at 604.
228 Pagter & Wolfe, Jr. at 610; Facility Plan for District Wastewater Treatment System (May 1978), p. V-16.
229 Pagter & Wolfe, Jr. at 610.
230 Facility Plan for District Wastewater Treatment System (May 1978), p. VII-9 to VII-10.
231 Facility Plan for District Wastewater Treatment System (May 1978), p. VII-10.
232 Facility Plan for District Wastewater Treatment System (May 1978), p. VII-10.
233 Facility Plan for District Wastewater Treatment System (May 1978), pp. VII-10, V-16.
234 Wat. Code § 1211(a).
235 Wat. Code § 1211(b).

There are no provisions in the Water Code that explicitly prohibit or restrict the importation of recycled water from California to another state. Analogously, in its 1958 Decision 913,[236] the SWRCB granted the Bureau of Reclamation's application to appropriate water from the Truckee River within California for use in the vicinity of Reno, Nevada. Like the Carson River, the Truckee River and its tributaries flow through both California and Nevada.

Nevada law, also, does not expressly preclude the import of the District's reclaimed water for use on property in Nevada. However, as stated above and discussed further below, any reclaimed water users must comply with the various water quality regulations and permitting requirements set forth in the NAC and as governed by NDEP. Additionally, NAC § 445A.235(1) provides that in connection with the issuance of a permit, NDEP must transmit a fact sheet to any other states "whose waters may be affected by the issuance of a permit" and "[e]ach affected state must be given an opportunity to submit written recommendations to the Director and to the Regional Administrator which the Director may incorporate into the permit if issued."

The Compact does not distinguish based on state lines, but on watershed boundaries and expressly permits inter-basin transfers.[237]

Similarly, the Settlement Act provides that it "shall [not] prevent interstate transfer of water or water rights within the Truckee River Basin so long as the transfer complies with all state laws . . . including any conditions imposed by a State agency" [238] and that the Alpine Decree court shall retain jurisdiction to "administer interstate transfers of water or water rights on the Carson River under the Alpine decree."[239] Here again, transfers within the same basin are permitted. The District's reclaimed water used by irrigators in the Carson River Basin is not a "water right[] . . . under the Alpine Decree", nor is it "water" expressly anticipated by the Alpine Decree.[240] Therefore, it appears that approval by the Alpine Decree court is unnecessary for transfers of reclaimed water. Nothing in section 204 of the Settlement Act alters the applicability of State law or the procedures to the water allocated to the States by the Settlement Act.[241]

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[236] In the Matter of Applications 15672 and 15673 by the United States of America, Bureau of Reclamation (1958) D-913.
[237] Wat. Code § 5976 (Compact), Art. X (The Compact "may use directly, by exchange, or otherwise its allocated waters of the Truckee River in the Lake Tahoe Basin or the Carson River Basin, or its allocated waters of the Carson River in the Lake Tahoe Basin or the Truckee River Basin.").
[238] Settlement Act, § 204(f)(1).
[239] Settlement Act, § 204(f)(2). The Settlement Act provides that each State may intervene as of right in a proceeding regarding an interstate transfer and may report to the court findings or decisions regarding the proposed change made by the State Water Board or Nevada State Engineer pursuant to state law.
[240] See Rulings on Specific Objections to Special Masters Findings in Acreages and Priorities, *United States of America v. Alpine Land and Reservoir Company, et al.* (Nev. May 28, 1980) Civ. No. D 183 BRT, pp. 9-10.
[241] Settlement Act, § 204(j).

Another outstanding issue related to interstate transfers is related to the allocation of the transferred quantity of recycled water between California and Nevada. Article V of the Compact prescribes specific allocations of water in the Basin between the states and permits transfers of allocated waters, but the impact of a recycled water transfer is not specifically addressed.[242] Generally, where the water is used determines which state to which the water is allocated.[243] However, within the Truckee River Basin, the transfer is charged to the allocation of the State wherein use was made *prior* to the transfer.[244]

2. Water Quality Regulatory Requirements

a. NDEP

As stated above, the use of reclaimed water in Nevada must comply with Nevada's water quality standards. The water quality standards are set forth in Chapter 445A of the Nevada Revised Statutes and in regulations NAC 445A.11704 through 445A.2234. The Nevada Administrative Code also sets various categories of reuse for reclaimed water and water quality standards for each use (see below table).[245]

Category of Reuse	**Allowable Uses for Reclaimed Water**
A+	Indirect potable reuse through groundwater augmentation and other allowed uses
A	• Spray irrigation of food crops, cemetery, commercial lawn, golf course, greenbelts and parks • Impoundment and outdoor decorative water features • Snowmaking (may require additional treatment) • Commercial toilet and urinal flushing • Commercial window washing or pressure cleaning • Any activity approved for reuse category B, C, D or E
B	• Spray irrigation of cemetery, commercial lawn, golf course, greenbelts and parks • Cooling water for industrial processes • Firefighting in urban areas • Commercial chemical mixing • Street sweeping • Any activity approved for reuse category C, D or E

[242] Wat. Code § 5976 (Compact), Arts. V, X.
[243] Wat. Code § 5976 (Compact), Art. V.D; Settlement Act, § 204(i).
[244] Settlement Act, § 204 (f)(1).
[245] NAC §§ 445A.2761–445A.2771.

Category of Reuse	Allowable Uses for Reclaimed Water
C	• Spray irrigation of cemeteries, nurseries, commercial lawns, golf courses, green belts and parks with 100-foot buffer • Establishment, restoration or maintenance of wetlands – with buffer zone • Firefighting of forest or wildland fires • Any activity approved for reuse category D or E
D	• Spray irrigation for agriculture with 400-foot buffer • Dust control • Flushing sewer lines or impoundment (with conditions) • Any activity approved for reuse category E
E	Spray irrigation of agriculture with 800-foot buffer

Figure 3: Categories and water quality standards for reuse of reclaimed water as set by the Nevada Administrative Code.

b. Lahontan RWQCB

If recycled water is conveyed through California, the same permitting requirements as discussed for California use would be applicable.

3. Conveyance Within Nevada

Issues relating to discharge of recycled water in California were described in section IV.B, *supra*. The following analysis assumes discharge will occur at the state line and transportation will only occur within Nevada.

a. Issues Unique to Discharge into Indian Creek

Under this alternative, Indian Creek would convey reclaimed water to end users in Nevada via the existing discharge point from Harvey Place Reservoir to Indian Creek. End users could access the water from Indian Creek, Mud Lake or the Carson River downstream of the Indian Creek confluence. Indian Creek within Nevada (like the California segment discussed in section IV.B.2) is listed as an impaired water body by the USEPA, but lack a TMDL.[246] This portion of Indian Creek is listed due to

[246] How's My Waterway? Waterbody Report: Indian Creek, USEPA, https://mywaterway.epa.gov/waterbody-report/21NEV1/NV08-CR-32_00/2022 (last visited Dec. 23, 2022).

nitrogen/phosphorous and temperature concerns.[247] Therefore, to discharge into Indian Creek within Nevada, the District would be required to obtain a permit. As described above, any future Indian Creek TMDL would not prescribe limitations for any one discharger, but set high-level water quality objectives for the water body.

The water quality standards applicable to Indian Creek in Nevada are the same as those in the nearby segment of the East Fork Carson River in NAC 445A.1806, which is included as Appendix F.[248] The standards require that temperature must be less than or equal to 13 degrees Celsius November to May, 17 degrees Celsius in June, 21 degrees Celsius in July, and 22 degrees Celsius in August to October.[249] Total temperature change cannot be greater than 2 degrees Celsius, but no change in temperature is required to maintain existing water quality.[250] Total nitrogen must average 0.5mg/L or less and may not exceed 0.8mg/L to maintain existing quality.[251] Nitrate is limited to 10mg/L or less and nitrite must not exceed 0.06mg/L.[252] Total phosphorus must not exceed 0.10mg/L on average.[253]

Discharge into Indian Creek or a pipeline would direct reclaimed water out of the Carson River, making that water unavailable for direct diversion and potentially impacting downstream users reliant on tailwater.

b. Issues Unique to Discharge into the West Fork Carson River

Utilizing the West Fork Carson River for conveyance presents significant physical and accounting challenges. Accounting for conveyance between segments is difficult because each segment operates relatively independently and there are no set maximum diversion quantities outlined in the Alpine Decree. Additionally, conveyance would likely be limited to the season before the river goes on regulation because portions of the river go dry and reappear, causing physical constraints on water delivery while the river is on regulation.

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[247] How's My Waterway? Waterbody Report: Indian Creek, USEPA, https://mywaterway.epa.gov/waterbody-report/21NEV1/NV08-CR-32_00/2022 (last visited Dec. 23, 2022).
[248] NDEP, Bureau of Water Quality Planning, Nevada 2020-2022 Water Quality Integrated Report: Assessment Period - October 1, 2013 through September 30, 2022 (Feb. 2022), Attachment 3b, p. 145, available at: https://ndep.nv.gov/uploads/water-wqm-docs/IR2022FINAL_Report.pdf.
[249] NAC 445A.1806.
[250] NAC 445A.1806.
[251] NAC 445A.1806.
[252] NAC 445A.1806.
[253] NAC 445A.1806.

The Carson River is also a listed impaired waterbody within Nevada, with metals and temperature concerns at the state line[254] and metals, temperature, microbes, and nitrogen/phosphorous at Genoa Lane.[255] Water Quality Standards for the West Fork Carson River from the State line into Nevada are included in NAC 445A.1796 and are included as Appendix G. Water quality standards for the West Fork Carson River in Nevada at Genoa Lane are included in NAC 445A.1808 and are included as Appendix H.

c. Issues Applicable to Pipeline Conveyance to Mud Lake or Douglas County Lake Tahoe Sewer Authority ("DCLTSA")

Both alternatives involving delivery to Mud Lake and to DCLTSA would involve water delivery to Nevada via new pipelines.[256] Neither alternative would involve deliveries via the Carson River, and therefore would not implicate the Alpine Decree.

Both alternatives would require a permitting and environmental analysis process for construction of the respective new pipeline. The permitting process for the DCLTSA pipeline would likely be more onerous because a portion of the pipeline would be constructed within the Lake Tahoe Basin to connect the District's wastewater treatment facility to DCLTSA's facility. Under the DCLTSA alternative, the water would need to be treated to meet the standards of DCLTSA's existing permit.

d. Issues Applicable to All Alternatives

(1) Nevada Regulatory Requirements

As discussed above in section IV.B.2, *supra*, discharge into either the Indian Creek or the West Fork Carson River would require a permit from NDEP.[257] Pollutants requiring permits include "sewage, garbage, sewage sludge . . . municipal and agricultural waste."[258] As described in section IV.B.2.a, *supra*, some the ranchers have a Tailwater Operating Agreement with NDEP allowing tailwater to flow and be used on certain Nevada properties included in the agreement.

NDEP staff have stated that if discharge were to occur in California, discharge would need to meet the nearest downstream water quality standards at the Nevada state line. While both the East and West Forks of the Carson River are Waters of the United States, requiring NPDES permits for any discharge,

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[254] How's My Waterway? Waterbody Report: Carson River, West Fork at the state line, USEPA, https://mywaterway.epa.gov/waterbody-report/21NEV1/NV08-CR-01_00/2022 (last visited Dec. 24, 2022).
[255] How's My Waterway? Waterbody Report: Carson River, West Fork at Genoa Lane, USEPA, https://mywaterway.epa.gov/waterbody-report/21NEV1/NV08-CR-06_01/2022 (last visited Dec. 24, 2022).
[256] According to Federal Water Master representatives, current capacity in existing infrastructure would not allow any additional deliveries to Mud Lake.
[257] NRS 445A.465; NRS 445A.395.
[258] NRS 445A.400(1).

Indian Creek is not a classified water source. NDEP also indicated that further discussion with NDEP management would be required to address legal and water rights issues associated with conveying effluent from California into Nevada.

The Nevada Division of Water Resources ("NDWR") has the authority to permit the use of any water within the State including the use of reclaimed water. Any person who desires to appropriate public water in the State needs, prior to performing any work, to make application to the State Engineer to change the place of diversion or change in manner or place of use. NDWR also administers permits for the conservation of water resources and for the quantities and manner of use of the various water resources, including the use of reclaimed water. The role of the NDWR in regulating the reuse of reclaimed water is to set maximum quantities of reclaimed water which may be used for specific purposes as part of the State's water conservation efforts.

(2) Water Rights/Alpine Decree Issues

Pursuant to the Compact, any change in point of diversion or manner, purpose, or place of use of the Waters of the Carson, Truckee or Walker River Basins must not adversely affect the allocation of water to the other state.[259] Such a change may be made in either state pursuant to state law or applicable decree.[260]

As described in sections IV.A.4-5, *supra*, change in discharge of reclaimed water from Alpine County to the Carson or Truckee Basins could implicate the Settlement Act "compensation" to California of 2,000 AF of Replacement Water. The Settlement Act and Compact do not limit application based on state lines, but on basin boundaries.

The Compact, reflecting the Alpine Decree, limits use of waters of the Carson River to the Carson River Basin except directly or by exchange in the Lake Tahoe Basin or the Truckee River Basin.[261] This creates opportunity for water rights trading.

In Nevada, water may be appropriated and an appropriative right obtained through instream beneficial use without a diversion.[262] Additionally, the Compact declares that use of water for preservation, protection, and enhancement of fish, wildlife, and recreation (including instream uses) are beneficial uses.[263]

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[259] Wat. Code § 5976 (Compact), Art. XVI.
[260] Wat. Code § 5976 (Compact), Art. XVI.
[261] Wat. Code § 5976 (Compact), Art VII, § E; Art. X.
[262] See *State v. Morros* (1988) 104 Nev. 709, 715.
[263] Wat. Code § 5976 (Compact), Art. XIII.

Rancher recipients of recycled water have tailwater rights as the discharged water drains onto other properties. Releases of recycled water are controlled to avoid reaching the West Fork Carson River as surface flow.[264] A control ditch is located on the Dressler/Brooke property (the lowest gradient property of the ranches) near the California/Nevada border to prevent water from crossing the state boundary.[265] However, tailwater may still enter Nevada via groundwater or pursuant to the Tailwater Operating Agreement between NDEP and the ranchers.

There are similar issues as to application for a change of place of use under the Alpine Decree as discussed in section IV.B.5, *supra*. Generally, the Alpine Decree prohibits "claimants or potential claimants" from "diverting, taking or interfering in any way with the waters of the Carson River . . . so as to in any way prevent or interfere with the diversion, use and enjoyment of water of any of the persons or parties as allowed by [the Alpine Decree]."[266] A technical analysis may be necessary to determine the impacts in a change in place of use.

4. Relative Difficulty of Implementing Nevada Alternatives

Exporting reclaimed water to Nevada implicates certain interstate water rights and quality issues, which increase the complexity beyond that of some of the other alternatives, including the Alpine County alternatives. If discharge were to occur in California for conveyance to Nevada, discharge would need to meet the nearest downstream water quality standards at the Nevada state line in addition to California requirements. The fact that the District ceased discharge into Indian Creek Reservoir because it could not consistently meet water quality requirements suggests that increased treatment levels would be necessary to meet applicable requirements. This would likely require several potential treatment upgrades including nutrient removal, tertiary filtration, and disinfection.

E. <u>Export within California to TTSA Facilities in Nevada County via Tahoe City PUD</u>

The District could leverage existing infrastructure to export recycled water from the Basin. To do so, however, the District would need to connect to the existing TTSA facilities, which would need to be upgraded because TTSA's Truckee River Interceptor pipeline and its treatment facilities do not have existing sufficient capacity to take the District's existing and future flows. This alternative would involve reaching an agreement with both Tahoe City PUD and TTSA to upgrade their facilities and use their capacity and obtaining approval from the Lahontan RWQCB to expand existing permits to accommodate additional volumes. Significant construction would be required to connect the District

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[264] See e.g., Lahontan RWQCB, Staff Report: Review/Update of Wastewater Reclamation Requirements for Neddenriep Ranch Irrigation Site (Mar. 20, 2000), p. 2.

[265] Lahontan RWQCB, Staff Report: Review/Update of Wastewater Reclamation Requirements for Brooke On-Farm Irrigation Site (Mar. 20, 2000), p. 3.

[266] Alpine Decree, p. 158.

to the Tahoe City PUD system and TTSA facilities and to upgrade those facilities. This would require land use approvals issued by several jurisdictions, including TRPA, cities, counties, and the U.S. Forest Service, depending on the route of the connecting pipeline. Additionally, expanding the capacity of TTSA's pipeline would involve construction along the Truckee River in a stream environment zone and in easements, which would require many permits and challenging construction.

When the potential discharge of recycled water was considered in the 1960s, the alternative was eventually "abandoned because of strenuous opposition by downstream Nevada users of Truckee River water," including the cities of Reno and Sparks, which formally protested the proposal.[267] However, drought and water resources limitations may provide renewed interest in receiving recycled water.

Given the significant number of land use and other regulatory approvals that would be required from different local agencies, this alternative is unlikely to be feasible.

V. ANALYSIS OF POTENTIAL FUTURE REGULATORY REQUIREMENTS

Although it is impossible to predict precisely what regulations or restrictions may arise in the future, the following lists a selection of potential issues and describes how these regulations, if promulgated, could impact the District's recycled water strategy.

- As discussed above, there is presently no SNMP for the Tahoe Basin. If additional recycled water users or uses require changes to the District's Lahontan RWQCB permits (particularly in-basin uses), the Lahontan RWQCB may require an SNMP. Alternatively, recycled water permits may be amended to include salt and nutrient management restrictions.

- Because there is no vested right to continue to discharge waste into waters of the state, changes to permit terms may occur at any time.[268] Permit terms are reviewed periodically and changes to permit terms may occur on application by any affected person or by Lahontan RWQCB's own motion.[269] State law contemplates that Lahontan RWQCB may prescribe requirements even where no permit application has been filed.[270] The Lahontan RWQCB may

[267] Pagter & Wolfe, Jr., at p. 608, n. 241.
[268] "No discharge of waste into the waters of the state, whether or not the discharge is made pursuant to waste discharge requirements, shall create a vested right to continue the discharge. All discharges of waste into waters of the state are privileges, not rights." Wat. Code § 13263(g).
[269] Wat. Code § 13263(e).
[270] Wat. Code § 13263(d).

prescribe WDRs for proposed discharge, existing discharge, or regarding a material change in an existing discharge.[271]

- Biostimulatory Substances Regulations.
  - "The State Water Board is considering statewide water quality objectives for nutrients, other biostimulatory substances, and cyanotoxins, and a program of implementation under the Biostimulation, Cyanotoxins, and Biological Condition Provisions (Provisions). The Provisions could include statewide numeric or narrative water quality objectives and regulatory control options for point and non-point sources in California's freshwater wadeable streams and rivers, non-wadeable streams and rivers, lakes, and reservoirs. The Provisions may also establish and implement biological condition assessment methods, scoring tools, and targets aimed at protecting the biological integrity (biointegrity) in California's wadeable streams. The Provisions will be established as state policy for water quality control and will include a water quality control plan component."[272]
  - The SWRCB held a public workshop on July 14, 2022 and described the timeline for the regulations. The SWRCB planned to complete scientific research and reports in 2022, then proceed to develop objectives and implementation provisions before tribal consultation, CEQA scoping, public review and Board adoption. The SWRCB intends to consult with stakeholders throughout the process.[273]
- West Fork Carson River Vision Plan
  - The West Fork Carson River (in California) is on the 303(d) List and part of the USEPA's 2022-2032 Vision for the Clean Water Act Section 303(d) Program, which focuses attention on priority waters and acknowledges that states have flexibility in using available tools in addition to TMDLs to attain water quality restoration and protection.[274] Generally, the July 2023 Draft West Fork Carson River Vision Plan ("Draft

[271] Wat. Code § 13263(a).
[272] Biostimulation, Cyanotoxins, and Biological Condition Provisions, California Water Boards: State Water Resources Control Board, https://www.waterboards.ca.gov/water_issues/programs/biostimulatory_substances_biointegrity/ (last visited Dec. 23, 2022).
[273] Public Staff Workshop Presentation, State Water Board, Biostimulation, Cyanotoxins, & Biological Condition Provisions (July 14, 2022), available at https://drive.google.com/file/d/1WpRDOrnPO3xtY8bJVAua4-7SIBQ_PLBS/view.
[274] Ranching for Improved Water Quality - Vision Project Forum #4 (March 8, 2022), available at: https://www.youtube.com/watch?v=SffPohGy56I&t=2514s; Lahontan RWQCB, West Fork Carson River Vision Plan: A water quality improvement plan to address multiple pollutants in the West Fork Carson River in Alpine County, California (July 2023 Draft) [hereinafter "Draft WFCR Vision Plan"], p. 2.

WFCR Vision Plan") describes present and future actions that will be taken to restore and protect water quality in the West Fork Carson River.[275] The Draft WFCR Vision Plan "does not establish or change any existing regulations but rather it references existing regulatory and non-regulatory actions that are expected to result in attainment of Water Quality Standards in the West Fork Carson River."[276] The West Fork of the Carson River remains impaired on the 303(d) list and requires TMDLs; however, the Draft WFCR Vision Plan provides an adequate reason for the state to deprioritize development of TMDLs.[277] If advance restoration plans included in the Draft WFCR Vision Plan are successful and standards are attained, TMDLs may not be necessary.[278] If, however, water quality objectives are not met within 10 years, the Lahontan RWQCB may reprioritize development of TMDLs for remaining impairments.[279]

- The implementation actions discussed in section 6 of the Draft WFCR Vision Plan were borrowed from the Carson River Watershed Adaptive Stewardship Plan and categorized as "completed", "ongoing", and "proposed and potential future" projects and actions.[280] The Draft WFCR Vision Plan proposes several projects involving or relevant to the District:

  - Lahontan RWQCB will request that the District participate in the development of ranch water quality management plans to control of the use of recycled water by the end of 2025.[281] The Draft WFCR Vision Plan notes that requiring the ranchers to obtain WDRs and/or NPDES permits may be an alternative regulatory mechanism if the proposed tools and means are unsuccessful.[282]

  - Lahontan RWQCB will request that the District analyze potential effects of its recycled wastewater on the West Fork Carson River by the end of 2025.[283]

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[275] Draft WFCR Vision Plan, p. 2.
[276] Draft WFCR Vision Plan, p. 2.
[277] Draft WFCR Vision Plan, p. 3.
[278] Draft WFCR Vision Plan, p. 2.
[279] Draft WFCR Vision Plan, p. 102.
[280] Draft WFCR Vision Plan, p. 3; Carson Water Subconservancy District, NDEP, and Carson River Coalition, Carson River Watershed Adaptive Stewardship Plan (2017), Tables 8.3, 8.4, 8.5, 8.8, available at: https://www.cwsd.org/wp-content/uploads/2017/12/Final-CRWASP-2017-Update-Plan-Part-1.pdf.
[281] Draft WFCR Vision Plan, pp. 92, 104.
[282] Draft WFCR Vision Plan, p. 75, Table 6-5.
[283]Draft WFCR Vision Plan, pp. 92–93.

- Lahontan RWQCB may request that the District facilitate water quality planning and reporting for users of recycled District water.[284]

- Lahontan RWQCB contemplates the potential connection of Onsite Wastewater Treatment Systems ("OWTS") (including the Desolation Hotel Hope Valley, formerly the Sorensen's Resort) to the District's C-Line and partnering with the District on OWTS education, outreach, and improvements.[285]

  - As of the date of this memorandum, the Draft WFCR Vision Plan had been released for public comment, but not adopted.[286] The Lahontan RWQCB will consider approval at its October 2023 meeting, and, if approved, initiate the 10-year implementation timeline.[287] The Draft WFCR Vision Plan anticipates achievement of water quality objectives by October 2033, informing 2032 and 2038 303(d) listings and integrated reports.[288] Implementation of the Draft WFCR Vision Plan is to be evaluated annually and after five years, progress towards attainment of water quality objectives will be evaluated.[289] The timeline for additional milestones specific to each implementation action is included in Table 10-1 of the Draft WFCR Vision Plan.

- State Recycled Water Policy

  - The Policy sets goals to increase the use of recycled water from 714,000 AFY in 2015 to 1.5 million AFY by 2020 and to 2.5 million AFY by 2030.[290] Increased incentives to use recycled water may create or expand the market to which the District may deliver its recycled water.

  - The presence, variety, and concentration of constituents of emerging concern ("CECs") in water may vary over time. In addition, the state of knowledge regarding CECs is inherently incomplete and will change over time based on scientific developments and continuing research on which CECs present a risk to public health and the

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[284] Draft WFCR Vision Plan, Table 10-1, p. 9.
[285] Draft WFCR Vision Plan, pp. 69, 89–90.
[286] California Water Boards, West Fork Carson River Multiple Pollutants Vision Plan, https://www.waterboards.ca.gov/lahontan/water_issues/programs/tmdl/west_fork_carson_river.html (last visited September 5, 2023).
[287] Draft WFCR Vision Plan, p. 102.
[288] Draft WFCR Vision Plan, pp. 60, 102.
[289] Draft WFCR Vision Plan, pp. 102, 104–06.
[290] State Water Board, Water Quality Control Policy for Recycled Water, § 3.1.1 (adopted Dec. 11, 2018) available at: https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2018/121118_7_final_amendment_oal.pdf.

environment.[291] As new constitutions of concern emerge and are studied, there may be new or increased regulation of certain activities or a tightening of water quality standards.

VI. CONCLUSION

This memorandum examines legal and regulatory challenges associated with implementing a broad range of alternative disposal methods or uses of the District's recycled water. Further legal and regulatory analysis will be necessary once the list of possible alternatives is narrowed and those alternatives are further developed is sufficient detail to evaluate permitting and environmental review requirements.

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[291] State Water Board, Water Quality Control Policy for Recycled Water, § 10.1.1 (adopted Dec. 11, 2018) available at: https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2018/121118_7_final_amendment_oal.pdf.

Appendices

Appendix A

Table 8-3. Basin-wide pollutant reductions needed to meet Clarity Challenge and transparency standard.

Pollutant	Interim Secchi Depth 24.0 meters "Clarity Challenge"	Target Secchi Depth 29.7 meters Transparency Standard
Fine Sediment Particles (< 16 μm)	32 %	65 %
Phosphorus	17 %	35 %
Nitrogen	4 %	10 %

Appendix B

Table 10-1. Fine Sediment Particle Load Allocations by Pollutant Source Category.

	Baseline Load		Milestone Load Reductions												Standard Attainment
	Basin-Wide Load (Particles/yr)	% of Basin-Wide Load	5 yrs	10 yrs	15 yrs	20 yrs	25 yrs	30 yrs	35 yrs	40 yrs	45 yrs	50 yrs	55 yrs	60 yrs	65 yrs
Forest Upland	4.1E+19	9%	6%	9%	12%	12%	13%	14%	15%	16%	17%	18%	19%	20%	20%
Urban Upland*	3.5E+20	72%	10%	21%	34%	38%	41%	45%	48%	52%	55%	59%	62%	66%	71%
Atmosphere	7.5E+19	16%	8%	15%	30%	32%	35%	37%	40%	42%	45%	47%	50%	52%	55%
Stream Channel	1.7E+19	3%	13%	26%	53%	56%	60%	63%	67%	70%	74%	77%	81%	85%	89%
Basin Wide Total	4.8E+20	100%	10%	19%	32%	35%	38%	42%	44%	47%	51%	55%	58%	61%	65%

Table 10-2. Total Nitrogen Load Allocations by Pollutant Source Category.

Nitrogen	Baseline Load		Milestone Load Reductions												Standard Attainment
	Basin-Wide Nitrogen Load (MT/yr)	% of Basin-Wide Load	5 yrs	10 yrs	15 yrs	20 yrs	25 yrs	30 yrs	35 yrs	40 yrs	45 yrs	50 yrs	55 yrs	60 yrs	65 yrs
Forest Upland	62	18%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Urban Upland*	63	18%	8%	14%	19%	22%	25%	28%	31%	34%	37%	40%	43%	46%	50%
Atmosphere	218	63%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Stream Channel	2	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Basin Wide Total	345	100%	2%	3%	4%	5%	6%	6%	7%	7%	8%	8%	9%	9%	10%

Table 10-3. Total Phosphorus Load Allocations by Pollutant Source Category.

Phosphorus	Baseline Load		Milestone Load Reductions												Standard Attainment
	Basin-Wide Phosphorus Load (MT/yr)	% of Basin-Wide Load	5 yrs	10 yrs	15 yrs	20 yrs	25 yrs	30 yrs	35 yrs	40 yrs	45 yrs	50 yrs	55 yrs	60 yrs	65 yrs
Forest Upland	12	32%	1%	1%	1%	1%	1%	1%	2%	2%	2%	2%	2%	3%	3%
Urban Upland*	18	47%	7%	14%	21%	23%	26%	28%	31%	33%	36%	38%	41%	44%	46%
Atmosphere	7	18%	9%	17%	33%	36%	39%	42%	45%	48%	51%	53%	56%	58%	61%
Stream Channel	1	3%	8%	15%	30%	32%	34%	36%	38%	40%	42%	44%	46%	48%	51%
Basin Wide Total	38	100%	5%	10%	17%	19%	22%	24%	26%	28%	30%	32%	33%	34%	35%

*Urban upland load reduction requirements constitute wasteload allocations for the City of South Lake Tahoe, El Dorado County, Placer County, the California Department of Transportation, and the Nevada Department of Transportation, and load allocations for Douglas County jurisdictions and Washoe County.

Appendix C

Table 10-4. Fine Sediment Particle Daily Loading Estimate.

Flow Range	Associated Flow (Liters/Second)			Pollutant Concentration (Number of Particles/L)		
Percentile	Mean	Min	Max	Mean	Min	Max
0-10	1375.7	1011.6	1588.1	6.6E+07	2.1E+07	5.8E+08
10-20	1763.1	1588.7	1950.2	1.0E+08	1.7E+07	9.4E+08
20-30	2211.6	1950.5	2522.4	2.1E+08	1.9E+07	1.1E+09
30-40	2858.7	2523.8	3245.2	3.1E+08	3.1E+07	1.5E+09
40-50	3853.9	3246.4	4585.4	3.8E+08	3.1E+07	1.9E+09
50-60	5541.2	4591.3	6688.8	4.7E+08	4.2E+07	2.7E+09
60-70	8640.3	6696.0	11006.6	5.7E+08	5.3E+07	4.6E+09
70-80	14260.5	11022.9	18204.7	6.0E+08	7.2E+07	2.6E+09
80-90	24350.5	18209.9	34290.9	5.9E+08	1.2E+08	2.6E+09
90-100	60418.5	34368.2	165776.2	7.9E+08	2.7E+08	3.5E+09

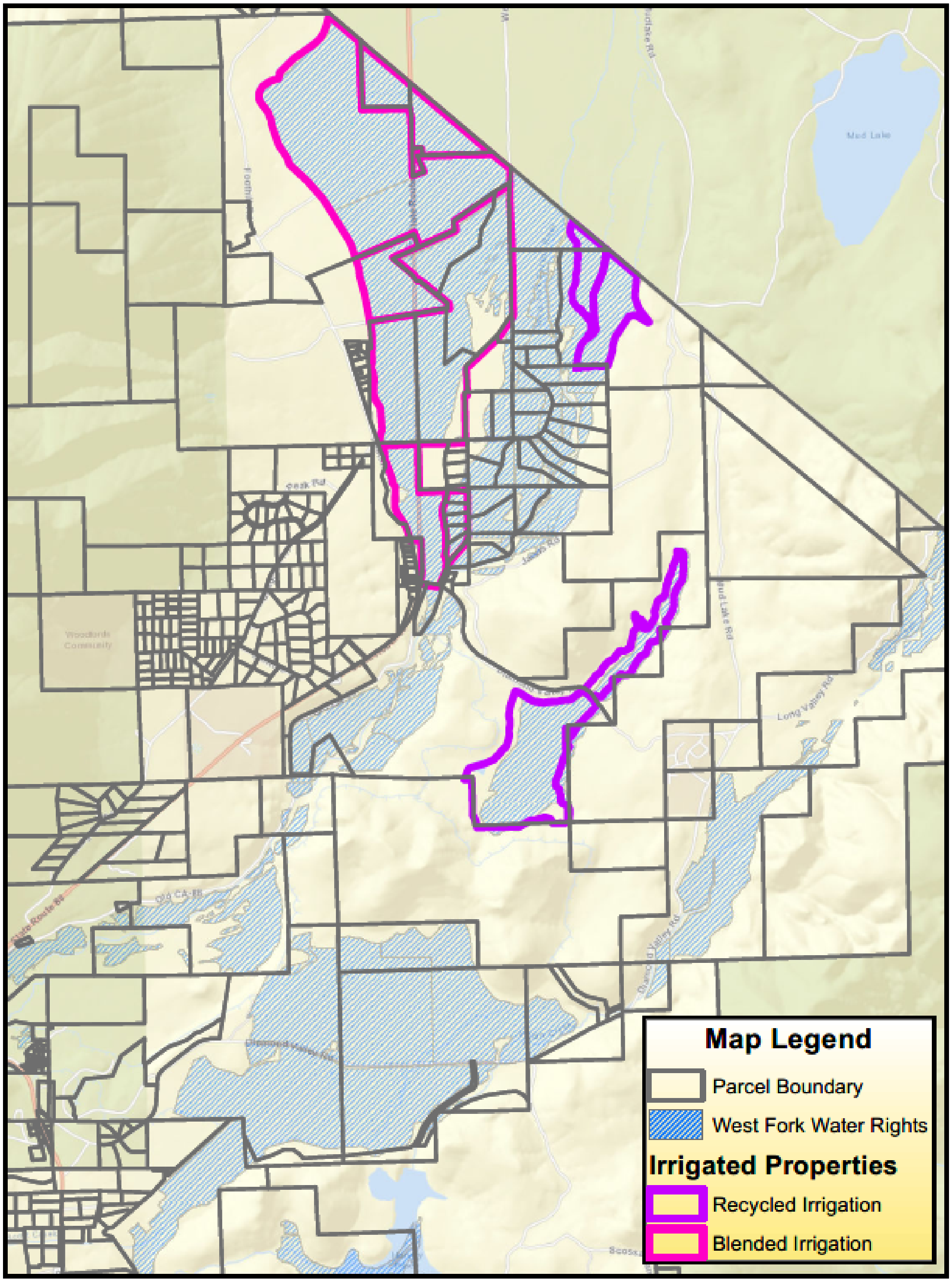
Table 10-5. Total Phosphorus Daily Loading Estimate.

Flow Range	Associated Flow (Liters/Second)			Pollutant Concentration (mg/L)		
Percentile	Mean	Min	Max	Mean	Min	Max
0-10	1375.7	1011.6	1588.1	0.041	0.031	0.097
10-20	1763.1	1588.7	1950.2	0.044	0.027	0.133
20-30	2211.6	1950.5	2522.4	0.055	0.019	0.170
30-40	2858.7	2523.8	3245.2	0.064	0.023	0.214
40-50	3853.9	3246.4	4585.4	0.069	0.022	0.224
50-60	5541.2	4591.3	6688.8	0.075	0.025	0.229
60-70	8640.3	6696.0	11006.6	0.078	0.029	0.320
70-80	14260.5	11022.9	18204.7	0.073	0.034	0.202
80-90	24350.5	18209.9	34290.9	0.067	0.035	0.208
90-100	60418.5	34368.2	165776.2	0.062	0.036	0.185

Table 10-6. Total Nitrogen Daily Loading Estimate.

Flow Range	Associated Flow (Liters/second)			Pollutant Concentration (mg/L)		
Percentile	Mean	Min	Max	Mean	Min	Max
0-10	1375.7	1011.6	1588.1	0.10	0.06	0.70
10-20	1763.1	1588.7	1950.2	0.13	0.05	1.06
20-30	2211.6	1950.5	2522.4	0.23	0.05	1.36
30-40	2858.7	2523.8	3245.2	0.32	0.05	1.58
40-50	3853.9	3246.4	4585.4	0.38	0.06	1.64
50-60	5541.2	4591.3	6688.8	0.44	0.07	1.80
60-70	8640.3	6696.0	11006.6	0.43	0.07	1.81
70-80	14260.5	11022.9	18204.7	0.36	0.08	1.85
80-90	24350.5	18209.9	34290.9	0.28	0.08	1.81
90-100	60418.5	34368.2	165776.2	0.23	0.09	1.55

Appendix D



Mud Lake
Peak Rd
Mud Lake Rd
Long Valley Rd
Old CA-88
State Route 88
Map Legend
Parcel Boundary
West Fork Water Rights
Irrigated Properties
Recycled Irrigation
Blended Irrigation

Appendix E

Diamond Valley Rd. Bridge is located near the intersection of Diamond Valley Road and Chambers Lane. The coordinates are: 38°48'31.03"N, 119°46'37.73"W.

Appendix F

STANDARDS OF WATER QUALITY
Carson River, East Fork at Muller Lane

PARAMETER	REQUIREMENTS TO MAINTAIN EXISTING HIGHER QUALITY	WATER QUALITY CRITERIA TO PROTECT BENEFICIAL USES	Beneficial Uses[a]										
			Livestock	Irrigation	Aquatic	Contact	Noncontact	Municipal	Industrial	Wildlife	Aesthetic	Enhance	Marsh
Beneficial Uses			X	X	X	X	X	X	X	X			
Aquatic Life Species of Concern			Rainbow trout and brown trout.										
Temperature - °C ΔT[b] - °C	 $\Delta T = 0$	S.V. Nov-May ≤ 13°C S.V. Jun ≤ 17°C S.V. Jul ≤ 21°C S.V. Aug-Oct ≤ 22°C $\Delta T \leq 2$°C			*								
pH - SU	S.V. 7.4 - 8.7	S.V. 6.5 - 9.0 $\Delta pH \pm 0.5$			*								
Dissolved Oxygen - mg/L		S.V. Nov-May ≥ 6.0 S.V. Jun-Oct ≥ 5.0			*								
Total Phosphorus (as P) - mg/L		A-Avg. ≤ 0.10			*	*							
Total Nitrogen (as N) - mg/L	A-Avg. ≤ 0.5 S.V. ≤ 0.8				*	*							
Nitrate (as N) - mg/L		S.V. ≤ 10						*					
Nitrite (as N) - mg/L		S.V. ≤ 0.06			*								
Total Ammonia (as N) - mg/L		c			*								
Total Suspended Solids - mg/L		S.V. ≤ 80			*								
Turbidity - NTU		S.V. ≤ 10			*								
Color - PCU	d	S.V. ≤ 75						*					
Total Dissolved Solids - mg/L	A-Avg. ≤ 180 S.V. ≤ 205	A-Avg. ≤ 500						*					
Chloride - mg/L	A-Avg. ≤ 8 S.V. ≤ 10	S.V. ≤ 250						*					
Sulfate - mg/L		S.V. ≤ 250						*					
Sodium - SAR	A-Avg. ≤ 2	A-Avg. ≤ 8		*									
Alkalinity (as $CaCO_3$) - mg/L		S.V. ≥ 20			*								
E. coli - cfu/100 mL[e]		G.M. ≤ 126 S.V. ≤ 410				*							
Fecal Coliform - No./100 mL	A.G.M. ≤ 50	S.V. ≤ 1,000		*									
Toxic Materials		f											

Appendix G

STANDARDS OF WATER QUALITY
Carson River, West Fork at the state line

PARAMETER	REQUIREMENTS TO MAINTAIN EXISTING HIGHER QUALITY	WATER QUALITY CRITERIA TO PROTECT BENEFICIAL USES	Beneficial Uses[a]										
			Livestock	Irrigation	Aquatic	Contact	Noncontact	Municipal	Industrial	Wildlife	Aesthetic	Enhance	Marsh
Beneficial Uses			X	X	X	X	X	X	X	X			
Aquatic Life Species of Concern			Rainbow trout and brown trout.										
Temperature - °C ΔT^b - °C	$\Delta T = 0$	S.V. Nov-May ≤ 13 S.V. Jun ≤ 17 S.V. Jul ≤ 21 S.V. Aug-Oct ≤ 22 $\Delta T \leq 2$			*								
pH - SU	S.V. 7.4 - 8.4	S.V. 6.5 - 9.0 $\Delta pH \pm 0.5$			*								
Dissolved Oxygen - mg/L		S.V. Nov-May ≥ 6.0 S.V. Jun-Oct ≥ 5.0			*								
Total Phosphorus (as P) - mg/L	A-Avg. ≤ 0.016 S.V. ≤ 0.033	A-Avg. ≤ 0.10			*	*							
Total Nitrogen (as N) - mg/L	A-Avg. ≤ 0.4 S.V. ≤ 0.5				*	*							
Nitrate (as N) - mg/L		S.V. ≤ 10						*					
Nitrite (as N) - mg/L		S.V. ≤ 0.06			*								
Total Ammonia (as N) - mg/L		c			*								
Total Suspended Solids - mg/L	A-Avg. ≤ 15	S.V. ≤ 25			*								
Turbidity - NTU	A-Avg. ≤ 3 S.V. ≤ 5	S.V. ≤ 10			*								
Color - PCU	d	S.V. ≤ 75						*					
Total Dissolved Solids - mg/L	A-Avg. ≤ 70 S.V. ≤ 95	A-Avg. ≤ 500						*					
Chloride - mg/L	A-Avg. ≤ 3 S.V. ≤ 5	S.V. ≤ 250						*					
Sulfate - mg/L	S.V. ≤ 4	S.V. ≤ 250						*					
Sodium - SAR	A-Avg. ≤ 1	A-Avg. ≤ 8		*									
Alkalinity (as $CaCO_3$) - mg/L		S.V. ≥ 20			*								
E. coli - cfu/100 mL[e]		G.M. ≤ 126 S.V. ≤ 410				*							
Fecal Coliform - No./100 mL	A.G.M. ≤ 105	S.V. ≤ 1,000		*									
Toxic Materials		f											

Appendix H

STANDARDS OF WATER QUALITY
Carson River at Genoa Lane

PARAMETER	REQUIREMENTS TO MAINTAIN EXISTING HIGHER QUALITY	WATER QUALITY CRITERIA TO PROTECT BENEFICIAL USES	Beneficial Uses[a]										
			Livestock	Irrigation	Aquatic	Contact	Noncontact	Municipal	Industrial	Wildlife	Aesthetic	Enhance	Marsh
Beneficial Uses			X	X	X	X	X	X	X	X			
Aquatic Life Species of Concern			Catfish, rainbow trout and brown trout.										
Temperature - °C ΔT^{b} - °C	$\Delta T = 0$	S.V. Nov-Apr ≤ 13 S.V. May-Jun ≤ 17 S.V. Jul-Oct ≤ 23 $\Delta T \leq 2$			•								
pH - SU	S.V. 7.4 - 8.5	S.V. 6.5 - 9.0 $\Delta pH \pm 0.5$			•								
Dissolved Oxygen - mg/L		S.V. Nov-Apr ≥ 6.0 S.V. May-Oct ≥ 5.0			•								
Total Phosphorus (as P) - mg/L		A-Avg. ≤ 0.10			•	•							
Total Nitrogen (as N) - mg/L	A-Avg. ≤ 0.8 S.V. ≤ 1.3				•	•							
Nitrate (as N) - mg/L		S.V. ≤ 10						•					
Nitrite (as N) - mg/L		S.V. ≤ 0.06			•								
Total Ammonia (as N) - mg/L		c			•								
Total Suspended Solids - mg/L		S.V. ≤ 80			•								
Turbidity - NTU		S.V. ≤ 10			•								
Color - PCU	d	S.V. ≤ 75						•					
Total Dissolved Solids - mg/L	A-Avg. ≤ 165 S.V. ≤ 220	A-Avg. ≤ 500						•					
Chloride - mg/L	A-Avg. ≤ 8 S.V. ≤ 12	S.V. ≤ 250						•					
Sulfate - mg/L		S.V. ≤ 250						•					
Sodium - SAR	A-Avg. ≤ 2	A-Avg. ≤ 8		•									
Alkalinity (as $CaCO_3$) - mg/L		S.V. ≥ 20			•								
E. coli - cfu/100 mL[e]		G.M. ≤ 126 S.V. ≤ 410				•							
Fecal Coliform - No./100 mL	A.G.M. ≤ 180	S.V. $\leq 1{,}000$		•									
Toxic Materials		f											

Appendix B:

Technical Memorandum 2, Alternatives Identification

South Tahoe Public Utility District
Recycled Water Strategic Plan

Technical Memorandum 2
ALTERNATIVES IDENTIFICATION

FINAL DRAFT | January 2024

South Tahoe Public Utility District
Recycled Water Strategic Plan

Technical Memorandum 2
ALTERNATIVES IDENTIFICATION

FINAL DRAFT | January 2024

This document is released for the purpose of information exchange review and planning only under the authority of
Elisa A. Garvey,
January 11, 2024,
California C-71690.

Contents

Appendices

Tables

Figures

Abbreviations

AF	acre-feet
AFY	acre-feet per year
AOP	advanced oxidation processes
BAC	biologically activated carbon
Basin Plan	Water Quality Control Plan
BLM	Bureau of Land Management
BNR	biological nutrient removal
CA	California
CAMP®	Concentrated Accelerated Motivated Problem-Solving
Carollo	Carollo Engineers, Inc.
Compact	California-Nevada Interstate Compact
CVRWQCB	Central Valley Regional Water Quality Control Board
DCLTSA	Douglas County Lake Tahoe Sewer Authority
disinfected secondary-23	disinfected secondary 23 recycled water
District	South Tahoe Public Utility District
DPR	direct potable reuse
DVR	Diamond Valley Ranch
EC	electrical conductivity
EPA	Environmental Protection Agency
FEPS	Final Effluent Pump Station
ft	feet
gpm	gallons per minute
HDPE	high-density polyethylene
IPR	indirect potable reuse
IRT	Interagency Review Team
KGID	Kingsbury General Improvement District
kW	kilowatt
Lake Tahoe Basin	Lake Tahoe Hydrologic Unit
LF	linear foot
LRWQCB	Lahontan Regional Water Quality Control Board
M	million
MF	microfiltration
mg/L	Milligrams per liter
mgd	million gallons per day
µS/cm	microsiemens per centimeter

MWh	megawatt hours
N	nitrogen
NA	not applicable
NDEP	Nevada Division of Environmental Protection
NPDES	National Pollutant Discharge Elimination System
NV	Nevada
O&M	operations and maintenance
ONRW	Outstanding National Resource Water
P	phosphorus
Plan	South Tahoe Public Utility District Recycled Water Strategic Plan
Porter-Cologne Act	Porter-Cologne Act of 1970
Ranchers	contract irrigators
RO	reverse osmosis
ROC	reverse osmosis concentrate
ROWD	Report of Waste Discharge
RPA	reasonable potential analysis
SAG	Stakeholder Advisory Group
Settlement Act	Truckee-Carson-Pyramid Lake Water Rights Settlement Act
SGMA	Sustainable Groundwater Management Act
SNMP	Salt and Nutrient Management Plan
SWRCB	State Water Resources Control Board
T-TSA	Tahoe-Truckee Sanitation Agency
TCPUD	Tahoe City Public Utility District
TDS	total dissolved solids
TM	technical memorandum
TMDL	total maximum daily load
TRPA	Tahoe Regional Planning Agency
UF	ultrafiltration
UV	ultraviolet
Vision Plan	West Fork Carson Vision Plan
WDR	Waste Discharge Requirement
WQBEL	Water Quality-Based Effluent Limitation
WQMP	Water Quality Management Plan
WRR	Water Reclamation Requirement
WWTP	wastewater treatment plant

Technical Memorandum 2

ALTERNATIVES IDENTIFICATION

The objective of the South Tahoe Public Utility District (District) Recycled Water Strategic Plan (Plan) is to develop a long-term (50-year horizon) strategy for the District's wastewater effluent that incorporates viable alternatives to the existing system. These alternatives would be triggered for implementation by existing or future drivers, constraints, and/or opportunities.

There have been significant advances in the treatment and use of recycled water in California (CA) over the last 50 years. In addition, the District's existing recycled water system relies on recycled water use by ranchers in Alpine County. The agreements associated with this end use of recycled water will expire in 2028. As such, the intent of the Plan is to evaluate both existing recycled water practices and potential alternative recycled water practices that may be implemented in the future.

This technical memorandum (TM) documents the process of identifying and screening potential alternatives. The alternatives identification process includes consideration of a broad range of potential alternatives for treatment, conveyance, type of recycled water end use, and end use location. The alternatives screening process includes a high-level evaluation of the alternatives based on a relative comparison of challenges and benefits. The result of the alternatives screening process is a list of alternatives that will be further developed and evaluated.

This TM includes the following sections:

- Background and existing system.
- Alternatives identification and screening process.
- Alternatives overview.
- Legal and regulatory considerations.
- Alternative descriptions.
- System modifications.
- Alternatives screening analysis.
- Recommendations.

2.1 Background

The District supplies sewage collection, treatment, and disposal to approximately 17,000 residential and commercial customers in its service area, which includes the City of South Lake Tahoe and unincorporated areas of El Dorado County. The District's service area is located within the Lake Tahoe Hydrologic Unit (Lake Tahoe Basin) and covers approximately 27,000 acres (42 square miles). The District's first wastewater treatment plant (WWTP) was constructed in 1956. Subsequently, the District's treatment facilities and disposal system have evolved in response to growth in the region and regulatory requirements.

In 1962 the Lahontan Regional Water Quality Control Board (LRWQCB) adopted Resolution 58-1, which prohibits discharge of treated domestic sewage into Lake Tahoe. The Porter-Cologne Act of 1970 (Porter-Cologne Act) mandated export of wastewater out of the

Lake Tahoe Basin by 1972. These requirements prompted changes in the District's disposal of treated effluent. In 1967 the District began exporting treated effluent out of the Lake Tahoe Basin for reuse/disposal in Alpine County. Since 1988, the District has supplied recycled water to six contract irrigators whose current agreements expire in 2028. As of 2018, the District has also been irrigating 70 acres of District property in Alpine County using recycled water to grow and sell alfalfa.

2.2 Existing System

2.2.1 System Description

The District's existing WWTP processes an annual average of 3.9 million gallons per day (mgd) of treated effluent. The treated effluent meets CA Title 22 regulations for disinfected secondary 23 recycled water (disinfected secondary-23). The recycled water is exported out of the Lake Tahoe Watershed and into Harvey Place Reservoir, which is in Alpine County and within the Carson River Watershed. Recycled water is stored in Harvey Place Reservoir and used in the summer months for irrigation supply. The end uses of recycled water include:

- Irrigation of hay and alfalfa on the District's Diamond Valley Ranch (DVR) property.
- Irrigation supply for contract irrigators (Ranchers) in Alpine County.

The major components of this system include the WWTP (Figure 2.1), the recycled water export system (Figure 2.2), irrigation at Rancher properties (Figure 2.3), and District recycled water operations at DVR (Figure 2.4). Additional detail on these and other system components and operations are included in Table 2.1.

Table 2.1 Existing System Components

Components and Operations	Description
WWTP Capacity	The WWTP capacity is 7.7 mgd.
WWTP Treatment Processes	The WWTP is a secondary treatment facility. The liquid treatment train facilities include bar screens, vortex grit chambers, two primary clarifiers, three aeration basins, three equalization basins, three secondary clarifiers, six multimedia pressure filters, sodium hypochlorite disinfection, final pumping, storage in Harvey Place Reservoir, and ultimately non-potable water reclamation in the form of agricultural irrigation. The solids treatment train includes grit removal with ultimate disposal in a landfill, and combined primary sludge and waste activated sludge that goes through a centrifuge and is stored before being taken for off-site composting and land application at Bently Ranch in Minden, NV. Other processes include odor control, emergency retention basins, emergency power generation, and maintenance facilities.
Export System	The export system includes a 26-mile pipeline from the WWTP (approximately 6,270 ft elevation) over Luther Pass (approximately 7,750 ft elevation) to Harvey Place Reservoir (approximately 5,560 ft elevation of primary spillway on Harvey Place Dam), with a total elevation change of approximately 1,480 ft. To address the elevation gain, the FEPS at the WWTP and the Luther Pass Pump Station pump recycled water through the first two segments of pipeline. The pipeline is composed of three main segments, which are constructed of cement mortar lined and coal tar epoxy-coated steel pipe. The specific facilities associated with the export system are described below: • FEPS – This pump station has a capacity of 8 mgd and pumps effluent from the WWTP through the A-Line. The FEPS was replaced in 2009. • A-Line Export Pipeline – The A-Line extends from the WWTP to Luther Pass Pump Station. The A-Line is 10.5 miles long and was replaced between 1996 and 2000. • Luther Pass Pump Station – This pump station has a firm capacity of 5,800 gpm and lifts the recycled water approximately 1,250 ft (elevation gain from Luther Pass Pump Station to the top of Luther Pass) in elevation through the B-Line. • B-Line Export Pipeline – The B-Line extends from Luther Pass Pump Station to the top of Luther Pass. The B-Line is 4.9 miles long and the majority of the B-Line was replaced in 2001. • C-Line Export Pipeline – The C-Line extends from Luther Pass to Harvey Place Reservoir. The C-Line is approximately 12 miles long and was constructed in 1968. Treated effluent in the C-line flows by gravity from the top of Luther Pass to Harvey Place Reservoir.

Components and Operations	Description
Hydroelectric Plant	A hydroelectric plant was installed on the C-Line in 2018, which can produce 381,000 kW per year in hydroelectricity as recycled water flows from the top of Luther Pass and down into Alpine County.
Harvey Place Reservoir	Harvey Place Reservoir is a clay core, earthen dam constructed in 1988 and has an active storage capacity of approximately 3,800 AF. The District's typical operations involve filling the reservoir with recycled water from October 15 to April 1, without any discharge. After April 1, the District may begin drawing the reservoir to the minimum pool before October 15 to allow it to be filled again during the winter.
Diamond Ditch	Diamond Ditch conveys recycled water from Harvey Place Reservoir to irrigated lands in Wade Valley and along Highway 88, west of the West Fork Carson River. Several irrigation laterals distribute the recycled water from Diamond Ditch to recycled water application areas. Diamond Ditch begins at the outlet of Harvey Place Reservoir and crosses under Diamond Valley Road and Indian Creek in a double-barrel inverted siphon. The capacity of Diamond Ditch and the inverted siphon is about 22 mgd; however due to two choke points, the capacity is limited to approximately 11 mgd. Characteristics of Diamond Ditch include: • Concrete-lined trapezoidal channel; 1,800 ft. • Riprap lined channel and then a steep unlined section; 1,170 ft. • 36-inch HDPE pipeline; 1,080 ft. • Concreted-lined trapezoidal channel in Wade Valley; 5,313 ft. • Unlined channel; 8,000 ft.

Components and Operations	Description
Ranchland Irrigation	Recycled water is conveyed from Harvey Place Reservoir via Diamond Ditch for distribution to the six Ranchers. Ranchland irrigation on these sites is permitted via individual permits with the LRWQCB. Allowable uses of the District's treated effluent include irrigation of fodder, fiber, and seed crops, as well as pasture irrigation for animals. The District has contracts with the following Ranchers: • Chris Gansberg Jr. Ranch. • Kent Neddenriep Ranch. • Hubert Bruns Ranch. • Ace Hereford Ranch (operated by Bently Agrodynamics). • Scotte Brooke Ranch (also known as West Fork Ranch, formerly Dressler On-Farm Irrigation Site). • Celio Ranch. The District contracts include the following requirements: • Minimum of 2,600 AFY to a maximum of 3,600 AFY to be divided equally between the first four Ranchers in the list above (Gansberg, Neddenriep, Bruns, and Ace Hereford). • Minimum of 800 AFY and a maximum of 2,000 AFY to the Scotte Brook Ranch. • Minimum of 100 AFY and a maximum of 200 AFY to the Celio Ranch. The total maximum (or capacity) for ranchland irrigation is 5,800 AFY.
District Irrigation on DVR	The District acquired the 1,400-acre DVR property in 2006 and uses a portion of the site to grow and sell alfalfa. Since 2018, the District has used recycled water to irrigate alfalfa on 70 acres of the DVR property. The total average recycled water usage for alfalfa irrigation is approximately 200 AFY. In addition to the DVR property, the District manages BLM property in Alpine County. In total, the District manages approximately 3,000 acres of both District and BLM property.
Biosolids Disposal	All the biosolids from the WWTP are recycled as fertilizer for agricultural land at Bently Agrodynamics in Douglas County, NV.

Notes:
(1) References:
- The District Wastewater Collection System Master Plan, Brown and Caldwell, December 2009.
- South Tahoe Public Utility District Recycled Water Facilities Master Plan, Poggemeyer Design Group, October 2009.
- South Tahoe Public Utility District Request for Proposals for Engineering Services for Recycled Water Strategic Plan, The District, 2021.

Abbreviations: AF - acre-feet; AFY - acre-feet per year; BLM - Bureau of Land Management; FEPS - Final Effluent Pump Station; ft - feet; gpm - gallons per minute; HDPE - high-density polyethylene; kW - kilowatts; NV - Nevada.

2.2.2 WWTP Flow and Quality

The WWTP currently treats 3.8 mgd (4,260 AFY). The estimated future (buildout condition) wastewater flows were based on future water demand estimates and a return to sewer factor of 0.51 calculated from 2018 water production and wastewater influent flow data and an estimated ratio of wastewater influent to effluent based on 2018 data. The estimated future WWTP effluent flow is 5.4 mgd (6,000 AFY).

The WWTP produces effluent that meets the Title 22 regulations for disinfected secondary-23. There are several parameters that are important for understanding existing effluent quality when considering alternatives to the existing system. Table 2.2 includes a summary of key parameters.

Table 2.2 Summary of Effluent Water Quality

Parameter	Units	Average Value (Based on 2019 to 2020 Data)
TDS	mg/L	269
EC	µS/cm	647
Chloride	mg/L	58
Total N	mg/L	30
Ammonia	mg/L - N	29
Nitrate	mg/L - N	0.29
Total P	mg/L	3.6

Notes:
Abbreviations: EC - electrical conductivity; mg/L - milligrams per liter; µS/cm - microsiemens per centimeter; N - nitrogen; P - phosphorus; TDS - total dissolved solids.

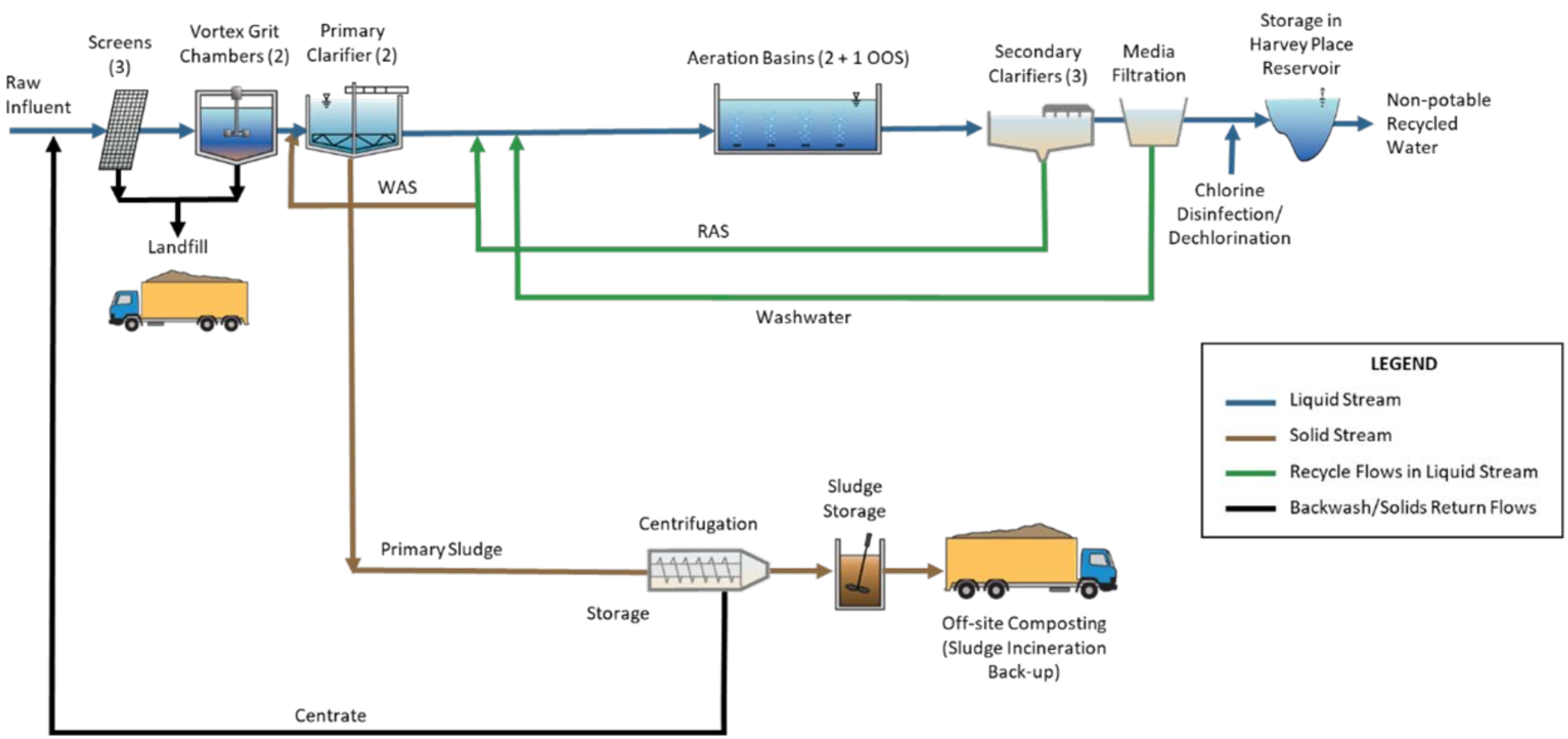


Figure 2.1 Existing System – Process Flow Diagram

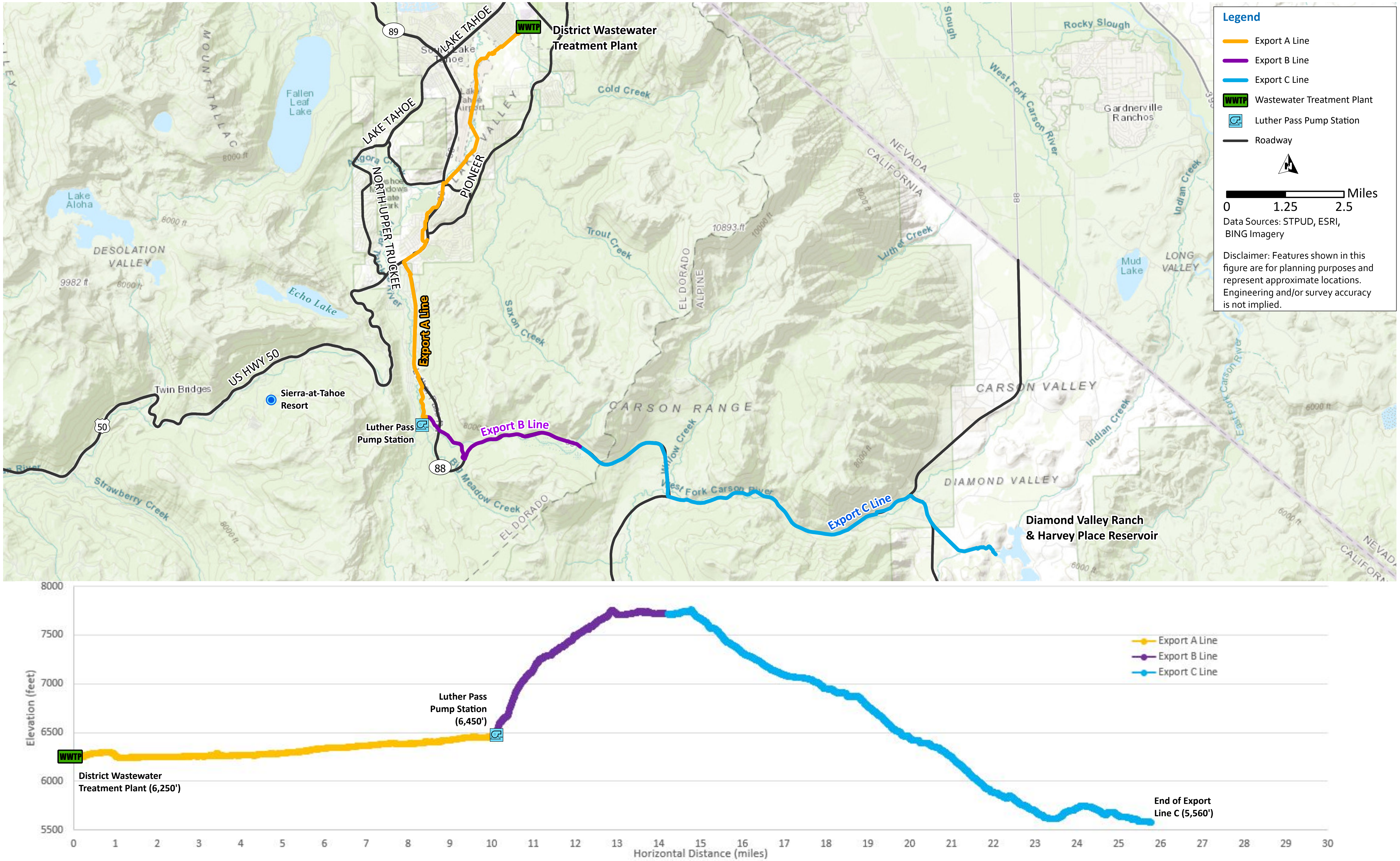
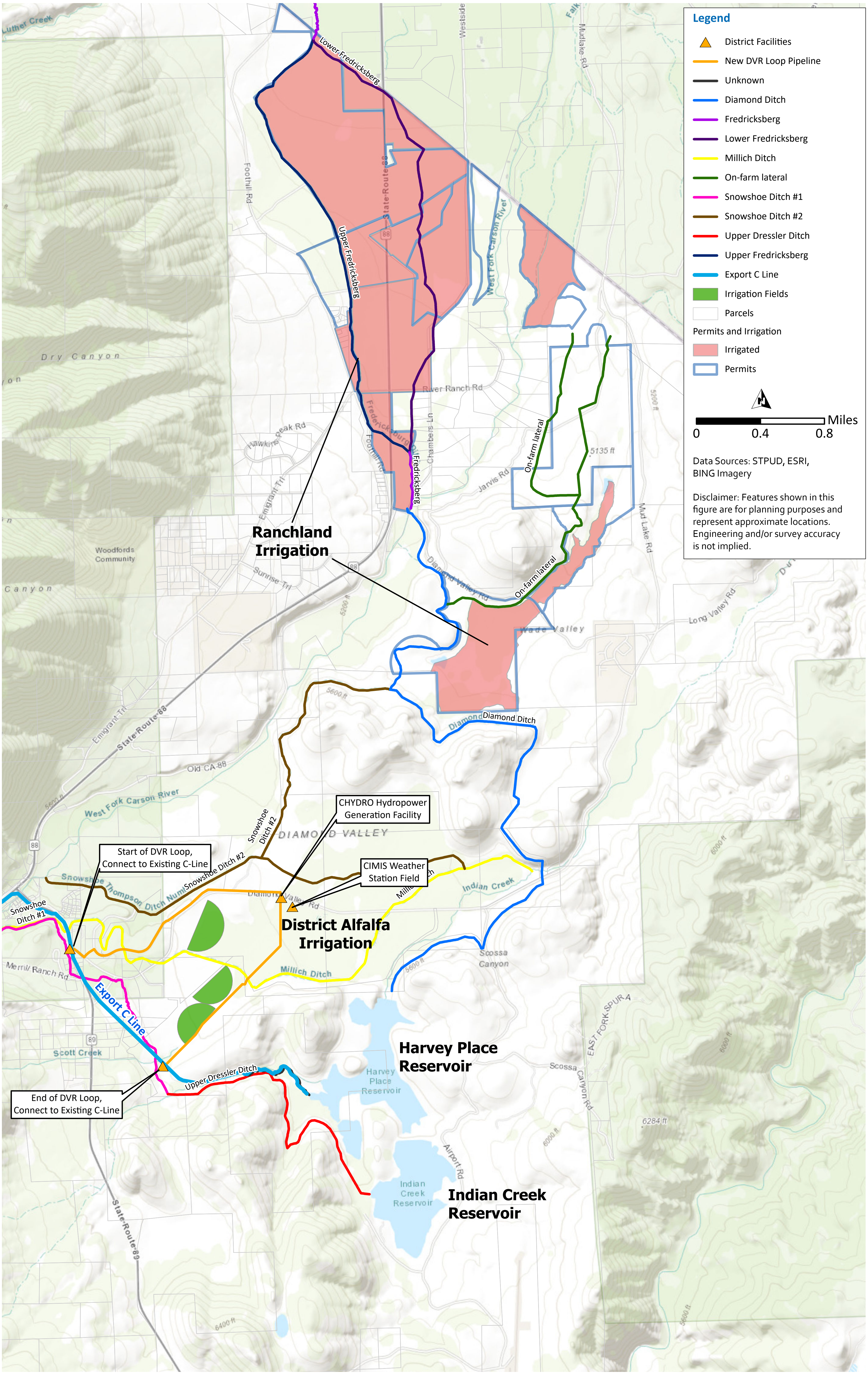


Figure 2.2 Existing System – Export Line Plan and Profile


Legend
District Facilities
New DVR Loop Pipeline
Unknown
Diamond Ditch
Fredricksberg
Lower Fredricksberg
Millich Ditch
On-farm lateral
Snowshoe Ditch #1
Snowshoe Ditch #2
Upper Dressler Ditch
Upper Fredricksberg
Export C Line
Irrigation Fields
Parcels
Permits and Irrigation
Irrigated
Permits
Miles
0 0.4 0.8
Data Sources: STPUD, ESRI, BING Imagery
Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.
Ranchland Irrigation
District Alfalfa Irrigation
Harvey Place Reservoir
Indian Creek Reservoir
CHYDRO Hydropower Generation Facility
CIMIS Weather Station Field
Start of DVR Loop, Connect to Existing C-Line
End of DVR Loop, Connect to Existing C-Line
Lower Fredricksberg
Upper Fredricksberg
Fredricksberg
On-farm lateral
Diamond Ditch
Snowshoe Ditch #1
Snowshoe Ditch #2
Millich Ditch
Upper Dressler Ditch
Export C Line
Woodfords Community
Dry Canyon
Diamond Valley
Indian Creek
West Fork Carson River
Scott Creek
Scossa Canyon
State Route 88
State Route 89
Foothill Rd
River Ranch Rd
Jarvis Rd
Mud Lake Rd
Long Valley Rd
Airport Rd
Emigrant Trl
Old CA-88
Merril Ranch Rd

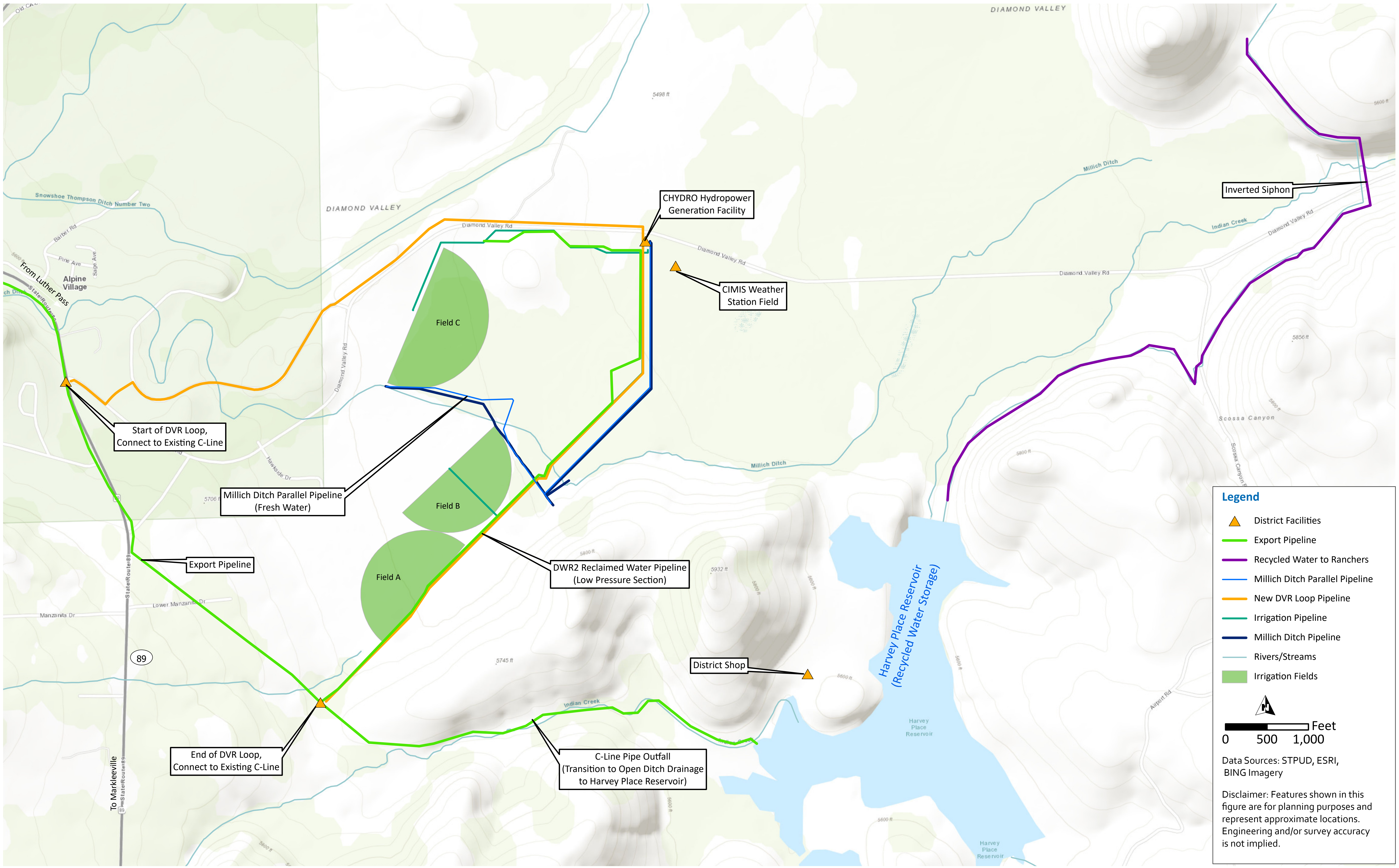


Figure 2.4 Existing System - Harvey Place Reservoir Operations

2.2.3 Existing Regulations

The District's existing system is subject to regulatory requirements associated with the treatment and reuse of domestic sewage. In addition, the District must comply with laws and contractual agreements associated with the end uses of recycled water in Alpine County. Regulatory and legal requirements are described in detail in TM1 Existing and Future Regulations.

There are several laws and regulations that have directly or indirectly influenced the configuration and operation of the existing treatment and export system. A brief summary of existing regulations, laws, and agreements is provided in Table 2.3.

Table 2.3 Overview of Select Existing Regulations, Laws, and Agreements

Agency	Statute / Regulation / Agreement	Description	TM1 Section
State of CA	Porter-Cologne Act	• Required for export of effluent outside the Lake Tahoe Basin.	III.B.1.A IV.A.1
TRPA	TRPA Code of Ordinances Chapter 60, and TRPA Regional Plan	• Prohibitions on the discharge of effluent (surface waters, groundwater, and land) in the Lake Tahoe Basin.	IV.A.2.a,b,c
LRWQCB	Basin Plan	• Basis for the LRWQCB regulatory program. Requires export of wastewater from the Lake Tahoe Watershed.	III.B.1.A
LRWQCB	WDRs and WRRs	• Specifies that the effluent must meet disinfected secondary-23 standards, per CA Code of Regulations Title 22, Section 60301.225. • Specifies District effluent disposal locations and use of recycled water for irrigation on District-owned property. • Specifies non-District water recycling permit holders (total of six), approximate use of recycled water, and acreage of irrigated area.	IV.B.1.a
Federal, States of CA and NV	Public Law 101-618, Settlement Act, Compact	• Governs the allocation of water rights between CA and NV.	IV.A.4
States of CA and NV	Alpine Decree	• Adjudicated water rights on the CA and NV portions of the Carson River.	IV.A.4
SWRCB	Title 22 Code of Regulations	• Approved recycled water uses and associated treatment requirements.	III.B.1.b
Ranchers in Alpine County	Recycled Water Use Contracts	• Contracts with individual Ranchers describing type of use and quantity of recycled water.	IV.B.4

Notes:
Abbreviations: Basin Plan - Water Quality Control Plan; Compact - California-Nevada Interstate Compact; Settlement Act - Truckee-Carson-Pyramid Lake Water Rights Settlement Act; SWRCB - State Water Resources Control Board; TRPA - Tahoe Regional Planning Agency; WDR - Waste Discharge Requirements; WRR - Water Reclamation Requirements.

2.2.4 Key Considerations

While there have been changes and improvements in the District WWTP, export infrastructure, and recycled water infrastructure, the overall intent/function of the system (export out of the Lake Tahoe Watershed and recycled water use in Alpine County) has not changed significantly since the late 1960s.

There are several benefits of the existing system including:

- Compliance with all local, state, and federal laws and regulations.
- 100 percent reuse of wastewater from the District's service area.
- 100 percent recycling of the biosolids produced through treatment.

The drivers for considering alternatives to the existing system, as part of the development of this long-term strategic plan, include the challenges associated with this existing system and the potential benefits that may be realized through implementation of an alternative approach. The challenges associated with the existing system are summarized in Table 2.4.

Table 2.4 Existing System Challenges

Category	Challenges
Economic	• Annual O&M – Annual O&M cost for the wastewater treatment system (treatment export, recycled water) is approximately $6M per year. Annual cost for energy for export accounts for approximately $1.2M per year of the total annual O&M cost. • Revenue – The District generates limited revenue from the sale of hay and alfalfa. • The District does not generate any revenue from the recycled water provided to the Ranchers. This is based on existing agreements between the District and the Ranchers, where a fee for recycled water is not included.
Technical	• Aging Infrastructure – Continued operation of the existing WWTP, export system, and recycled water system will require continued investment for repair and replacement to maintain District established level of service. • Recycled Water Use Capacity – The total recycled water use capacity is about 6,000 AFY. This is the combination of maximum delivery of recycled water to the Ranchers of 5,800 AFY, and an approximate use of 200 AFY by the District in DVR. Projected future effluent flows are 5.4 mgd (6,000 AFY). If future effluent flows increase beyond 6,000 AFY, then there would be no available buffer of recycled water end use capacity.
Institutional	• Agreement with Alpine County – There is ongoing legal action over the provisions of 1967 Agreement (and amendments) between the District and Alpine County. • The agreements between the District and Ranchers will expire in 2028.
Environmental and Sustainability	• Energy Consumption – The annual energy demand for the export system is 6,680 MWh.
Public	• Alternative Approaches – Internal and external stakeholders have provided input on potential alternatives approaches to recycled water treatment and use. • Cost of Service – General public concern with the cost of service to treat and export effluent out of the Lake Tahoe Watershed.

Notes:
Abbreviations: M - million; MWh - megawatt hours; O&M - operations and maintenance.

The potential opportunities or benefits of an alternative approach are unique to each of the alternatives and are included in the descriptions of the alternatives considered. In general, the potential benefits associated target the previously described limitations of the existing system. Potential benefits associated with one or more of the alternatives include:

- Reduced O&M costs.
- Reduced energy demand and associated emissions.
- Increased capacity of recycled water use.
- Increased revenue from the use of recycled water.
- Improved water quality.
- Higher beneficial use of recycled water.

2.3 Alternatives Identification and Screening Process

One objective of the Plan was to consider a wide range of potential alternatives to the existing system. The following sections describe the first step of developing a comprehensive list of alternatives, followed by the second step of a high-level screening evaluation to identify the most viable alternatives for future evaluation. A more detailed evaluation of the selected group of alternatives is presented in TM3 Alternatives Evaluation.

The alternatives identification and screening analysis was conducted by the District's project team. In addition, throughout the process, the District engaged a Stakeholder Advisory Group (SAG) and the general public to provide information and to solicit feedback. Members of the SAG include:

- City of South Lake Tahoe.
- Tahoe Resource Conservation District.
- California Tahoe Conservancy.
- Tahoe Water Suppliers Association.
- United States Forest Service.
- Sierra Nevada Alliance.
- TRPA.
- LRWQCB.
- Nevada Division of Environmental Protection (NDEP).
- Washoe Tribe.
- Alpine Watershed Group.
- Lukins Brothers (also representing Tahoe Keys Water).
- Tahoe Environmental Research Center.
- Incline Village General Improvement District.
- Douglas County Lake Tahoe Sewer Authority (DCLTSA).
- League to Save Lake Tahoe.
- El Dorado County.

The SAG and public meetings, as presented in Table 2.5, have provided valuable ideas and feedback that have been considered in the alternatives identification and screening analysis.

Table 2.5 Recycled Water Strategic Plan Meeting Summary

Meeting Date	Meeting Title	Meeting Description / Purpose
2/8/2022	Public / SAG Meeting 1 (virtual)	This meeting provided an overview of the District's existing system, described the Plan and why the District is engaging in it, shared the Plan development process including a background of drivers/constraints and a broad overview of alternatives categories, and informed the public/SAG how they could stay involved. During this meeting, the public/SAG had opportunities to comment on alternative categories and provide initial feedback about this Plan.
5/17/2022	Internal CAMP® meeting with Carollo team members	Carollo team members learned about the project and alternatives. They were asked to identify if there are other alternatives that should be considered, as well as if there are alternatives that make sense to combine. They provided feedback on high-level screening of alternatives based on comparative assessment of challenges and opportunities, in three groups: low potential, medium potential, and high potential. This CAMP® meeting ensured that a broader group of experienced Carollo team members could provide feedback and additional on the alternatives.
6/30/2022	Alternatives Screening Review with the District	Carollo team members met with key District team members as well as the District's legal counsel. The District team members and legal counsel provided input on the preliminary findings of the alternatives screening, which were based on the results of the CAMP® meeting. They were also asked to provide input on the key next steps in analysis to refine the alternatives screening, and to brainstorm the preferred approach on engaging SAG and the public in the alternatives screening analysis.
7/7/2022	Meeting with DCLTSA and the District	This meeting allowed the District and DCLTSA to discuss the alternative that involves DCLTSA, and to get more concrete information about DCLTSA's system and end use, to better define this alternative.
8/11/2022	Meeting with LRWQCB and the District	This meeting allowed the District and Carollo to better understand existing and future LRWQCB regulations, especially as they pertain to specific alternatives.

Meeting Date	Meeting Title	Meeting Description / Purpose
9/28/2022	SAG Meeting 2 (hybrid)	This meeting allowed the District and Carollo to obtain SAG input on preliminary findings, allowed the SAG to identify any additional challenges or opportunities with the alternatives, and allowed the SAG to provide input on considerations for the alternatives evaluation process.
2/1/2023	Meeting with NDEP and the District	Carollo and District team members met with NDEP staff to provide information to NDEP on alternatives being considered, identify key regulatory considerations associated with the alternatives, and identify the need for follow-up discussion and/or research.
5/18/2023	District Board Meeting (in person)	This meeting allowed District staff to update the Board on the Plan status and the preliminary alternatives screening in advance of the public/SAG meeting on 5/23/2023.
5/23/2023	Public Meeting 2 / SAG Meeting 3 (hybrid)	This meeting updated the Public/SAG on the Plan status and the preliminary alternatives screening. Additionally, the Public/SAG had the opportunity to comment on the alternatives and the initial screening results. For in-person attendees, there was an "open-house" portion of the meeting, allowing for additional discussion related to the Plan, the alternatives, and any additional opportunities or constraints that attendees identified.
6/26/2023	Follow-up meeting with NDEP and the District	This meeting was a continuation of the previous meeting with NDEP. The District/Carollo shared updated information on the alternatives, and NDEP provided further clarification on permitting and water rights considerations and recommendations for future coordination on specific topics.

Notes:
Abbreviations: CAMP® - Concentrated Accelerated Motivated Problem-Solving; Carollo - Carollo Engineers, Inc.

2.3.1 Alternatives Identification

The project team brainstormed alternatives based on the identified drivers (challenges and opportunities) described in Section 2.2. The SAG and the general public provided ideas and feedback on the list of alternatives.

To support understanding of the alternatives and screening analysis, a high-level characterization of each alternative was developed. Section 2.6 includes a subsection for each alternative, where the following topics are included in a high-level characterization of each alternative:

- Overview.
- Key components.

- Alternative justification.
- Key issues and challenges.

2.3.2 Alternatives Screening

The alternatives screening analysis consisted of a high-level and relative comparison of the justification/benefits and key issues/challenges of each alternative. The qualitative assessment of key issues and challenges included:

- **Technical:** Pertaining to the technical challenges with implementing and operating treatment processes and infrastructure.
- **Watershed and Regional Regulatory and Legal:** Regulatory and legal issues associated with the broader watershed/State location of the discharge and end use of recycled water.
- **Alternative Specific Regulatory and Institutional:** Related to the specific regulatory and institutional requirements for an alternative based on the specific discharge location, end use location, and end use type.
- **Environment and Sustainability:** Pertaining to environmental impacts of construction and operation, as well as sustainability issues with a specific focus on energy demands.
- **Economic:** Qualitative assessment of capital and O&M costs associated with treatment and infrastructure. In many cases there is a tradeoff between infrastructure and treatment. The "net" economic challenge is currently a qualitative discussion. The potential revenue from the sale of recycled water is also a consideration. However, based on the sale of recycled water of similar quality, the rate is $0.01 to $0.02 per 1,000 gallons (personal communication with DCLTSA). The estimated revenue from sale of recycled water based on future flows (5.4 mgd) is approximately $20,000 to $40,000 per year. Since the potential revenue is minor compared to the annual operating budget, the potential revenue from the sale of recycled water is mentioned in the analysis but is a minor benefit.
- **Public Acceptance:** Pertains to general concerns the public may have about any of the topics listed above and others.

An assessment of the relative degree of challenge was conducted, on a relative scale of 1 to 4, where:

- 1 = low level of difficulty (shown in tables as ■).
- 2 = moderate level of difficulty (shown in tables as ■).
- 3 = moderately high level of difficulty (shown in tables as ■).
- 4 = high level of difficulty (shown in tables as ■).

Section 2.6 (as well as the subsections for each alternative) includes a qualitative assessment of the level of challenge. The combination of the potential benefits of the alternative along with the relative difficulty in overcoming the associated challenges, is the basis for the screening analysis. The outcome of the screening analysis is a grouping of the alternatives into two groups:

- Low Potential Alternatives: Limited additional evaluation of the alternative is included in the Plan.
- High Potential Alternatives: Additional development and evaluation of the alternatives is included in the Plan (TM3 Alternatives Evaluation).

Section 2.8 includes a summary of the screening analysis for all alternatives and the list of the relatively high-potential alternatives that will be further evaluated (TM3 Alternatives Evaluation).

2.4 Alternatives Overview

Sixteen alternatives were developed as a result of the process described in Section 2.3. The alternatives include a range of recycled water end-uses and a range of locations. Figure 2.5 presents an overview of the recycled water end-use locations for the alternatives. The recycled water end use locations are in CA and NV, and within the following four watersheds:

- Carson River Watershed:
  - CA portion of the Carson River Watershed.
  - NV portion of the Carson River Watershed.
- South Fork of the American River Watershed.
- Truckee River Watershed.
- Lake Tahoe Basin Watershed.

Table 2.6 includes the discharge location, end use location, end use description, and a brief description of infrastructure and treatment required for each alternative. The alternatives are described in detail in Section 2.6.

In addition to identifying alternatives to the existing District system, a list of potential system modifications was developed. Each system modification does not represent a standalone alternative that could replace the existing export and use of recycled water. Rather, these modifications may be considered as part of several alternatives. These modifications include:

- Increased export system energy recovery.
- Use of recycled water for urban fire protection.
- Export infrastructure tunneling.
- Split treatment facilities.
- Constructed wetlands.

The system modifications are described in detail in Section 2.7.

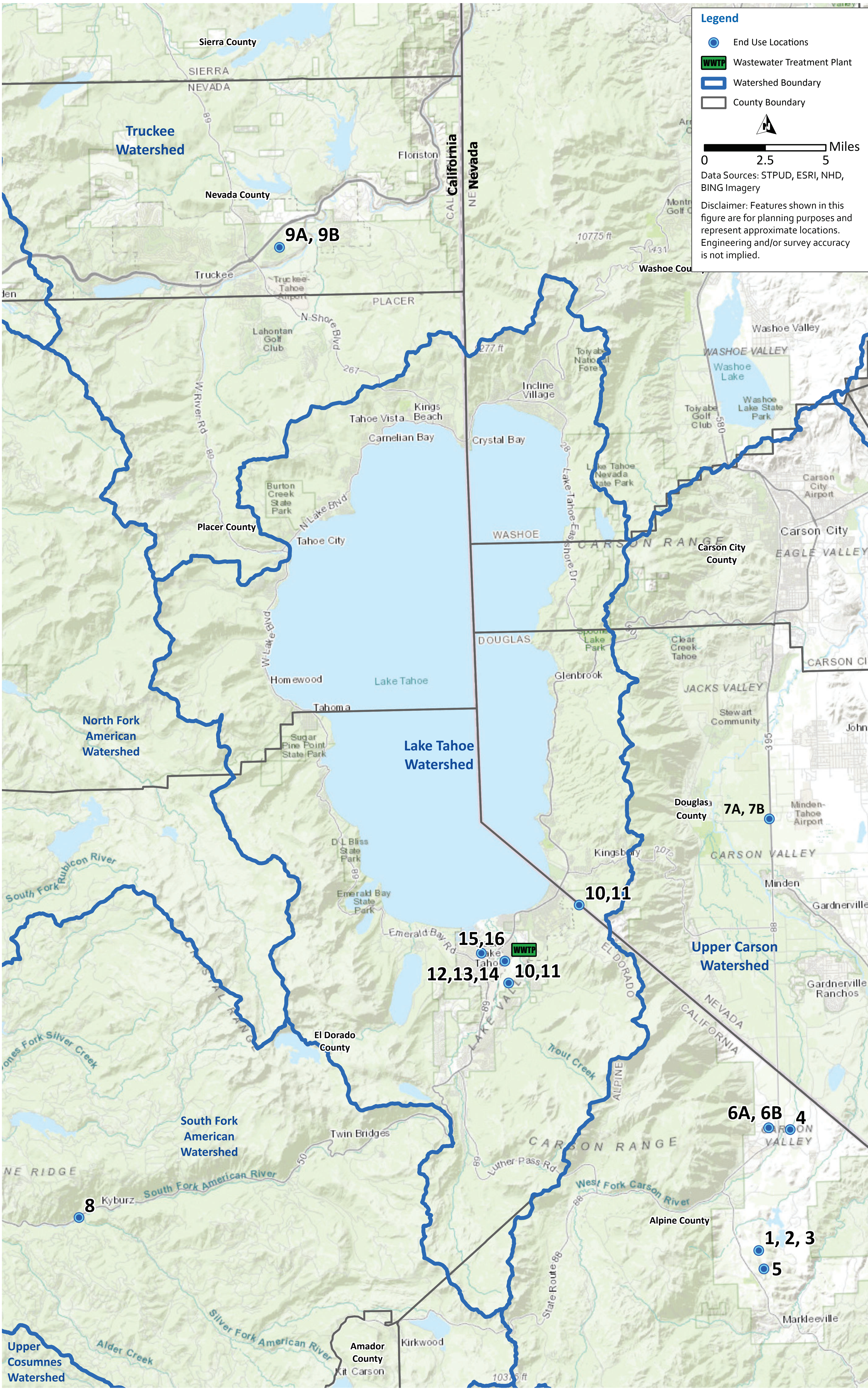


Figure 2.5 Overview of Alternatives

Table 2.6 Alternatives

Alternative		Discharge Location		End Use		End Use Description	Infrastructure	Treatment(1)
No.	Title	Watershed	State	Watershed	State			
1	Existing System	Carson River Watershed	CA	Carson River Watershed	CA	Transmission over Luther Pass to Harvey Place Reservoir. Water used for alfalfa irrigation and by local Ranchers.	Existing infrastructure for conveyance to Alpine County.	Existing treatment
2	Expanded Disinfected Secondary-23 Delivery in Alpine County	Carson River Watershed	CA	Carson River Watershed	CA	Transmission over Luther Pass to Harvey Place Reservoir. Existing treatment will allow use for irrigation of landscape or pastureland. This alternative would serve new users or expand use with additional District facilities.	Existing infrastructure for conveyance to Alpine County. Distribution piping may be required depending on identified end users.	Existing treatment
3	Expanded Disinfected Tertiary Reuse in Alpine County	Carson River Watershed	CA	Carson River Watershed	CA	Transmission over Luther Pass to Harvey Place Reservoir. Additional treatment will allow use for landscape and agricultural irrigation. This alternative would serve new users or expand use with additional District facilities.	Existing infrastructure for conveyance to Alpine County. Distribution piping may be required depending on identified end users.	Advanced treatment
4	Discharge to West Fork of Carson River and Use in NV	Carson River Watershed	CA	Carson River Watershed	NV	Transmission over Luther Pass to Harvey Place Reservoir with new discharge piping to the West Fork Carson River in CA. Water would travel in the river to NV for potential utilization by downstream users.	Existing infrastructure for conveyance to Alpine County. Construction of new section of export pipeline and outfall to discharge to the West Fork Carson River.	Highly advanced treatment
5	Groundwater Recharge for Disposal in Alpine County	Carson River Watershed	CA	-(2)	CA	Transmission over Luther Pass to inject effluent into the Carson Valley Groundwater Basin in Alpine County. This alternative is a disposal mechanism and there is not technically an end use associated with it.	Existing infrastructure for conveyance to Alpine County. Construction of new conveyance piping and injection wells.	Highly advanced treatment
6A	Expanded Class A or B Reuse in NV via Indian Creek	Carson River Watershed	CA	Carson River Watershed	NV	Transmission over Luther Pass to Harvey Place Reservoir to Indian Creek. Transmission to NV via Indian Creek for potential utilization by downstream users.	Existing infrastructure for conveyance to Alpine County. Discharge from Harvey Place Reservoir to Indian Creek, and conveyance into NV.	Advanced treatment
6B	Expanded Class A or B Reuse in NV via Pipeline Conveyance	Carson River Watershed	NV	Carson River Watershed	NV	Transmission to NV via a new transmission pipeline for potential utilization by downstream users.	Existing infrastructure for conveyance to Alpine County. Construction of new pipeline for conveyance to Mud Lake, NV.	Advanced treatment
7A	Treated Effluent Conveyance to DCLTSA	Carson River Watershed	NV	Carson River Watershed	NV	Transfer of treated wastewater to DCLTSA. DCLTSA has existing effluent piping to a land-applied irrigation site and a series of storage reservoirs.	Construction of new transmission piping from the District to DCLTSA.	Advanced treatment
7B	Raw or Partially Treated Effluent to DCLTSA	Carson River Watershed	NV	Carson River Watershed	NV	Transfer of raw or partially treated wastewater to DCLTSA. Water would be treated at the DCLTSA WWTP and sent via their existing effluent piping to a land applied irrigation site and a series of storage reservoirs.	Construction of new transmission piping from the District to DCLTSA.	Treatment at the DCLTSA facilities
8A	Recycled Water for Irrigation in South Fork American River Watershed	American River	CA	American River	CA	Transmission to recycled water users in the South Fork American River watershed, via a new conveyance pipeline.	Construction of new export pipeline and recycled water distribution system	Advanced treatment

Alternative		Discharge Location		End Use		End Use Description	Infrastructure	Treatment[(1)]
No.	Title	Watershed	State	Watershed	State			
8B	Discharge to South Fork American River	American River	CA	American River	CA	Transmission to South Fork American River via a new conveyance pipeline. Water could potentially be utilized by downstream users.	Construction of new export pipeline and outfall to discharge to the South Fork American River.	Advanced treatment
9A	Treated Effluent Conveyance to T-TSA	Truckee Watershed	CA	Truckee Watershed	CA	Transfer of treated wastewater to T-TSA. Water would ultimately be discharged into the Truckee River for potential downstream use.	Construction of new transmission piping from the District to the TCPUD's existing West Shore Interceptor, and then to the T-TSA Truckee River Interceptor for conveyance to T-TSA.	Highly advanced treatment
9B	Raw or Partially Treated Effluent Conveyance to T-TSA	Truckee Watershed	CA	Truckee Watershed	CA	Transfer of raw or partially treated wastewater to T-TSA. Water would be treated at the T-TSA WWTP and would ultimately be discharged into the Truckee River for potential downstream use.	Construction of new transmission piping from the District to the TCPUD's existing West Shore Interceptor, and then to the T-TSA Truckee River Interceptor for conveyance to T-TSA.	Treatment at the T-TSA facility, with upgrades to achieve highly advanced treatment
10	Land Application (Landscape Irrigation) in Lake Tahoe Basin	Lake Tahoe Watershed	CA	Lake Tahoe Watershed	CA	Reuse in the Tahoe Basin for urban irrigation. Major customers include local parks and golf courses.	Construction of conveyance piping and pumping within the Tahoe Basin.	Highly advanced treatment
11	Land Application (Snowmaking) in Lake Tahoe Basin	Lake Tahoe Watershed	CA	Lake Tahoe Watershed	CA	Reuse in the Tahoe Basin for snowmaking at local ski resorts.	Construction of conveyance piping and pumping within the Tahoe Basin.	Highly advanced treatment
12	Discharge to Waters in Lake Tahoe Basin (Heavenly Valley Creek)	Lake Tahoe Watershed	CA	Lake Tahoe Watershed	CA	Transmission of treated water to Heavenly Valley Creek for potential utilization by downstream users.	Construction of a short discharge pipe and outfall to Heavenly Valley Creek.	Highly advanced treatment
13	Discharge to Waters in Lake Tahoe Basin (Trout Creek)	Lake Tahoe Watershed	CA	Lake Tahoe Watershed	CA	Transmission of treated water to Trout Creek for potential utilization by downstream users.	Construction of a short discharge pipe and outfall to Trout Creek.	Highly advanced treatment
14	Discharge to Waters in Lake Tahoe Basin (Upper Truckee River)	Lake Tahoe Watershed	CA	Lake Tahoe Watershed	CA	Transmission of treated water to the Upper Truckee River for potential utilization by downstream users.	A portion of the existing export pipeline can be utilized. A turnout and outfall to the Upper Truckee River would need to be constructed.	Highly advanced treatment
15	IPR in Lake Tahoe Basin	Lake Tahoe Watershed	CA	Lake Tahoe Watershed	CA	Advanced treatment and injection into the Tahoe Valley South Groundwater Subbasin. Water would be reused as a source of drinking water supply for the existing domestic and municipal wells in the basin.	Construction of new conveyance piping and injection wells.	Highly advanced treatment
16	DPR in Lake Tahoe Basin	Lake Tahoe Watershed	CA	Lake Tahoe Watershed	CA	Advanced treatment for a DPR supply within the District water supply system.	Construction of new potable water distribution system. The current system is spread out and distributed from water supply wells.	Highly advanced treatment

Notes:

(1) The treatment process is grouped into three categories. Existing (no change), Advanced (potentially including biological nutrient removal [BNR], filtration, and/or disinfection), Highly Advanced (potentially including, in addition, reverse osmosis [RO] [removal of TDS, chloride, and other contaminants] and advanced oxidation processes [AOP] [removal of trace organics and other contaminants]).

(2) No beneficial end use – disposal.

Abbreviations: DPR - direct potable reuse; IPR - indirect potable reuse; T-TSA - Tahoe-Truckee Sanitation Agency; TCPUD - Tahoe City Public Utility District.

2.5 Legal and Regulatory Considerations

The alternatives are subject to various legal agreements and regulations, which are presented in detail in TM1 Existing and Future Regulations. In general, there are higher level legal and regulatory requirements associated with the watershed and region, and alternative-specific legal and regulatory requirements that are dependent on the components of the alternatives and the specific discharge location and end use. In addition, there are some considerations for all alternatives, which are referenced herein and not included in subsequent sections, including:

- For any alternative that would require a significant change in the management and use of recycled water, the District would be required to conduct an environmental review, as described in TM1 (Section III.C).
- For any alternative that leads to reduced available flow for ranchland irrigation in Alpine County, then one or more of the agreements may need to be modified, and it is possible that the Ranchers (or some of the Ranchers) may be opposed to changes in their available supply and changes to the agreements. As the existing Rancher agreements expire in 2028, new agreements will need to be developed and negotiated if there is planned continued use of recycled water by the Ranchers. Rancher agreements are described in TM1 (Section IV.B.4.a. through b).
- For any alternative that leads to reduced flow for ranchland irrigation, such that there is reduced tailwater available in the Carson River Watershed, there may be opposition to reduce the amount of tailwater available and then tailwater rights may need to be revisited (TM1 Sections IV.A., IV.B.,IV.D).

The higher level legal and regulatory requirements are dependent on the end use location (watershed and state) and discharge location (watershed and state). Table 2.6 includes these geographic details for each of the alternatives. Because there are some common higher-level watershed and regional requirements for alternatives with similar end use and discharge locations, the alternatives have been grouped by these geographic characteristics, as follows:

- Discharge in CA and reuse in CA portion of the Carson River Watershed.
- Discharge in CA and reuse in NV portion of the Carson River Watershed.
- Discharge in NV and reuse in the NV portion of the Carson River Watershed.
- Discharge and reuse in the South Fork of the American River Watershed.
- Discharge and reuse in the Truckee River Watershed.
- Discharge and reuse in the Lake Tahoe Basin Watershed.

The discussion that follows includes an assessment of the higher-level watershed-based and regional legal and regulatory challenges with these groups of alternatives. The most significant agreements/regulations/policies for each group of alternatives are discussed in Sections 2.5.1 through 2.5.6, with summarized information in Table 2.7 through Table 2.12. This assessment of higher-level legal and regulatory feasibility is valuable as background information for the more detailed presentation of the alternatives and the additional alternative-specific regulations presented in Section 2.6. For example, an alternative may require a new National Pollutant Discharge Elimination System (NPDES) discharge permit, which is noted in this section, but more detailed discussion of anticipated permit requirements is addressed in Section 2.6.

2.5.1 Regulatory Assessment – Discharge in CA and Reuse in CA Portion of the Carson River Watershed

The regulations and agreements associated with alternatives characterized by discharge of recycled water in CA and recycled water end uses in the CA portion of the Carson Watershed are summarized in Table 2.7. These regulations and agreements are relevant to Alternatives 2, 3, and 5, as described below:

- Alternatives 2 and 3 – These alternatives involve continued operation of the existing system with potential for additional or new users of recycled water. The expansion of recycled water use to other users in Alpine County would trigger the need for permit modifications, possibly a Salt and Nutrient Management Plan (SNMP), and new/renewed contracts with users. However, while there is regulatory complexity, there is a relatively low level of legal/regulatory difficulty with implementing Alternatives 2 and 3.
- Alternative 5 – This alternative involves discharge to the Carson Valley Groundwater Basin for effluent disposal. Based on the basin characteristics, it is expected that the SWRCB would permit this alternative as IPR under Title 22 Recycled Water Regulations. Compliance with IPR regulations would present a high level of difficulty based on the treatment requirements for IPR. Other regulatory requirements are similar to those described for Alternatives 2 and 3, including permit modifications and development of an SNMP.

Table 2.7 Summary of Regulations and Agreements Associated With Discharge of Recycled Water in CA and Recycled Water End Uses in CA Portion of Carson Watershed

Authority	Regulation/Agreement/ Policy/Permit	Description	Applicable Alternatives	Reference in TM1
LRWQCB	WDRs and WRRs	Requirements for treatment and discharge of recycled water	2, 3, 5	IV.B.1.c
SWRCB	Title 22 and Title 17 CA Recycled Water Regulations	Treatment requirements for recycled water end uses, and uniform statewide criteria for recycled water	2, 3, 5	III.B.a.b
SWRCB	SNMP (included in the Recycled Water Policy)	Plan that addresses basin-wide management of salts and nutrients in groundwater	2, 3, 5	IV.B.1.d

Authority	Regulation/Agreement/ Policy/Permit	Description	Applicable Alternatives	Reference in TM1
Alpine County	Ordinances and Agreements with the District	Several ordinances and agreements that stipulate the conditions/ requirements for use of recycled water in Alpine County	2, 3, 5	IV.B.3.a through e
States of CA and NV	Alpine Decree	Adjudicated water rights on the CA and NV portions of the Carson River	2, 3, 5	IV.A.4

2.5.2 Regulatory Assessment – Discharge in CA and Reuse in NV Portion of the Carson River Watershed

The regulations and agreements associated with alternatives characterized by discharge of recycled water in CA and recycled water end uses in the NV portion of the Carson Watershed are summarized in Table 2.8. These regulations and agreements are relevant to Alternatives 4 and 6A, as described below:

- Alternatives 4 and 6A – Both alternatives involve discharge to a surface water (Alternative 4 to the West Fork Carson River and Alternative 6A to Indian Creek). These alternatives would require new NPDES discharge permits to the respective receiving waters, with permit conditions based on receiving water quality objectives. Both alternatives would require a Basin Plan Amendment to allow discharge into the East Fork Carson River Hydrologic Unit (Alternative 6A) or West Fork Carson River Hydrologic Unit (Alternative 4). A Basin Plan Amendment is anticipated to be a complex and lengthy process, presenting a moderately high level of difficulty in obtaining regulatory approval for these two alternatives.
- Alternative 4 – There is additional complication with discharge to the West Fork Carson River, which increases the level of legal/regulatory challenge. The West Fork Carson River is an adjudicated system, which may present some complexity associated with discharge and downstream end use for irrigation or other purposes. The West Fork Carson has stringent water quality objectives and is impaired for several constituents, which increases the complexity of compliance with a discharge permit.

Table 2.8 Summary of Regulations and Agreements Associated With Discharge of Recycled Water in CA and Recycled Water End Uses in NV Portion of Carson River Watershed

Authority	Regulation/Agreement/ Policy/Permit	Description	Applicable Alternatives	Reference in TM1
LRWQCB	NPDES Discharge Permit	New permit for surface water discharge	6A, 4	IV.B.2.a, IV.B.2.b
LRWQCB	Basin Plan	Basin Plan prohibits discharge of effluent within East Fork or West Fork Hydrologic Unit	6A, 4	IV.B.2.a, IV.B.2.b
LRWQCB	West Fork TMDLs – Draft West Fork Carson River Vision Plan	Collaborative Framework for Addressing Water Quality Impairments	4	IV.B.1.b
Alpine County	1965 Ordinance	Prohibits the discharge of effluent in sections of the West Fork Carson River, within Alpine County	4	IV.B.3.a
States of CA and NV	Alpine Decree	Adjudicated water rights on the CA and NV portions of the Carson River	4	IV.A.4
NDEP	Water Quality Standards	Attainment of water quality standards at CA/NV border	6A, 4	IV.B.5

Notes:
Abbreviations: TMDL - total maximum daily load.

2.5.3 Regulatory Assessment – Discharge in NV and Reuse in the NV Portion of the Carson River Watershed

The regulations and agreements associated with alternatives characterized by discharge of recycled water in NV and recycled water end uses in the NV portion of the Carson Watershed are summarized in Table 2.9. These regulations and agreements are relevant to Alternatives 6B, 7A, and 7B, as described below:

- Alternatives 6B, 7A, 7B – All of these alternatives involve conveyance into NV for recycled water use. There is complexity with interstate water rights and agreements, which present a moderate level of difficulty.
- Alternative 6B – This alternative involves discharge to an unclassified surface water in NV. There is a moderate level of difficulty in the development of a NDEP discharge permit and compliance with permit requirements.
- Alternatives 7A and 7B – These alternatives involve use of DCLTSA facilities and NDEP permits associated with combining the District wastewater into the DCLTSA system. There is a moderate level of difficulty with this regulatory process.

Table 2.9 Summary of Regulations and Agreements Associated With Discharge of Recycled Water in NV and Recycled Water End Uses in NV Portion of Carson Watershed

Authority	Regulation/Agreement/ Policy/Permit	Description	Applicable Alternatives	Reference in TM1
NDEP	NPDES Discharge Permit	New permit for surface water discharge	6B	IV.D.3.c
NDEP	NPDES Discharge Permit	Permit to connect to DCLTSA Export Pipeline	7A	IV.D.1
NDEP	Reclaimed Water Regulations – NV Administrative Code 445A	Requires compliance with NV water quality standards, and categories of reuse of reclaimed water and corresponding water quality standards	6B, 7A, 7B	IV.D.2.a
Federal, States of CA and NV	Settlement Act, Compact	Governs the allocation of water rights between CA and NV	6B, 7A, 7B	IV.D.3.d
States of CA and NV	Alpine Decree	Adjudicated water rights on the CA and NV portions of the Carson River	6B, 7A, 7B	IV.A.4

2.5.4 Regulatory Assessment – South Fork of the American River Watershed

The regulations and agreements associated with alternatives characterized by recycled water end uses in the South Fork American River Watershed are summarized in Table 2.10. These regulations and agreements are relevant to Alternatives 8A and 8B, as described below:

- Alternatives 8A and 8B – These alternatives involve use/discharge in the South Fork American River Watershed. There is complexity with interstate water rights and agreements, which present a moderate level of difficulty.
- Alternative 8B – This alternative involves discharge to the South Fork American River, with subsequent use by downstream users. There is an additional level of regulatory difficulty given uncertainty in limitations on discharge location and obtaining a new surface water discharge permit for direct discharge to South Fork American River. Overall, with this additional consideration, a moderately high level of difficulty applies to Alternative 8B.

Table 2.10 Summary of Regulations and Agreements Associated With End Uses in the South Fork American River Watershed

Authority	Regulation/ Agreement/ Policy/Permit	Description	Applicable Alternatives	Reference in TM1
CVRWQCB	NPDES Discharge Permit	Permit required for surface water discharge	8	IV.C. 2.a, d
CVRWQCB	WDR	Permit for Discharge to Land	8	IV.C. 2.a, d
CVRWQCB	1977 Letter from CVRWQCB – Discharge	Discharge below the confluence of the Silver Fork with the South Fork American River (near Kyburz, CA)	8	IV.C. 1.d
CVRWQCB	Basin Plan	Water Quality Objectives for the South Fork American River	8	IV.C. 2.d
SWRCB	Title 22 and Title 17 CA Recycled Water Regulations	Recycled Water Requirements Non-Potable Reuse	8 (Land application options)	
Federal, States of CA and NV	Settlement Act, Compact	Governs the allocation of water rights between CA and NV	8	IV.C. 3.d
States of CA and NV	Alpine Decree	Adjudicated water rights on the CA and NV portions of the Carson River	8	IV.A.4

Notes:
Abbreviations: CVRWQCB - Central Valley Regional Water Quality Control Board.

2.5.5 Regulatory Assessment – Truckee River Watershed

The regulations and agreements associated with alternatives characterized by recycled water end uses in the Truckee River Watershed are summarized in Table 2.11. These regulations and agreements are relevant to Alternatives 9A and 9B, as described below:

- Alternatives 9A and 9B – Both alternatives involve discharge and use in the Truckee River Watershed. There is associated regulatory/legal complexity with interstate water rights and agreements. In addition, both alternatives involve some level of use of T-TSA facilities, which would require modification of T-TSA WDRs to accommodate the addition of partially treated or fully treated wastewater from the District. Overall, the regulations/agreements present a relatively moderate level of difficulty.

Table 2.11 Summary of Regulations and Agreements Associated With End Uses in the Truckee River Watershed

Authority	Regulation/Agreement/ Policy/Permit	Description	Applicable Alternatives	Reference in TM1
LRWQCB	NPDES Discharge Permit	Permit modifications to accommodate flow from T-TSA	9A, 9B	IV.E
Federal, States of CA and NV	Settlement Act, Compact	Governs the allocation of water rights between CA and NV	9A, 9B	IV.C. 3.d
States of CA and NV	Alpine Decree	Adjudicated water rights on the CA and NV portions of the Carson River	9A, 9B	IV.A.4

2.5.6 Regulatory Assessment – Lake Tahoe Basin Watershed

The regulations and agreements associated with alternatives characterized by recycled water end uses in the Lake Tahoe Basin Watershed are summarized in Table 2.12. These regulations and agreements are relevant to the following Lake Tahoe Basin Watershed alternatives:

- Alternative 10 – Land Application (Landscape Irrigation) in Lake Tahoe Basin.
- Alternative 11 – Land Application (Snowmaking) in Lake Tahoe Basin.
- Alternatives 12, 13, 14 – Discharge to Waters in Lake Tahoe Basin.
- Alternative 15 – IPR in Lake Tahoe Basin.
- Alternative 16 – DPR in Lake Tahoe Basin.

A brief description of applicable regulations and agreement is included as follows:

- Alternatives 10 to 16 – All of these alternatives include some type of discharge and use in the Lake Tahoe Basin Watershed. The most significant challenge is that the Porter-Cologne Act would need to be modified to allow discharge of resultant effluent in the Lake Tahoe Basin Watershed. An amendment to the Porter-Cologne Act would require approval by the CA Legislature. Additional significant challenges include a Basin Plan Amendment, and modification to the TRPA Code of Ordinances and plans. Implementing these changes would be very challenging.
- Alternatives 10 to 15 – All of these alternatives would require WDRs or NPDES discharge permits to allow land application or discharge to surface water. Based on the existing water quality objectives and the designation of Lake Tahoe as an Outstanding National Resource Water (ONRW), very stringent water quality limitations would be expected to be included in these permits. The anticipated permit requirements present a high level of difficulty with implementing these alternatives.
- Alternative 15 – This alternative involves potable reuse. Alternative 15 is IPR via groundwater injection. The potable reuse regulations and the groundwater water quality objectives (as well as existing water quality) present a high degree of difficulty with treatment train process requirements and regulatory compliance.
- Alternative 16 – This alternative involves DPR in a direct to distribution configuration. DPR regulations in CA are currently under development. It is anticipated that the DPR

regulations would present a high degree of difficulty with treatment train process requirements and regulatory compliance.

Table 2.12 Summary of Regulations and Agreements Associated With End Uses in the Lake Tahoe Basin Watershed

Authority	Regulation/Agreement/ Policy/Permit	Description	Applicable Alternatives	Reference in TM1
State of CA	Porter-Cologne Act	Requires export of resultant effluent out of Lake Tahoe Watershed.	10, 11, 12, 13, 14, 15, 16	IV.A.1
TRPA	Lake Tahoe WQMP	Plan for controlling pollution in the Lake Tahoe Watershed.	10, 11, 12, 13, 14, 15, 16	IV.A.2.a
TRPA	Code of Ordinances	Prohibits municipal wastewater discharge to Lake Tahoe, its tributaries, the groundwaters of the Tahoe Region, or the Truckee River within the Tahoe Region.	10, 11, 12, 13, 14, 15, 16	IV.A.2.b
TRPA	Regional Plan	Multiple goals and policies that include limitations on discharge of pollutants and wastewaters.	10, 11, 12, 13, 14, 15, 16	IV.A.2.c
LRWQCB	Basin Plan	Designates Lake Tahoe as an ONRW. Federal anti-degradation policy directs that "no permanent or long-term reduction in water quality is allowed." Requires export of domestic wastewater from the Lake Tahoe Watershed based on TMDL for fine sediment, particles, N, and P.	10, 11, 12, 13, 14, 15, 16	IV.A.3.a
SWRCB	SNMP (included in the Recycled Water Policy)	Addresses basin wide management of salts and nutrients in groundwater.	10, 11, 12, 13, 14, 15	IV.A.3.b
SWRCB	Title 22 and Title 17 CA Recycled Water Regulations	Recycled Water Requirements Non-Potable and Potable Reuse	10, 11, 15, 16	
Federal, States of CA and NV	Settlement Act, Compact	Governs the allocation of water rights between CA and NV.	10, 11, 12, 13, 14, 15, 16	IV.C. 3.d
States of CA and NV	Alpine Decree	Adjudicated water rights on the CA and NV portions of the Carson River.	10, 11, 12, 13, 14, 15, 16	IV.A.4

Notes:
Abbreviations: WQMP - Water Quality Management Plan.

2.6 Alternative Descriptions

The various alternatives described above in Section 2.4 are further detailed in the subsections below. Alternatives have been grouped based on their end-use location.

2.6.1 CA Portion of Carson Watershed Alternatives

2.6.1.1 Alternative 1: Existing System

Key Components

The existing system is described in detail in Section 2.2. It includes treatment of wastewater at the District to meet disinfected secondary-23 quality standards (Figure 2.1), export over Luther Pass to Harvey Place Reservoir (Figure 2.2), subsequent use by the District for alfalfa irrigation at DVR (Figure 2.3), and by Ranchers for ranchland irrigation (Figure 2.4).

The discharge of recycled water is in CA. End uses of the recycled water are in the CA portion of the Carson Watershed.

Alternative Justification

If the existing conditions are maintained, no additional treatment or infrastructure improvements will be needed, aside from those necessary to maintain a useful life or to address any future capacity limits.

Key Issues and Challenges

The key issues and challenges with the existing system are summarized in Table 2.4. The screening level analysis of the challenges associated with this alternative are summarized in Table 2.13 where the degree of challenge is presented on a scale of green to red, representing lowest to highest level of challenge, respectively. Based on this analysis, Alternative 1 will be further evaluated in this planning process.

Table 2.13 Alternative 1 – Assessment of Relative Challenge

No.	Alternative Name	Level of Challenge								
		Watershed and Regional Regulatory & Legal	Alternative-Specific Regulatory & Institutional	Technical-Treatment Level	Technical-Infrastructure (Conveyance and Treatment Facility Capacity)	Environmental/ Sustainability	Public Perception	Economic	Recycled Water Capacity Limitation	Included in Evaluation Phase (Y/N)
1	Existing System								Not Applicable	Y

Notes:

	Low
	Moderate
	Moderately High
	High

(1) The degree of challenge is presented on a scale of green to red, as represented by the associated color.

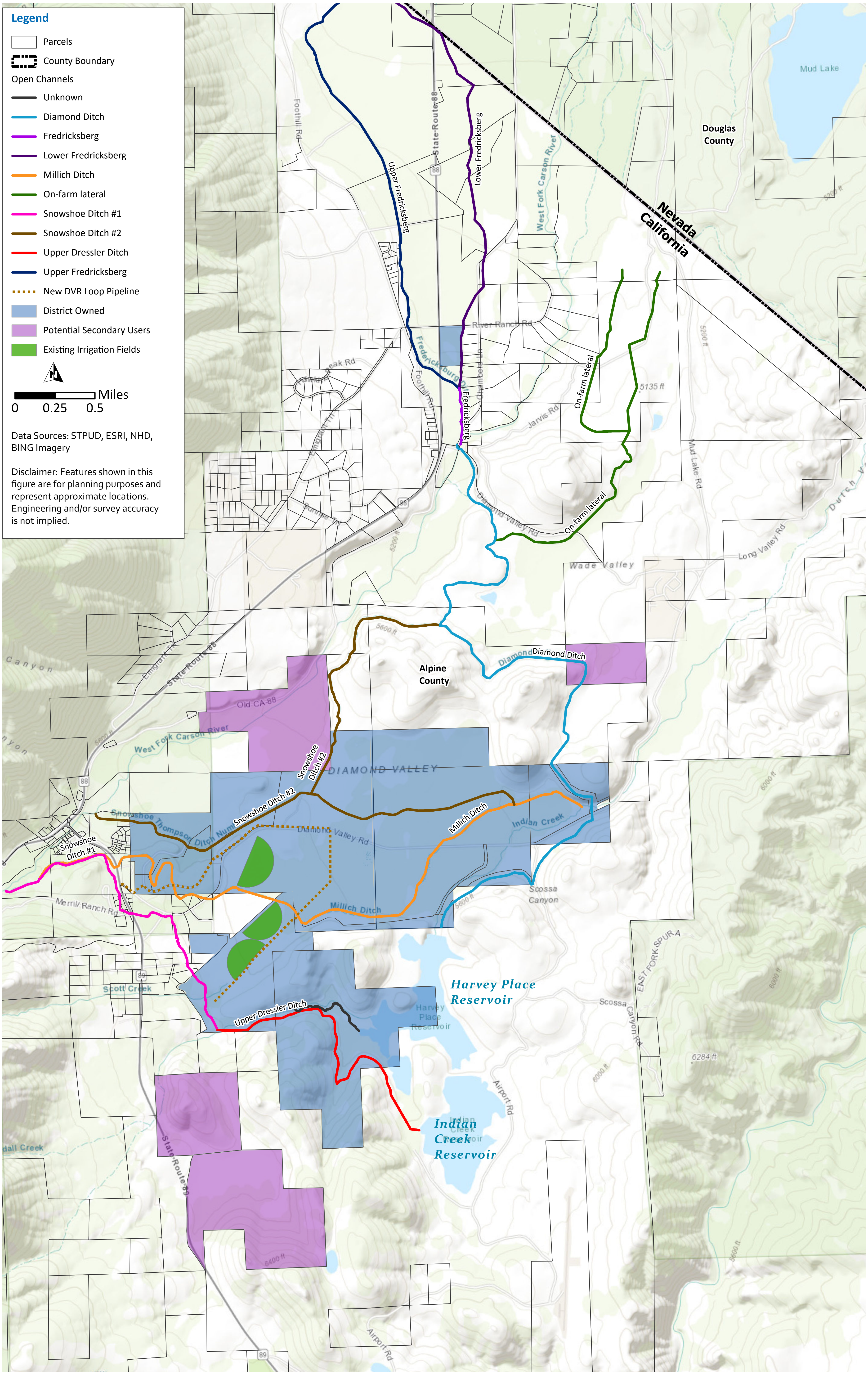
2.6.1.2 Alternative 2: Expanded Disinfected Secondary-23 Delivery in Alpine County

This alternative builds off the existing recycled water system with expanded reuse in Alpine County. As noted in Table 2.6, both the discharge and end uses of recycled water would be in the CA portion of the Carson watershed.

This alternative would involve providing disinfected secondary-23 to existing users, along with either providing recycled water to new users in the vicinity of the existing operations, and/or expanding recycled water use on District-owned properties. Disinfected secondary-23 is limited to the following approved uses:

- Pastureland for milking or non-milking animals.
- Restricted landscape irrigation.
- Landscape impoundment (i.e., water storage, not for recreational use).

Figure 2.6 depicts the land use in Alpine County, including the site of District-owned facilities (including DVR). Additional potential new users have been identified by the District and are shown in Figure 2.6. The total acreage associated with the potential new users is approximately 820 acres. Assuming demands of 2.40 AF/acre, there could be up to approximately 1,970 AF of new recycled water demands. Additional users may be identified adjacent to the existing irrigation ditch system. Recycled water could be delivered either via this existing ditch system or through direct delivery from Harvey Place Reservoir. Options for recycled water use at the District's DVR include expanded fodder crop cultivation and possibly wetlands creation (see Section 2.7.5 for discussion of wetlands).


Legend
Parcels
County Boundary
Open Channels
Unknown
Diamond Ditch
Fredricksberg
Lower Fredricksberg
Millich Ditch
On-farm lateral
Snowshoe Ditch #1
Snowshoe Ditch #2
Upper Dressler Ditch
Upper Fredricksberg
New DVR Loop Pipeline
District Owned
Potential Secondary Users
Existing Irrigation Fields
Miles
0 0.25 0.5
Data Sources: STPUD, ESRI, NHD, BING Imagery
Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.
Mud Lake
Douglas County
Nevada
California
Alpine County
Upper Fredricksberg
Lower Fredricksberg
Fredricksberg
State Route 88
West Fork Carson River
On-farm lateral
Diamond Ditch
Snowshoe Ditch #2
Snowshoe Ditch #1
Millich Ditch
Indian Creek
Upper Dressler Ditch
DIAMOND VALLEY
Diamond Valley Rd
Wade Valley
Long Valley Rd
Harvey Place Reservoir
Indian Creek Reservoir
Scossa Canyon
Airport Rd
State Route 89
Merril Ranch Rd
Scott Creek
Old CA-88
Mud Lake Rd
Jarvis Rd
River Ranch Rd
Foothill Rd
Emigrant Trl
EAST FORK SPUR-A
Scossa Canyon Rd

Key Components

Table 2.14 presents the key components of this alternative.

Table 2.14 Key Components – Alternative 2

Components and Operations	Description
Treatment Process	Same as existing system.
Export System	Same as existing system.
Discharge Location	Same as existing system (Harvey Place Reservoir).
District Irrigation	Same as existing system, plus potential increase in use in DVR.
Ranchland Irrigation	Same as existing system plus potential additional users.
Recycled Water Distribution	Existing ditch system if new users have access. Potential implementation of distribution system to better serve existing and new users.
Hydroelectric Plant	Same as existing system.
Biosolids Disposal	Same as existing system.

Alternative Justification

Implementation of this alternative could expand the capacity for recycled water use in Alpine County by up to 1,970 AF or possibly greater if other users are identified. This alternative may also generate revenue for the District if there were new users in the vicinity of the existing system who would be willing to pay for disinfected secondary-23. If there were modifications to the recycled water delivery system to the Ranchers, then there may be a greater potential to negotiate payment for recycled water with existing and new users. Expanding the District irrigation operations at the DVR site would lead to increased capacity for recycled water and increased revenue from sale of fodder crops. Implementation of this alternative could potentially provide the District with additional flexibility and capacity for recycled water uses.

Key Issues and Challenges

The following presents a qualitative discussion on anticipated issues and challenges with this alternative.

- **Technical - Treatment:**
  - No additional treatment needed.
- **Technical - Infrastructure:**
  - Continued maintenance and investment in aging export system infrastructure would be needed.
  - May require expansion of ditch system or alternative conveyance infrastructure to deliver recycled water to new users.
  - May require additional infrastructure to expand District recycled water use in DVR.
- **Watershed and Regional Legal and Regulatory:**
  - See Section 2.5.1.
- **Alternative-Specific Regulatory, Legal, and Institutional:**
  - Continued involvement in ongoing Alpine County litigation.

- Requires renewal of contracts with existing Rancher users, new contracts with new users, and/or expansion of District irrigation system in DVR.
- Requires agreements with new users.
- For new recycled water users or uses, the District would need to prepare an updated Report of Waste Discharge (ROWD), obtain new WDRs from the LRWQCB, and meet all requirements including any associated with findings of an adopted SNMP.
- Environmental review, approvals, and permits would be required for new conveyance infrastructure, if needed.

- **Economics:**
  - The District does not receive revenue for recycled water per existing Rancher contracts. It may be challenging to negotiate payment for recycled water in future contracts with the existing users and/or new users.
  - Cost of energy and other O&M costs associated with export system.
  - Repair and replacement costs associated with export system.
  - Capital and O&M associated with new recycled water distribution system infrastructure (if implemented).
- **Environmental and Sustainability:**
  - Sustained energy consumption and corresponding greenhouse gas emissions associated with the export system.
  - Potential environmental impacts associated with construction of new recycled water infrastructure (if implemented).
  - Energy consumption and corresponding greenhouse gas emissions associated with operation of new recycled water infrastructure (if implemented).
- **Public:**
  - Potential concern that this recycled water could be used more beneficially elsewhere within the basin.

The screening level analysis of the challenges associated with this alternative are summarized in Table 2.15, where the degree of challenge is presented on a scale of green to red, representing lowest to highest level of challenge, respectively. There is a moderate to low level of complexity with implementing Alternative 2. Based on this analysis, Alternative 2 will be further evaluated in this planning process.

Table 2.15 Alternative 2 – Assessment of Relative Challenge

No.	Alternative Name	Level of Challenge								
		Watershed and Regional Regulatory & Legal	Alternative-Specific Regulatory & Institutional	Technical-Treatment Level	Technical-Infrastructure (Conveyance and Treatment Facility Capacity)	Environmental/ Sustainability	Public Perception	Economic	Recycled Water Capacity Limitation	Included in Evaluation Phase (Y/N)
2	Expanded Disinfected Secondary-23 Reuse in Alpine County									Y

Notes:

	Low
	Moderate
	Moderately High
	High

(1) The degree of challenge is presented on a scale of green to red, as represented by the associated color.

2.6.1.3 Alternative 3: Expanded Disinfected Tertiary Reuse in Alpine County

This alternative would expand reuse in Alpine County through use of disinfected tertiary recycled water. The discharge and end uses of recycled water would be in the CA portion of the Carson River Watershed (as presented in Table 2.6).

By upgrading the treatment process to produce disinfected tertiary recycled water, the District would be able to implement unrestricted non-potable reuse. The disinfected tertiary recycled water could be used for the existing uses (currently served by disinfected secondary-23) as well as the following additional uses:

- Landscape irrigation.
- Surface and spray irrigation of food crops.
- Non-restricted recreational impoundment (i.e., water storage, appropriate for recreational use).

In this alternative, disinfected tertiary recycled water would be conveyed to Harvey Place Reservoir via the existing export system. Figure 2.7 shows the possible users of disinfected tertiary recycled water. Assuming demands of 2.40 AF/acre and an area of 41.9 acres for potential disinfected tertiary users, there could be up to 100 AFY of new recycled water demands by implementing this alternative. None of these locations are adjacent to the existing ditch system; therefore, this alternative would require construction of a recycled water distribution system to deliver recycled water for use.

Any potential new user of disinfected secondary-23 could also use disinfected tertiary recycled water. As described in Section 2.6.1.2, the potential additional disinfected secondary-23 demand is approximately 1,970 AFY. In combination with end uses that require disinfected tertiary recycled water, the total potential demand is up to 2,070 AFY.

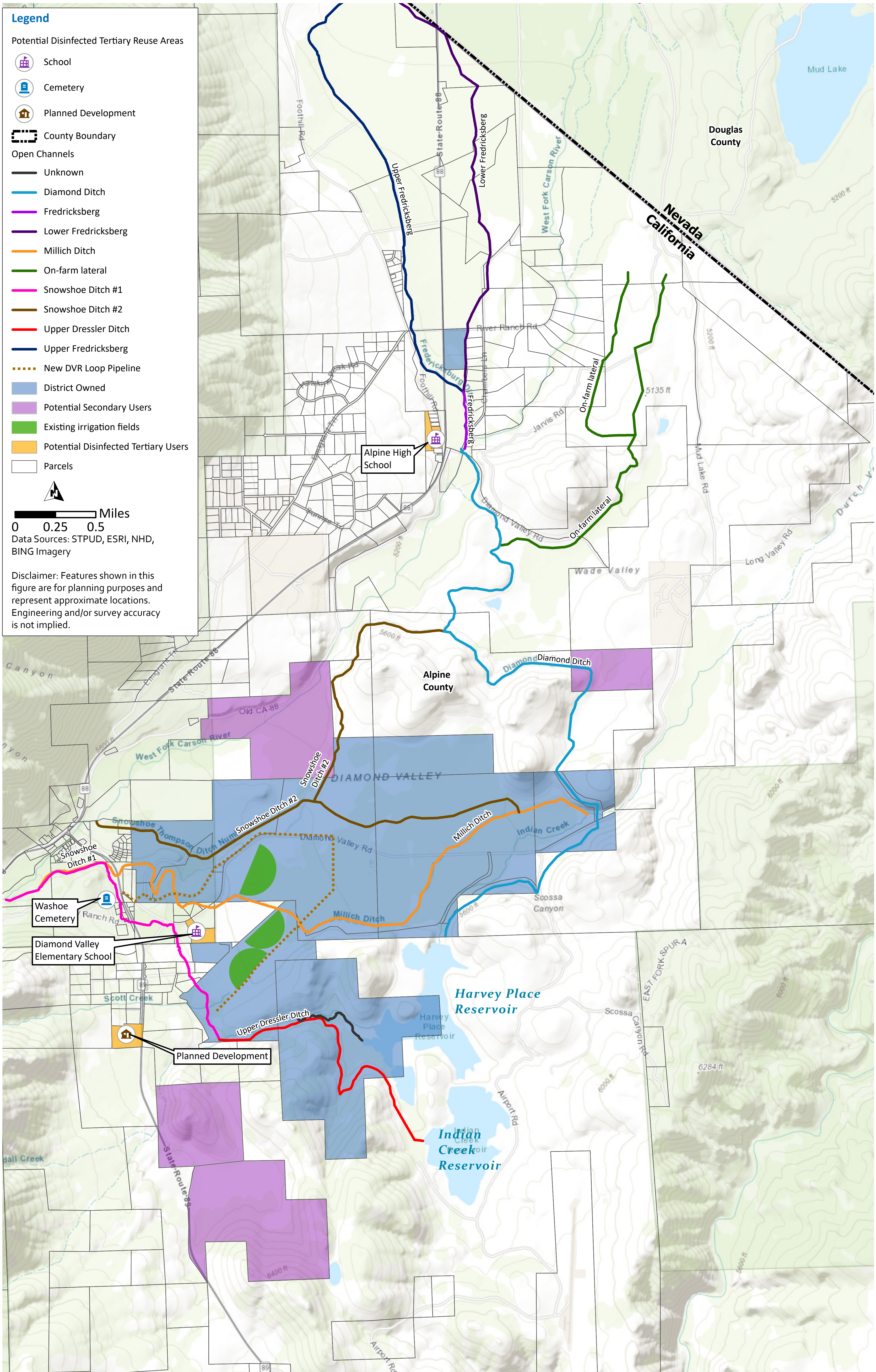


Figure 2.7 Alpine County Land Use and Demands for Disinfected Tertiary Reuse

Key Components

Table 2.16 presents the key components of this alternative.

Table 2.16 Key Components – Alternative 3

Components and Operations	Description
WWTP	Upgrades to meet disinfected tertiary recycled water requirements. These upgrades would likely include replacement of the existing filters and disinfection improvements. The potential treatment train upgrades are shown in Figure 2.8.
Export System	Same as existing system.
Discharge Location	Same as existing system (Harvey Place Reservoir).
District Irrigation	Same as existing system. New users may reduce the need for some existing District irrigation.
Ranchland Irrigation	Same as existing system. New users may reduce the need for some existing ranchland irrigation.
New Recycled Water Uses	Potential new users of disinfected tertiary recycled water including school fields, a future development, and a cemetery.
Recycled Water Distribution	Implementation of a recycled water distribution system to serve existing and new users.
Hydroelectric Plant	Same as existing system.
Biosolids Disposal	Potential increase in biosolids production due to increased suspended solids removal.

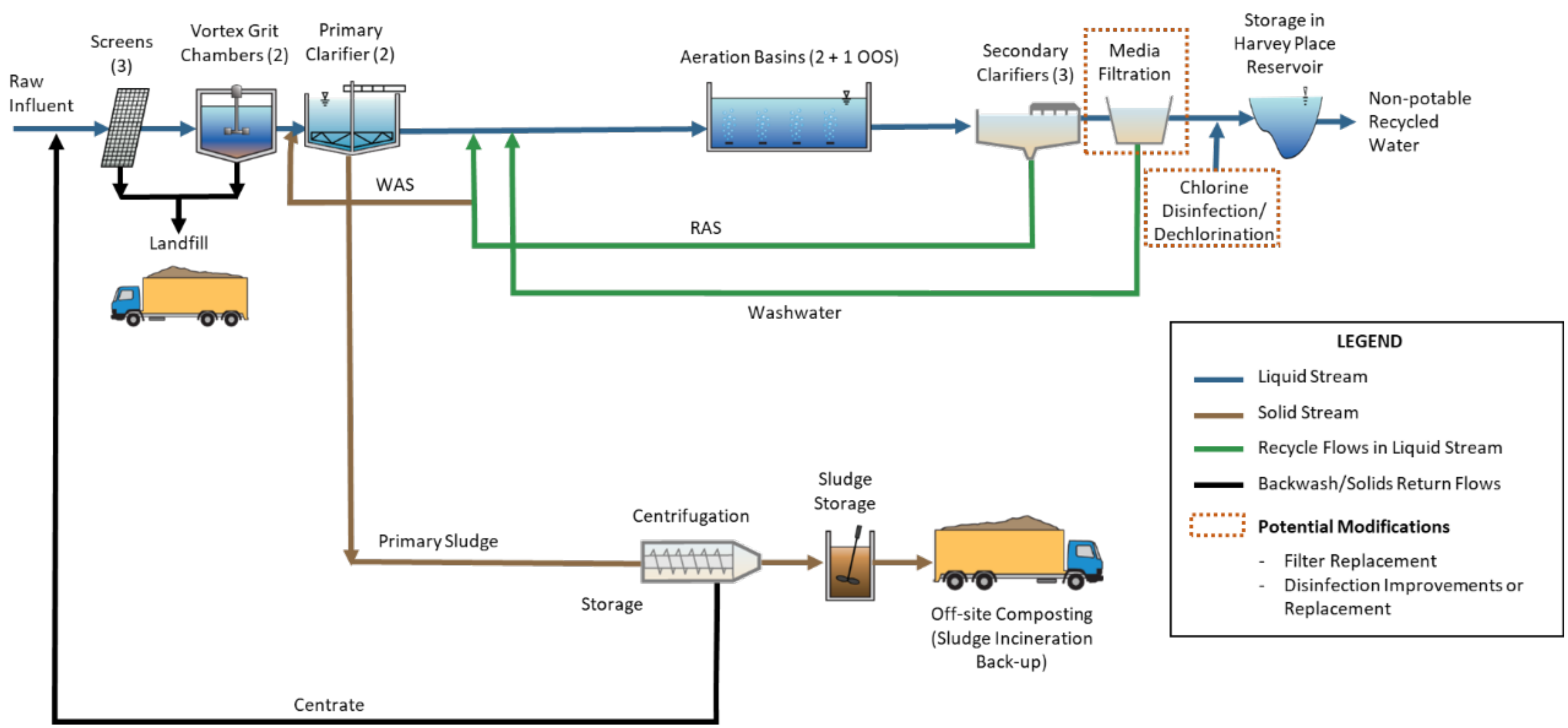


Figure 2.8 Process Train Modifications to Meet Disinfected Tertiary Requirements

Alternative Justification

This alternative builds upon Alternative 2, as disinfected tertiary water could be used to serve all existing and potential new users of disinfected secondary-23 recycled water. Implementation of this alternative could further expand the capacity for recycled water use in Alpine County by up to 100 AFY (total of 2,070 AFY), or possibly greater, if other users of disinfected tertiary recycled water are identified. It is possible that the users would be willing to pay for disinfected tertiary recycled water (a common practice in CA). The sale of recycled water would generate revenue for the District. Implementation of this alternative could potentially provide the District with additional flexibility and capacity for recycled water uses.

Key Issues and Challenges

The following presents a qualitative discussion on anticipated issues and challenges with this alternative.

- **Technical - Treatment:**
  - Treatment train upgrades to meet disinfected tertiary standards, which would likely require replacement of existing filters and disinfection improvements. The treatment train upgrades add a degree of complexity as compared to the existing treatment process.
  - There is limited space on the WWTP site for the anticipated process improvements.
- **Technical - Infrastructure:**
  - Continued maintenance and investment in aging export system infrastructure.
  - May require alternative conveyance infrastructure to deliver recycled water to new users.
  - Demand for disinfected tertiary is very low (100 AFY) compared to future effluent production of 6,000 AFY.
- **Watershed and Regional Legal and Regulatory:**
  - See Section 2.5.1.
- **Alternative-Specific Regulatory, Legal, and Institutional:**
  - Continued involvement in ongoing Alpine County litigation.
  - Requires renewal of contracts with existing Rancher users, and new contracts with new users.
  - Requires agreements with new users.
  - For new recycled water users or uses, the District would need to prepare an updated ROWD, obtain new WDRs from the LRWQCB, and meet all requirements including any associated with findings of an adopted SNMP.
  - Environmental review, approvals, and permits would be required for treatment plant upgrades.
  - Environmental review, approvals, and permits would be required for new conveyance infrastructure, if needed.
- **Economics:**
  - Capital and O&M associated with new treatment systems.
  - Capital and O&M associated with new recycled water distribution system infrastructure (if implemented).

  - The District does not receive revenue for recycled water used by Ranchers, and it therefore may be challenging to negotiate recycled water fees even with the increased level of treatment.
  - The demand for tertiary disinfected recycled water may not support the investment in required treatment upgrades.
  - Cost of energy and other O&M costs associated with export system.
  - Repair and replacement costs associated with export system.
- **Environmental and Sustainability:**
  - Sustained energy consumption and corresponding greenhouse gas emissions associated with the export system.
  - Energy consumption and corresponding greenhouse gas emissions associated with upgraded treatment process and new recycled water delivery infrastructure.
  - Potential environmental impacts associated with construction of new recycled water treatment facilities and infrastructure.
- **Public:**
  - Potential concern with justification for investment in treatment plant upgrades.
  - Public concern that the water could be used more beneficially elsewhere within the basin, especially given the higher level of treatment.

The screening level analysis of the challenges associated with this alternative are summarized in Table 2.17, where the degree of challenge is presented on a scale of green to red, representing lowest to highest level of challenge, respectively. While the treatment plant upgrades add technical complexity, the other challenges are moderate or low. Based on this analysis, Alternative 3 will be further evaluated in this planning process.

Table 2.17 Alternative 3 – Assessment of Relative Challenge

No.	Alternative Name	Level of Challenge								
		Watershed and Regional Regulatory & Legal	Alternative-Specific Regulatory & Institutional	Technical-Treatment Level	Technical-Infrastructure (Conveyance and Treatment Facility Capacity)	Environmental/ Sustainability	Public Perception	Economic	Recycled Water Capacity Limitation	Included in Evaluation Phase (Y/N)
3	Expanded Disinfected Tertiary Reuse in Alpine County									Y

Notes:

	Low
	Moderate
	Moderately High
	High

(1) The degree of challenge is presented on a scale of green to red, as represented by the associated color.

2.6.1.4 Alternative 4: Discharge to West Fork Carson River and Use in NV

This alternative consists of direct surface water discharge of recycled water to the West Fork Carson River. The water, once discharged to the river, could potentially be utilized by downstream users. While the discharge point of this alternative is in CA, end use for this alternative would be in the NV portion of the Carson Watershed (as presented in Table 2.6).

The original concept for this alternative was to take advantage of the proximity of the existing export pipeline and several crossings and/or close alignment of the West Fork Carson River. However, per the Alpine County 1965 Ordinance for Recycled Water (TM1 Section IV.B.3.a), discharge to the West Fork Carson River is prohibited if located upstream of 1/2 mile below the County Highway bridge on the Diamond Valley Road crossing of the West Fork Carson River (TM1 Section IV.B.2). Figure 2.9 shows the location of the referenced bridge crossing with the West Fork Carson River. To be in compliance with the Alpine County 1965 Ordinance for Recycled Water, this alternative considers discharge downstream of this location.

The West Fork Carson River is divided into three sections by the United States Environmental Protection Agency (EPA). Alpine Decree Segment 4 (Woodfords to Stateline) is inclusive of the section where discharge is allowed (per the Alpine County 1965 Ordinance for Recycled Water). Segment 4 of the West Fork Carson River is listed as an impaired water (303(d) List) and key water quality issues include bacteria, metals, murky water, N, and/or P, and salts (TM1 Section IV.B.2.b). TMDLs have not been developed for the West Fork Carson River.

For the West Fork Carson River, an alternative approach to restoring water quality in the river is being implemented. The LRWQCB, in collaboration with stakeholders in the Carson River Watershed, has developed the West Fork Carson Vision Plan (Vision Plan) (LRWQCB, 2023). The Draft Vision Plan notes that while the Clean Water Act requires TMDLs to be developed to address water quality impairments, the EPA Vision recognizes that there may be other plans for restoring water quality and that the most effective approaches should be implemented. In addition, if other approaches lead to attainment of water quality objectives, then TMDLs may not be needed (LRWQCB, 2023). It is not clear at this time how the Vision Plan would influence the permit requirements associated with discharge of effluent to the West Fork Carson River. It is possible that at some level of effluent quality, the discharge may provide an ecological benefit to the river. Additional tracking of the Vision Plan, and coordination with the LRWQCB and Carson River Stakeholders would be needed to further refine the regulatory requirements for a discharge to the West Fork Carson River.

While recognizing that the Vision Plan would influence permit conditions for a discharge to the river, a preliminary quantitative reasonable potential analysis (RPA) provides some context for understanding the potential for water quality-based limits in a discharge permit, which would dictate the need for additional treatment of the effluent. A quantitative RPA is a procedure that uses effluent and receiving water data and numeric nutrient criteria to assess the need for Water Quality-based Effluent Limitations (WQBELs) by characterizing the effect of a discharge on attainment of water quality standards. Information regarding West Fork Carson water quality data and objectives, flow data, and the RPA is in Appendix 2A. The RPA is based on conservative conditions of low river flow conditions and maximum effluent concentrations. The results of the RPA indicated that the discharge would have a reasonable potential to exceed water quality objectives for nutrients, chloride, and TDS, suggesting the need for additional treatment to remove these constituents.

It is possible that a seasonal discharge approach could reduce the extent of treatment required. In this approach, effluent would be stored in Harvey Place Reservoir in the summer months, when West Fork Carson River flows are low, and then effluent would be discharged to the river in the winter months when river flows are relatively higher. While a seasonal discharge to the West Fork Carson River may reduce treatment needs, the timing of the discharge would not coincide with timing of irrigation demands and the dry periods when additional water in the river may be beneficial.

In addition to meeting discharge requirements for the discharge into the West Fork Carson River in CA, the river would need to meet NV water quality standards at the CA/NV state line. The West Fork Carson River is a NDEP classified surface water and the nearest downstream water quality standards would apply. The potential to attain these standards would depend on the discharge location, the flow and water quality of the river, degree of mixing, and contributions of flow and constituents from other sources.

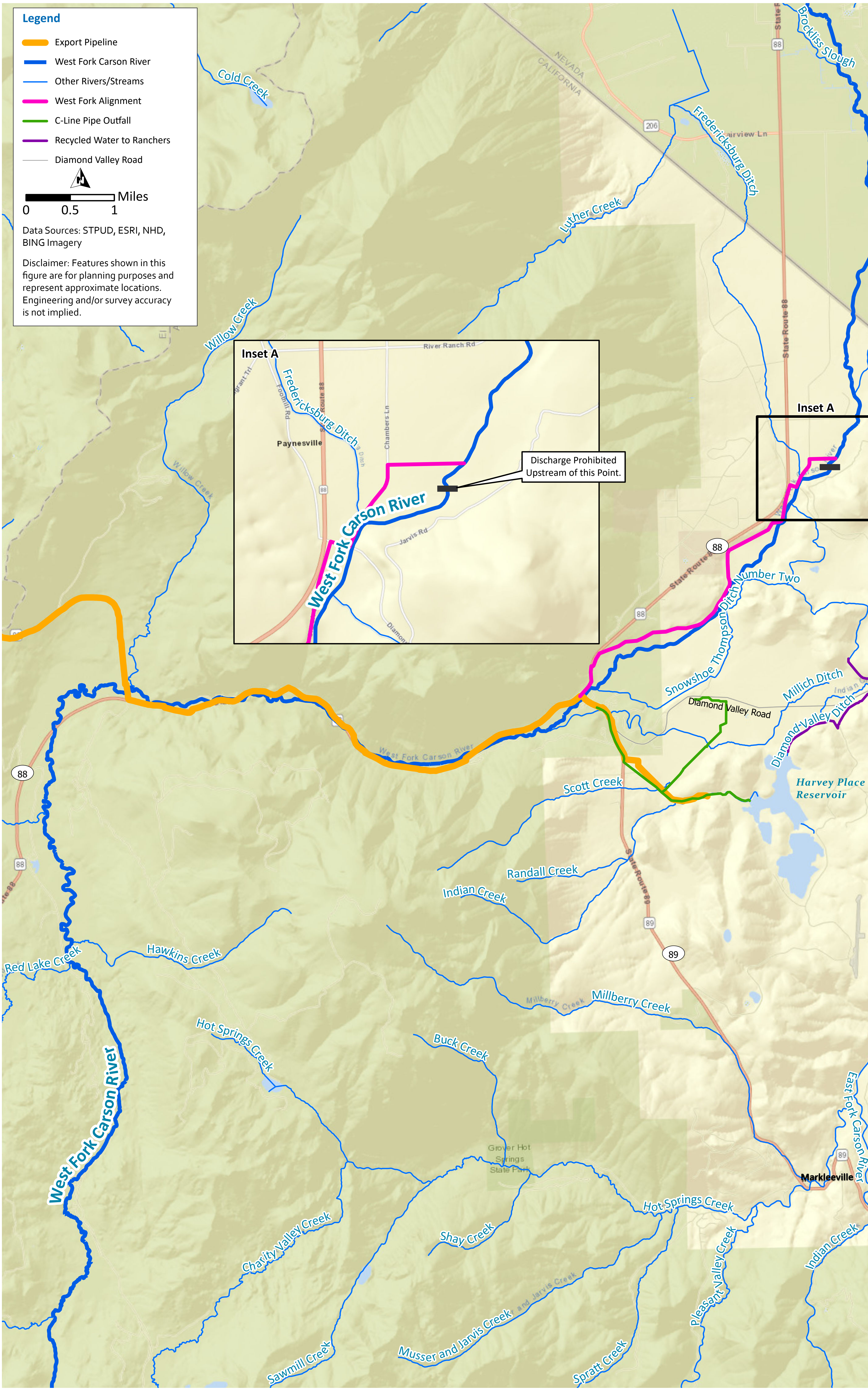


Figure 2.9 Discharge to West Fork Carson River

Key Components

Table 2.18 presents the key components of this alternative.

Table 2.18 Key Components – Alternative 4

Components and Operations	Description
WWTP	Based on the RPA, potential treatment upgrades would be required to remove nutrients, TDS, and chloride to meet water quality objectives of the West Fork Carson River. This would potentially include upgrading to BNR in the existing aeration basins, and the addition of MF, RO, and UV disinfection. While there are several possible approaches to nutrient removal and disinfection, the RO process is the industry standard for removal of TDS and chloride. In addition, the combination of BNR and RO may be required to meet stringent nutrient limits in the receiving water. A potential advanced treatment train is shown in Figure 2.10.
Export System	Existing export line to Harvey Place Reservoir. Additional 4- to 5-mile conveyance pipeline from Harvey Place Reservoir to a new outfall at a selected discharge location on the West Fork Carson River.
Discharge Location	West Fork Carson River.
District Irrigation	If only a portion of the effluent were discharged to the West Fork Carson River, then the District may still use recycled water for irrigation in DVR.
Ranchland Irrigation	If only a portion of the effluent were discharged to the West Fork Carson River, then the District may still use recycled water for irrigation in DVR.
New Recycled Water Uses	Potential use downstream of discharge point by users that have obtained a water right for a specific use. In addition, there may be potential new uses along the new pipeline alignment to the discharge location on the West Fork Carson River.
Recycled Water Distribution	Same as existing, if there is some remaining use of effluent for ranchland irrigation and District irrigation at DVR.
Hydroelectric Plant	Same as existing system.
Biosolids Disposal	Potential increase in biosolids production due to increased suspended solids removal.
ROC Disposal(1)	Assuming that 100 percent of the existing District effluent flow was discharged year-round to the West Fork Carson, the estimated ROC volume is 760,000 gallons per day, which is roughly 76 truck trips per day. The amount of ROC concentrate generated could be reduced by reducing the volume of discharge, altering the timing of discharge, or modifying water quality objectives of the West Fork Carson River. In addition, there are innovative approaches to reducing ROC volume that are being explored at other inland agencies.

Notes:
(1) ROC is a waste stream generated by the RO process. For an inland location, ROC disposal options include trucking to a landfill, thermal concentration and crystallization, evaporation ponds, and deep well injection. Additional details on ROC disposal options will be included in TM3 Alternatives Evaluation, for any alternative that requires an RO process. The assumed approach for the screening analysis is trucking and disposal, as all the other ROC concentrate disposal options have significant environmental, regulatory, and economic challenges.
Abbreviations: MF - microfiltration; ROC - reverse osmosis concentrate; UV - ultraviolet.

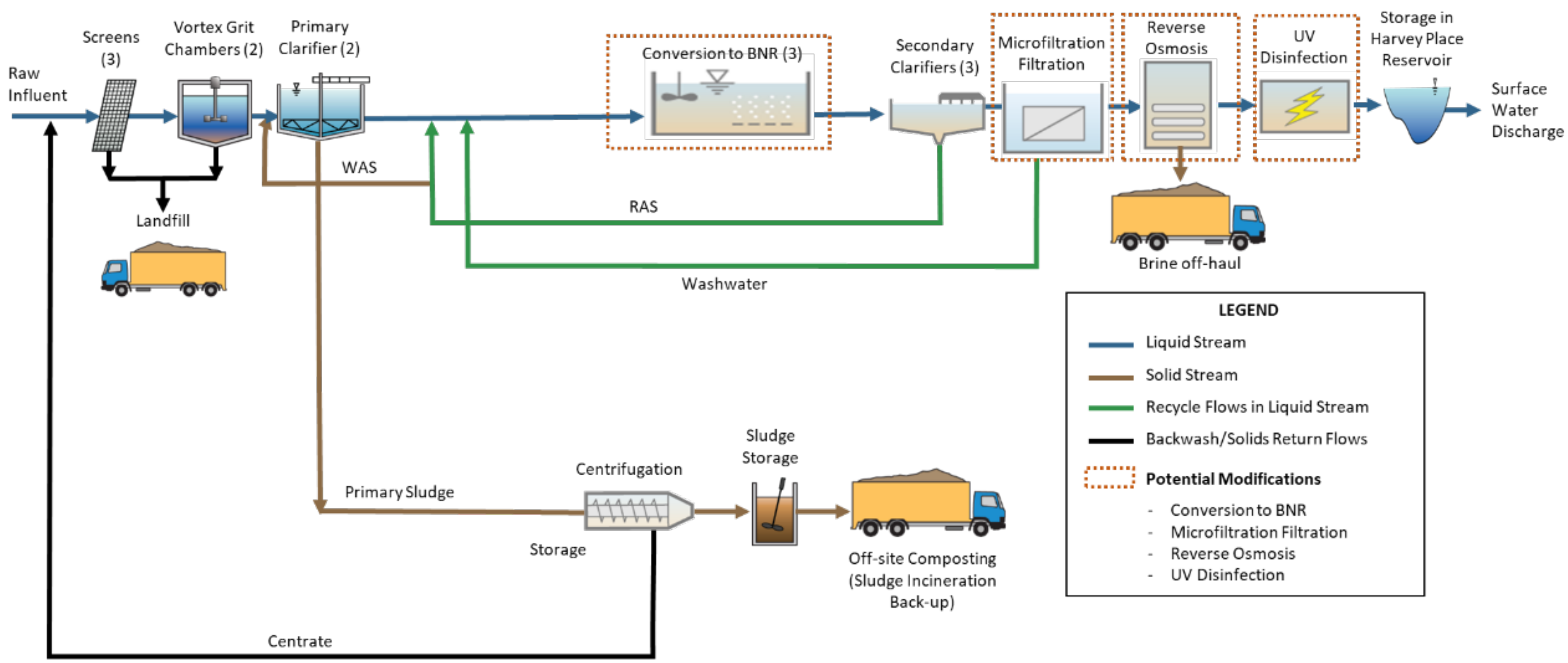


Figure 2.10 Process Train to Achieve Removal of Nutrients, TDS, and Chloride

Alternative Justification

This alternative could potentially reduce or eliminate the existing recycled water system in DVR and Alpine County, depending on the discharge approach. This alternative may present the opportunity for revenue from sale of water rights in the Carson Watershed, although adjudication of this river may make it challenging to sell water rights in downstream segments.

Key Issues and Challenges

The following presents a qualitative discussion on anticipated issues and challenges with this alternative.

- **Technical - Treatment:**
  - Upgrade of the WWTP to meet future discharge permit requirements. While these permit requirements have not been established at this time, it is anticipated that treatment upgrades would likely include BNR, MF, RO treatment, and UV disinfection. The treatment train upgrades add a significant degree of complexity as compared to the existing treatment process.
  - Potential issues with meeting stringent nutrient limits, even with the combination of BNR and RO.
  - ROC production and disposal. Based on estimated ROC production, disposal via landfill is not feasible. Additional discharge approaches and/or treatment of the ROC to reduce the volume would be required.
  - There is limited space on the WWTP site for the anticipated process improvements.
- **Technical - Infrastructure:**
  - Maintenance and investment in aging export system infrastructure would be needed.
  - A new outfall would need to be constructed to discharge to the West Fork Carson River.
  - Approximately 4 to 5 miles of piping to convey water from Harvey Place Reservoir to the new outfall on the West Fork Carson River.
- **Watershed and Regional Legal and Regulatory:**
  - See Section 2.5.2.
- **Alternative-Specific Regulatory, Legal, and Institutional:**
  - Continued involvement in ongoing Alpine County litigation.
  - LRWQCB Basin Plan amendment to allow discharge of effluent in the West Fork Hydrologic Unit.
  - Consistency with the Vision Plan, and associated implementation actions.
  - Environmental review, approvals, and permits would be required for new conveyance infrastructure to the West Fork Carson River.
  - New outfall to the West Fork Carson River will require a new NPDES permit, subject to stringent WQBELs for TDS, chloride, total N, and total P.
  - Permitting and approvals for ROC treatment and disposal. The specific permits and approvals would require identification of a feasible ROC disposal solution.
  - For new recycled water users or uses, the District would need to prepare an ROWD and obtain new WDRs from the LRWQCB.

- **Economics:**
  - Capital and O&M associated with an advanced process to meet quality requirements.
  - Capital and O&M associated with additional treatment of ROC and disposal.
  - Capital and O&M associated with new outfall and conveyance pipeline to West Fork Carson discharge location.
  - Cost of energy and other O&M costs associated with existing export system.
  - Repair and replacement costs associated with export system.
  - Challenges with receiving revenue due to West Fork Carson River adjudication and accounting of water delivery.
- **Environmental and Sustainability:**
  - Additional energy-intensive treatment to reduce the ROC volume for disposal.
  - Significant energy consumption and corresponding greenhouse gas emissions associated with the new treatment systems.
  - Sustained energy consumption and corresponding greenhouse gas emissions associated with the export system.
  - Potential environmental impacts associated with construction of new recycled water infrastructure.
  - Potential impacts to sensitive species during construction of outfall and conveyance infrastructure between Harvey Place Reservoir and the discharge location on the West Fork Carson River.
- **Public:**
  - Concern that CA is not using its water resources and providing them to NV instead.
  - Justification for the investment in treatment and infrastructure improvements.

The screening level analysis of the challenges associated with this alternative are summarized in Table 2.19, where the degree of challenge is presented on a scale of green to red, representing lowest to highest level of challenge, respectively. With the ongoing development of the Vision Plan, there is some uncertainty in the basis for discharge permit conditions. There is also uncertainty as to whether a seasonal discharge approach could be adopted to reduce treatment (TDS and chloride) requirements. Under the assumptions associated with the RPA, a very complex treatment train would be required. This is reflected in the high level of technical challenge, and moderately high level of regulatory and economic challenge presented in Table 2.19. Alternative 4 is selected for further analysis because there is a need to further advance understanding of the most likely permit conditions and if there are options for compliance without implementing an RO process in the treatment plant upgrades (i.e., reducing the degree of technical, economic, and regulatory challenges).

Table 2.19 Alternative 4 – Assessment of Relative Challenge

No.	Alternative Name	Level of Challenge								
		Watershed and Regional Regulatory & Legal	Alternative-Specific Regulatory & Institutional	Technical-Treatment Level	Technical-Infrastructure (Conveyance and Treatment Facility Capacity)	Environmental/ Sustainability	Public Perception	Economic	Recycled Water Capacity Limitation	Included in Evaluation Phase (Y/N)
4	Discharge to West Fork Carson and Use in NV									Y

Notes:

	Low
	Moderate
	Moderately High
	High

(1) The degree of challenge is presented on a scale of green to red, as represented by the associated color.

2.6.1.5 Alternative 5: Groundwater Recharge for Disposal in Alpine County

This alternative would provide groundwater injection as a disposal option into the Carson Valley Groundwater Basin, located in Alpine County. The existing export line over Luther Pass would be utilized and this alternative could potentially eliminate the existing recycled water system in Alpine County. The discharge of effluent, via groundwater injection wells, would occur in CA and would be for the purpose of disposal.

The Carson Valley Groundwater Basin (shown in Figure 2.11) straddles the CA/NV border. The CA portion of the basin is approximately 17 square miles. Per the LRWQCB Basin Plan, the groundwater basin has a municipal supply designated use. There are approximately 30 municipal wells and 180 domestic wells in the CA portion of the basin. Alpine County uses this basin for municipal water supply. Based on the 2022 Alpine County Consumer Confidence Report Water quality parameters for the basin are as follows:

- TDS = 94 mg/L.
- Chloride = 9 mg/L.

There is no known isolated portion of the aquifer that would not ultimately mix with groundwater that is used for drinking water supply. It is therefore anticipated that discharge to the aquifer would be permitted as an IPR project, per CA Title 22 Recycled Water Regulations. Per these regulations, IPR via injection requires MF or ultrafiltration (UF), RO, and UV-AOP. While Title 22 allows for use of an alternative treatment train (i.e., a treatment train without RO), this option has not been pursued by any other agency in CA to date. In addition, even if an alternative treatment train was approved, permitting for an IPR groundwater injection project would require an antidegradation analysis and would potentially lead to the need to reduce TDS and chloride concentrations in the effluent. In this case, both nutrient removal and partial flow RO treatment may be required.

While it is anticipated that this alternative would be permitted as an IPR project, the alternative was conceptualized as effluent disposal because there is not an existing or anticipated future driver for municipal water supply augmentation or offset. Per requirements of the Sustainable Groundwater Management Act (SGMA), the State of California Department of Water Resources prioritized groundwater basins in CA. A number of factors went into determining the priority of the basins (see Appendix 2A for details). Carson Valley Groundwater Basin was categorized as a "low priority" basin based on findings that indicate there is limited threat to the sustainability of the Carson Valley Groundwater Basin. As a result, there are no significant drivers for implementing projects such as IPR which are intended to improve supply reliability and contribute to groundwater sustainability in compromised systems.

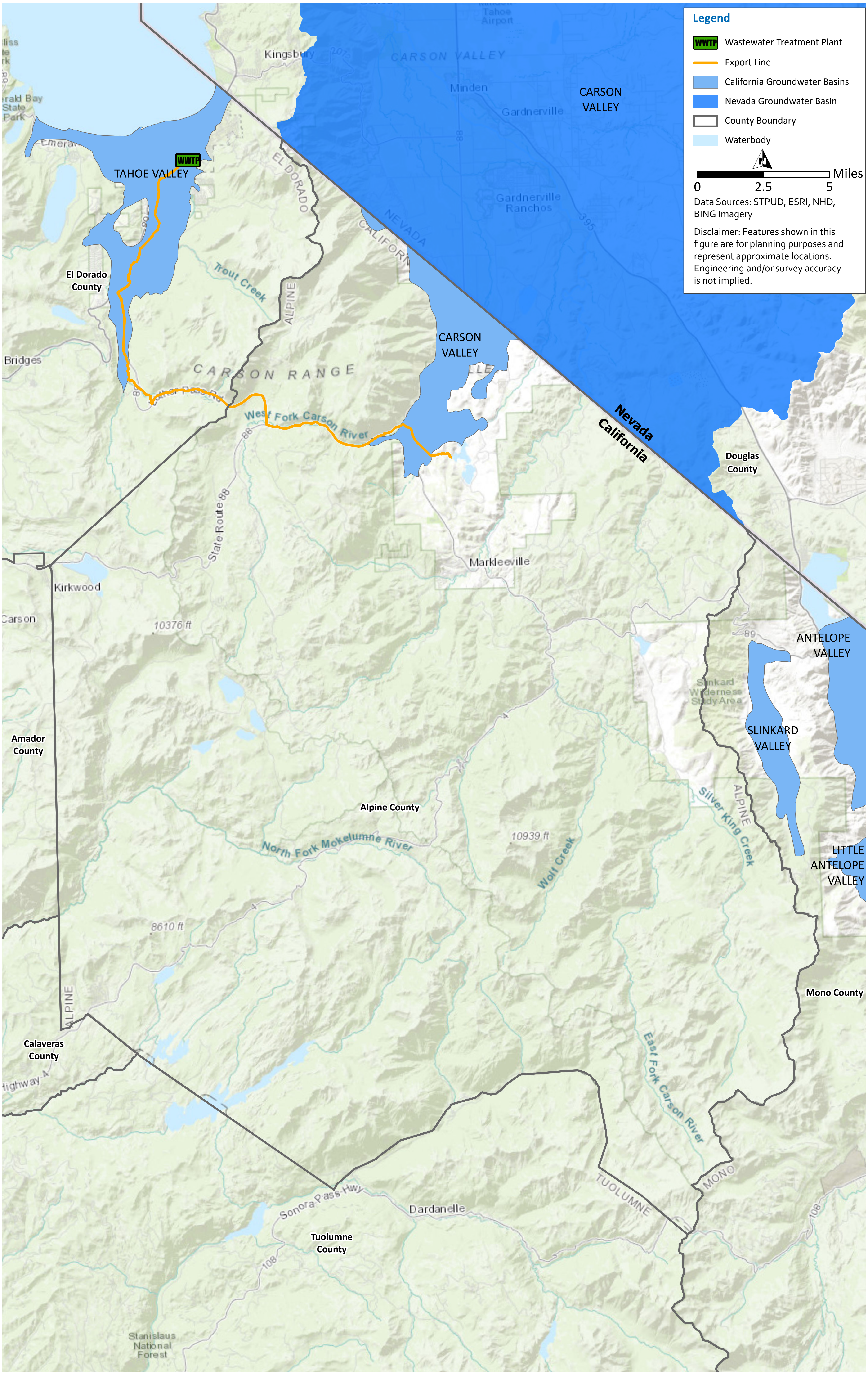


Figure 2.11 Groundwater Recharge for Disposal in Alpine County

Key Components

Table 2.20 presents the key components of this alternative.

Table 2.20 Key Components – Alternative 5

Components and Operations	Description
WWTP	This alternative would most likely be permitted as IPR via groundwater injection. In the absence of approval for an alternative treatment train, the required treatment process includes MF or UF, RO, and UV-AOP. The potential treatment train upgrades are shown in Figure 2.12.
Export System	Existing export line to over Luther Pass, along with new conveyance infrastructure to route the water to new groundwater injection wells.
Discharge Location	Injected into the Carson Valley Groundwater Basin.
District Irrigation	Groundwater injection would likely be configured to dispose of all the effluent, eliminating the need for District irrigation.
Ranchland Irrigation	Groundwater injection would likely be configured to dispose of all the effluent, eliminating the need/supply for ranchland irrigation.
New Recycled Water Uses	No recycled water use - all effluent discharged to the groundwater basin.
Recycled Water Distribution	Groundwater injection wells and infrastructure needed to convey water to injection location.
Hydroelectric Plant	Same as existing system.
Biosolids Disposal	Potential increase in biosolids production due to increased suspended solids removal.
ROC Disposal(1)	Assuming that 100 percent of the existing District effluent flow was injected into the groundwater, the estimated ROC volume is 760,000 gallons per day, which is roughly 76 truck trips per day. Innovative approaches to reduce ROC volume, which are currently being explored at other inland agencies, could be implemented.

Notes:

(1) ROC is a waste stream generated by the RO process. For an inland location, ROC disposal options include trucking to a landfill, thermal concentration and crystallization, evaporation ponds, and deep well injection. Additional details on ROC disposal options will be included in TM3 Alternatives Evaluation, for any alternative that requires an RO process. The assumed approach for the screening analysis is trucking and disposal, as all the other ROC concentrate disposal options have significant environmental, regulatory, and economic challenges.

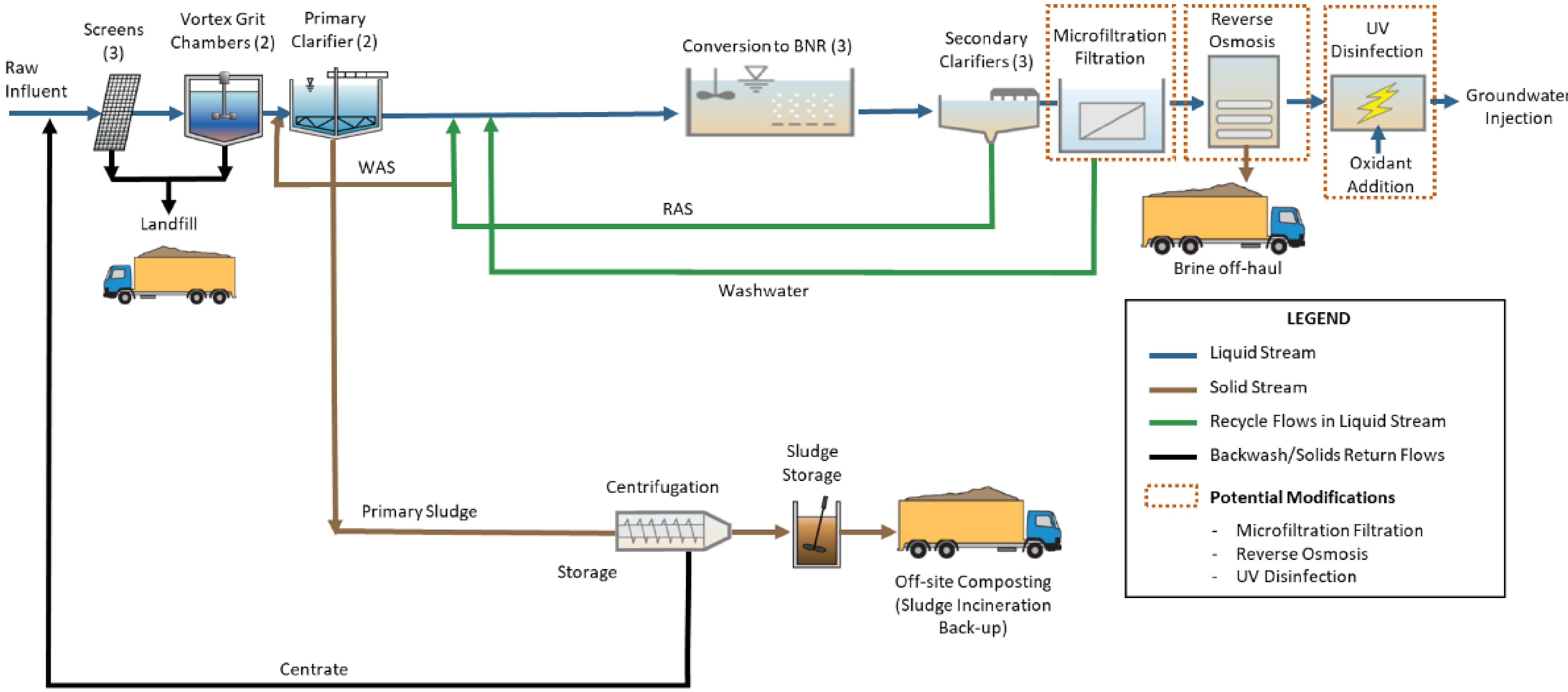


Figure 2.12 Treatment Train for Effluent Disposal

Alternative Justification

Implementation of this alternative would potentially eliminate the need for District irrigation in DVR and eliminate the need to maintain existing Rancher contracts. Since the intent of this alternative is effluent disposal, there is no intended beneficial use of the effluent. However, with implementation of an upgraded treatment process to meet IPR regulations for groundwater injection, this alternative could potentially augment potable supply in Alpine County. However, based on the "low priority" designation (per SGMA) of the Carson Valley Groundwater Basin, there is not an existing or anticipated future driver for additional water supply or an alternative water supply.

Key Issues and Challenges

The following presents a qualitative discussion on anticipated issues and challenges with this alternative.

- **Technical - Treatment:**
  - Upgrade of the WWTP to meet Title 22 Recycled Water Regulations for IPR via groundwater injection. The required treatment train is MF/UF, RO, UV-AOP. The treatment train upgrades add a significant degree of complexity as compared to the existing treatment process.
  - ROC production and disposal. Based on estimated ROC production, disposal via landfill is not feasible. Additional discharge approaches and treatment of the ROC to reduce the volume would be required.
  - There is limited space on the WWTP site for the anticipated process improvements.
- **Technical - Infrastructure:**
  - Maintenance and investment in aging export system infrastructure.
  - Further assessment of groundwater basin capacity required before implementation.
  - Construction of injection wells.
- **Watershed and Regional Legal and Regulatory:**
  - See Section 2.5.1.
- **Alternative-Specific Regulatory, Legal, and Institutional:**
  - Requires regulatory approval for a groundwater project. This involves SWRCB approval of an Engineers Report and new WDRs.
  - It is possible that even with this alternative approach to effluent disposal and high level of treatment, there may be public opposition to injection into the groundwater basin.
  - Permitting and approvals for ROC treatment and disposal. The specific permits and approvals would require identification of a feasible ROC disposal solution.
- **Economics:**
  - Capital and O&M associated with new treatment systems to meet water regulatory requirements for IPR.
  - Capital and O&M associated with additional treatment of ROC and disposal.
  - Capital and O&M associated with conveyance infrastructure and groundwater injection wells.
  - Cost of energy and other O&M costs associated with export system.
  - Repair and replacement costs associated with export system.

  - Cost of new injection well construction.
  - No opportunity for the District to generate revenue because it is a disposal project.
- **Environmental and Sustainability:**
  - Production of ROC requires additional treatment to reduce the volume and disposal.
  - Additional energy-intensive treatment to reduce the ROC volume for disposal.
  - Energy consumption and corresponding greenhouse gas emissions associated with the new treatment systems.
  - Energy consumption and corresponding greenhouse gas emissions associated with the export system.
  - Potential environmental impacts associated with construction of conveyance infrastructure and injection wells.
  - Alternative does not provide a beneficial end use of District effluent.
- **Public:**
  - Public concern that CA is not using its water resources, no beneficial end use is generated.
  - Justification for the investment in treatment and infrastructure improvements, especially given that there is no end beneficial use of the District effluent.

The screening level analysis of the challenges associated with this alternative are summarized in Table 2.21, where the degree of challenge is presented on a scale of green to red, representing lowest to highest level of challenge, respectively. A very complex treatment train would be required to meet anticipated regulatory requirements. In addition, this alternative does not provide a beneficial use of the District effluent. Based on this analysis, Alternative 5 will not be further evaluated in this planning process.

Table 2.21 Alternative 5 – Assessment of Relative Challenge

No.	Alternative Name	Level of Challenge								
		Watershed and Regional Regulatory & Legal	Alternative-Specific Regulatory & Institutional	Technical-Treatment Level	Technical-Infrastructure (Conveyance and Treatment Facility Capacity)	Environmental/ Sustainability	Public Perception	Economic	Recycled Water Capacity Limitation	Included in Evaluation Phase (Y/N)
5	Groundwater Recharge for Disposal in Alpine County									N

Notes:

	Low
	Moderate
	Moderately High
	High

(1) The degree of challenge is presented on a scale of green to red, as represented by the associated color.

2.6.2 NV Portion of Carson Watershed Alternatives

2.6.2.1 Alternatives 6A and 6B: Expanded Class A or B Reuse in NV

This alternative involves export of District effluent for beneficial reuse in the NV portion of the Carson River Watershed. This alternative would include the existing export infrastructure over Luther Pass, storage in Harvey Place Reservoir, and conveyance into NV for recycled water use (as presented in Table 2.6).

There are two main options for conveyance from Harvey Place Reservoir (depicted in Figure 2.13).

- **Alternative 6A (Indian Creek):** There is existing infrastructure that allows release of water from Harvey Place Reservoir to Indian Creek. This existing infrastructure would be used to discharge effluent into Indian Creek. Indian Creek flows across the CA/NV border and ultimately joins the East Fork Carson River. The discharge location for this alternative is in CA, with end use of the water in NV.
- **Alternative 6B (Pipeline Conveyance):** This option involves a new pipeline to convey stored water from Harvey Place Reservoir to Mud Lake, although the actual routing is yet to be determined. Figure 2.13 also shows a variety of potential pipeline segments that could be utilized for Alternative 6B. "Pipeline A & B" goes from Indian Creek Reservoir, then heads north along Diamond Valley Road. "Pipeline A" could be used to go from "Pipeline A & B" to Mud Lake, along Mud Lake Road. "Pipeline B" could be used to go from "Pipeline A & B" to Mud Lake, along Long Valley Road. "Pipeline B (Roadway)" could extend from "Pipeline B" to Mud Lake, along Indian Creek Ranch Road, while "Pipeline B (to Stream)" could extend from "Pipeline B" to Mud Lake, via the existing stream between Indian Creek and Mud Lake. Once the water is conveyed to Mud Lake, it would then be diverted from Mud Lake for use. Both the discharge and end use locations for this alternative are in NV.

An additional option would be to store District effluent in the Indian Creek Reservoir, which would provide a storage capacity benefit to the District. The stored water in Indian Creek Reservoir could then be conveyed to Indian Creek using existing infrastructure between these reservoirs. The treatment needs for this option are influenced by the discharge location, conveyance in Indian Creek, and recycled water requirements in NV, as described below:

- **Storage in a recreational impoundment:** To discharge/store recycled water in Indian Creek Reservoir, the recycled water would need to meet Title 22 regulations for unrestricted reuse (i.e., storage in recreational impoundment).
- **Discharge to Indian Creek Reservoir and Indian Creek:** The effluent would need to meet all water quality based effluent limits for Indian Creek Reservoir and Indian Creek and be in compliance with Indian Creek Reservoir TMDL limitations.
- **Recycled water use in NV:** The recycled water would need to meet Class A or Class B standards, depending on the specific end uses.

This option effectively combines Alternatives 3 and 6A and will be further explored in TM3 Alternatives Evaluation.

Potential demands in the Carson Valley include cattle ranching and other animal production as well as agricultural irrigation. There are some scattered demands for urban irrigation, such as golf courses and parks. Customers in the Carson Valley currently use surface water from the East Fork Carson River and then shift to groundwater wells when surface water is less available (seasonally or based on hydrologic condition). The use of recycled water would offset use of surface water or groundwater supplies. Figure 2.14 shows land use and potential recycled water demands in the Carson Valley. Based on discussions with NDEP, there is demand for additional water in the Carson Valley, and use of this water would require a user to establish a water right contract.

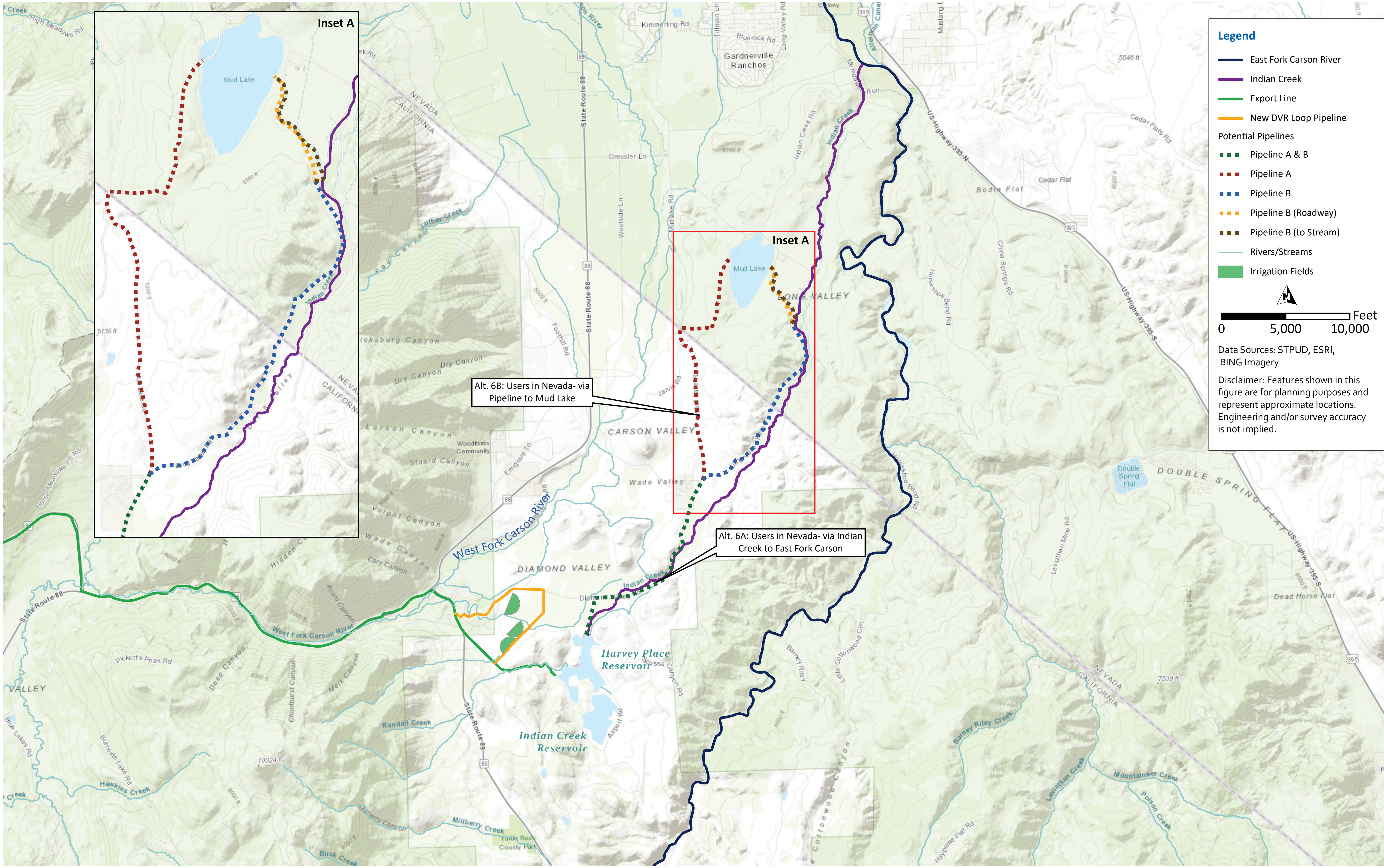


Figure 2.13 Potential Conveyance Routes for Recycled Water in Carson Valley

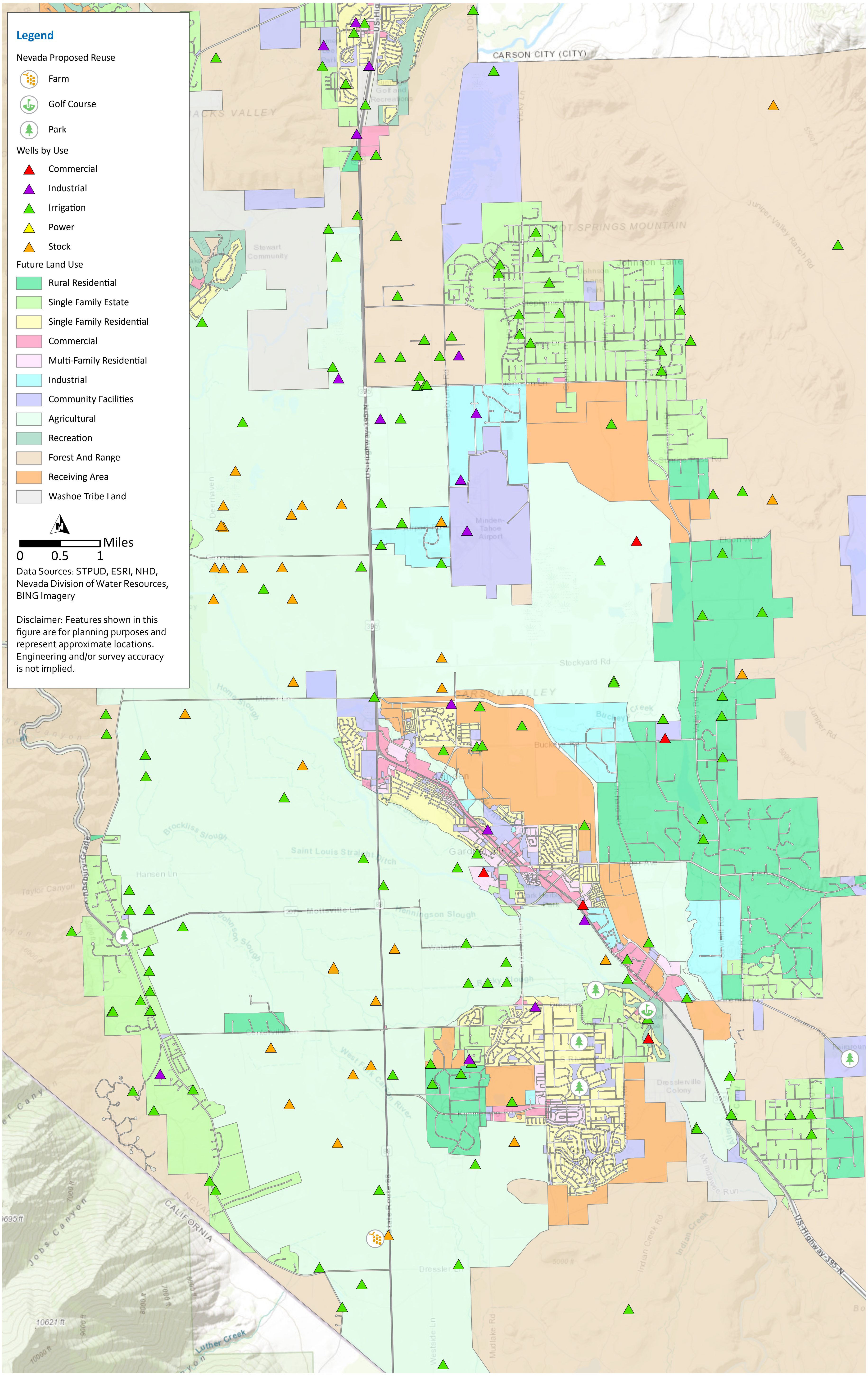


Figure 2.14 Land Use and Potential Recycled Water Demands in Carson Valley

Key Components – 6A

For this alternative, two sets of water quality objectives would apply. The discharge to Indian Creek (in CA) would be permitted based on the water quality objectives of Indian Creek. At the CA/NV state line, the NV water quality objectives for Indian Creek would need to be met.

A high-level quantitative RPA was performed to assess the potential for effluent discharge to Indian Creek. Information regarding Indian Creek water quality and flow data and the RPA is in Appendix 2A. Very limited flow data for Indian Creek was available, with a period of record from 1987 to 1991. Two or three water quality data points were available from 1983 to 1986, all prior to the completion of Harvey Place Reservoir. Results of the RPA suggest that additional removal of TDS would not likely be required, but additional removal of chloride may be required. Additional removal of nutrients would likely be required as well.

In addition to meeting requirements for discharge into Indian Creek in CA, the creek would need to meet NV water quality standards at the CA/NV state line. NV water quality objectives for Indian Creek (applicable at the CA/NV state line) are not specified explicitly because Indian Creek is not a classified waterway in NV. In this case, the tributary rule applies, where the water quality objectives for the closest classified downstream waterways are applied. The East Fork Carson River is the closest classified downstream waterway and the specific water quality objectives are for the segment designated East Fork Carson River at Muller Lane. The potential to attain these standards would depend on the discharge location, and the flow and water quality of the creek, degree of mixing, and contributions of flow and constituents from other sources. For the purposes of this TM, it is assumed that treatment requirements would be governed by the CA water quality objectives for Indian Creek. However, additional analysis would need to be conducted to assess attainment of the applicable NV water quality objectives at the state line.

Table 2.22 presents the key components of this alternative.

Table 2.22 Key Components – Alternative 6A

Components and Operations	Description
WWTP	The limitations of the RPA for Indian Creek provide a greater degree of uncertainty with respect to the required treatment upgrades. For this analysis it is assumed that nutrient removal would be required, and that would be achieved through the addition of BNR in the existing aeration basins. It is also assumed that a change in the disinfection process from chlorination to UV may be sufficient to reduce chloride concentrations to meet standards. The potential treatment train upgrades are shown in Figure 2.15.
Export System	Same as existing system (Harvey Place Reservoir), utilizing existing piping connecting the reservoir to Indian Creek.
Discharge Location	Indian Creek – Downstream of Harvey Place Reservoir.
District Irrigation(1)	None – All effluent discharged to Indian Creek.
Ranchland Irrigation(1)	None – All effluent discharged in Indian Creek.
New Recycled Water Uses	New uses of recycled water in the Carson Watershed.

Components and Operations	Description
Recycled Water Distribution	It is assumed that existing diversions (ditches) would be sufficient to convey recycled water to users. It is possible that some additional infrastructure may be needed, depending on end use locations.
Hydroelectric Plant	Same as existing system.
Biosolids Disposal	Same as existing system.

Notes:

(1) If there is sufficient demand, and capacity for effluent in Indian Creek, then this alternative may be configured to eliminate District operations and ranchland irrigation in Alpine County. Alternatively, these uses of recycled water could be maintained to some degree, and remaining water could be discharged to Indian Creek for beneficial use in NV.

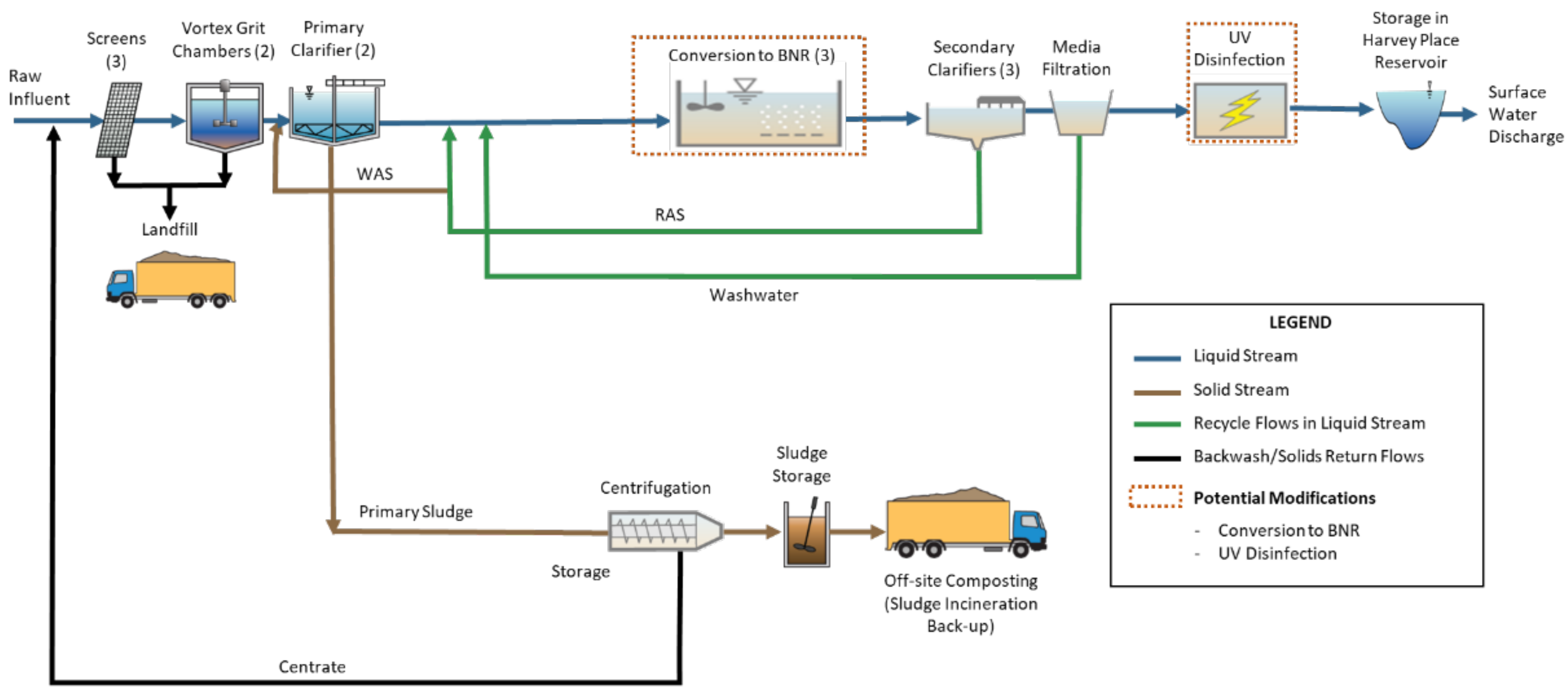


Figure 2.15 Process Train to Achieve Nutrient Removal and Reduce TDS

Alternative Justification – 6A

With sufficient recycled water demand, it is possible that this alternative could eliminate District irrigation and ranchland irrigation in Alpine County. In addition, this alternative can be combined with any other alternative that delivers disinfected secondary-23 or higher quality recycled water to land in Alpine County. A market study to determine NV users, their needs, and location would need to be done to estimate potential demand. It is possible that water rights agreements may provide a source of revenue for the District. An additional benefit of this alternative includes augmenting water supply for the Carson Watershed, which may provide drought resiliency for NV end users.

Key Issues and Challenges – 6A

The following presents a qualitative discussion on anticipated issues and challenges with this alternative.

- **Technical - Treatment:**
  - Upgrade of the WWTP to meet permit requirements for a discharge to Indian Creek. While these permit requirements have not been established at this time, it is anticipated that treatment upgrades would likely include BNR and UV disinfection. This increases the level of complexity of the treatment process in comparison to the existing system.
  - There is limited space on the WWTP site for the anticipated process improvements.
- **Technical - Infrastructure:**
  - Maintenance and investment in aging export system infrastructure.
- **Watershed and Regional Legal and Regulatory:**
  - See Section 2.5.2.
- **Alternative-Specific Regulatory, Legal, and Institutional:**
  - Continued involvement in ongoing Alpine County litigation.
  - New discharge to Indian Creek will require a new NPDES permit from the LRWQCB. The permit may potentially include WQBELs for chloride and nutrients.
  - Attainment of the most immediate downstream water quality objectives for the East Fork Carson River, at the state line (East Fork Carson at Muller Lane).
  - Permitting associated with construction of treatment plant upgrades.
  - Development of water rights agreements for users in NV.
- **Economics:**
  - Capital and O&M associated with new treatment systems to meet water quality requirements.
  - Cost of energy and other O&M costs associated with export system.
  - Repair and replacement costs associated with export system.
  - Cost and O&M associated with a new recycled water distribution system.
  - Uncertainty on the revenue potential from water rights.
- **Environmental and Sustainability:**
  - Energy consumption and corresponding greenhouse gas emissions associated with the new treatment processes.
  - Energy consumption and corresponding greenhouse gas emissions associated with the export system.

- **Public:**
  - Public concern that water resources/supply augmentation benefits are being provided to NV rather than CA.

The screening level analysis of the challenges associated with this alternative are summarized in Table 2.23, where the degree of challenge is presented on a scale of green to red, representing lowest to highest level of challenge, respectively. There is a moderately high level of technical complexity with the addition of BNR and UV to the treatment train, and regulatory compliance with two regulating entities. The other challenges are moderate or low. Based on this analysis, Alternative 6A will be further evaluated in the planning process.

Table 2.23 Alternative 6A – Assessment of Relative Challenge

No.	Alternative Name	Level of Challenge								
		Watershed and Regional Regulatory & Legal	Alternative-Specific Regulatory & Institutional	Technical-Treatment Level	Technical-Infrastructure (Conveyance and Treatment Facility Capacity)	Environmental/ Sustainability	Public Perception	Economic	Recycled Water Capacity Limitation	Included in Evaluation Phase (Y/N)
6A	Expanded Class A or B Reuse in NV (Indian Creek)									Y

Notes:

	Low
	Moderate
	Moderately High
	High

(1) The degree of challenge is presented on a scale of green to red, as represented by the associated color.

Key Components – 6B

This alternative would involve a new conveyance pipeline from Harvey Place Reservoir, across state line, with direct discharge to Mud Lake. The discharge into Mud Lake would be permitted by NDEP. Mud Lake is not a classified surface water; as such, there are no existing water quality objectives. Mud Lake has an outlet that flows in the direction of existing ditches, which are also not classified. These ditches flow in the direction of the East Fork Carson, but it is uncertain if the tributary rule would apply. If there are no applicable water quality objectives via the tributary rule, then the NDEP would need to follow an established process for developing discharge permits to waterways that are not classified. Future coordination with NDEP would be required to determine if there are applicable downstream objectives or to advance the process of establishing permit limits for an unclassified waterbody.

It is reasonable to draw a parallel between discharge to Mud Lake and discharge to reservoirs used by DCLTSA (for recycled water storage). The most recent DCLTSA permit required upgrades to the facility for nutrient removal. For the purpose of this analysis, it is assumed that a discharge to Mud Lake would require nutrient removal.

In addition, the discharge would need to comply with NV recycled water regulations for non-potable reuse. Depending on the end uses of recycled water, up to Class A requirements may need to be met. Additional analysis of the District effluent and comparison with recycled water requirements would need to be conducted to identify any additional treatment upgrades.

Table 2.24 presents the key components of this alternative.

Table 2.24 Key Components – Alternative 6B

Components and Operations	Description
WWTP	Potential treatment upgrades include adding BNR in the existing aeration basins to achieve nutrient removal. The potential treatment train upgrades are shown in Figure 2.16. Depending on the end uses identified, treatment upgrades may be required to meet NDEP Class A or Class B recycled water requirements. Additional treatment upgrades to meet specific NV recycled water regulations are not included in Figure 2.16.
Export System	Same as existing system to Harvey Place Reservoir. Approximately 6 miles of discharge piping would be constructed to convey water to Mud Lake.
Discharge Location	Carson Valley, NV.
District Irrigation(1)	None – All effluent discharged to Mud Lake.
Ranchland Irrigation(1)	None – All effluent discharged to Mud Lake.
New Recycled Water Uses	Water use in the Carson Watershed, in NV.
Recycled Water Distribution	Assumes that existing diversions and ditches from Mud Lake would be used.

Components and Operations	Description
Hydroelectric Plant	Same as existing system.
Biosolids Disposal	Same as existing system.

Notes:
(1) If there is sufficient demand, and capacity for effluent in Mud Lake, then this alternative may be configured to eliminate District operations and ranchland irrigation in Alpine County. Alternatively, these uses of recycled water could be maintained to some degree, and remaining water could be discharged to Mud Lake for beneficial use in NV.

Alternative Justification – 6B

With sufficient recycled water demand, it is possible that this alternative could eliminate District irrigation and ranchland irrigation in Alpine County. In addition, this alternative can be combined with any other alternative that delivers disinfected secondary-23 or higher quality recycled water to land in Alpine County. A market study to determine NV users, their needs, and locations would need to be done to estimate potential demand. It is possible that water rights agreements may provide a source of revenue for the District. An additional benefit of this alternative includes augmenting water supply for the Carson Watershed, which may provide drought resiliency for NV end users.

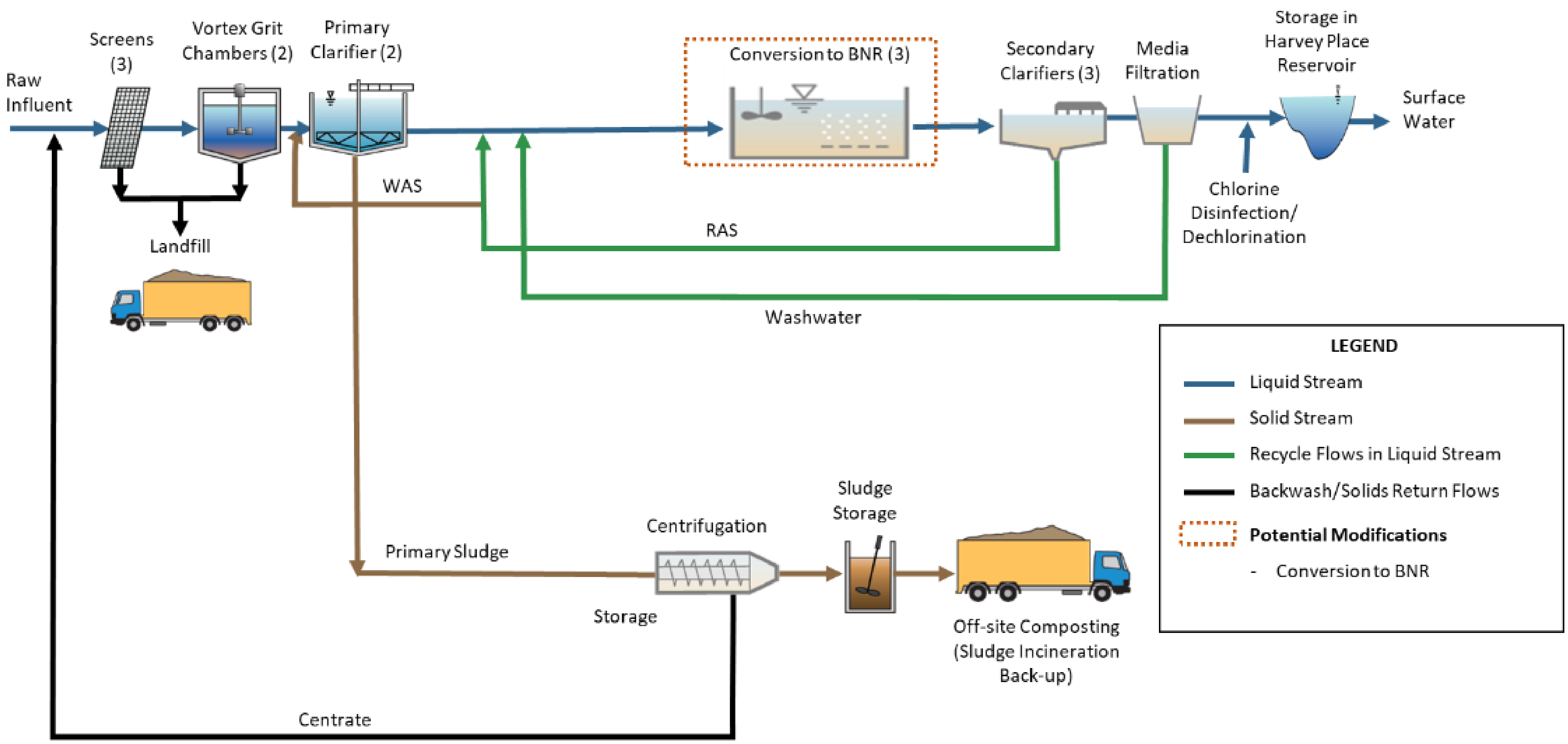


Figure 2.16 Process Train to Achieve Nutrient Removal

Key Issues and Challenges – 6B

The following presents a qualitative discussion on anticipated issues and challenges with this alternative.

- **Technical - Treatment:**
  - Upgrade of the WWTP to meet permit requirements to discharge to Mud Lake, and potentially to meet NDEP Class A/B recycled water standards. As this may include the addition of BNR, there is an increased level of complexity in the treatment process as compared to the existing system.
- **Technical - Infrastructure:**
  - Maintenance and investment in aging export system infrastructure.
  - Construction and maintenance of a new 6-mile recycled water transmission pipeline from Harvey Place Reservoir to Mud Lake.
- **Watershed and Regional Legal and Regulatory:**
  - See Section 2.5.3.
- **Alternative-Specific Regulatory, Legal, and Institutional:**
  - New discharge to Mud Lake will require a new discharge permit from the NDEP. The permit may potentially include limits for nutrients and other constituents.
  - Permitting associated with construction of treatment plant upgrades.
  - Permitting associated with construction of a 6-mile transmission pipeline to convey water to Mud Lake.
  - Development of water rights agreements for users in NV.
- **Economics:**
  - Capital and O&M associated with new treatment systems to meet water quality requirements.
  - Capital and O&M associated with new conveyance pipeline to Mud Lake.
  - Cost of energy and other O&M costs associated with export system.
  - Repair and replacement costs associated with export system.
  - Uncertainty on the revenue potential from water rights.
- **Environmental and Sustainability:**
  - Energy consumption and corresponding greenhouse gas emissions associated with the export system.
  - Potential environmental impacts associated with construction of new conveyance infrastructure.
  - Energy consumption and corresponding greenhouse gas emissions associated with operation of new conveyance infrastructure.
  - Permitting issues associated with constructing a 6-mile transmission pipeline.
- **Public:**
  - Public concern that water resources/supply augmentation benefits are being provided to NV rather than CA.

The screening level analysis of the challenges associated with this alternative are summarized in Table 2.25, where the degree of challenge is presented on a scale of green to red, representing lowest to highest level of challenge, respectively. There is a moderately high level of technical complexity with the addition of BNR to the treatment train, and some uncertainty with regulatory compliance. The other challenges are moderate or low. Based on this analysis, Alternative 6B will be further evaluated in this planning process.

Table 2.25 Alternative 6B – Assessment of Relative Challenge

No.	Alternative Name	Level of Challenge								
		Watershed and Regional Regulatory & Legal	Alternative-Specific Regulatory & Institutional	Technical-Treatment Level	Technical-Infrastructure (Conveyance and Treatment Facility Capacity)	Environmental/ Sustainability	Public Perception	Economic	Recycled Water Capacity Limitation	Included in Evaluation Phase (Y/N)
6B	Expanded Class A or B Reuse in NV (Mud Lake)									Y

Notes:

	Low
	Moderate
	Moderately High
	High

(1) The degree of challenge is presented on a scale of green to red, as represented by the associated color.

2.6.2.2 Alternatives 7A and 7B: Conveyance to DCLTSA With Reuse in NV

This alternative would involve conveying either treated or partially treated/raw water from the District's WWTP to DCLTSA. DCLTSA has an existing export pipeline, which conveys recycled water from DCLTSA, over Kingsbury Grade, and into Carson Valley. Recycled water from DCLTSA is stored in a reservoir and used for alfalfa and pastureland/livestock irrigation. For both alternatives, conveyance of treated and conveyance raw wastewater to DCLTSA, the wastewater would be routed to DCLTSA facilities in NV, and end use would be in the NV portion of the Carson Watershed.

This alternative could be implemented in one of two ways:

- **Alternative 7A (Treated Effluent to DCLTSA):** This option involves utilizing the District's existing treatment process and then sending treated effluent to DCLTSA, downstream of DCLTSA's treatment facility, and into DCLTSA's effluent pipeline.
- **Alternative 7B (Raw or Partially Treated Effluent to DCLTSA):** This option would send either raw or partially treated effluent from the District plant to the DCLTSA treatment facility, utilizing DCLTSA's treatment facility and effluent pipeline.

Potential demands in the Carson Valley include existing livestock and fodder crop irrigation (currently provided by DCLTSA) and possible new agricultural or industrial users. Figure 2.17 shows the current DCLTSA infrastructure and storage, while Figure 2.18 shows current (DCLTSA) and potential future land use sites and recycled water customers in the Carson Valley. Snowmaking on the NV side for Heavenly Lake Tahoe ski resort was considered as a potential end use. However, further investigation indicated that the storage of water used for snowmaking was primarily located on the CA side of the resort, and there is not existing infrastructure that would effectively limit the use of recycled water to the NV portion of the resort. As such, using recycled water from DCLTSA for snowmaking at Heavenly Lake Tahoe ski resort would trigger the legal and regulatory limitations associated with alternatives with recycled water end use in the Lake Tahoe Watershed. Snowmaking is not considered a feasible end use for Alternatives 7A or 7B.

For Alternative 7A, the treatment of District wastewater would be provided at the District's existing WWTP, and the treated effluent would be combined with DCLTSA effluent in their export infrastructure. The concept for Alternative 7A was discussed with NDEP. The District would need a permit from NDEP to add effluent to the DCLTSA export system. The permit would include, at a minimum, effluent limits that are the same as those required for the DCLTSA facility. DCLTSA recently upgraded their facility to include nutrient removal in anticipation of future changes in their permit requirements. The District would need to implement nutrient removal to provide effluent with similar quality. DCLTSA effluent meets the requirements for Class B recycled water. Additional treatment upgrades at the District's WWTP may be required to meet Class B standards.

In addition, DCLTSA indicated that the pressurized section of their export pipeline, from the treatment facility to the top of Kingsbury Grade, has limited capacity. Further analysis of the best approach to connecting to the DCLTSA export line and the potential need to increase the capacity of the pressurized section of the export line would need to be performed.

For Alternative 7B, treatment of District wastewater would be provided at the DCLTSA's WWTP followed by conveyance in their export infrastructure. Based on discussions with DCLTSA, their

WWTP currently has a rated capacity of 3.75 mgd and a maximum daily flow capacity of 4.2 mgd. Existing District flows already exceed this capacity, and there is limited space for expanding the treatment facility. For this reason, Alternative 7B is not further considered in this analysis, with the key issue being the lack of available capacity and limitations on capacity expansion. An overall assessment of the relative degree of complexity for Alternative 7B is included in Table 2.43.

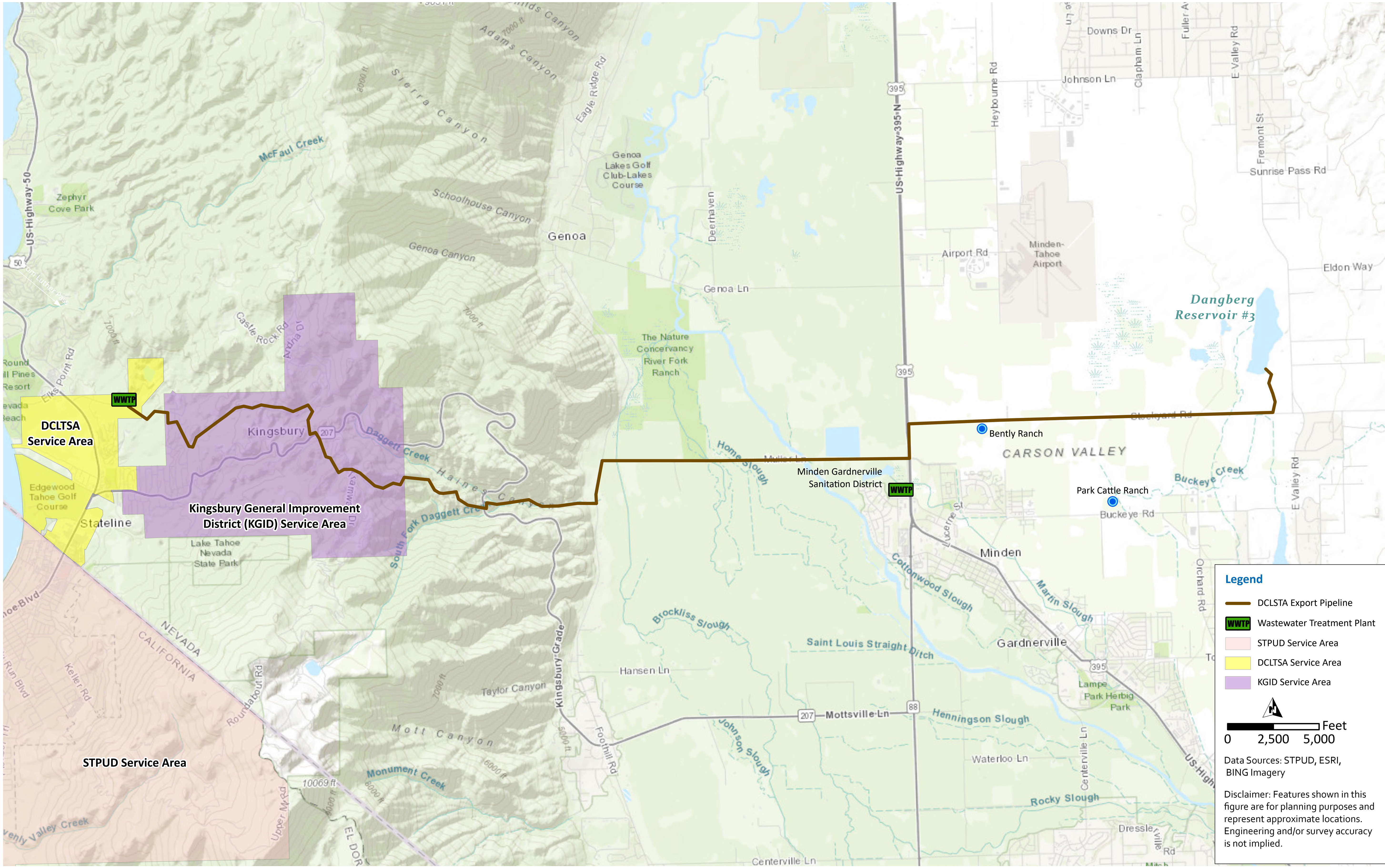


Figure 2.17 DCLTSA System

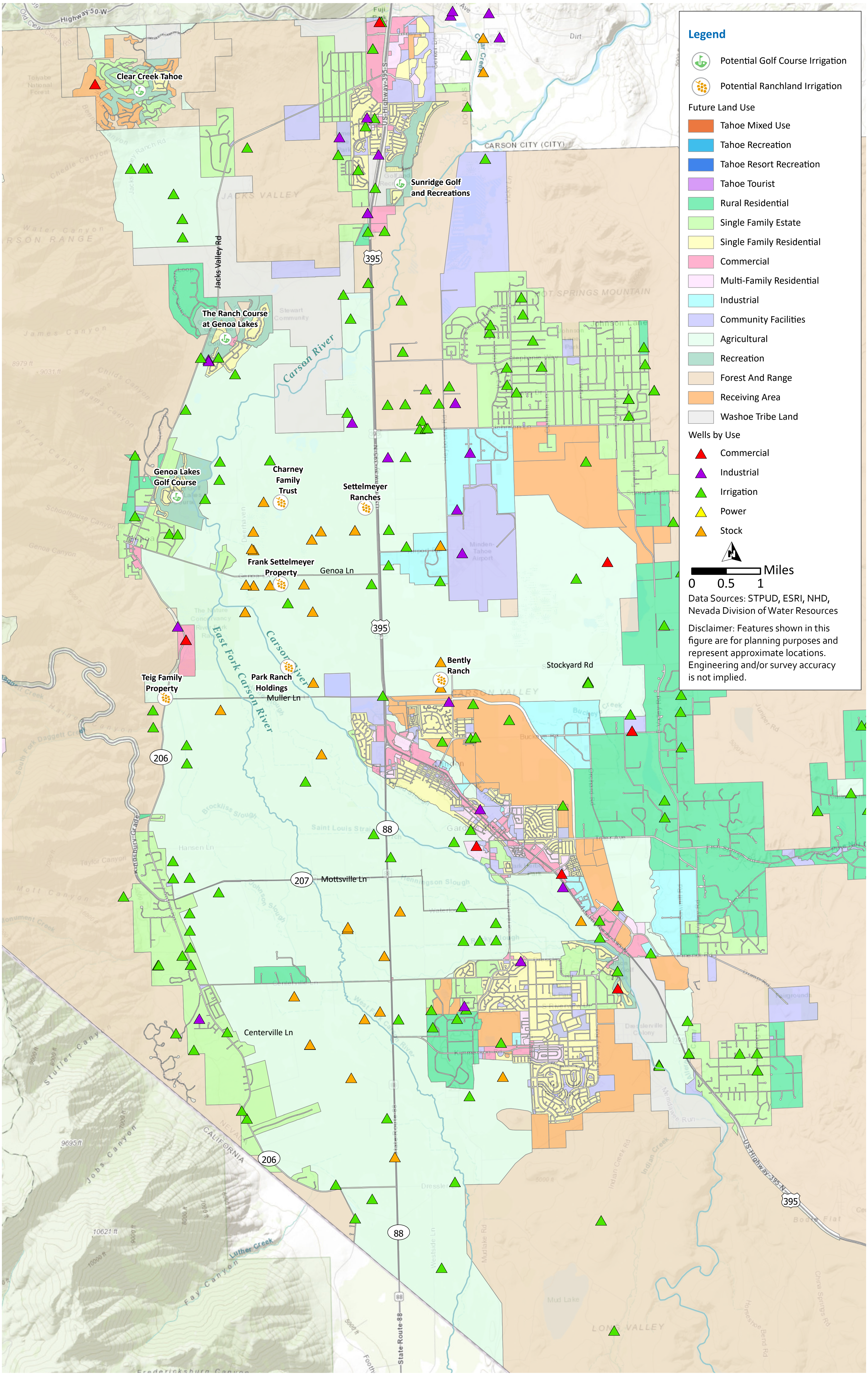


Figure 2.18 Land Use and Wells in Northern Carson Valley

Key Components

Table 2.26 presents the key components of Alternative 7A.

Table 2.26 Key Components – Alternative 7A

Components and Operations	Description
WWTP	Potential treatment upgrades include adding BNR in the existing aeration basins to achieve nutrient removal. The potential treatment train upgrades are shown in Figure 2.20. Treatment upgrades may be required to meet NDEP Class B recycled water requirements. Additional treatment upgrades to meet specific NV recycled water regulations are not included in Figure 2.20.
Export System	The District's existing export pipeline to Harvey Place Reservoir would not be used. New conveyance piping from District facilities to DCLTSA would be required. Approximately 6 miles of 24 to 30-inch force main would need to be constructed. Figure 2.19 shows a potential conveyance route for recycled water from the District to DCLTSA.
Discharge Location	DCLTSA WWTP.
District Irrigation	None – All of the effluent would be conveyed to DCLTSA.
Ranchland Irrigation	None – All of the effluent would be conveyed to DCLTSA.
New Recycled Water Uses	Livestock and fodder crop irrigation and possible new agricultural or industrial users in the Carson Valley.
Recycled Water Distribution	Use of DCLTSA's existing transmission and distribution piping.
Hydroelectric Plant	None – All of the effluent would be conveyed to DCLTSA and the existing export line with the hydroelectric plant would not be used.
Biosolids Disposal	Same as existing system.

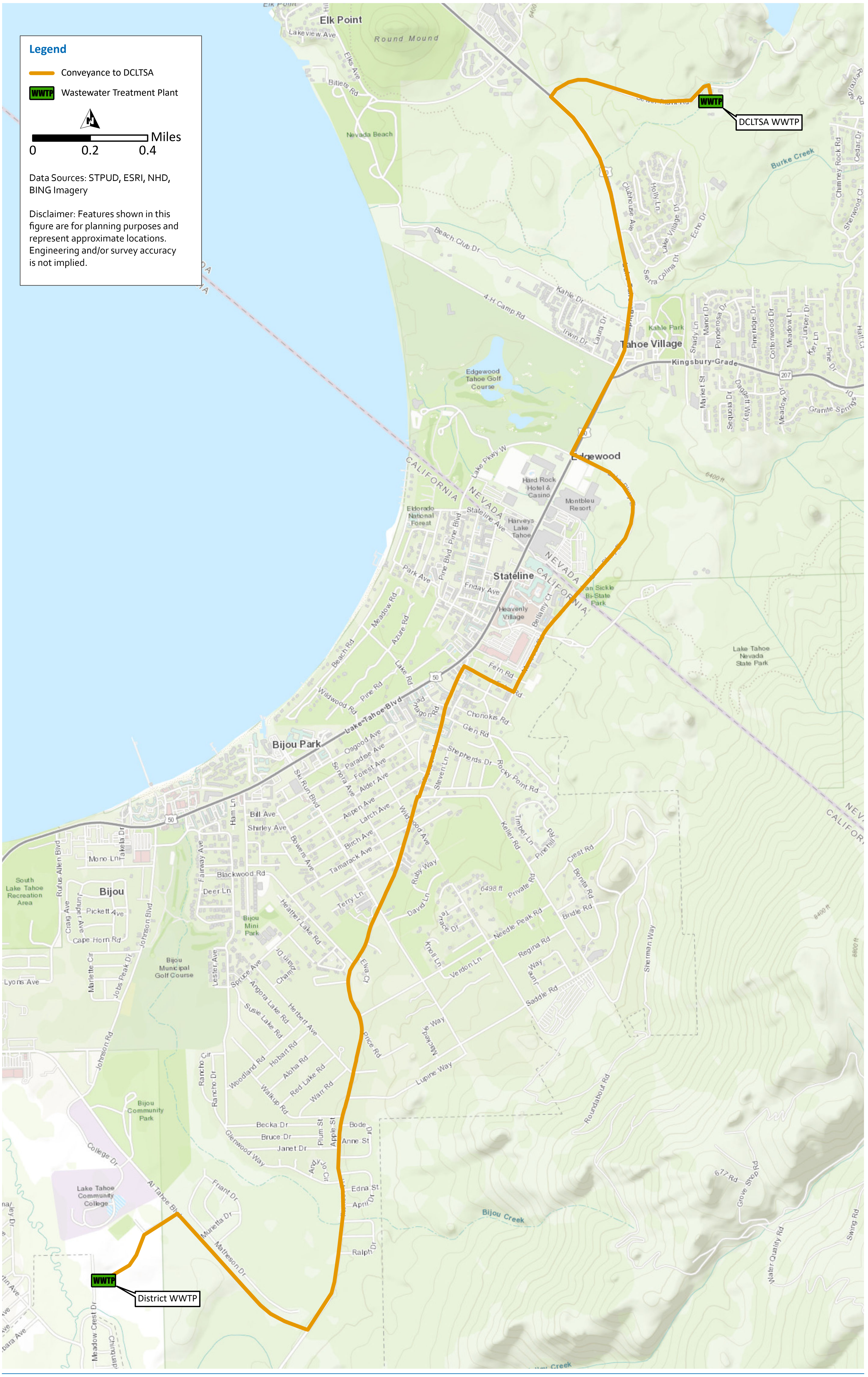


Figure 2.19 Potential Conveyance Route for Recycled Water to DCLTSA

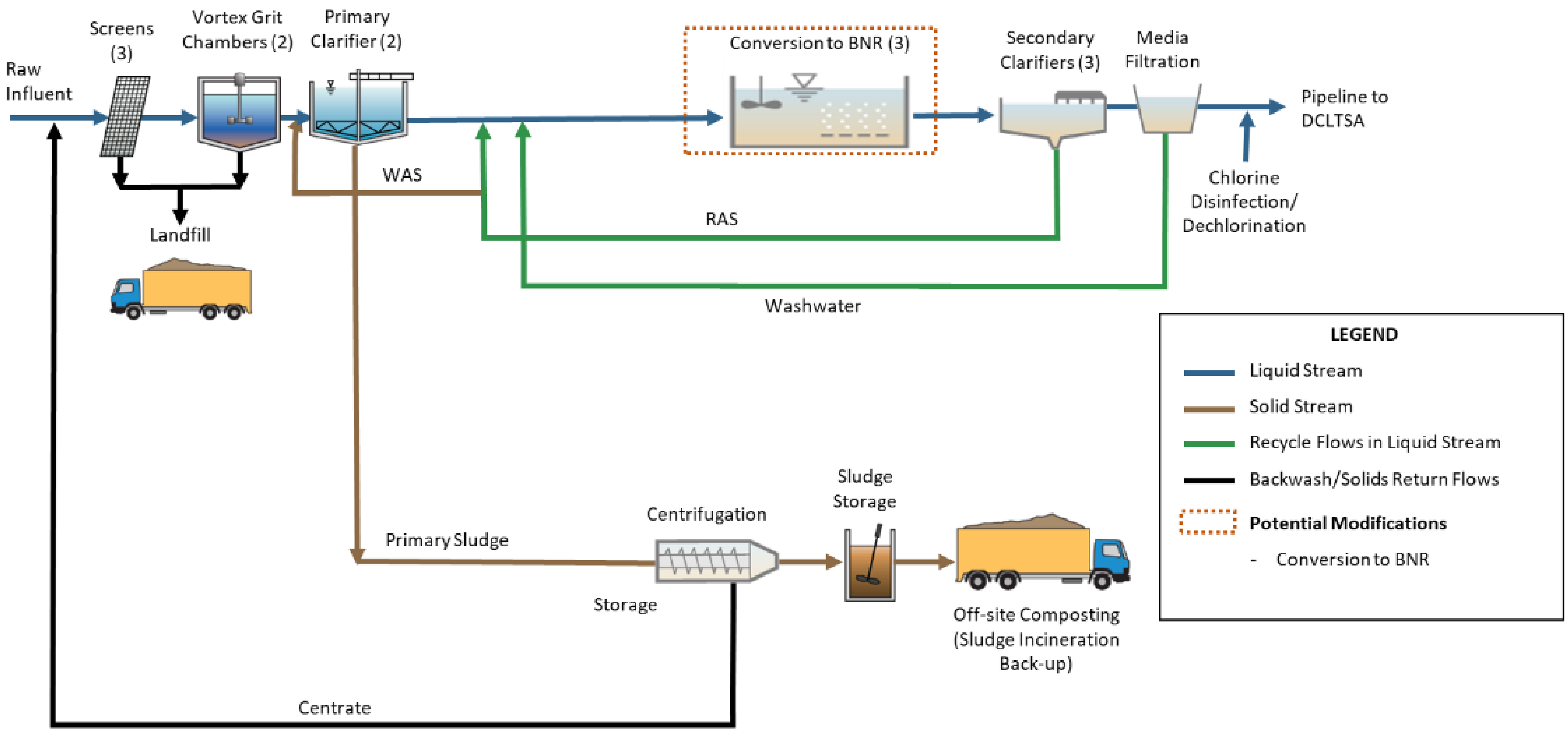


Figure 2.20 Treatment Train to Achieve Nutrient Removal

Alternative Justification

This alternative would potentially eliminate the need for the District's existing export system, irrigation operations, and Rancher irrigation in Alpine County. It may also provide an opportunity for shared costs (between DCLTSA and the District) in maintenance and repair of export infrastructure, and revenue opportunity to sell recycled water to new customers in NV. An additional benefit includes augmenting water supply for the Carson Watershed, which may provide drought resiliency for NV end users.

Key Issues and Challenges

The following presents a qualitative discussion on anticipated issues and challenges with Alternative 7A.

- **Technical - Treatment:**
  - Upgrades to the WWTP include BNR and potentially other processes to meet permit and recycled water requirements. The addition of BNR and possible other treatment processes increases the complexity of the treatment train as compared to the existing system.
  - There is limited space on the WWTP site for the anticipated process improvements.
- **Technical - Infrastructure:**
  - Construction of a new 6.8-mile transmission pipeline, within the Lake Tahoe Watershed, to DCLTSA facilities.
  - Transmission pipeline construction would need to take place over a short construction window due to weather and TRPA restrictions limiting excavation to the period between May 1 and October 15.
  - Potential infrastructure improvements to increase the capacity of the DCLTSA export system for the pressurized section between the treatment facility and the top of Kingsbury Grade.
- **Watershed and Regional Legal and Regulatory:**
  - See Section 2.5.3.
- **Alternative-Specific Regulatory, Legal, and Institutional:**
  - Permitting associated with construction of treatment plant upgrades.
  - Permitting associated with the construction of new 6.8-mile infrastructure. Transmission pipeline construction would involve multiple creek crossings, potentially unstable soils, and impacts to commercial businesses.
  - Agreement with DCLTSA to accept the District effluent in their system.
  - Modification of the DCLTSA Recycled Water Management Plan (recycled water permit requirement for NDEP).
- **Economics:**
  - Capital and O&M associated with new treatment systems to meet permit requirements.
  - Capital and O&M associated with new transmission infrastructure to DCLTSA.
  - Limited potential for revenue from sale of recycled water, and potential water rights after the District effluent is combined with the DCLTSA export system.
  - District share of costs, such as energy and other O&M activities, repair and replacement, and monitoring.

- **Environmental and Sustainability:**
  - Energy consumption and corresponding greenhouse gas emissions associated with the new treatment systems.
  - Energy consumption and corresponding greenhouse gas emissions associated with the DCLTSA export system. Regardless of export location, this alternative includes export out of the basin.
  - Potential environmental impacts associated with construction of a 6.8-mile transmission pipeline in the Lake Tahoe Watershed. The pipeline will cross multiple creeks and thus may disrupt sensitive species and/or habitats.
- **Public:**
  - Public concern that CA is not using its water resources and sending to NV instead.
  - Potential public concern with the need for this alternative, given that the District already has an existing export system.
  - Public sensitivities to the anticipated environmental impacts associated with constructing the new conveyance to DCLTSA.

The screening level analysis of the challenges associated with this alternative are summarized in Table 2.27, where the degree of challenge is presented on a scale of green to red, representing lowest to highest level of challenge, respectively. The upgrade to BNR, attainment of permit requirements established by NDEP, and agreement with DCLTSA lead to a moderately high level of technical and regulatory complexity. The other challenges are assessed as low to moderate. Based on this analysis, Alternative 7A will be further evaluated in this planning process.

Table 2.27 Alternative 7A – Assessment of Relative Challenge

No.	Alternative Name	Level of Challenge								
		Watershed and Regional Regulatory & Legal	Alternative-Specific Regulatory & Institutional	Technical-Treatment Level	Technical-Infrastructure (Conveyance and Treatment Facility Capacity)	Environmental/ Sustainability	Public Perception	Economic	Recycled Water Capacity Limitation	Included in Evaluation Phase (Y/N)
7A	Conveyance to DCLTSA With Reuse in NV (Treated Effluent to DCLTSA)									Y

Notes:

	Low
	Moderate
	Moderately High
	High

(1) The degree of challenge is presented on a scale of green to red, as represented by the associated color.

2.6.3 American River Watershed Alternatives

2.6.3.1 Alternatives 8A and 8B: Recycled Water in the South Fork American Watershed and Discharge to the South Fork American River

This alternative consists of recycled water use in the South Fork American Watershed, and/or discharge to the South Fork American River for subsequent downstream river augmentation and use. Both options would include discharge and end use in the American River Watershed, and include:

- **Alternative 8A (Recycled Water for Irrigation in South Fork American River Watershed):** This alternative would involve landscape or agricultural irrigation, or snowmaking within the South Fork American River Watershed.
- **Alternative 8B (Discharge to South Fork American River):** This alternative would involve discharge to the South Fork American River with potential use by downstream users.

For Alternative 8A, land use mapping of the South Fork American River Watershed shows that there is limited potential demand for non-potable reuse in the upper watershed. There is a greater potential demand in the lower sections of the watershed near Placerville, including golf courses and agricultural areas. Conveyance to this region would require an approximately 50-mile pipeline to deliver recycled water to uses in the area of the watershed near Placerville.

The one exception to the limited demand for recycled water in the upper section of the South Fork American River Watershed is snowmaking at Sierra-at-Tahoe. While Sierra-at-Tahoe has expressed interest in using recycled water for snowmaking and potentially for summer dust control and revegetation irrigation, the demand for this use is small relative to the existing and future effluent flows of 4,260 AFY and 6,000 AFY, respectively. As a result, recycled water use by Sierra-at-Tahoe would need to be implemented in combination with other recycled water end uses that require the same level of treatment and are in proximity to existing or new infrastructure. Recycled water use for snowmaking would need to meet disinfected tertiary requirements, per CA Title 22 Recycled Water Regulations.

Due to the lack of other land based recycled water demands in the upper sections of the South Fork American River Watershed, Alternative 8A is effectively limited to one end use (snowmaking at Sierra-at-Tahoe). This single demand would not be a driver for the District to implement treatment upgrades to produce disinfected tertiary recycled water. Alternative 8A is not considered further as an independent alternative for the District (due to the approximately 50-mile distance to significant recycled water demand/users). An overall assessment of the relative degree of complexity for Alternative 8A is included in Table 2.43.

However, the recycled water demand for snowmaking at Sierra-at-Tahoe can be included in Alternative 3. As discussed in Section 2.6.1.3, there are limited demands for disinfected tertiary recycled water outside the Lake Tahoe Watershed and in the vicinity of existing recycled water operations in Alpine County. However, if in the future there are increased demands for disinfected tertiary recycled water, then recycled water could be provided to Sierra-at-Tahoe since the resort is in close proximity to the alignment of the A-Line segment of the District's export system.

As Sierra-at-Tahoe has expressed keen interest in using recycled water for snowmaking, another option may be considered. The District could enter into an agreement with Sierra-at-Tahoe to provide recycled water at the existing quality (disinfected secondary). Sierra-at-Tahoe would take on the responsibility of compliance with Title 22 Recycled Water Regulations, which would involve treatment to meet disinfected tertiary recycled water requirements to use the recycled water for snowmaking. Sierra-at-Tahoe would be responsible for obtaining approval for the treatment system, monitoring, and reporting associated with compliance with Title 22 Recycled Water Regulations.

Alternative 8B consists of direct surface water discharge to the South Fork American River. In the late 1970s the District had previously considered discharge to the South Fork American River as part of the Facility Plan for the Districts Wastewater Treatment System (1978). In a CVRWQCB letter (1977) to the District, the CVRWQCB indicated that discharge of effluent to the South Fork American River would be allowed in locations downstream of the confluence of the Silver Fork and South Fork American River, based on the rationale that the discharge point location would be downstream of many domestic diversions.

Figure 2.21 shows the location of the confluence of the Silver Fork and the South Fork American River, which is near Kyburz, CA.

While the 1977 CVRWQCB letter provides background information from when discharge to the South Fork American was previously considered, it does not mean that the CVRWQCB would impose these conditions now or in the future. However, there are also no existing direct municipal wastewater discharges to the South Fork American River in the upper reaches of the river. The Kirkwood Meadows Public Utility District permit includes a prohibition on discharging "wastes to surface water or surface water drainage courses." Similar permit conditions may potentially be imposed on the District, and additional coordination with the CVRWQCB would be needed to assess effluent discharge options and requirements. Due to this uncertainty, this alternative includes the conservative assumption that effluent would need to be conveyed to a location downstream of the confluence of the Silver Fork and the South Fork American River, for surface water discharge to the South Fork American River.

Key Components – 8B

A high-level quantitative RPA was performed on the South Fork American River, to assess the water quality effects of existing District effluent on the river. Information regarding the South Fork American River water quality, flow data, and the RPA is in Appendix 2A. The RPA is based on a numeric objective for TDS, but there is no objective for chloride. The RPA suggests that the river TDS objective of 125 mg/L would not be exceeded with the addition of District effluent, and that TDS removal would not be required. The South Fork American River has narrative standards related to biostimulatory substances, algal growth, suspended material, and settleable materials. As a result, it is likely that nutrient removal and filtration would be required to meet discharge permit requirements. It is possible the UV disinfection would be needed to replace chlorine disinfection, depending on permit limits for disinfection by-products.

Table 2.28 presents the key components of this alternative.

Table 2.28 Key Components – Alternative 8B

Components and Operations	Description
WWTP	Potential treatment upgrades to meet anticipated discharge permit limits include BNR in the existing aeration basins, media filtration, and UV disinfection. The potential treatment train upgrades are shown in Figure 2.22.
Export System	The District's existing Export A Line and Luther Pass Pump Station would be used, but the rest of the system would not be used. A new transmission line from the Luther Pass Pump Station to a new outfall on the South Fork American River would be required, extending from the A-Line, crossing the South Upper Truckee River to United States Highway 50 to near Kyburz, CA. Approximately 19 miles of 24 to 30-inch pipeline with an elevation gain of 951 ft (for the section of transmission line from Luther Pass Pump Station to Highway 50) would need to be constructed. Figure 2.21 shows a potential conveyance route for effluent from the District to the South Fork American River.
Discharge Location	South Fork American River.
District Irrigation	None – All of the effluent would be conveyed to discharge to the South Fork American River.
Ranchland Irrigation	None – All of the effluent would be conveyed to discharge to the South Fork American River.
New Recycled Water Uses	Potential use downstream of discharge point.
Recycled Water Distribution	None.
Hydroelectric Plant	None.
Biosolids Disposal	Potential increase in biosolids production due to increased suspended solids removal.

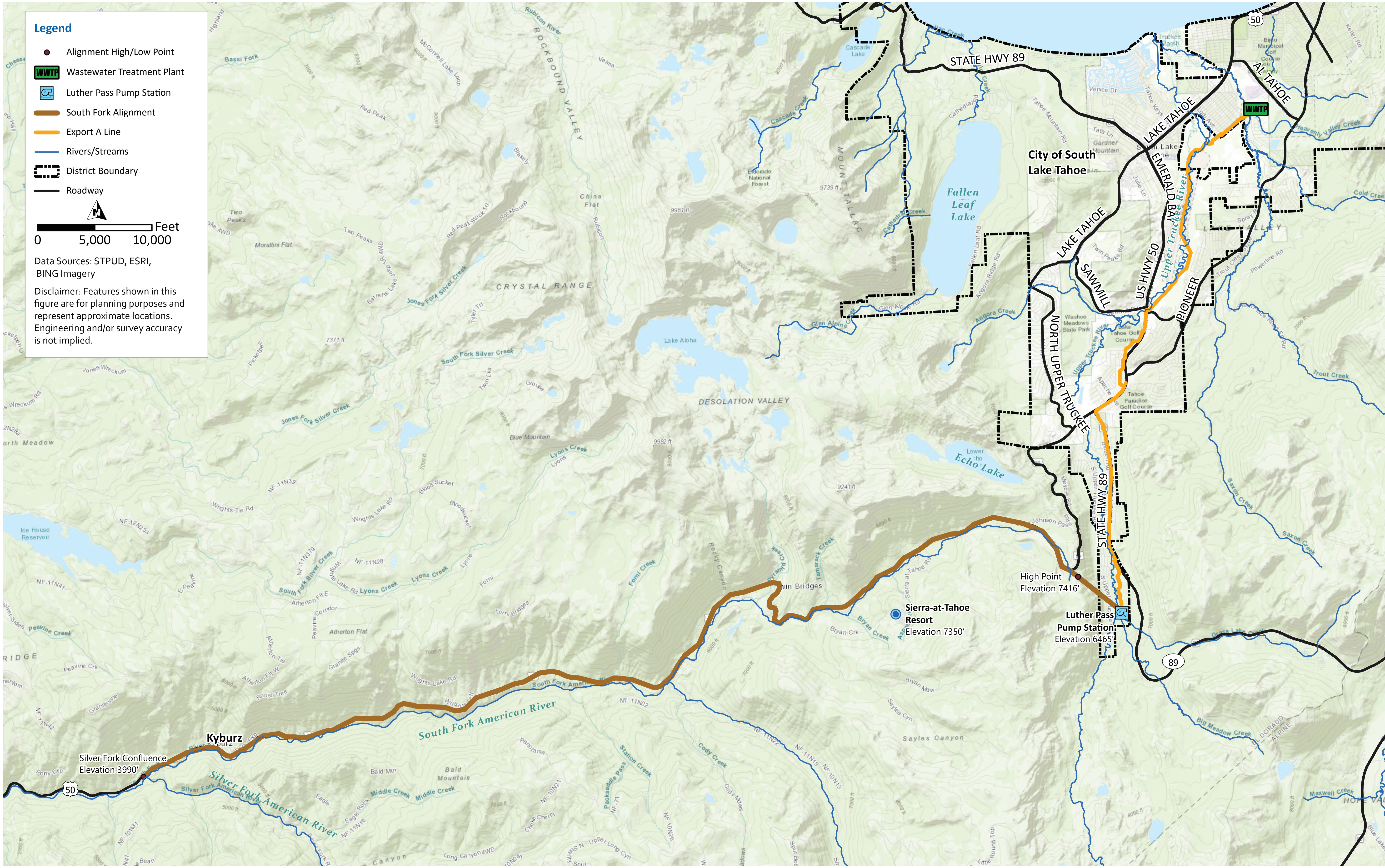


Figure 2.21 Potential Conveyance Route for Discharge to South Fork American River

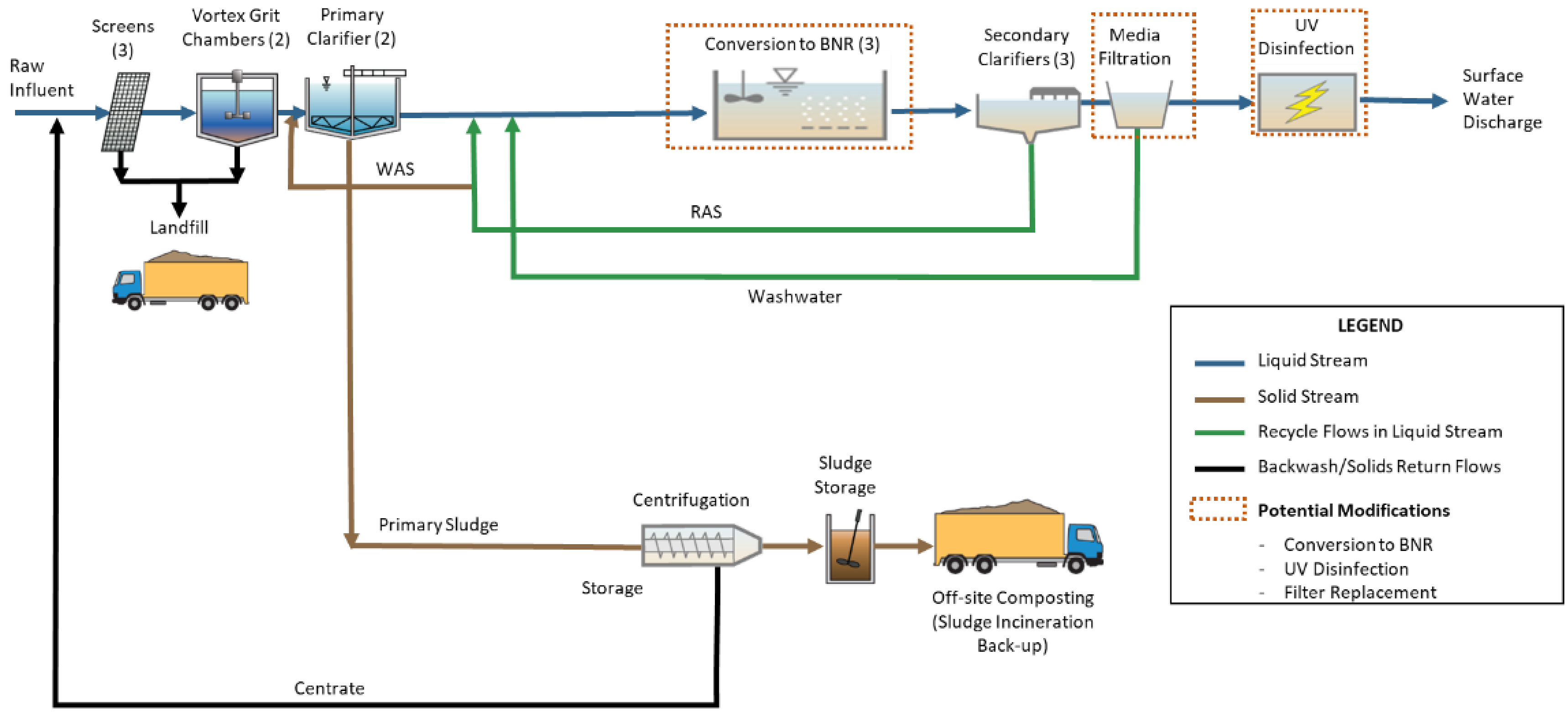


Figure 2.22 Process Train to Achieve Nutrient Removal and Improve Filtration and Disinfection

Alternative Justification – 8B

This alternative could potentially eliminate the need for the existing export system, District irrigation facilities, and Rancher irrigation in Alpine County. There may be potential revenue from water rights with the addition of effluent to the South Fork American River. An additional benefit includes augmenting water supply for the South Fork American River watershed, which may provide drought resiliency for CA end users.

Key Issues and Challenges – 8B

The following presents a qualitative discussion on anticipated issues and challenges with this alternative.

- **Technical - Treatment:**
  - Upgrade of the WWTP to meet South Fork American River water quality objectives and anticipated discharge permit limits. Process upgrades would likely include BNR, filtration, and UV disinfection, which would increase the complexity of the treatment process as compared to the existing system.
  - There is limited space on the WWTP site for the anticipated process improvements.
- **Technical - Infrastructure:**
  - Construction of a long (19-mile) water transmission pipeline with 951-ft elevation gain from Luther Pass Pump Station to the high point near Highway 50; from that high point to the discharge point, the pipeline alignment is primarily downhill. Construction challenges include mountainous terrain, multiple creek and river crossings, and a short construction window to avoid winter months.
  - New outfall would need to be constructed to discharge to the South Fork American River.
- **Watershed and Regional Legal and Regulatory:**
  - See Section 2.5.4.
- **Alternative-Specific Regulatory, Legal, and Institutional:**
  - Environmental review, approvals, and permits associated with construction of treatment plant upgrades.
  - Environmental review, approvals, and permits associated with new transmission line to the South Fork American River.
  - New outfall to the South Fork American River will require a new NPDES permit, subject to stringent WQBELs.
- **Economics:**
  - Capital and O&M associated with new treatment systems to meet permit requirements.
  - Capital and O&M associated with new transmission infrastructure to discharge location.
  - Cost of energy (specifically) associated with new transmission pipeline.
  - Cost of new outfall construction.
- **Environmental and Sustainability:**
  - Energy consumption and corresponding greenhouse gas emissions associated with the new treatment systems.
  - Energy consumption and corresponding greenhouse gas emissions associated with the new transmission pipeline. As noted above, a 19-mile pipeline with a 951-ft

  elevation gain for the section between Luther Pass Pump Station and the high point near Highway 50 would demand less energy, as compared to the existing export system.
  - Potential impacts to sensitive species in the South Fork American Watershed during pipeline and outfall construction.
- **Public:**
  - Public concern that the water could be used more beneficially elsewhere within the basin.
  - Public concern that this would provide a precedent for using water that originates in the Lake Tahoe Watershed to provide supply to meet water supply needs in other CA watersheds.
  - Public sensitivities to the anticipated environmental impacts associated with constructing the new conveyance to the South Fork American River.

The screening level analysis of the challenges associated with this alternative are summarized in Table 2.29, where the degree of challenge is presented on a scale of green to red, representing lowest to highest level of challenge, respectively. Based on the moderately high technical challenges (treatment and infrastructure) in combination with the moderately high regulatory, environment, economic, and public perception challenges, Alternative 8B will not be further evaluated in this planning process.

Table 2.29 Alternative 8B – Assessment of Relative Challenge

No.	Alternative Name	Level of Challenge								
		Watershed and Regional Regulatory & Legal	Alternative-Specific Regulatory & Institutional	Technical-Treatment Level	Technical-Infrastructure (Conveyance and Treatment Facility Capacity)	Environmental/ Sustainability	Public Perception	Economic	Recycled Water Capacity Limitation	Included in Evaluation Phase (Y/N)
8B	Discharge to South Fork American River									N

Notes:

	Low
	Moderate
	Moderately High
	High

(1) The degree of challenge is presented on a scale of green to red, as represented by the associated color.

2.6.4 Truckee Watershed Alternatives

2.6.4.1 Alternatives 9A and 9B: Conveyance to T-TSA and Discharge to Truckee River

This alternative would involve transferring either treated or partially treated/raw water from the District to T-TSA. The T-TSA plant applies treated effluent to the soil via a subsurface percolation system. Treated effluent in the subsurface disposal system migrates toward the Truckee River and Martis Creek. For both alternatives, the District effluent would be conveyed to a facility in the Truckee River Watershed in CA. There would be potential downstream use of the water in the Truckee River Watershed. This alternative could be implemented in one of two ways:

- **Alternative 9A (Treated Effluent to T-TSA):** This involves treatment at the District WWTP site followed by conveyance of treated effluent to T-TSA via a new pipeline from the District's WWTP to T-TSA's subsurface effluent disposal system. Figure 2.23 and Figure 2.24 show the pipeline alignment.
- **Alternative 9B (Raw or Partially Treated Effluent to T-TSA):** This option involves conveyance of either raw or partially treated effluent from the District WWTP to the T-TSA WWTP via the TCPUD's West Shore Interceptor and then the T-TSA's Truckee River Interceptor. Treatment of the raw or partially treated effluent would be further treated at the T-TSA WWTP and discharged via the existing subsurface effluent disposal system. Figure 2.23 and Figure 2.24 show the pipeline alignment.

The differences between these two options include the location of treatment and conveyance infrastructure. One common issue is that the T-TSA WWTP has an annual TDS load limit. Based on T-TSA permitted flows, the corresponding TDS concentration limit is 306 mg/L. The District effluent concentrations can exceed TDS concentrations of 306 mg/L. In addition, because it is a load-based limit, any additional flow with measurable TDS concentrations will result in additional load in comparison to the limit. Neither treatment facility (T-TSA's WWTP or the District's WWTP) includes an RO process that would provide removal of TDS. The most likely location for incorporating an RO process is at the District WWTP for Alternative 9A, and at the T-TSA WWTP for Alternative 9B.

Another common component of both alternatives is conveyance of effluent from the District's WWTP to, at minimum, the vicinity of the TCPUD's West Shore Interceptor. The section between the District's WWTP and TCPUD's West Shore Interceptor would involve a force main that generally follows existing roads around the south and west shore of Lake Tahoe, where several sections would be adjacent to Lake Tahoe and Emerald Bay. For Alternative 9A, a new conveyance pipeline would continue from this location to T-TSA. For Alternative 9B, the new pipeline would connect to the TCPUD's West Shore Interceptor.

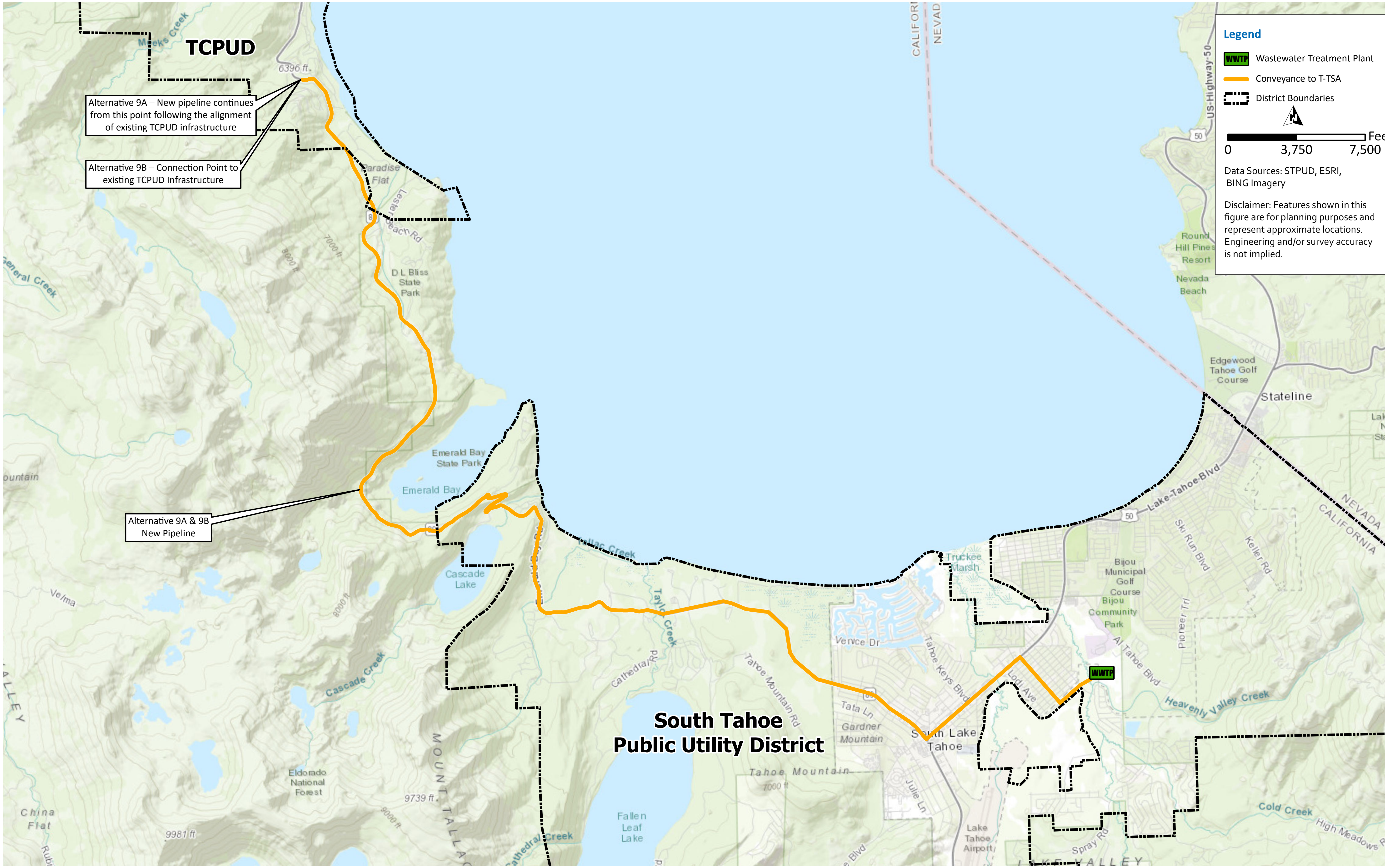


Figure 2.23 Potential Conveyance Route From District to TCPUD Service Area

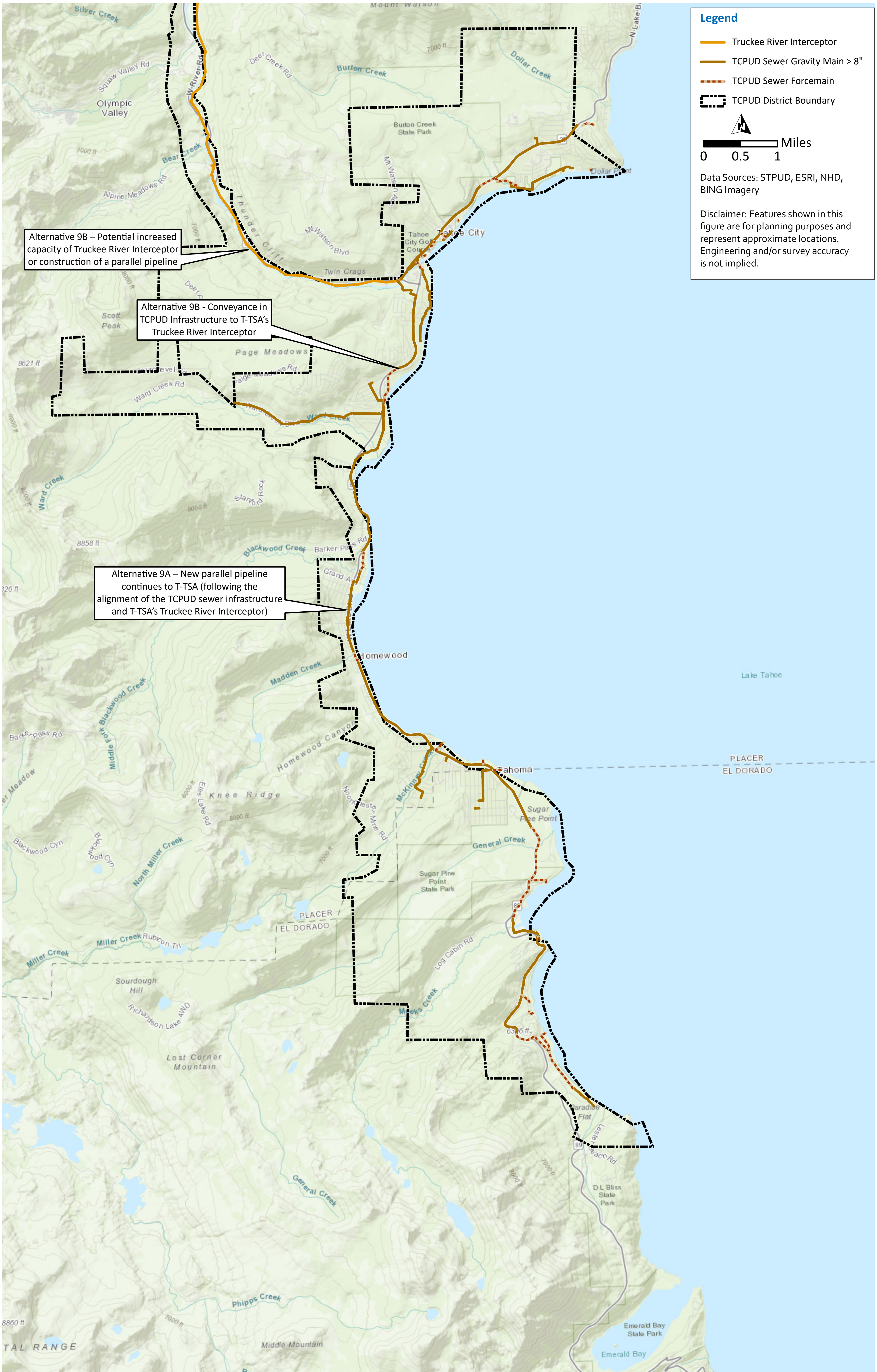


Figure 2.24 Potential Conveyance Route From TCPUD Service Area to T-TSA

Key Components – 9A

For this alternative it is anticipated that the District would need at a minimum to meet T-TSA permit limits and may need to meet or exceed the T-TSA's existing effluent quality. Treatment upgrades would be needed to remove nutrients. In addition, as discussed above, TDS removal would be needed for compliance with T-TSA's TDS load limit. Additional coordination with T-TSA and the LRWQCB would be needed to determine the extent of TDS removal. Depending on the TDS target, partial flow RO treatment may provide sufficient TDS removal. Table 2.30 presents the key components of Alternative 9A.

Table 2.30 Key Components – Alternative 9A

Components and Operations	Description
WWTP	Treatment plant upgrades would potentially include BNR in the existing aeration basins, MF, and RO. The TDS target for the effluent conveyed to T-TSA is not known at this time. It is assumed that between 50 percent and 100 percent of the flow would need to be treated by RO. With this treatment process, it is likely that UV disinfection would be added such that additional salts would not be added back into the wastewater through chlorination. The potential treatment train upgrades are shown in Figure 2.10.
Export System	The existing export system would not be used. Treated effluent would be conveyed in a new transmission pipeline from the District facilities to T-TSA. This would involve the pipeline segment that is common to Alternatives 9A and 9B (described above), and a continuation of that pipeline to T-TSA, for a total distance of approximately 45 miles.
Discharge Location	T-TSA WWTP effluent disposal system.
District Irrigation	None – All flow conveyed to T-TSA.
Ranchland Irrigation	None – All flow conveyed to T-TSA.
New Recycled Water Uses	Potential downstream use from Truckee River.
Recycled Water Distribution	None.
Hydroelectric Plant	None.
Biosolids Disposal	Potential increase in biosolids production due to increased suspended solids removal.
ROC Disposal(1)	Assuming that between 50 percent to 100 percent of the existing District effluent flow was treated by RO, the estimated ROC volume ranges from 380,000 to 760,000 gallons per day, which is roughly 38 to 76 truck trips per day. Innovative approaches to reduce ROC volume, which are currently being explored at other inland agencies, could be implemented.

Notes:
(1) ROC is a waste stream generated by the RO process. For an inland location, ROC disposal options include trucking to a landfill, thermal concentration and crystallization, evaporation ponds, and deep well injection. Additional details on ROC disposal options will be included in TM3 Alternatives Evaluation, for any alternative that requires an RO process. The assumed approach for the screening analysis is trucking and disposal, as all the other ROC concentrate disposal options have significant environmental, regulatory, and economic challenges.

Alternative Justification – 9A

Alternative 9A has the potential to eliminate the need for the District's existing export system, irrigation operations in DVR, and Rancher irrigation contracts. Alternative 9A also has the potential for water supply benefit and revenue by adding water to the Truckee River. It is possible that conveyance to T-TSA would yield an overall reduction in energy demands and associated costs; however, the force main portion of the conveyance pipeline and partial RO treatment generate energy demands, which would influence the overall potential energy reduction.

Key Issues and Challenges – 9A

The following presents a qualitative discussion on anticipated issues and challenges with this alternative.

- **Technical - Treatment:**
  - Potential treatment upgrades at the District WWTP including BNR, MF, at least partial RO, and possibly UV disinfection. The treatment train upgrades add a significant degree of complexity as compared to the existing treatment process.
  - Partial RO would generate a proportional ROC waste stream that requires disposal. Based on estimated ROC production, disposal via landfill is not feasible. Additional discharge approaches and/or treatment of the ROC to reduce the volume would be required.
  - There is limited space on the WWTP site for the anticipated process improvements.
- **Technical - Infrastructure:**
  - Construction and maintenance of a new 15-mile transmission pipeline segment from the District WWTP to the location of the TCPUD Interceptor. The construction of this pipeline would be technically challenging, complicated by steep terrain, and would have a short construction window.
  - Construction of an additional new 30-mile transmission pipeline that follows existing infrastructure, along the West Shore of Lake Tahoe and Truckee River to the T-TSA WWTP.
- **Watershed and Regional Legal and Regulatory:**
  - See Section 2.5.5.
- **Alternative-Specific Regulatory, Legal, and Institutional:**
  - Permitting associated with construction of treatment plant upgrades.
  - Permitting and approvals for ROC treatment and disposal. The specific permits and approvals would require identification of a feasible ROC disposal solution.
  - Permitting associated with the construction of new 15-mile conveyance infrastructure from the District to the vicinity of the TCPUD West Shore Interceptor and the 30-mile conveyance from this location to the T-TSA WWTP.
  - New T-TSA NPDES permit for discharge of the combined flow.
  - Modification of the T-TSA Ordinance related to accepting wastewater from the District for effluent disposal.
  - Development of a service agreement with T-TSA to accept District effluent for disposal at their facility. Agreement on the flow split for RO treatment (for TDS removal) may be a particular challenge.

- **Economics:**
  - Capital and O&M associated with new treatment systems to meet water quality requirements.
  - Capital and O&M associated with additional treatment of ROC and disposal.
  - Cost and O&M associated with new transmission infrastructure to T-TSA.
  - Cost of service that would be imposed on the District by T-TSA.
  - Cost of conveyance service that would be imposed on the District by TCPUD.
- **Environmental and Sustainability:**
  - Potential environmental impacts associated with construction of a 15-mile conveyance pipeline from the District WWTP to the location of the TCPUD West Shore Interceptor. This pipeline would cross environmentally sensitive areas and multiple creeks and has the potential to impact sensitive species and/or habitats. The pipeline is located on steep terrain and adjacent to Lake Tahoe, and construction activities have the potential to impact the watershed and lake water quality.
  - Potential environmental impacts associated with construction of a 30-mile conveyance pipeline from the vicinity of the TCPUD Interceptor to T-TSA facilities. Portions of this alignment are adjacent to Lake Tahoe, and construction activities have the potential to impact the watershed and lake water quality.
  - Additional energy-intensive treatment to reduce the ROC volume for disposal.
  - Significant energy consumption and corresponding greenhouse gas emissions associated with the new treatment systems.
  - Significant energy consumption and corresponding greenhouse gas emissions associated with the export system.
  - Additional energy-intensive treatment to reduce the ROC volume for disposal.
- **Public:**
  - The public within the District service area may feel that this alternative is not necessary given the existing District recycled water system.
  - Public sensitivities to the potential environmental impacts associated with constructing the new conveyance to T-TSA; specifically, the section between the District's WWTP and the TCPUD's West Shore Interceptor.

The screening level analysis of the challenges associated with this alternative are summarized in Table 2.31, where the degree of challenge is presented on a scale of green to red, representing lowest to highest level of challenge, respectively. The very high technical, regulatory, environmental, and public perception challenges associated with Alternative 9A limit the feasibility of implementation. Based on this analysis, Alternative 9A will not be further evaluated in this planning process.

Table 2.31 Alternative 9A – Assessment of Relative Challenge

No.	Alternative Name	Level of Challenge								
		Watershed and Regional Regulatory & Legal	Alternative-Specific Regulatory & Institutional	Technical-Treatment Level	Technical-Infrastructure (Conveyance and Treatment Facility Capacity)	Environmental/ Sustainability	Public Perception	Economic	Recycled Water Capacity Limitation	Included in Evaluation Phase (Y/N)
9A	Conveyance to T-TSA and Discharge to Truckee River (Treated Effluent to T-TSA)									N

Notes:

	Low
	Moderate
	Moderately High
	High

(1) The degree of challenge is presented on a scale of green to red, as represented by the associated color.

Key Components – 9B

Alternative 9B relies on T-TSA's WWTP for treatment of raw or partially treated effluent. The T-TSA treatment facility has capacity to treat existing and future District flows. As discussed, it is anticipated that at least partial RO would be needed to mitigate the additional TDS load that the District effluent would add to the treated effluent. The RO process would be added to the T-TSA treatment train at the capacity of at least 50 percent to 100 percent of the District flows, depending on coordination with T-TSA and LRWQCB.

This alternative involves conveyance in existing and new infrastructure. As mentioned above, a new pipeline would be required to convey raw or partially treated effluent from the District WWTP to the TCPUD West Shore Interceptor, where it would be combined with existing flows, conveyed to the T-TSA's Truckee River Interceptor and then to the T-TSA treatment facility. The T-TSA's Truckee River Interceptor is currently capacity limited, and this alternative would likely require expansion of that interceptor or construction of a parallel pipeline.

Table 2.32 presents the key components for Alternative 9B.

Table 2.32 Key Components – Alternative 9B

Components and Operations	Description
WWTP	Treatment upgrades at the T-TSA facility to include RO to reduce TDS loads. It is estimated that the equivalent of 50 percent to 100 percent of the District effluent flow would need to be treated by MF and RO.
Export System	The existing export system would not be used. Conveyance piping from the District facilities to the TCPUD West Shore Interceptor consisting of approximately 15 miles of 24 to 30-inch force main. Expansion of the T-TSA Truckee River Interceptor or construction of a parallel pipeline to accommodate District flow. Figure 2.23 and Figure 2.24, above, show a potential conveyance route for recycled water from the District ultimately to T-TSA.
Discharge Location	T-TSA WWTP.
District Irrigation	None – All flows routed to T-TSA.
Ranchland Irrigation	None – All flows routed to T-TSA.
New Recycled Water Uses	Potential downstream use from Truckee River.
Recycled Water Distribution	None.
Hydroelectric Plant	None – Existing export system would not be used.
Biosolids Disposal	Potential increase in biosolids production due to increased suspended solids removal.

Alternative Justification – 9B

Alternative 9B has the potential to eliminate the need for the District's existing export system, irrigation operations in DVR, and Rancher irrigation contracts. Alternative 9B also has the potential for water supply benefit and revenue by adding water to the Truckee River. It is possible that conveyance to T-TSA would yield an overall reduction in energy demands and associated costs; however, the force main portion of the conveyance pipeline and partial RO treatment generate energy demands, which would influence the overall potential energy reduction.

Key Issues and Challenges – 9B

The following presents a qualitative discussion on anticipated issues and challenges with this alternative.

- **Technical - Treatment:**
  - Potential treatment upgrades at the T-TSA's WWTP to include at least partial MF and RO for TDS removal. The treatment train upgrades add a significant degree of complexity as compared to the existing treatment process.
  - Partial RO would generate a proportional ROC waste stream that requires disposal. Based on estimated ROC production, disposal via landfill is not feasible. Additional discharge approaches and/or treatment of the ROC to reduce the volume would be required.
- **Technical - Infrastructure:**
  - Construction and maintenance of a new 15-mile transmission pipeline from the District WWTP to the location of the TCPUD Interceptor. The construction of this pipeline would be technically challenging, complicated by steep terrain, and would have a short construction window.
  - Expansion of the T-TSA Truckee River Interceptor or construction of a parallel pipeline from Tahoe City to T-TSA.
- **Watershed and Regional Legal and Regulatory:**
  - See Section 2.5.5.
- **Alternative-Specific Regulatory, Legal, and Institutional:**
  - Permitting associated with construction of treatment plant upgrades.
  - Permitting and approvals for ROC treatment and disposal. The specific permits and approvals would require identification of a feasible ROC disposal solution.
  - Permitting associated with the construction of new 15-mile conveyance infrastructure from the District to the TCPUD West Shore Interceptor.
  - Permitting associated with expansion of the T-TSA Truckee River Interceptor or construction of a parallel pipeline from Tahoe City to T-TSA.
  - Discharging to the Truckee River will likely trigger a transfer of water rights from the Carson River watershed to the Truckee River watershed.
  - New T-TSA NPDES permit for treatment and discharge of the combined flow.
  - Modification of T-TSA Ordinances related to accepting wastewater from T-TSA for conveyance, treatment, and disposal.
  - Modification of TCPUD Ordinances related to service area boundary and acceptance of wastewater from the District.
  - Development of a service agreement with T-TSA to accept District effluent for treatment disposal at their facility. Agreement on the extent of RO treatment for TDS removal may be a particular challenge.
  - Development of service agreement with TCPUD for conveyance in their existing infrastructure.

- **Economics:**
  - Capital and O&M associated with new treatment systems.
  - Capital and O&M associated with additional treatment of ROC and disposal.
  - Cost and O&M associated with new transmission infrastructure including new pipeline from the District to the TCPUD Interceptor and the expansion of the T-TSA Truckee River Interceptor or construction of a parallel pipeline.
  - Cost of treatment and disposal services that would be imposed on the District by T-TSA.
- **Environmental and Sustainability:**
  - Potential environmental impacts associated with construction of a 15-mile conveyance pipeline from the District WWTP to the location of the TCPUD West Shore Interceptor. This pipeline would cross environmentally sensitive areas and multiple creeks and has the potential to impact sensitive species and/or habitats. The pipeline is located on steep terrain and adjacent to Lake Tahoe, and construction activities have the potential to impact the watershed and lake water quality.
  - Potential environmental impacts associated with expanding the T-TSA Truckee River Interceptor or constructing a parallel pipeline.
  - Energy demands and greenhouse gas emissions associated with new treatment processes.
  - Energy demands and greenhouse gas emissions associated with conveyance to T-TSA.
  - Production and disposal of ROC.
- **Public:**
  - The public within the District service area may feel that this alternative is not necessary given the existing District recycled water system in Alpine County.
  - Public sensitivities to the potential environmental impacts associated with constructing the new conveyance to T-TSA; specifically, the section between the District's WWTP and the TCPUD's West Shore Interceptor.
  - Public sensitivities to the potential environmental impacts associated with expanding the Truckee River Interceptor or constructing a parallel pipeline along the Truckee River.

The screening level analysis of the challenges associated with this alternative are summarized in Table 2.33, where the degree of challenge is presented on a scale of green to red, representing lowest to highest level of challenge, respectively. The very high regulatory, environmental, and public perception challenges associated with Alternative 9B limit the feasibility of implementation. Based on this analysis, Alternative 9B will not be further evaluated in this planning process.

Table 2.33 Alternative 9B – Assessment of Relative Challenge

No.	Alternative Name	Level of Challenge								
		Watershed and Regional Regulatory & Legal	Alternative-Specific Regulatory & Institutional	Technical-Treatment Level	Technical-Infrastructure (Conveyance and Treatment Facility Capacity)	Environmental/ Sustainability	Public Perception	Economic	Recycled Water Capacity Limitation	Included in Evaluation Phase (Y/N)
9B	Conveyance to T-TSA and Discharge to Truckee River (Raw or Partially Treated Effluent to T-TSA)									N

Notes:

	Low
	Moderate
	Moderately High
	High

(1) The degree of challenge is presented on a scale of green to red, as represented by the associated color.

2.6.5 Lake Tahoe Watershed Alternatives

2.6.5.1 Alternatives 10 and 11: Land Application (Landscape Irrigation and Snowmaking) in Lake Tahoe Basin

Alternatives 10 and 11 involve non-potable reuse in the Lake Tahoe Basin. The specific end uses are unique to the alternatives but fall under the general category of land application of recycled water. District wastewater would be treated at the existing WWTP to meet water quality requirements. The discharge and end use of the recycled water would be primarily in CA. These alternatives include:

- **Alternative 10:** This alternative includes recycled water use for urban irrigation of golf courses, parks, recreational fields, and other urban irrigation applications. Figure 2.25 shows the location and type of potential recycled water users.
- **Alternative 11:** This alternative includes recycled water use for snowmaking. Use of recycled water for snowmaking would primarily occur at Heavenly Lake Tahoe ski resort, as shown in Figure 2.25. Since the Heavenly Lake Tahoe ski resort snowmaking infrastructure is integrated across the CA and NV portions of the resort, some recycled water used for snowmaking may occur in both states.

The estimated demand for golf course irrigation (Alternative 10) is based on the annual reports for the Truckee River Operating Agreement. These reports include irrigation use for the following golf courses in the South Lake Tahoe area, all of which currently use groundwater for irrigation supply:

- Bijou Golf Course.
- Lake Tahoe Golf Course.
- Tahoe Paradise Golf Course.

The total irrigation use for these golf courses is about 360 AFY. In addition to golf course irrigation, there are other non-potable demands in the South Lake Tahoe area. There are some parks (e.g., Bijou Community Park) and schools with irrigation demands. However, the total irrigation demand (based on irrigation accounts) from locations distributed throughout South Lake Tahoe is about 40 AFY. This total demand of 40 AFY is small relative to the golf course irrigation demand of 360 AFY and is complicated by demands at disperse locations in South Lake Tahoe. For this reason, irrigation other than for the golf courses is much less cost effective and is therefore not considered further as a demand.

The estimated demand for snowmaking (Alternative 11) is based on the annual reports for the Heavenly Mountain Resort Mitigation and Monitoring Plan (2022). Estimated usage is about 450 AFY.

The golf course and snowmaking demand combined are approximately 810 AFY. This total snowmaking demand is a small fraction (about 14 percent) of the future recycled water flow from the WWTP of 6,000 AFY. Alternatives 10 and/or 11, separate or in combination, would need to be implemented with other alternatives to provide sufficient recycled water demand to equal the projected effluent flows of 6,000 AFY. For this analysis, it is assumed that Alternatives 10 and/or 11 would be implemented in combination with the existing system.

As discussed, there are significant legal and regulatory challenges associated with recycled water use in the basin. It is assumed that land application of recycled water has the potential to contribute as runoff into receiving waters of the basin and/or contribute to underlying groundwater aquifers (through infiltration). As such, it is assumed that recycled water for land application (irrigation or snowmaking) would need to meet (or better) water quality objectives for groundwater and surface waters in the basin, based on the ONRW designation of Lake Tahoe and waters (groundwater or surface water) that contribute to Lake Tahoe.

While specific permit requirements are not known at this time, it is possible that water quality constituents may be more stringent than drinking water levels, based on the water quality objectives of Lake Tahoe and surrounding tributaries, as well as existing water quality of Lake Tahoe, tributaries, and groundwater. It is possible that water quality limits could be as stringent (or more stringent) as:

- < 60 mg/L TDS.
- < 4 mg/L chloride.
- < 0.2 mg/L total N.
- < 0.02 mg/L total P.

These objectives are more restrictive than drinking water standards for common constituents. The potential treatment train is based on requirements for removal of TDS, chloride, and nutrients. The total N and total P limits would potentially require the combination of BNR and RO. Even with these advanced treatment processes, it may not be technically feasible to meet nutrient water quality requirements.

Land application (irrigation and snowmaking) would also need to meet requirements for disinfected tertiary recycled water per Title 22 regulations; however, the previously described water quality requirements (i.e., drinking water or better) would dictate a treatment train that would easily meet Title 22 regulations for unrestricted non-potable reuse.

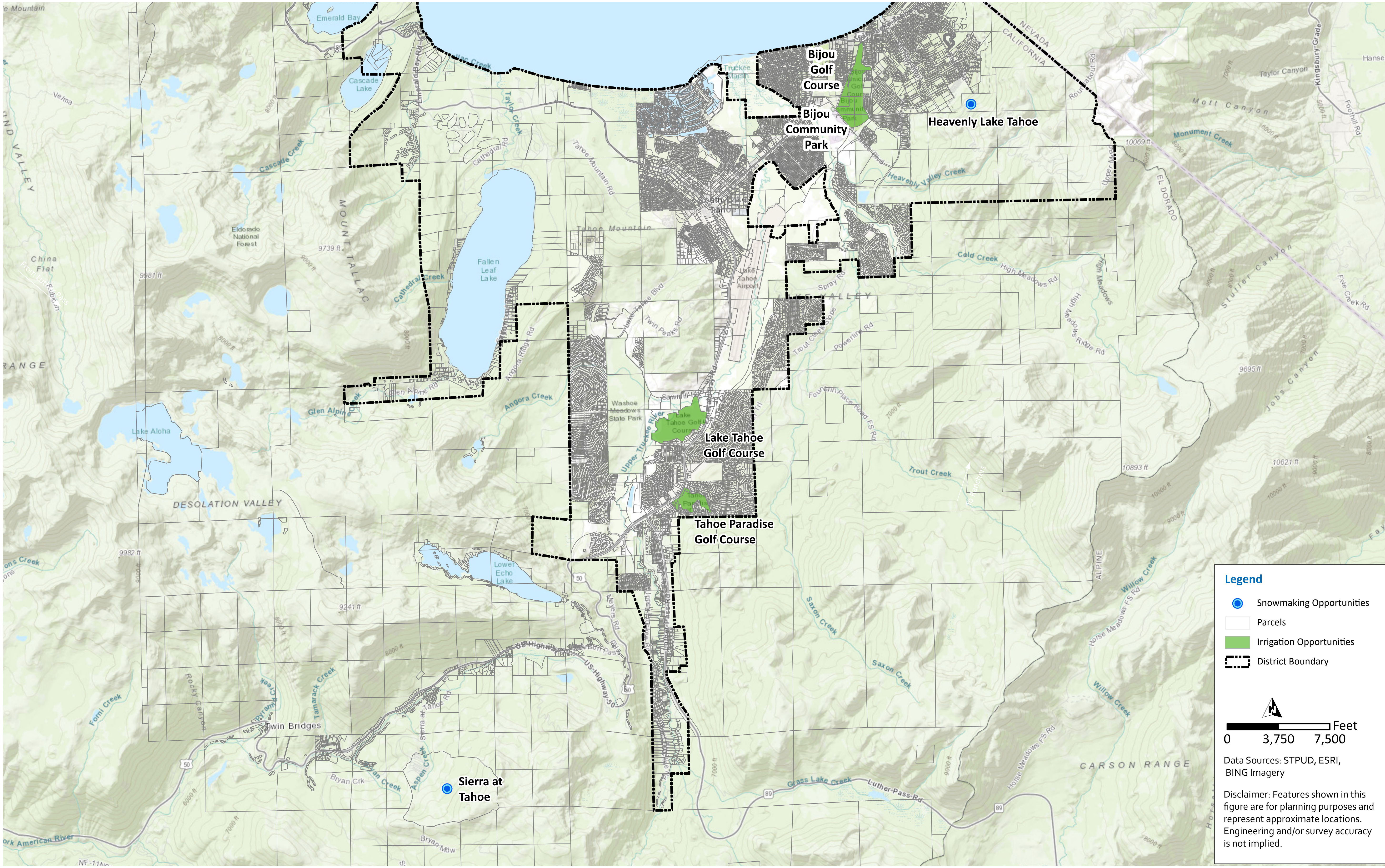


Figure 2.25 Irrigation and Snowmaking Opportunities in South Lake Tahoe

Key Components

Table 2.34 presents the key components of these alternatives.

Table 2.34 Key Components – Alternatives 10 and 11

Components and Operations	Description
WWTP	Treatment plant upgrades would potentially include BNR in the existing aeration basins, MF, and RO. With this treatment train, it may not be desirable to add TDS back into the water after RO. For this reason, UV disinfection replaces chlorine disinfection in this treatment train. Depending on specific requirements, additional processes may be required. The potential treatment train upgrades for Alternatives 10 and 11 are shown in Figure 2.26.
Export System	The existing export system would also be used because these alternatives do not provide sufficient demand for existing or future flows.
Discharge Location	Local users in the Lake Tahoe Basin and existing users in Alpine County.
District Irrigation	Since there is not sufficient irrigation and/or snowmaking demand, the District may still use recycled water for irrigation in DVR.
Ranchland Irrigation	Since there is not sufficient irrigation and/or snowmaking demand, the ranchland irrigation by the existing Ranchers may still occur.
New Recycled Water Uses	Water use for urban irrigation (Alternative 10) and snowmaking (Alternative 11).
Recycled Water Distribution	New recycled water distribution piping would be required to convey treated water to local users within the Lake Tahoe Basin.
Hydroelectric Plant	Same as existing for any flow that is exported over Luther Pass and into Alpine County.
Biosolids Disposal	Potential increase in biosolids production due to increased suspended solids removal.
ROC Disposal(1)	Assuming that, at most, 30 percent of the existing District effluent flow was used for landscape irrigation and snowmaking, the estimated ROC volume is 228,000 gallons per day, which is roughly 23 truck trips per day. Innovative approaches to reduce ROC volume, which are currently being explored at other inland agencies, could be implemented.

Notes:
(1) ROC is a waste stream generated by the RO process. For an inland location, ROC disposal options include trucking to a landfill, thermal concentration and crystallization, evaporation ponds, and deep well injection. Additional details on ROC disposal options will be included in TM3 Alternatives Evaluation, for any alternative that requires an RO process. The assumed approach for the screening analysis is trucking and disposal, as all the other ROC concentrate disposal options have significant environmental, regulatory, and economic challenges.

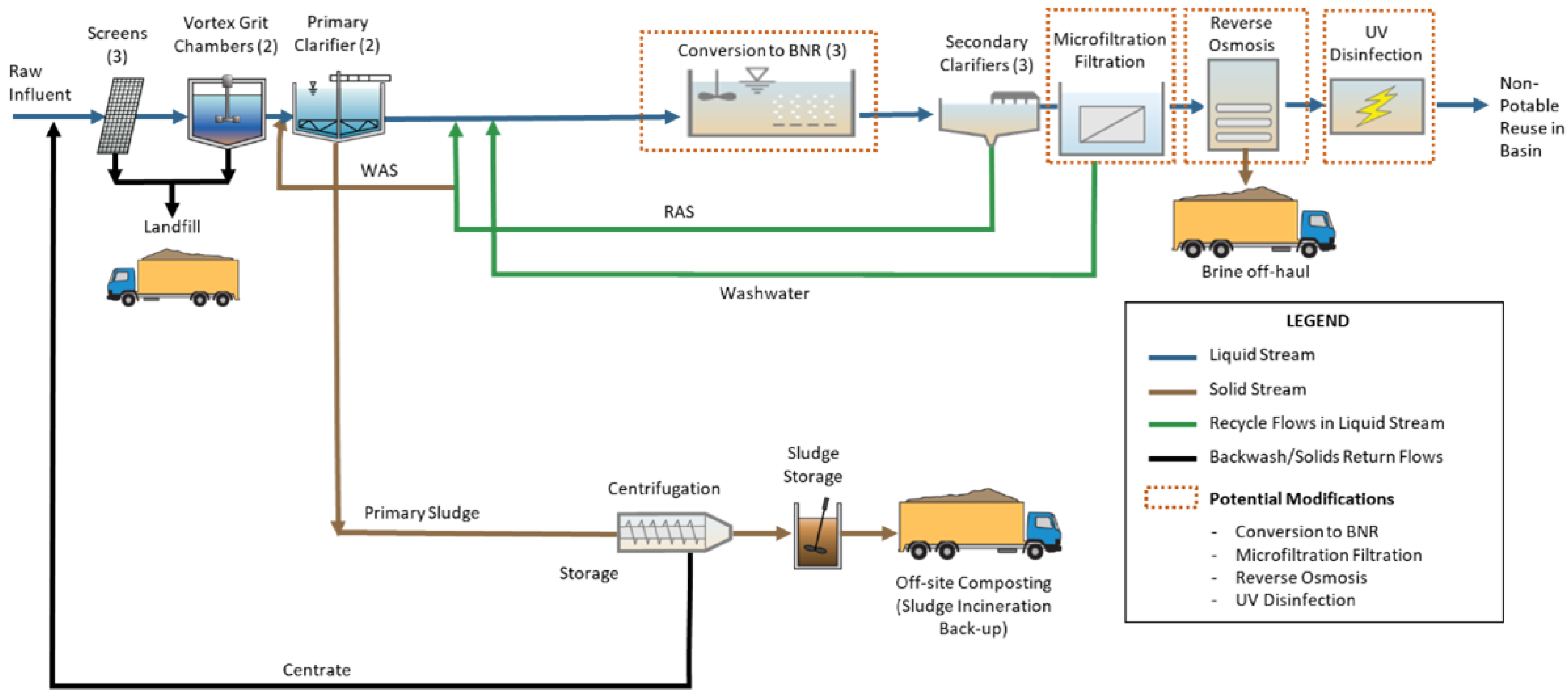


Figure 2.26 Process Train to Achieve Removal of Nutrients, TDS, and Chloride

Alternative Justification

This alternative would potentially reduce the quantity of water in the existing export system. It may also present an opportunity for the District to maintain the water in the Lake Tahoe Basin, offset/replace groundwater pumping, and sell water/rights to users to generate revenue.

Key Issues and Challenges

The following presents a qualitative discussion on anticipated issues and challenges with these alternatives.

- **Technical - Treatment:**
  - Upgrade of the WWTP to meet future WDRs. While these permit requirements have not been established at this time, it is anticipated that treatment upgrades would likely include BNR, MF, RO, and likely UV disinfection. The treatment train upgrades add a significant degree of complexity as compared to the existing treatment process.
  - Potential issues with meeting stringent nutrient limits, even with the combination of BNR and RO.
  - ROC production and disposal. Based on estimated ROC production, disposal via landfill is not feasible. Additional discharge approaches and/or treatment of the ROC to reduce the volume would be required.
  - There is limited space on the WWTP site for the anticipated process improvements.
- **Technical - Infrastructure:**
  - Assuming that the existing export system would be used for a portion of the flow, there is continued maintenance and investment in aging export system infrastructure.
  - New recycled water conveyance infrastructure to deliver recycled water to new users.
- **Watershed and Regional Legal and Regulatory:**
  - See Section 2.5.6.
- **Alternative-Specific Regulatory, Legal, and Institutional:**
  - Use of the water within the Lake Tahoe Basin will require changes to the TRPA code and may come into conflict with ONRW receiving water quality standards.
  - For new recycled water users or uses, the District would need to prepare an ROWD and obtain new WDRs from the LRWQCB.
  - LRWQCB Basin Plan Amendment to allow discharge in the Lake Tahoe Watershed.
  - Changes in TRPA code to allow use of recycled water in the Lake Tahoe Basin.
  - Modifications to the Lake Tahoe WQMP.
  - Permitting associated with construction of treatment plant upgrades.
  - Permitting and approvals for ROC treatment and disposal. The specific permits and approvals would require identification of a feasible ROC disposal solution.
  - Permitting associated with the construction of recycled water distribution pipelines to convey recycled water to end users.
- **Economics:**
  - Capital and O&M associated with new treatment systems to meet water quality requirements.

  - Capital and O&M associated with additional treatment of ROC and disposal.
  - Repair and replacement costs associated with export system.
- **Environmental and Sustainability:**
  - Additional energy-intensive treatment to reduce the ROC volume for disposal.
  - Significant energy consumption and corresponding greenhouse gas emissions associated with the new treatment systems.
  - Energy consumption and corresponding greenhouse gas emissions associated with the new recycled water distribution system.
  - Energy consumption and corresponding greenhouse gas emissions associated with the export system.
  - Potential environmental impacts to sensitive species and habitats associated with construction of new recycled water infrastructure.
- **Public:**
  - Opposition to use of recycled water within the Lake Tahoe Basin.
  - Public concern that the irrigation water and snowmelt will eventually drain to Lake Tahoe, impacting the water quality.

The screening level analysis of the challenges associated with this alternative are summarized in Table 2.35, where the degree of challenge is presented on a scale of green to red, representing lowest to highest level of challenge, respectively. The high level of watershed and regional legal and regulatory challenges associated with use of recycled water in the Lake Tahoe limit the feasibility of implementation. In addition, anticipated discharge permit requirements present a high level of challenge, as potential nutrient limits may not be achievable. There is also a moderately high level of technical, environmental, and economic challenges. Based on this analysis, Alternatives 10 and 11 will not be further evaluated in this planning process.

Table 2.35 Alternatives 10 and 11 – Assessment of Relative Challenge

No.	Alternative Name	Level of Challenge								
		Watershed and Regional Regulatory & Legal	Alternative-Specific Regulatory & Institutional	Technical-Treatment Level	Technical-Infrastructure (Conveyance and Treatment Facility Capacity)	Environmental/ Sustainability	Public Perception	Economic	Recycled Water Capacity Limitation	Included in Evaluation Phase (Y/N)
10, 11	Landscape Irrigation and Snowmaking									N

Notes:

	Low
	Moderate
	Moderately High
	High

(1) The degree of challenge is presented on a scale of green to red, as represented by the associated color.

2.6.5.2 Alternatives 12, 13, and 14: Discharge to Waters in Lake Tahoe Basin

This alternative would involve advanced treatment, and then direct surface water discharge of recycled water into the Lake Tahoe Basin via discharge to three different waterways. For all these alternatives, the discharge would be in the Lake Tahoe Watershed in CA. The three alternatives include:

- **Alternative 12 (Heavenly Valley Creek):** Heavenly Valley Creek parallels the boundary of the District's treatment plant. This alternative would include treatment at the District WWTP followed by conveyance to a surface water discharge into Heavenly Valley Creek. The proximity of the export line to Heavenly Valley Creek is shown in Figure 2.27. Heavenly Valley Creek is ephemeral, with low flows (0.1 mgd on average).
- **Alternative 13 (Trout Creek):** Trout Creek is across the street from the District's WWTP. This alternative would include treatment at the District WWTP followed by conveyance to a surface water discharge into Trout Creek. The proximity of the export line to Trout Creek is shown in Figure 2.28. Trout Creek averages approximately 18 mgd of flow.
- **Alternative 14 (Upper Truckee River):** The existing recycled water export pipelines cross the Upper Truckee River in several places. This alternative would include treatment at the District WWTP followed by conveyance to a surface water discharge into the Upper Truckee River. The proximity of the export line to the Upper Truckee River is shown in Figure 2.29. The Upper Truckee River averages approximately 47 mgd of flow.

As discussed, there are significant legal and regulatory challenges associated with recycled water use in the basin. If there was a legal and regulatory pathway for discharge in the basin, then the governing water quality objectives and permit requirements would need to be identified. The designation of Lake Tahoe as an ONRW would dictate the water quality requirements for discharge to these three tributaries. The requirement of “no degradation” of ONRWs indicates that water quality objectives of the tributaries would need to be met at the point of discharge. However, even if there was an allowance for some level of degradation, based on available assimilative capacity, the relatively limited flows (year-round and seasonal) in these waterways would limit the assimilative capacity on a seasonal basis (at a minimum). With the addition of effluent from the District’s WWTP, Trout Creek and the Upper Truckee River would be effluent-dominated for some months of the year, and Heavenly Valley Creek would be effluent-dominated for much of the year. When effluent-dominated, attainment of water quality objectives at the point of discharge would be required.

Key water quality objectives for the three waterways are presented in Table 2.36. In addition, limits for other constituents may require additional treatment processes.

Table 2.36 Key Water Quality Objectives for Waterways in the Lake Tahoe Watershed

Waterway	TDS (mg/L)	Chloride (mg/L)	Total N (mg/L)	Total P (mg/L)
Heavenly Valley Creek	~60(1)	-(2)	-(2)	-(2)
Trout Creek	55	4	0.19	0.015
Upper Truckee River	50	0.15	0.19	0.015

Notes:
(1) Approximate value based on a conductivity limit of 95 micromhos per centimeter.
(2) No data available for these parameters.

The water quality objectives for Heavenly Valley Creek (Alternative 12) are limited to a TDS concentration of about 60 mg/L. At a minimum, meeting this objective would require TDS reduction by RO full flow. It is possible that additional nutrient limits would be included in a discharge permit, based on the clarity TMDL for Lake Tahoe, where some clarity issues are attributed to nutrient inputs and biostimulation of algae. If nutrient limits were proposed, then it is likely that BNR (and possibly in combination with RO) would be needed to meet limits. It is assumed that BNR would be needed for nutrient removal to achieve anticipated limits in a discharge permit for Heavenly Valley Creek.

The water quality objectives for Trout Creek (Alternative 13) would require treatment to remove TDS, chloride, and nutrients (N and P). The TDS and chloride concentrations are achievable through an RO process of all flow that would be discharged. The total N and total P limits would require the combination of BNR and RO. Even with these advanced treatment processes, it may not be technically feasible to meet the nutrient water quality objectives. It is also possible that other water quality-based effluent limits would be incorporated into a discharge permit for Trout Creek. These limits may require additional treatment processes such as AOP and/or granular activated carbon.

The water quality objectives for Upper Truckee River (Alternative 14) are similar to Trout Creek, with the exception of a lower chloride objective. The above discussion on meeting nutrient limits is applicable to Alternative 14. In addition, the more stringent chloride objective of 0.15 mg/L would be challenging to achieve, potentially requiring additional processes or a multi-stage RO process.

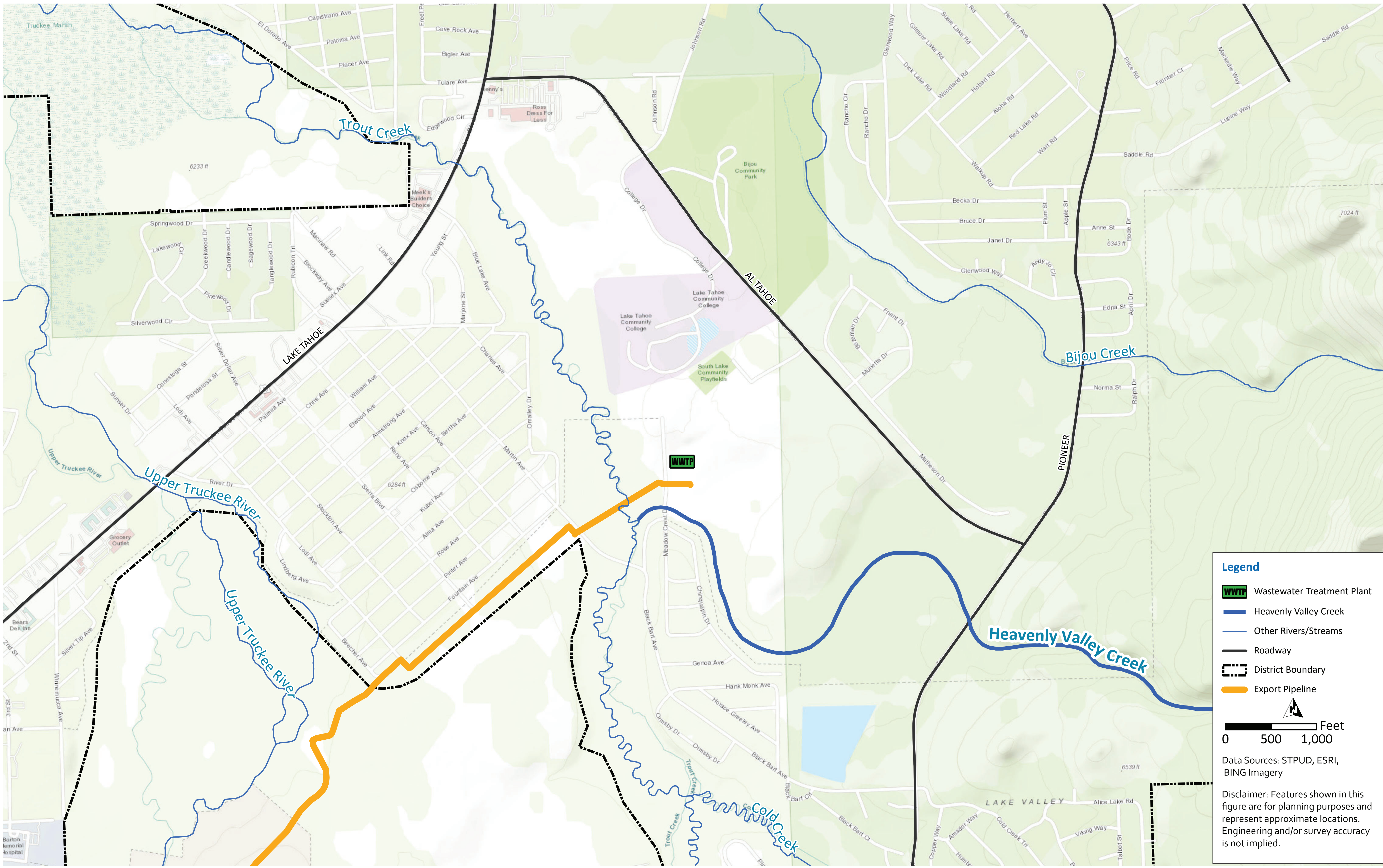


Figure 2.27 Discharge to Heavenly Valley Creek

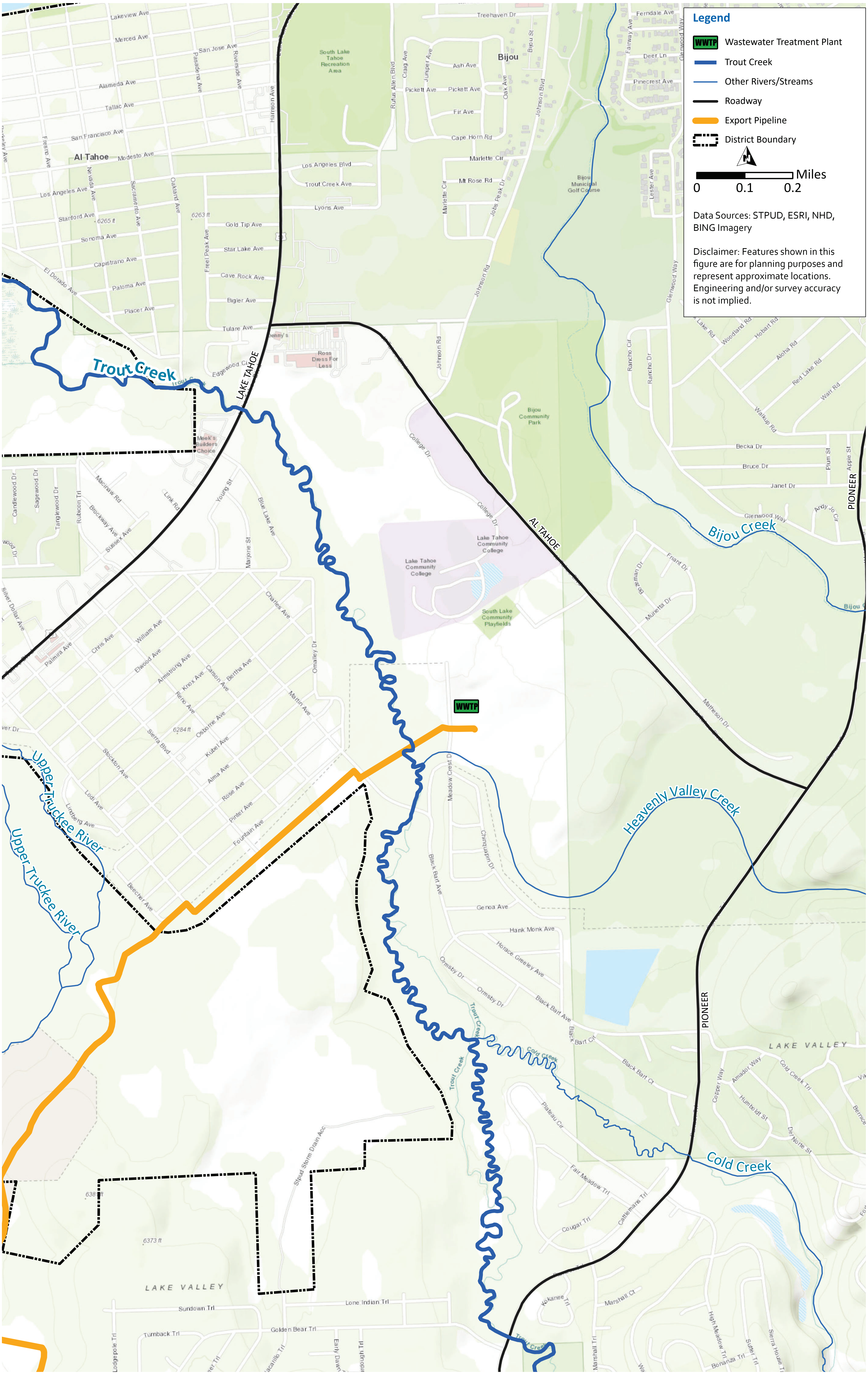


Figure 2.28 Discharge to Trout Creek

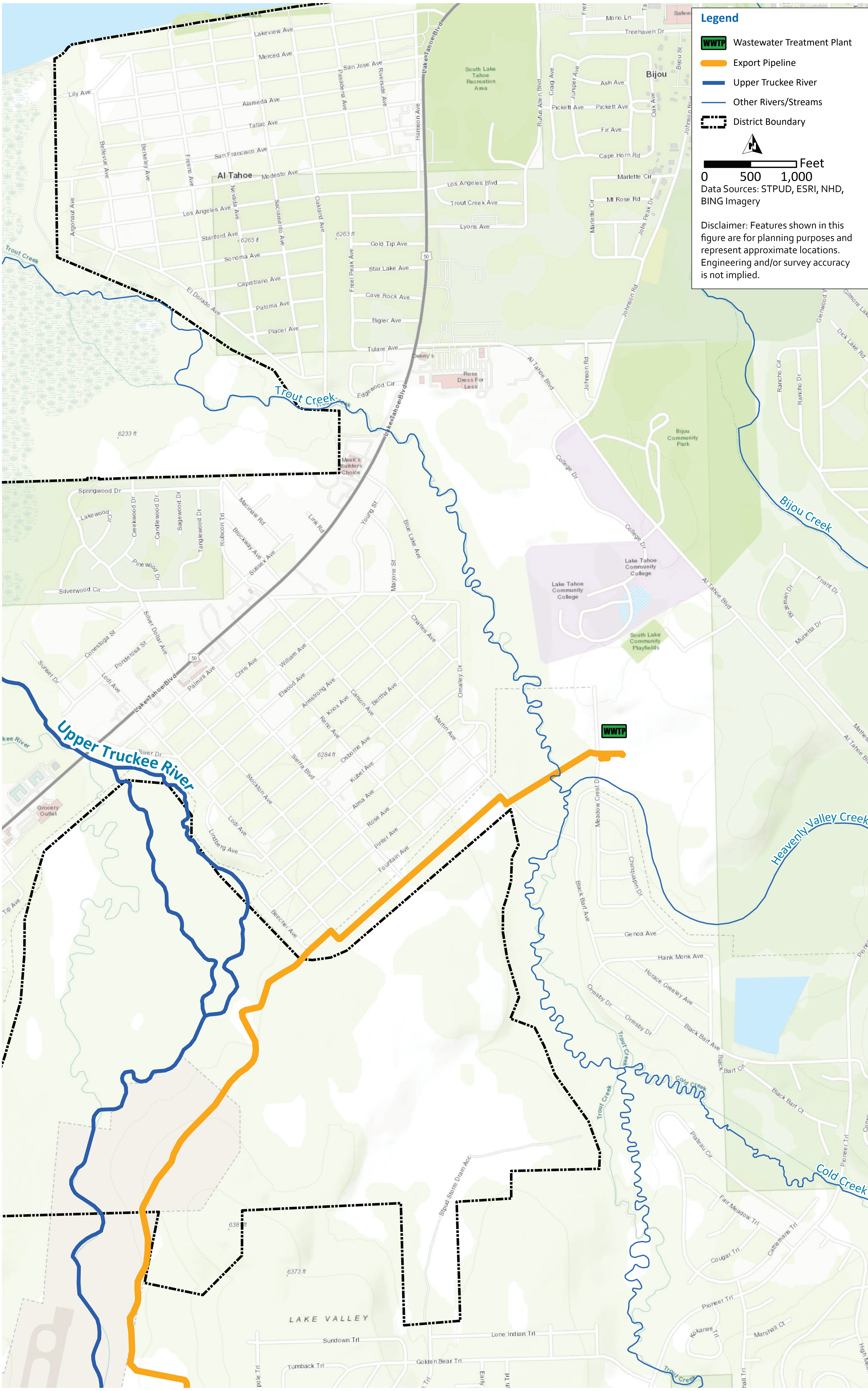


Figure 2.29 Discharge to Upper Truckee River

Key Components

Table 2.37 presents the key components of these alternatives.

Table 2.37 Key Components – Alternatives 12, 13, and 14

Components and Operations	Description
WWTP	For all alternatives, removal of nutrients, TDS, and chloride would be required. Potential treatment process upgrades include adding BNR in the existing aeration basins, MF, RO, and UV disinfection. The potential treatment train upgrades are shown in Figure 2.30. As discussed, this treatment train may not be sufficient to meet stringent nutrient limits that would likely be incorporated into a permit. In addition, other advanced treatment processes may be required (not shown in Figure 2.30).
Export System	New conveyance pipelines from the District WWTP plant to a new outfall at one of the three identified waterways. All three of the waterways are either adjacent to the District plant or are near the existing export line. Export out of the basin would not be continued.
Discharge Location	Trout Creek, Upper Truckee River, Heavenly Valley Creek.
District Irrigation	None – All flow would be discharged to a tributary in the basin.
Ranchland Irrigation	None – All flow would be discharged to a tributary in the basin.
New Recycled Water Uses	None.
Recycled Water Distribution	None.
Hydroelectric Plant	None.
Biosolids Disposal	Potential increase in biosolids production due to increased suspended solids removal.
ROC Disposal(1)	Assuming that 100 percent of the existing District effluent flow was discharged to waters in the Lake Tahoe Basin, the estimated ROC volume is 760,000 gallons per day, which is roughly 76 truck trips per day. Innovative approaches to reduce ROC volume, which are currently being explored at other inland agencies, could be implemented.

Notes:
(1) ROC is a waste stream generated by the RO process. For an inland location, ROC disposal options include trucking to a landfill, thermal concentration and crystallization, evaporation ponds, and deep well injection. Additional details on ROC disposal options will be included in TM3 Alternatives Evaluation, for any alternative that requires an RO process. The assumed approach for the screening analysis is trucking and disposal, as all the other ROC concentrate disposal options have significant environmental, regulatory, and economic challenges.

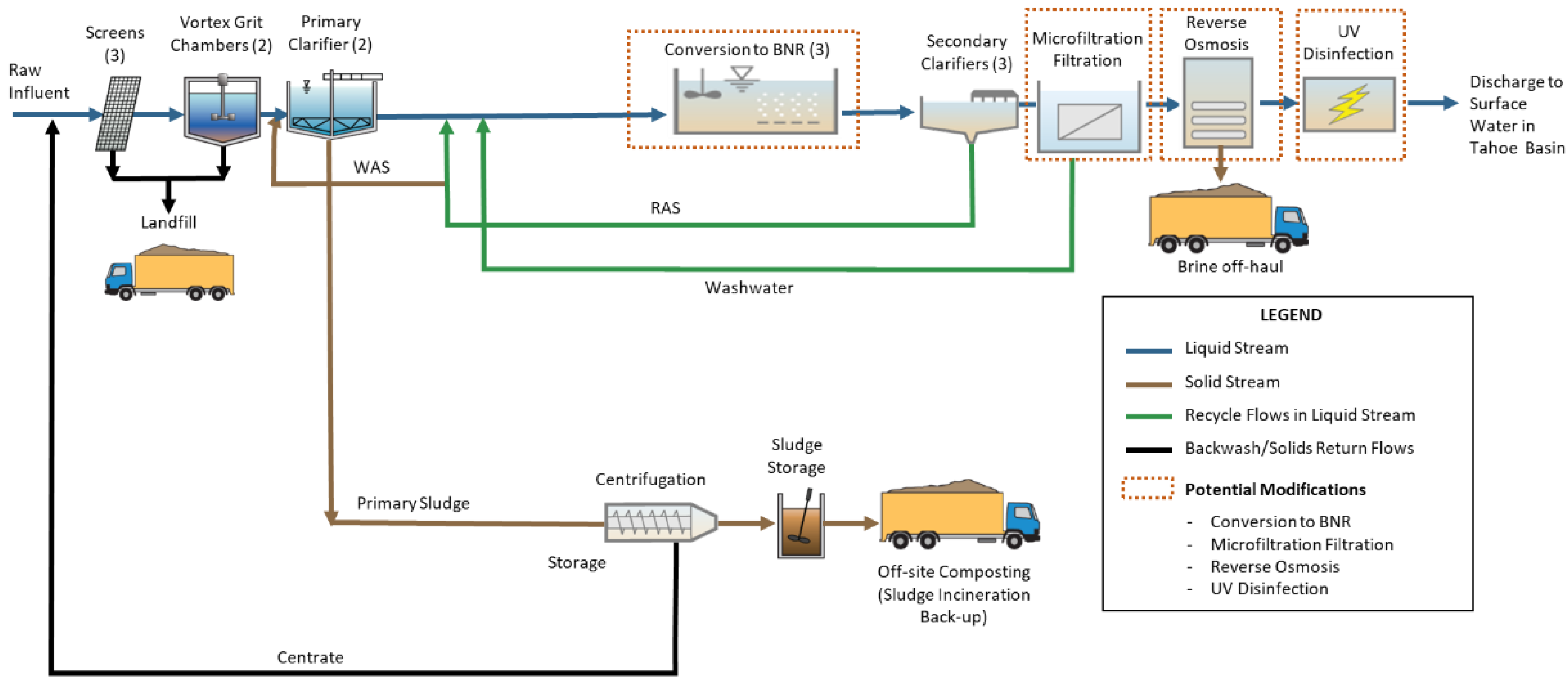


Figure 2.30 Treatment Train to Achieve Removal of Nutrients, TDS, and Chloride

Alternative Justification

These alternatives could potentially eliminate the use of the existing export system, District irrigation operations in DVR, and ranchland irrigation. There may be an opportunity for sale of water and/or water rights in the Truckee River Watershed (between CA and NV).

Key Issues and Challenges

The following presents a qualitative discussion on anticipated issues and challenges with this alternative.

- **Technical - Treatment:**
  - Upgrade of the WWTP to meet future WDRs. While these permit requirements have not been established at this time, it is anticipated that treatment upgrades would likely include BNR, MF, and RO. The treatment train upgrades add a significant degree of complexity as compared to the existing treatment process.
  - Potential limitations to the technical feasibility of meeting stringent water quality limits in WDRs.
  - Potential issue with meeting stringent nutrient limits, even with the combination of BNR and RO.
  - ROC production and disposal. Based on estimated ROC production, disposal via landfill is not feasible. Additional discharge approaches and treatment of the ROC to reduce the volume would be required.
  - There is limited space on the WWTP site for the anticipated process improvements.
- **Technical - Infrastructure:**
  - New outfall would need to be constructed to discharge to any of the three waterways.
  - Potential requirements to maintain the existing export system for emergency purposes.
- **Watershed and Regional Legal and Regulatory:**
  - See Section 2.5.6.
- **Alternative-Specific Regulatory, Legal, and Institutional:**
  - Discharge to Trout Creek and Upper Truckee River would require a new NPDES permit, subject to stringent WQBELs for TDS, chloride, total N, and total P.
  - Discharge to Heavenly Valley Creek would require a new NPDES permit, subject to stringent WQBELs for TDS and likely for other constituents including chloride, total N, and total P.
  - Existing technologies may not be sufficient to produce treated effluent that meets anticipated nutrient limits which would be included in discharge permits for Trout Creek, Upper Truckee River, and Heavenly Creek, which renders these alternatives as infeasible from a regulatory compliance perspective.
  - For discharges to all three waterways, additional water quality-based effluent limits may dictate the need for additional processes to achieve removal of trace organics and/or emerging contaminants of concern.
  - New NPDES permit for discharge to any of the surface waters.
  - Regulatory approval in tributaries contributing to an ONRW may require demonstration that there is "no degradation" of water quality as a consequence of the discharge.

  - Environmental review, approvals, and permits for new treatment processes.
  - Environmental review, approvals, and permits for new outfall and conveyance infrastructure.
  - Permitting and approvals for ROC treatment and disposal. The specific permits and approvals would require identification of a feasible ROC disposal solution.
  - LRWQCB Basin Plan Amendment to allow discharge in the Lake Tahoe Watershed.
  - Changes in TRPA code to allow use of recycled water in the Lake Tahoe Basin.
  - Modifications to the Lake Tahoe WQMP would be required.
- **Economics:**
  - Significant capital and O&M costs associated with new treatment systems to meet water quality requirements.
  - Cost of new conveyance pipelines and outfall construction.
- **Environmental and Sustainability:**
  - Additional energy-intensive treatment to reduce the ROC volume for disposal.
  - Significant energy consumption and corresponding greenhouse gas emissions associated with the new treatment systems.
  - Potential impacts to sensitive species and habitats during discharge piping and outfall construction.
- **Public:**
  - Opposition to use of recycled water within the Lake Tahoe Basin.
  - Public concern that the receiving waterways are tributaries to Lake Tahoe and would potentially impact Lake Tahoe water quality.

The screening level analysis of the challenges associated with this alternative are summarized in Table 2.38, where the degree of challenge is presented on a scale of green to red, representing lowest to highest level of challenge, respectively. The high level of watershed and regional legal and regulatory challenges associated with use of recycled water in the Lake Tahoe limit the feasibility of implementation. In addition, anticipated discharge permit requirements lead to a high level of challenge with respect to attainment of regulations and the need for a complex treatment train. Other significant challenges include economics, environmental, and public perception. Based on this analysis, Alternatives 12, 13, and 14 will not be further evaluated in this planning process.

Table 2.38 Alternatives 12, 13, and 14 – Assessment of Relative Challenge

No.	Alternative Name	Level of Challenge								
		Watershed and Regional Regulatory & Legal	Alternative-Specific Regulatory & Institutional	Technical-Treatment Level	Technical-Infrastructure (Conveyance and Treatment Facility Capacity)	Environmental/ Sustainability	Public Perception	Economic	Recycled Water Capacity Limitation	Included in Evaluation Phase (Y/N)
12, 13, 14	Discharge to Waters in Lake Tahoe Basin									N

Notes:

	Low
	Moderate
	Moderately High
	High

(1) The degree of challenge is presented on a scale of green to red, as represented by the associated color.

2.6.5.3 Alternative 15: IPR in Lake Tahoe Basin

This alternative would provide advanced treatment for IPR in the Lake Tahoe Basin, specifically via groundwater injection. The underlying groundwater basin in the region is the Tahoe Valley South Subbasin. An IPR project in the Lake Tahoe Basin would involve surface recharge or injection into the Tahoe Valley South Subbasin, followed by extraction for use as municipal supply. Based on the subsurface conditions, it would be challenging to site a surface recharge basin (i.e., via an infiltration basin) due to highly variable infiltration characteristics. Per a preliminary assessment, groundwater recharge via injection may be a more feasible option. Alternative 15 is therefore limited to IPR via groundwater injection followed by extraction and use at a downgradient location. The discharge (injection) and end use for this alternative would be within CA.

The Tahoe Valley South Subbasin (shown in Figure 2.31) is a portion of the Tahoe Valley Groundwater Basin and is approximately 23 square miles, extending south from the shore of Lake Tahoe. The District uses 11 active supply wells from several aquifers within the Tahoe Valley South Subbasin.[1] In addition to the District there are other water supply systems and private well owners that use the Tahoe Valley South Subbasin for water supply.

As discussed, there are significant legal and regulatory challenges associated with recycled water use in the basin. If these challenges could be overcome and there was a legal and regulatory pathway for use of recycled water for IPR in the Tahoe Watershed, then the Title 22 regulations for IPR for groundwater augmentation via injection would apply. For this type of IPR project, the regulations require full advanced treatment (MF, RO, AOP) for all the flow, followed by a minimum of two months travel time in the groundwater aquifer.

The IPR regulations include an allowance for an alternative to the MF, RO, AOP treatment train. A key driver for pursuing an alternative treatment train would be to eliminate the RO process and the disposal issues associated with ROC. To date, there are no agencies that have attempted to obtain SWRCB approval of an alternative treatment train, which would involve significant studies and demonstration scale testing to demonstrate that the non-RO train produces purified water that was protective of public health.

If the District were to implement a non-RO based treatment train, the recycled water would need to meet all drinking water standards, including secondary drinking water standards for TDS and chloride. The District effluent TDS and chloride concentrations meet the secondary standards of 1,000 mg/L and 500 mg/L, respectively. However, the groundwater in the Tahoe Valley South Subbasin generally exhibits low TDS and chloride concentrations of approximately 11 mg/L and 100 mg/L, respectively. These approximate concentrations are based on the average concentrations in the delivered water (100 percent groundwater) reported in the District's 2022 Consumer Confidence Report. The "no degradation" requirement associated with Lake Tahoe designated as an ONRW, may be applicable to the groundwater aquifer and would require TDS and chloride removal by an RO process. Similarly, nutrient removal would likely be required to meet the "no degradation" requirement. It is possible that additional processes would be required to provide a condition of "no degradation" of the groundwater basin.

[1] Kennedy Jenks. (2021). *2020 Urban Water Management Plan for South Tahoe Public Utility District*. https://stpud.us/asset/8955/.

Alternative 15 also involves the construction of conveyance pipelines from the District to the point of injection, injection wells, and extraction wells. The injection and extraction wells would need to be located to provide a minimum of two months travel time between the injection point and point of extraction of any potable water supply well (including private wells). Groundwater modeling and tracer studies would be required to demonstrate adequate travel time and to obtain approval from the SWRCB.

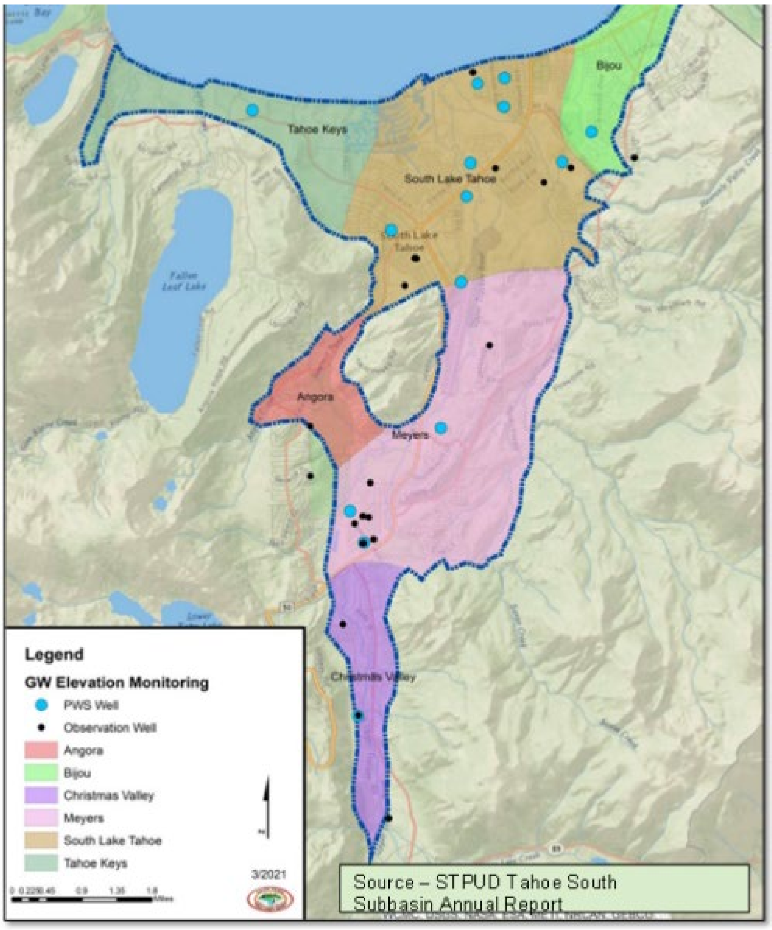


Figure 2.31 Public Water Supply Wells and Observation Wells in the Tahoe Valley South Groundwater Basin[2]

Key Components

Table 2.39 presents the key components of this alternative.

[2] Bergsohn, I. (2018). South Tahoe Public Utility District Tahoe Valley South Subbasin (6-5.01) Annual Report, 2017 Water Year.

Table 2.39 Key Components – Alternative 15

Components and Operations	Description
WWTP	Treatment plant upgrades to meet, at a minimum, Title 22 regulations for full advanced treatment, which includes BNR, MF, RO, and UV-AOP. The potential treatment train upgrades are shown in Figure 2.32.
Export System	New conveyance pipelines, injection wells, and extraction wells. Because the water is being injected in the South Tahoe area, the existing conveyance infrastructure over Luther Pass would not need to be operated. It is possible that the District would be required to maintain the existing export line for emergency situations.
Discharge Location	Tahoe Valley South Subbasin.
District Irrigation	None – All flow would be used for IPR in the Lake Tahoe Basin.
Ranchland Irrigation	None – All flow would be used for IPR in the Lake Tahoe Basin.
New Recycled Water Uses	Injected water would ultimately be used as a drinking water source within the Lake Tahoe Basin from existing supply wells.
Recycled Water Distribution	Depending on the extraction well location, new distribution system infrastructure may be required.
Hydroelectric Plant	None.
Biosolids Disposal	Potential increase in biosolids production due to increased suspended solids removal.
ROC Disposal(1)	Assuming that 100 percent of the existing District effluent flow was injected into the groundwater, the estimated ROC volume is 760,000 gallons per day, which is roughly 76 truck trips per day. Innovative approaches to reduce ROC volume, which are currently being explored at other inland agencies, could be implemented.

Notes:
(1) ROC is a waste stream generated by the RO process. For an inland location, ROC disposal options include trucking to a landfill, thermal concentration and crystallization, evaporation ponds, and deep well injection. Additional details on ROC disposal options will be included in TM3 Alternatives Evaluation, for any alternative that requires an RO process. The assumed approach for the screening analysis is trucking and disposal, as all the other ROC concentrate disposal options have significant environmental, regulatory, and economic challenges.

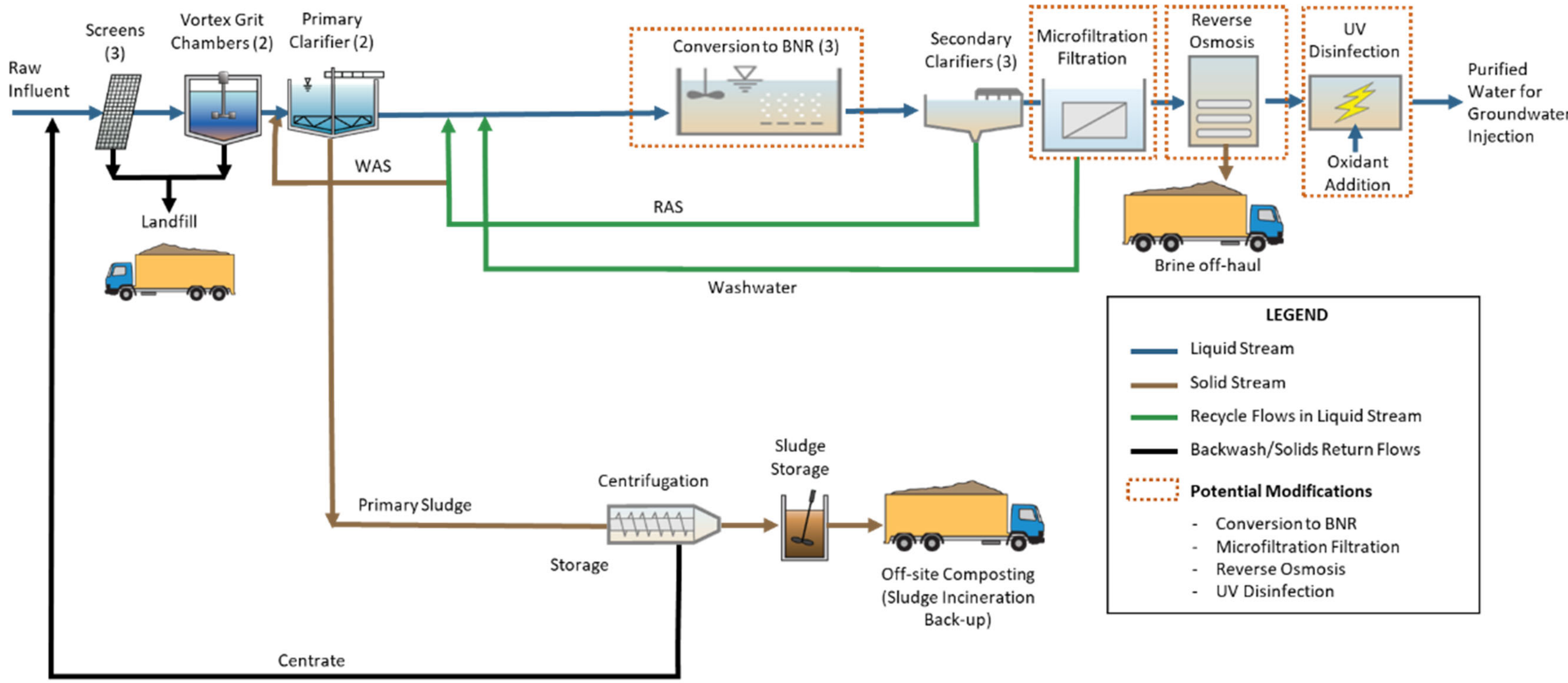


Figure 2.32 Treatment Train for Full Advanced Treatment and Additional Nutrient Removal

Alternative Justification

This alternative will potentially eliminate the need for the existing export system. Injection into the underlying groundwater basin provides a local, sustainable water supply, and keeps the water resource within the basin. It may also present an opportunity for the District to sell water and/or water rights in the Truckee Watershed.

Key Issues and Challenges

The following presents a qualitative discussion on anticipated issues and challenges with this alternative.

- **Technical - Treatment:**
  - Upgrade of the WWTP to include advanced treatment processes to include BNR, MF, RO, and UV-AOP. The treatment train upgrades add a significant degree of complexity as compared to the existing treatment process.
  - ROC production and disposal. Based on estimated ROC production, disposal via landfill is not feasible. Additional discharge approaches and treatment of the ROC to reduce the volume would be required.
  - There is limited space on the WWTP site for the anticipated process improvements.
- **Technical - Infrastructure:**
  - Construction of new injection and extraction wells and subsequent integration into the existing potable water system, which may require additional infrastructure.
  - Potential requirements to maintain the existing export system for emergency purposes.
- **Watershed and Regional Legal and Regulatory:**
  - See Section 2.5.6.
- **Alternative-Specific Regulatory, Legal, and Institutional:**
  - CA Division of Drinking Water approval for implementation of an IPR project.
  - Additional water quality requirements, potentially beyond drinking water standards, to be in compliance with anti-degradation limitations associated with ONRW designation of Lake Tahoe.
  - Environmental review, approvals, and permits would be required for the new treatment train, conveyance infrastructure, injection wells, and extraction wells.
  - Permitting and approvals for ROC treatment and disposal. The specific permits and approvals would require identification of a feasible ROC disposal solution.
  - New WDRs from the LRWQCB for groundwater injection.
  - Demonstration of minimum travel time requirements from the point of injection to any District or other potable supply well.
  - LRWQCB Basin Plan Amendment to allow discharge in the Lake Tahoe Watershed.
  - Changes in TRPA code to allow use of recycled water in the Lake Tahoe Basin.
  - Modifications to the Lake Tahoe WQMP
- **Economics:**
  - Significant capital and O&M associated with new treatment systems to meet IPR water quality requirements.
  - Capital and O&M associated with additional treatment of ROC and disposal.
  - Cost and O&M associated with conveyance piping, injection wells, and extraction wells.

- **Environmental and Sustainability:**
  - Existing water supply is sufficient, and the groundwater basin is in a sustainable condition; therefore, there is limited need for additional water supply from an IPR project.
  - Additional energy-intensive treatment to reduce the ROC volume for disposal.
  - Significant energy consumption and corresponding greenhouse gas emissions associated with the new treatment systems.
  - Potential environmental impacts to sensitive species and habitats associated with construction of new conveyance infrastructure.
  - Energy consumption and corresponding greenhouse gas emissions associated with operation of injection wells.
  - Possible water quality impacts to the groundwater basin.
- **Public:**
  - Opposition to use of recycled water within the Lake Tahoe Basin.
  - Public concern that the water will flow downgradient to Lake Tahoe and impact water quality of an ONRW.
  - General opposition to the need for additional water supply.
  - Opposition to potable reuse as a source of drinking water.

The screening level analysis of the challenges associated with this alternative are summarized in Table 2.40, where the degree of challenge is presented on a scale of green to red, representing lowest to highest level of challenge, respectively. The high level of watershed and regional legal and regulatory challenges associated with use of recycled water in the Lake Tahoe limit the feasibility of implementation. In addition, the combination of meeting IPR (via groundwater injection) regulations and potential WDRs lead to a high level of challenge with respect to attainment of regulations and the need for a complex treatment train. Other significant challenges include economics, environmental, and public perception. Based on this analysis, Alternative 15 will not be further evaluated in this planning process.

Table 2.40 Alternative 15 – Assessment of Relative Challenge

No.	Alternative Name	Level of Challenge								
		Watershed and Regional Regulatory & Legal	Alternative-Specific Regulatory & Institutional	Technical-Treatment Level	Technical-Infrastructure (Conveyance and Treatment Facility Capacity)	Environmental/ Sustainability	Public Perception	Economic	Recycled Water Capacity Limitation	Included in Evaluation Phase (Y/N)
15	IPR in Lake Tahoe Basin									N

Notes:

	Low
	Moderate
	Moderately High
	High

(1) The degree of challenge is presented on a scale of green to red, as represented by the associated color.

2.6.5.4 Alternative 16: DPR in Lake Tahoe Basin

This alternative would provide advanced treatment for DPR in the Lake Tahoe Basin, specifically within the District water supply system, shown in Figure 2.33. All components and the end use would be within CA.

As discussed, there are significant legal and regulatory challenges associated with recycled water use in the basin. If these challenges could be overcome and there was a legal and regulatory pathway for use of recycled water for DPR in the Tahoe Watershed, then the District would need to develop a project that met state DPR regulations.

The SWRCB is in the process of developing DPR regulations (expected end of 2023), which include raw water augmentation and direct to distribution. The District does not have a water treatment plant where purified water could be added to an existing surface water supply or blended with raw surface water at a plant intake. Therefore, the only DPR approach is direct to distribution.

The draft DPR regulations (2023) include requirements for pathogen reduction and chemical control, among many requirements. The draft regulations require pathogen reduction to be achieved through no less than three diverse treatment mechanisms that must include one membrane physical separation mechanism, one chemical inactivation mechanism, and one UV inactivation mechanism. Validation of pathogen reduction credit for each of these processes is required. The draft regulations for chemical control require three separate treatment processes including ozonation followed by biologically activated carbon (BAC), RO, and AOP. An alternative to a treatment or treatment sequence may be used for chemical control if an equivalent or better level of performance with respect to efficacy and reliability of pollutant reduction and protection of public health is demonstrated. This demonstration of performance requires review by an independent advisory panel. Based on the draft DPR regulations, a treatment train that would potentially comply with the DPR regulations, when finalized, would include ozone/BAC, MF/UF, RO, and UV-AOP.

As discussed for Alternative 15, the District's WWTP effluent meets secondary standards for TDS and chloride and would not need an RO process for the purpose of attainment of these standards. While the draft DPR regulations (2023) provides some flexibility for use of an alternative to RO for chemical control, the process for approval and precedent in CA would likely take decades. It is assumed for the analysis of this alternative that the treatment train would need to include ozone/BAC, MF/UF, RO, and UV-AOP.

A direct to distribution DPR alternative, regardless of the treatment train, would require additional infrastructure to convey purified water to the existing distribution system. The existing system infrastructure was configured based on the locations of groundwater supply wells. A direct to distribution DPR alternative may require additional infrastructure to connect to multiple locations in the existing distribution system, and/or replacement of portions of the existing distribution system.

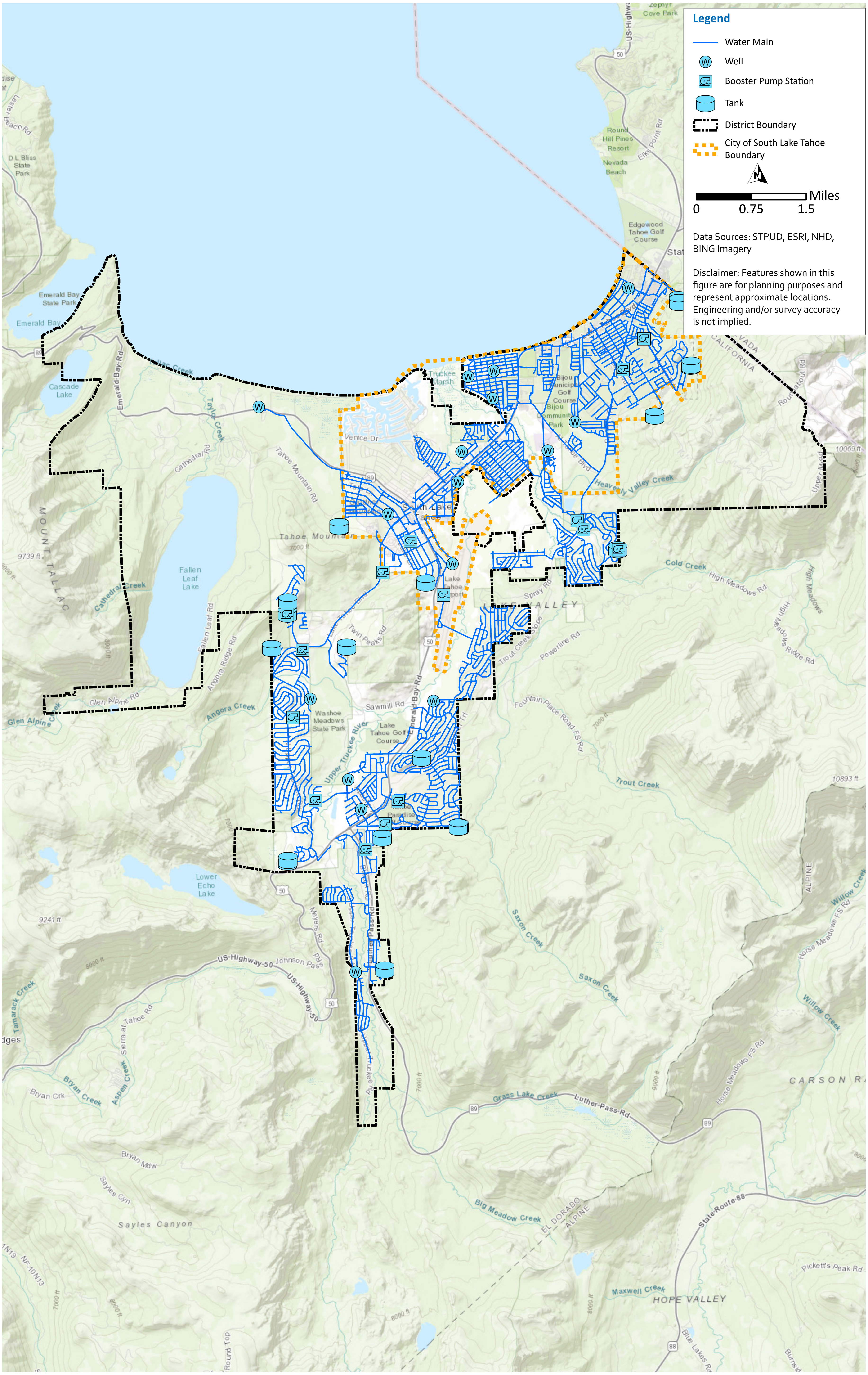


Figure 2.33 District Water Service Area

Key Components

Table 2.41 presents the key components of this alternative.

Table 2.41 Key Components – Alternative 16

Components and Operations	Description
WWTP	The DPR treatment train would include ozone/BAC, MF/UF, RO, and UV-AOP. Validation studies would identify the need for additional processes and treatment process requirements would be contingent upon adoption of final DRP regulations.
Export System	Conveyance and distribution piping for use as a potable water supply within the District service area. The existing export system would not be used.
Discharge Location	A direct to distribution DPR project does not include discharge to land, surface water, or groundwater. In this closed loop system, the purified water would be conveyed into the existing water distribution system.
District Irrigation	None – All water would be used for direct to distribution DPR.
Ranchland Irrigation	None – All water would be used for direct to distribution DPR.
New Recycled Water Uses	Treated water would be used as a drinking water source within the Lake Tahoe Basin and would be directly conveyed into the potable drinking water system.
Recycled Water Distribution	Conveyance infrastructure from the purification facilities to the existing potable water distribution system.
Hydroelectric Plant	None.
Biosolids Disposal	Potential increase in biosolids production due to increased suspended solids removal.
ROC Disposal(1)	Assuming that 100 percent of the existing District effluent flow was used for DPR, the estimated ROC volume is 760,000 gallons per day, which is roughly 76 truck trips per day. Innovative approaches to reduce ROC volume, which are currently being explored at other inland agencies, could be implemented.

Notes:

(1) ROC is a waste stream generated by the RO process. For an inland location, ROC disposal options include trucking to a landfill, thermal concentration and crystallization, evaporation ponds, and deep well injection. Additional details on ROC disposal options will be included in TM3 Alternatives Evaluation, for any alternative that requires an RO process. The assumed approach for the screening analysis is trucking and disposal, as all the other ROC concentrate disposal options have significant environmental, regulatory, and economic challenges.

Justification

This alternative will potentially eliminate the need for the existing export system. Direct reuse within the service area provides a local, sustainable water supply, and keeps the water resource within the basin. It may also present an opportunity for the District to sell water and/or water rights in the Truckee Watershed.

Key Issues and Challenges

The following presents a qualitative discussion on anticipated issues and challenges with this alternative.

- **Technical - Treatment:**
  - Upgrade of the WWTP to include advanced treatment processes to include MF/UF, RO, and UV-AOP. In addition, additional treatment processes would likely be required, including ozone/BAC and granular activated carbon.
  - ROC production and disposal. Based on estimated ROC production, disposal via landfill is not feasible. Additional discharge approaches and treatment of the ROC to reduce the volume would be required.
  - There is limited space on the WWTP site for the anticipated process improvements.
- **Technical - Infrastructure:**
  - Additional infrastructure to incorporate purified water into the existing potable water distribution system.
  - Potential requirements to maintain the existing export system for emergency purposes.
- **Watershed and Regional Legal and Regulatory:**
  - See Section 2.5.6.
- **Alternative-Specific Regulatory, Legal, and Institutional:**
  - Contingent upon finalization of CA DPR regulations.
  - Demonstration/approval of a treatment train that meets the DPR regulations.
  - Permitting and approvals for ROC treatment and disposal. The specific permits and approvals would require identification of a feasible ROC disposal solution.
  - Changes in TRPA code to allow use of recycled water in the Lake Tahoe Basin.
  - LRWQCB Basin Plan Amendment to allow discharge in the Lake Tahoe Watershed.
  - Environmental review, approvals, and permits would be required for new treatment train and conveyance infrastructure.
- **Economics:**
  - Significant capital and O&M associated with new treatment systems to meet DPR water quality requirements.
  - Significant capital and O&M associated with potable water distribution system infrastructure.
  - Capital and O&M associated with additional treatment of ROC and disposal.
- **Environmental and Sustainability:**
  - Energy consumption and corresponding greenhouse gas emissions associated with the new treatment systems needed to meet DPR requirements.
  - Existing water supply is sufficient; therefore, there is limited need for additional water supply from a DPR project.
  - Potential environmental impacts to sensitive species and habitats associated with construction of new infrastructure.
- **Public:**
  - Opposition to use of recycled water within the Lake Tahoe Basin.
  - General opposition to the need for additional water supply.
  - Opposition to DPR.

The screening level analysis of the challenges associated with this alternative are summarized in Table 2.42, where the degree of challenge is presented on a scale of green to red, representing lowest to highest level of challenge, respectively. The high level of watershed and regional legal and regulatory challenges associated with use of recycled water in the Lake Tahoe Basin limit the feasibility of implementation. In addition, the combination of meeting future DPR regulations leads to a high level of challenge with respect to attainment of regulations and the need for a complex treatment train. Other significant challenges include economics, environmental, and public perception. Based on this analysis, Alternative 16 will not be further evaluated in this planning process.

Table 2.42 Alternative 16 – Assessment of Relative Challenge

No.	Alternative Name	Level of Challenge								
		Watershed and Regional Regulatory & Legal	Alternative-Specific Regulatory & Institutional	Technical-Treatment Level	Technical-Infrastructure (Conveyance and Treatment Facility Capacity)	Environmental/ Sustainability	Public Perception	Economic	Recycled Water Capacity Limitation	Included in Evaluation Phase (Y/N)
16	DPR in Lake Tahoe Basin									N

Notes:

	Low
	Moderate
	Moderately High
	High

(1) The degree of challenge is presented on a scale of green to red, as represented by the associated color.

2.7 System Modifications

For some of the alternatives previously described, there are additional system modifications that could be implemented and not materially alter the alternatives, specifically with regards to the discharge location and end use. The five system modifications include:

- Export System Energy Recovery.
- Urban Fire Protection.
- Tunneling.
- Split Treatment.
- Constructed Wetlands.

The sections below describe these system modifications as well as which alternatives these could be applied to.

2.7.1 System Modification 1: Export System Energy Recovery

The District's existing export system includes a 50-kW hydroelectric plant on the C-Line. There are potential opportunities to improve or replace the existing hydroelectric plant to increase energy recovery. The improved energy recovery system modification would build off the existing recycled water system but add in options to recover energy in the export pipeline as it drops over Luther Pass. Another way to optimize export system energy recovery would be to add additional hydroelectric plants on the C-Line in as many locations as feasible. However, for both options which involve the existing C-Line, sections of existing pipe would need to be replaced with pipe rated to withstand higher pressures.

Applicable Alternatives

Improvement/replacement of the existing hydroelectric plant to increase energy recovery could be incorporated into any of the alternatives that utilize the existing export pipeline. In addition, any alternative that includes other export systems or new export systems with significant elevation losses could incorporate an energy recovery system.

Potential alternatives include:

- Improved Energy Recovery on Existing District Export Line:
  - No. 1: Existing System.
  - No. 2: Expanded Disinfected Secondary-23 Reuse in Alpine County.
  - No. 3: Expanded Reuse in Alpine County With Disinfected Tertiary.
  - No. 4: Discharge Into West Fork Carson River.
  - No. 5: Groundwater Injection for Disposal in Alpine County.
  - No. 6A and No. 6B: Expanded Reuse in NV.
- New Energy Recovery on DCLTSA's Export Line:
  - No. 7A and No. 7B: Conveyance to DCLTSA.
- New Energy Recovery on New Conveyance Line From District to South Fork American River:
  - No. 8: Discharge to South Fork American River.
- New Energy Recovery on New Conveyance Line From District to TCPUD:
  - No. 9A and No. 9B: Conveyance to T-TSA.

Key Components

Infrastructure associated with modification of the existing hydroelectric facility on the C-Line may include micro turbines in the existing export pipeline, replacing sections of the C-Line to pressurize the pipe, and/or constructing a new hydroelectric power facility. A long-term contract for power sales from Liberty Utilities, or the appropriate energy provider, would also be required to make this system modification financially viable. Figure 2.2 and Figure 2.4 show the existing export pipeline and the location of the existing hydroelectric plant, respectively.

For the other alternatives, the type and location of energy recovery facilities would need to be identified, with consideration of alignments of existing and new infrastructure. Relevant pipeline alignments are included in the following figures:

- Figure 2.17 – Existing conveyance route for DCLTSA's system.
- Figure 2.21 – Potential route for a new conveyance route from the District to the South Fork American River.
- Figure 2.23 – Potential route for a new conveyance line from the District to TCPUD's Service Area.

System Modification Justification

The District currently pumps up to 4.5 mgd of treated wastewater 1,505 ft over Luther Pass and out of the Lake Tahoe Basin. Annual energy costs associated with the export system are approximately $1,190,000. Increasing energy recovery in the existing export pipeline and recycled water system could be financially beneficial to the District. The District should conduct a new economic analysis and run a return on investment to determine if a new or updated hydroelectric power facility(ies) would be economically viable.

Key Issues and Challenges

The cons of this system modification are the typical challenges that arise with a construction project including permitting, bidding, construction, and documentation. In addition, a sufficient and reliable demand for energy would need to be identified to provide revenue for the District.

For all alternatives that use the District's existing export system, the state of technology and condition of the existing hydroelectric plant would need to be considered in the decision to modify or replace the system. For other existing export lines, e.g., DCLTSA's export line over Kingsbury Grade, the condition of the existing infrastructure, energy recovery technologies, and siting options for energy recovery systems along the existing alignment would need to be taken into account. For new export lines constructed (either for a new conveyance line to TCPUD or the South Fork American River), the energy recovery technologies and siting options for energy recovery systems would need to be included in the design process.

2.7.2 System Modification 2: Urban Fire Protection (Land Application in Lake Tahoe Basin)

The concept for urban fire protection is to use recycled water for fire water supply in the event that wildfires are threatening infrastructure and/or developed areas. This system modification is not a standalone alternative, given that recycled water is produced daily but would only be used rarely for urban fire protection.

The Water Code includes language that allows the District to use recycled water in the Lake Tahoe Basin to protect the Luther Pass Pump Station from catastrophic fire. As discussed at the

August 15, 2022, meeting with LRWQCB staff, recycled water was used for wildfire protection during the Caldor Fire for the purpose of protecting the Luther Pass Pump Station.

Potential modifications to expand use of recycled water for urban fire protection include obtaining approval for use of recycled water for fire flow to protect the District WWTP and/or other infrastructure and developed areas in South Lake Tahoe. In this case, the existing treatment facility and/or the existing access points along the export line would be used to access recycled water.

Another concept is implementation of additional infrastructure to provide access to recycled water at more locations along the wildland-urban interface. This system modification would essentially be a pipeline infrastructure project with hydrants accessible for firefighting needs. The amount and extent of pipeline infrastructure constructed would be determined based on both the needs and the recommendations of local firefighting agencies.

For both approaches, an amendment to the Porter-Cologne Act would be required. It is possible that broader use of recycled water for urban fire protection may require a higher level of treatment.

Applicable Alternatives

The modification described above could apply to any alternative that includes treatment at the existing District facilities. This includes all the alternatives with the exception of the two listed below, as they would not involve treatment at the District, and have already been eliminated from consideration due to complexities associated with treatment at these sites:

- No. 7B: Conveyance to DCLTSA.
- No. 9B: Conveyance to T-TSA.

System Modification Justification

This potential system modification would effectively provide an additional beneficial use of recycled water for the District and the community.

Key Issues and Challenges

Expanding the use of recycled water for fire protection supply would require an amendment to the Porter-Cologne Act, the Basin Plan, and TRPA ordinances. The system modifications would also need to be coordinated with wildland firefighting agencies to ensure that any system modifications would meet their needs. For a system that includes and expands the recycled water system in the basin, an additional challenge is justifying the cost of constructing and maintaining new infrastructure given that the system would be used infrequently.

2.7.3 System Modification 3: Export Tunnel

This system modification would involve using tunneling as part of the export infrastructure. The specific tunneling approach would depend on topography, subsurface properties, tunnel diameter, and other influencing factors. The general approach would be to avoid the elevation gain or portion of the elevation gain. Reducing elevation gain in an export system would potentially lead to reduced energy demands and costs.

There are a number of types of tunneling approaches. Trenchless tunneling methods include horizontal directional drilling and microtunneling, as well as others. The trenchless methods are typically appropriate for longitudinal distances from 1,000 to 5,000 ft. These types of tunneling approaches typically range from $2,000/linear foot (LF) to $3,000/LF. While costly, there may be opportunities in the infrastructure alignments to reduce a portion of the elevation gain of an export system. This approach is not intended for long distances, such as the distance of the combination of the B-Line and C-Line, which is approximately 90,000 ft.

For longer distances the tunneling approaches (typically used in the transportation and energy industries) include cut and cover, tunnel boring, drill and blast, and others. These tunnels are on the order of 10 ft in diameter or greater. The cost of this type of tunneling ranges from tens of millions per mile to hundreds of millions per mile (e.g., tens of thousands of dollars per LF). Depending on the length of the tunnel, this cost would likely be on the order of billions of dollars. Due to the high cost, this approach is only considered for a regional export tunnel, where multiple agencies would share the export system (tunnel) and cost of the infrastructure.

Applicable Alternatives

Trenchless tunneling approaches could be combined with any alternative that requires the conveyance of recycled water to Alpine County or Douglas County, and potentially to the South Fork American River or to the TCPUD's conveyance system. Tunneling in sections of the alignment would be evaluated as an alternative to buried pipelines that generally follow the topography. Some portion of tunneling along the existing or new infrastructure alignments may be incorporated into the following alternatives:

- Existing District Export Line:
  - No. 1: Existing System.
  - No. 2: Expanded Disinfected Secondary-23 Reuse in Alpine County.
  - No. 3: Expanded Reuse in Alpine County With Disinfected Tertiary.
  - No. 4: Discharge Into West Fork Carson River.
  - No. 5: Groundwater Injection for Disposal in Alpine County.
  - No. 6A and No. 6B: Expanded Reuse in NV.
- Existing DCLTSA Export Line:
  - No. 7A and No. 7B: Conveyance to DCLTSA.
- New Conveyance Line From District to South Fork American River:
  - No. 8: Discharge to South Fork American River.
- New Conveyance Line From District to TCPUD:
  - No. 9A and No. 9B: Conveyance to T-TSA.

A regional export tunnel that would potentially be used by several agencies would likely be designed to minimize the tunnel length. The eastern portion of the Lake Tahoe Watershed includes the steepest topography, and therefore requires the shortest tunneling distance to avoid the most elevation gain. In addition, a tunnel in the eastern portion of the Lake Tahoe Watershed would convey recycled water to users in the Carson Valley (NV), where there is an existing demand and potential future demand. This regional tunnel would be considered for general export out of the Lake Tahoe Basin and into NV for recycled water end uses. It is most closely aligned with alternatives with recycled water use in NV including:

- No. 6A and No. 6B: Expanded Reuse in NV.
- No. 7A and No. 7B: Conveyance to DCLTSA.

Key Components

Infrastructure needs for trenchless tunneling and a regional tunnel have not been determined at this time. Specific needs will depend on the alignment, topography, subsurface characteristics, pipe diameter, and other influencing factors. Additional evaluation of tunneling will be conducted as part of the alternatives evaluation phase.

System Modification Justification

The potential benefit of tunneling is to avoid the elevation gain, or portions of the elevation gain associated with the topography, in the export system. Lower energy demands and costs may be realized by reducing the elevation gain in the export system.

Key Issues and Challenges

The largest key issue with tunneling are the unknown associated factors that would influence the complexity and cost, which would ultimately impact the extent of economic benefit that could be realized through reduced energy demands over the lifetime of the tunneling infrastructure. Key influencing factors include whether there are sections of pipeline alignments where tunneling could provide benefit (relatively steep gain over a short longitudinal distance), and subsurface conditions that are more/less conducive to tunneling, and seismic risk potential. In addition, given the specialized nature of tunneling construction, getting qualified contractors to bid on a tunneling project in the Tahoe area could be even more challenging than in other areas with larger urban centers.

In addition to the physical and financial challenges, permitting would involve typical construction permits, but special permits are required due to the unique nature of tunnels and their special construction. It is anticipated permits and approvals would be required from several federal, state (CA and NV), regional, and local agencies.

2.7.4 System Modification 4: Split Treatment Facilities

This system modification involves splitting the treatment train process to accommodate two levels of treatment aimed at serving different end uses. The concept includes the use of District-owned property at the existing WWTP site and the DVR site. The general approach would be to produce advanced secondary recycled water at the existing treatment plant site. For alternatives that require a higher level of treatment, all or some of the additional treatment processes would be located at the DVR site.

Applicable Alternatives

The applicable alternatives include all alternatives that use the existing export system into Alpine County, where DVR is located, and may potentially require treatment upgrades. These alternatives include:

- No. 3: Expanded Reuse in Alpine County With Disinfected Tertiary.
- No. 4: Discharge Into West Fork Carson River.
- No. 5: Groundwater Injection for Disposal in Alpine County.
- No. 6A and No. 6B: Expanded Reuse in NV.

System Modification Justification

The potential benefits of split treatment include reducing the flow that is treated beyond the existing level of advanced secondary. However, an important consideration is that if two qualities of recycled water were produced to serve various end users, then the entire recycled water distribution system would need to be separated. This would complicate the use of existing components of the system such as Harvey Place Reservoir. The other potential benefits of split treatment are that there may be more room in DVR for new treatment processes and implementation of treatment facilities at DVR may provide job opportunities for Alpine County residents.

Key Issues and Challenges

The key challenges with split treatment include the complexity associated with producing/conveying two levels of recycled water quality (if applicable), and de-centralization of the District treatment facilities which may impact efficiencies with respect to staffing, instrumentation, and monitoring. In addition, there may be site-specific advantages and disadvantages with building on a relatively undeveloped site (DVR). For example, it may be easier from a space and utility conflicts perspective but may be more challenging from an environmental review perspective.

2.7.5 System Modification 5: Constructed Wetlands

This system modification involves the addition of constructed wetlands in Alpine County. The location of the treatment wetlands will be explored in more detail in TM3 Alternatives Evaluation. One potential option would be to locate the wetlands prior to discharge to Harvey Place Reservoir. The wetlands would provide a water quality polishing step prior to discharge to the reservoir and downstream end uses. The wetlands could also be designed to provide wetland habitat/ecological benefits, and possibly be used as a wetland mitigation bank.

Applicable Alternatives

The applicable alternatives include all alternatives that convey effluent to Alpine County, where some portion of the water could be used to support terminal wetlands, or for flow through wetlands prior to discharge to Harvey Place Reservoir. Applicable alternatives include:

- No. 1: Existing System.
- No. 2: Expanded Disinfected Secondary-23 Reuse in Alpine County.
- No. 3: Expanded Reuse in Alpine County With Disinfected Tertiary.
- No. 4: Discharge Into West Fork Carson River.
- No. 5: Groundwater Injection for Disposal in Alpine County.
- No. 6A and No. 6B: Expanded Reuse in NV.

System Modification Justification

The potential benefit of wetlands would be to potentially provide polishing treatment and/or wetland habitat/ecological benefits in Alpine County. If established as a wetland mitigation bank, there may be opportunities for District revenue from the sale of wetland credits.

Key Issues and Challenges

The most significant challenges associated with incorporating wetlands in Alpine County include permitting and approvals for implementation of a treatment wetlands and/or establishment of a wetlands mitigation bank. For a treatment wetlands, state and local permits and approvals would be required. Modification of the District's WDRs, as issued by the LRWQCB, would be required to include discharge to constructed wetlands. A key issue with LRWQCB permitting would be to maintain the wastewater regulatory compliance point at the treatment facility, as the quality of outflow from a wetland system can be variable and is difficult to control. Any work within the wetland, once constructed, would also require permits/approvals from state agencies.

For a wetland mitigation bank, federal and state agencies would be involved. Proposed mitigation bank projects are generally reviewed and approved by the United States Army Corps of Engineers, EPA (Region 9), United States Fish and Wildlife Service, National Oceanic Atmospheric Administration's National Marine Fisheries Service, and California Department of Fish and Wildlife. These agencies comprise and are referred to jointly as the Interagency Review Team (IRT) during the application process. There are a series of steps in the process for obtaining approval from the IRT.

2.8 Alternatives Screening Analysis

As discussed in Section 2.3.2, the alternatives were screened by the District project team, with input from the SAG and the public. The qualitative screening was based on the potential benefit/justification of an alternative, along with the anticipated challenges and issues associated with implementing that alternative. Alternatives were screened into two general categories:

- Low Potential Alternatives – No significant additional evaluation of this alternative is included as part of the Plan.
- High Potential Alternatives – Additional evaluation of this alternative is included as part of the Plan.

A summary of the screening analysis is presented in Table 2.43. The table identifies the relatively high potential alternatives that are selected for further evaluation, which include:

- No. 1: Existing System.
- No. 2: Expanded Disinfected Secondary-23 Reuse in Alpine County.
- No. 3: Expanded Reuse in Alpine County With Disinfected Tertiary.
- No. 4: Discharge Into West Fork Carson River.
- No. 6A: Expanded Reuse in NV – Indian Creek.
- No. 6B: Expanded Reuse in NV – Mud Lake.
- No. 7A: Conveyance to DCLTSA.

Table 2.43 Summary of Relative Challenges for All Alternatives

No.	Alternative Name	Level of Challenge								
		Watershed and Regional Regulatory & Legal	Alternative-Specific Regulatory & Institutional	Technical-Treatment Level	Technical-Infrastructure (Conveyance and Treatment Facility Capacity)	Environmental/ Sustainability	Public Perception	Economic	Recycled Water Capacity Limitation	Included in Evaluation Phase (Y/N)
1	Existing System								Not Applicable	Y
2	Expanded Disinfected Secondary-23 Reuse in Alpine County									Y
3	Expanded Disinfected Tertiary Reuse in Alpine County									Y
4	Discharge to West Fork Carson and Use in NV									Y
5	Groundwater Recharge for Disposal in Alpine County									N
6A	Expanded Class A or B Reuse in NV (Indian Creek)									Y
6B	Expanded Class A or B Reuse in NV (Mud Lake)									Y
7A	Conveyance to DCLTSA With Reuse in NV (Treated Effluent to DCLTSA)									Y
7B	Conveyance to DCLTSA With Reuse in NV (Raw or Partially Treated Effluent to DCLTSA)									N

No.	Alternative Name	Level of Challenge								
		Watershed and Regional Regulatory & Legal	Alternative-Specific Regulatory & Institutional	Technical-Treatment Level	Technical-Infrastructure (Conveyance and Treatment Facility Capacity)	Environmental/ Sustainability	Public Perception	Economic	Recycled Water Capacity Limitation	Included in Evaluation Phase (Y/N)
8A	Recycled Water for Irrigation in South Fork American Watershed									N
8B	Discharge to South Fork American River									N
9A	Conveyance to T-TSA and Discharge to Truckee River (Treated Effluent to T-TSA)									N
9B	Conveyance to T-TSA and Discharge to Truckee River (Raw or Partially Treated Effluent to T-TSA)									N
10, 11	Landscape Irrigation and Snowmaking									N
12, 13, 14	Discharge to Waters in Lake Tahoe Basin									N
15	IPR in Lake Tahoe Basin									N
16	DPR in Lake Tahoe Basin									N

Notes:

	Low
	Moderate
	Moderately High
	High

(1) The degree of challenge is presented on a scale of green to red, as represented by the associated color.

The system modifications described in Section 2.7 could be considered with one or more of the alternatives in the selected group. Therefore, the system modifications will be considered, where most applicable, as additional components or infrastructure options of the selected group of alternatives. The consideration of system modifications with the selected group of alternatives is summarized in Table 2.44.

Table 2.44 System Modification and Applicable Alternatives

System Modifications	Applicable Alternatives in Selected Group
Export System Energy Recovery	All.
Urban Fire Protection	All.
Trenchless Tunneling	All.
Regional Tunnel	No. 6A and No. 6B: Expanded Reuse in NV. No. 7A: Conveyance to DCLTSA.
Split Treatment	No. 3: Expanded Reuse in Alpine County With Disinfected Tertiary. No. 4: Discharge Into West Fork Carson River. No. 6A and No. 6B: Expanded Reuse in NV.
Constructed Wetlands	No. 1: Existing System. No. 2: Expanded Disinfected Secondary-23 Reuse in Alpine County. No. 3: Expanded Reuse in Alpine County With Disinfected Tertiary. No. 4: Discharge Into West Fork Carson River. No. 6A and No. 6B: Expanded Reuse in NV.

One important consideration is that the Plan has a 50-year horizon. As such, there are some alternatives that are anticipated to have a relatively low potential within this 50-year horizon. However, there are other alternatives that are characterized as low potential at present and in the relative near term (10 to 20 years) but may be more promising in the future if there are new drivers in the region, if legal/regulatory/institutional constraints are lessened, or if there are technical advancements in treatment technologies. Pathways for future consideration for some of the low potential alternatives are identified in Table 2.45.

Table 2.45 Pathways for Future Consideration of the Low Potential Alternatives

Alternative	Name	Potentially Considered in Future (Y/N)	Future Drivers and/or Modified Conditions
5	Groundwater Recharge for Disposal in Alpine County	Y – However, for future consideration this alternative would be configured as an IPR project.	• A need for an alternative water supply to the Carson Valley Basin.
7B	Conveyance to DCLTSA With Reuse in NV (Raw or Partially Treated Effluent to DCLTSA)	N – This alternative requires space for expansion of the DCLTSA treatment facility to treat wastewater from the District. Over the long-term planning horizon, it is expected that land availability and cost of land will become more challenging.	NA
8A	Recycled Water for Irrigation in South Fork American River Watershed	Y	• Increased demands in the upper section of the South Fork American River Watershed. • Opportunity for revenue from sale of recycled water.
8B	Discharge to South Fork American River	Y	• Increased need for water supply in the South Fork American River along with approval for discharge in the upper reaches of the river. • Discharge permit conditions that do not require implementation of RO, or technological developments such that permit limits could be attained with alternative treatment processes that do not generate a waste product with challenges similar to those associated with ROC. • Opportunity for revenue from downstream use of water discharged to the South Fork American River.
9A and 9B	Conveyance to T-TSA and Discharge to Truckee River	N – Both of these alternatives require a new pipeline segment from the District's WWTP to the vicinity of the TCPUD interceptor. The terrain and proximity to tributaries and Lake Tahoe contribute to the significant technical challenges and concerns for environmental impacts. Alternative 9A would require a new pipeline segment along the West Shore of Lake Tahoe and Truckee River to the T-TSA WWTP, which would also present challenges with potential for generating environmental impacts. Alternative 9B would require potential treatment upgrades at T-TSA's WWTP to mitigate the additional TDS load that the District effluent would contribute, which adds a significant degree of complexity. These challenges are not anticipated to be lessened in the 50-year planning horizon.	NA
10 and 11	Landscape Irrigation and Snowmaking	Y	• Significantly increased need for water supply in the basin. • Modification of Porter-Cologne Act, and all associated legal and regulatory constraints with discharge in the Lake Tahoe Basin. • WDRs that do not require implementation of RO, or technological developments such that permit limits could be attained with alternative treatment processes that do not generate a waste product with challenges similar to those associated with ROC. • Public acceptance of the use of recycled water for land application (irrigation and snowmaking) in the Lake Tahoe Watershed.
12, 13, 14	Discharge to Waters in Lake Tahoe Basin	N – All of these alternatives involve discharge to a tributary to Lake Tahoe. Of all the alternatives in the Lake Tahoe Watershed, these three alternatives would have the greatest potential to impact the water quality of Lake Tahoe, which is one of two waterbodies in CA with an ONRW designation. Protection of pristine waters is expected to be equally or more important in the 50-year planning horizon. In addition, existing technologies may not be sufficient to produce treated effluent that meets anticipated nutrient limits which would be included in the discharge permits for these three water tributaries.	NA

Alternative	Name	Potentially Considered in Future (Y/N)	Future Drivers and/or Modified Conditions
15	IPR in Lake Tahoe Basin	Y	• Significantly increased need for water supply in the basin, either as a consequence of shortage or water quality degradation. • Development of an IPR approach that would provide water quality benefits with respect to mitigating the impacts or migration of groundwater contaminant plumes. • Modification of Porter-Cologne Act, and all associated legal and regulatory constraints with discharge in the Lake Tahoe Basin. • Regulatory approval of a non-RO treatment train for IPR via groundwater injection. • Technological developments such that WDRs, which would be protective of groundwater quality, could be attained with alternative treatment processes to RO, which do not generate a waste product with challenges similar to those associated with ROC. • Public acceptance of IPR in the basin.
16	DPR in Lake Tahoe Basin	Y	• Significantly increased need for water supply in the basin, either as a consequence of shortage or water quality degradation. • Modification of Porter-Cologne Act, and all associated legal and regulatory constraints with discharge in the Lake Tahoe Basin. • SWRCB approval of a non-RO treatment train for DPR via direct to distribution. • Public acceptance of DPR via direct to distribution.

Notes:
Abbreviations: NA - Not Applicable.

2.9 Recommendations

The alternatives identification and screening process led to the selection of six alternatives in addition to the existing system. In addition, there are five system modifications that will be considered as part of the further development and evaluation of the selected alternatives. The selected alternatives include:

- No. 1: Existing System.
- No. 2: Expanded Disinfected Secondary-23 Reuse in Alpine County.
- No. 3: Expanded Reuse in Alpine County With Disinfected Tertiary.
- No. 4: Discharge Into West Fork Carson River.
- No. 6A: Expanded Reuse in NV – Indian Creek.
- No. 6B: Expanded Reuse in NV – Mud Lake.
- No. 7A: Conveyance to DCLTSA.

The five system modifications include:

- System Modification 1: Export System Energy Recovery.
- System Modification 2: Urban Fire Protection (Land Application in Lake Tahoe Basin).
- System Modification 3: Export Tunnel.
- System Modification 4: Split Treatment Facilities.
- System Modification 5: Constructed Wetlands.

The alternatives evaluation will include:

- Identification of specific conditions that would trigger the consideration of each alternative.
- Conceptual design of the treatment and infrastructure components.
- Incorporation of system modifications, as applicable, into the conceptual design of the alternative.
- Planning level life-cycle costs.
- Comparison with the existing system.
- Development of an implementation plan that outlines the process for addressing the specific legal/regulatory/institutional aspects of the alternative.

The alternatives evaluation will be the basis for developing the overall recycled water strategy that includes the most feasible alternatives and system modifications, conceptual level design, implementation process, and the future conditions/triggers that would support implementation.

Appendix 2A

ADDITIONAL ALTERNATIVE INFORMATION

South Tahoe Public Utility District
Recycled Water Strategic Plan

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Abbreviations

BOD	biochemical oxygen demand
C_d	maximum District effluent concentration of a given parameter
CEDEN	California Environmental Data Exchange Network
cfs	cubic feet per second
Cl	chloride
Cl_2	chlorine
C_r	concentration of combined flow
C_s	receiving water concentration
Deg C	degrees Celsius
District	South Tahoe Public Utility District
E. coli	*Escherichia coli*
Fe	iron
LRWQCB	Lahontan Regional Water Quality Control Board
mg/L	milligrams per liter
mgd	million gallons per day
mL/L	milliliter per liter
MPN	most probable number
µS/cm	microsiemens per centimeter
N	nitrogen
NO_3-N	nitrate nitrogen
NTU	nephelometric turbidity unit(s)
P	phosphorus
ppd	parts per day
Q_d	average District discharge flow
Q_r	combined flow of District discharge + flow of receiving water body
Q_s	receiving water flow
RPA	reasonable potential analysis
SGMA	Sustainable Groundwater Management Act
SO_4	sulfate
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TSS	total suspended solids
USGS	United States Geological Survey

Appendix 2A

ADDITIONAL ALTERNATIVE INFORMATION

This appendix contains additional alternative information for some of the alternatives discussed in the South Tahoe Public Utility District's (District) Recycled Water Strategic Plan.

Carson Watershed Alternatives

Alternative 1: Existing System

Water quality data for District wastewater is shown in Table 2A.1. Data presented here is from sampling that occurred between January 2019 and December 2020.

Table 2A.1 District Water Quality Parameters

Parameter	Measurement	Unit	25th Percentile	Median	Average	75th Percentile	Maximum
Flow	Influent	mgd	2.9	3.1	3.2	3.5	4.2
BOD	Raw	mg/L	234	260	257	289	374
	Raw	ppd	6,080	7,139	7,310	8,332	12,757
	Final	mg/L	6.1	7.2	8.1	9.7	25.9
TSS	Raw	mg/L	175	202	203	231	457
	Raw	ppd	4,586	5,509	5,747	6,549	10,291
	Final	mg/L	2	3	4	5	18
Settleable Solids	Raw	mL/L	13	15	16	18	32
	Final		<0.1	<0.1	<0.1	<0.1	<0.1
Electrical Conductivity	Raw	µS/cm	574	618	605	645	717
	Final		608	665	647	694	366
Total N	Raw	mg/L	36	39	40	45	54
	Final		26	31	30	34	41
TKN	Raw	mg/L	35	39	40	44	35
	Raw	ppd	944	1,033	1,084	1,188	1,855
	Final	mg/L	25	31	29	34	41
Ammonia	Raw	mg/L-N	27	30	30	33	40
	Final		26	29	29	32	40
Nitrite	Raw	mg/L-N	0.01	0.02	0.05	0.06	0.33
	Final		0.26	0.35	0.35	0.52	1.14
Nitrate	Raw	mg/L-N	0.01	0.01	0.05	0.01	0.37
	Final		0.10	0.15	0.29	0.23	3.93
pH	Raw	-	7.44	7.49	7.49	7.54	7.75
	Final		7.78	7.83	7.83	7.89	8.15

Parameter	Measurement	Unit	25th Percentile	Median	Average	75th Percentile	Maximum
Alkalinity	Raw	mg/L	177	197	192	209	239
	Final		176	196	191	209	239
Total P	Raw	mg/L	5.0	5.6	5.6	6.3	8.5
	Raw	ppd	128.7	141.1	150.0	173.7	223.5
	Final	mg/L	2.9	3.4	3.6	4.4	5.3
Cl	Raw	mg/L	43	45	45	47	63
	Final		55	58	58	60	76
SO_4	Raw	mg/L	14	15	15	16	19
	Final		17	18	17	19	21
Turbidity	Final	NTU	3.0	3.7	3.9	4.6	8.9
	Final - Grab		2.8	3.5	3.8	4.5	10.0
Temperature	Final - Grab	Deg C	10.7	13.2	14.0	17.8	21.6
Cl_2	Final - Total	mg/L	6.1	6.7	6.8	7.5	20.0
	Final - Free		<0.2	<0.2	<0.2	<0.2	<0.2
Total Coliform	Final - Grab	MPN	1.0	1.0	1.0	1.0	32.3
	7-day Average		1.0	1.0	1.0	1.0	2.0
E. coli	Final - Grab	MPN	<1	<1	<1	<1	<1
TDS	Raw	mg/L	-	-	270	-	-

Notes:
Abbreviations: BOD - biochemical oxygen demand; Cl - chloride; Cl_2 - chlorine; Deg C - degrees Celsius; *E. coli* - *Escherichia coli*; mg/L - milligrams per liter; mgd - million gallons per day; mL/L - milliliter per liter; MPN - most probable number; µS/cm - microsiemens per centimeter; N - nitrogen; NTU - nephelometric turbidity unit(s); P - phosphorus; ppd - parts per day; SO_4 - sulfate; TDS - total dissolved solids; TKN - total Kjeldahl nitrogen; TSS - total suspended solids.

Alternative 2: Expanded Secondary 23 Recycled Water Delivery in Alpine County

No additional alternative information is provided in this appendix.

Alternative 3: Expanded Disinfected Tertiary Reuse in Alpine County

No additional alternative information is provided in this appendix.

Alternative 4: Discharge to West Fork of Carson River and Use in Nevada

Water quality objectives for the West Fork Carson River are shown in Table 2A.2.

Table 2A.2 West Fork Carson Water Quality Objectives

Location	TDS (mg/L)	Cl (mg/L)	SO_4 (mg/L)	Total P (mg/L)	Boron (mg/L)	Total N (mg/L)	TKN (mg/L)	NO_3-N (mg/L)
West Fork Carson River at Woodfords	55	1.0	2.0	0.02	0.02	0.15	0.13	0.02
West Fork Carson River at Stateline	70	2.5	2.0	0.03	0.02	0.25	0.22	0.03

Notes:
(1) Data Source: Lahontan Regional Water Quality Control Board (LRWQCB) Basin Plan, Chapter 3 (2021).
Abbreviations: NO_3-N - nitrate nitrogen.

A simple reasonable potential analysis (RPA) was performed to determine the impacts of District effluent water on the existing water quality of the West Fork Carson River. The simple RPA performed uses the existing and anticipated District wastewater effluent data noted in Alternative 1, Table 2A.1, and calculates the anticipated water quality in the river for low, high, and average monthly streamflow conditions. Water quality data for the West Fork Carson River was pulled from the California Environmental Data Exchange Network (CEDEN) and flow data was pulled from available United States Geological Survey (USGS) stream gages.

For the RPA, TDS and Cl were the two parameters focused on, as these are the most difficult to remove in conventional treatment. The following variables were used in the RPA:

- Q_d: Average District discharge flow.
- C_d: Maximum District effluent concentration of a given parameter.
- Q_s: Receiving water flow (in this case, receiving water is the West Fork Carson River).
- C_s: Receiving water concentration (average based on CEDEN data).
- Q_r: Combined flow of District discharge + flow of receiving water body.
- C_r: Concentration of combined flow.

The resulting C_r is calculated as follows:

$$C_r = \frac{Q_d * C_d + Q_s * C_s}{Q_r}$$

C_r is compared against the previously mentioned water quality standards to determine if District effluent, with the existing treatment train, could be added into the receiving water. Results of the simple RPA for the existing and future District flows are shown in Table 2A.3 and Table 2A.4.

Table 2A.3 RPA – West Fork Carson and Existing District Flows

Flow Condition	Q_d (mgd)	C_d (mg/L)	Q_s (cfs)	Q_s (mgd)	C_s (mg/L)	Q_r (cfs)	C_r (mg/L)
TDS							
Low Monthly Average Streamflow	3.66	314	20	10.8	50.5	14.4	117.4
Average Monthly Streamflow	3.66	314	89.1	47.9	50.5	51.6	69.2
High Monthly Average Streamflow	3.66	314	317	170.5	50.5	174.2	56.1
Cl							
Low Monthly Average Streamflow	3.66	314	20	10.8	1.58	14.4	20.4
Average Monthly Streamflow	3.66	314	89.1	47.9	1.58	51.6	6.8
High Monthly Average Streamflow	3.66	314	317	170.5	1.58	174.2	3.1

Notes:
Abbreviations: cfs - cubic feet per second.

Table 2A.4 RPA – West Fork Carson and Future District Flows

Flow Condition	Q_d (mgd)	C_d (mg/L)	Q_s (cfs)	Q_s (mgd)	C_s (mg/L)	Q_r (cfs)	C_r (mg/L)
TDS							
Low Monthly Average Streamflow	5.4	314	20	10.8	50.5	16.2	138.6
Average Monthly Streamflow	5.4	314	89.1	47.9	50.5	53.3	77.2
High Monthly Average Streamflow	5.4	314	317	170.5	50.5	175.9	58.6
Cl							
Low Monthly Average Streamflow	5.4	314	20	10.8	1.58	16.2	26.3
Average Monthly Streamflow	5.4	314	89.1	47.9	1.58	53.3	9.1
High Monthly Average Streamflow	5.4	314	317	170.5	1.58	175.9	3.9

As demonstrated in the simple RPA, current and future effluent District flows and concentrations using the current level of treatment will cause exceedances in the TDS and Cl water quality objectives for the West Fork Carson River for all flow conditions.

Alternative 5: Groundwater Recharge for Disposal in Alpine County

Additional information regarding the Carson Valley Groundwater Basin and its related sustainable yield is based on the Sustainable Groundwater Management Act (SGMA). Per SGMA, the State of California Department of Water Resources is required to prioritize groundwater basins in California. A number of factors went into determining the priority of the basins, which are listed below:

1. The population overlying the basin or subbasin.
2. The rate of current and projected growth of the population overlying the basin or subbasin.
3. The number of public supply wells that draw from the basin or subbasin.
4. The total number of wells that draw from the basin or subbasin.
5. The irrigated acreage overlying the basin or subbasin.
6. The degree to which persons overlying the basin or subbasin rely on groundwater as their primary source of water.
7. Any documented impacts on the groundwater within the basin or subbasin, including overdraft, subsidence, saline intrusion, and other water quality degradation.
8. Any other information determined to be relevant by the department, including adverse impacts on local habitat and local streamflows:
   a. Adverse impacts on local habitat and local streamflows.
   b. Adjudicated areas.
   c. Critically overdrafted basins.
   d. Groundwater-related transfers.

As a result of this process, the Carson Valley Groundwater Basin is considered to be categorized as a low priority basin, shown in Figure 2A.1. As a low priority basin, neither a groundwater sustainability agency nor a groundwater sustainability plan is required. Therefore, there is no threat to the sustainability of the Carson Valley Groundwater Basin, which means there is no driver for indirect potable reuse in this basin.

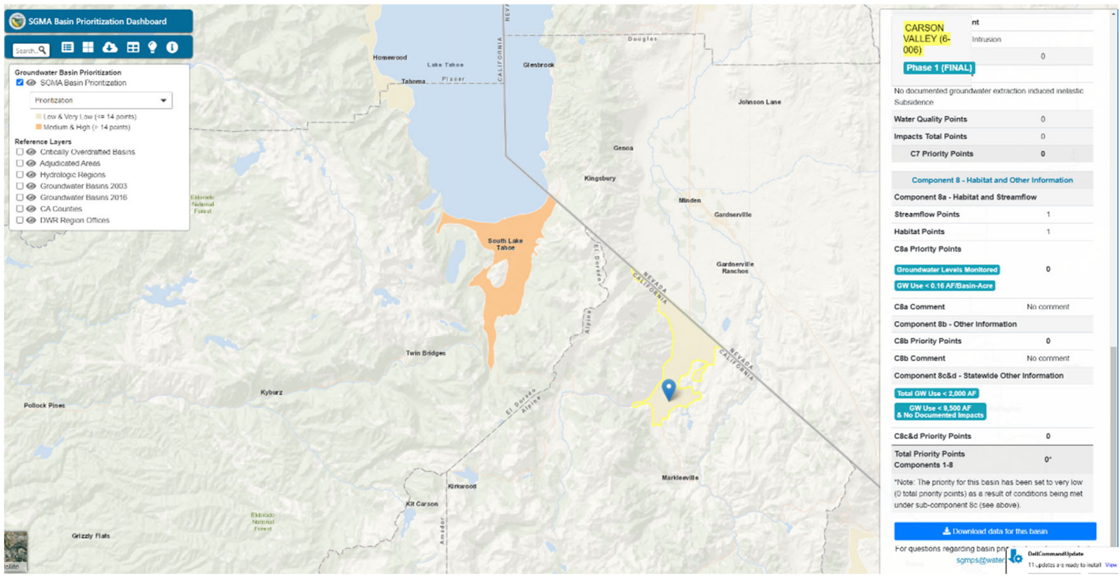

Figure 2A.1 SGMA Basin Prioritization Dashboard

Alternatives 6A and 6B: Expanded Class A or B Reuse in Nevada

Water quality objectives for Indian Creek are shown in Table 2A.5.

Table 2A.5 Indian Creek Water Quality Objectives

Location	TDS (mg/L)	Cl (mg/L)	SO_4 (mg/L)	Total P (mg/L)	Boron (mg/L)	Total N (mg/L)	TKN (mg/L)	NO_3-N (mg/L)
Indian Creek Reservoir	305	24	-	0.04	-	4.0	-	-

Notes:
(1) Data Source: LRWQCB Basin Plan, Chapter 3 (2021).

A simple RPA was performed to determine the impacts of District effluent water on the existing water quality of Indian Creek. The simple RPA performed uses the existing and anticipated District wastewater effluent data noted in Alternative 1, Table 2A.1, and calculates the anticipated water quality in the creek for low, high, and average monthly streamflow conditions. Water quality data for Indian Creek were pulled from the Nevada Division of Environmental Protection and flow data was pulled from available USGS stream gages.

Details for performing an RPA can be found in the Alternative 4 section above. Results of the simple RPA for the existing and future District flows are shown in Table 2A.6 and Table 2A.7.

Table 2A.6 RPA – Indian Creek and Existing District Flows

Flow Condition	Q_d (mgd)	C_d (mg/L)	Q_s (cfs)	Q_s (mgd)	C_s (mg/L)	Q_r (cfs)	C_r (mg/L)
TDS							
Low Monthly Average Streamflow	3.66	314	2.4	1.3	161.5	4.9	274.6
Average Monthly Streamflow	3.66	314	11.7	6.3	161.5	9.9	217.7
High Monthly Average Streamflow	3.66	314	24.1	13.0	161.5	16.6	195.0
Cl							
Low Monthly Average Streamflow	3.66	314	2.4	1.3	23.5	4.9	62.1
Average Monthly Streamflow	3.66	314	11.7	6.3	23.5	9.9	42.7
High Monthly Average Streamflow	3.66	314	24.1	13.0	23.5	16.6	35.0

Table 2A.7 RPA – Indian Creek and Future District Flows

Flow Condition	Q_d (mgd)	C_d (mg/L)	Q_s (cfs)	Q_s (mgd)	C_s (mg/L)	Q_r (cfs)	C_r (mg/L)
TDS							
Low Monthly Average Streamflow	5.4	314	2.4	1.3	161.5	6.7	284.9
Average Monthly Streamflow	5.4	314	12.0	6.3	161.5	11.7	232.1
High Monthly Average Streamflow	5.4	314	24.1	13.0	161.5	18.4	206.3
Cl							
Low Monthly Average Streamflow	5.4	314	2.4	1.3	23.5	6.7	65.6
Average Monthly Streamflow	5.4	314	12.0	6.3	23.5	11.7	47.6
High Monthly Average Streamflow	5.4	314	24.1	13.0	23.5	18.4	38.8

As demonstrated in the simple RPA, current and future effluent District flows and concentration using the current level of treatment will not exceed TDS water quality objectives but cause exceedances in the water quality objectives for Cl in Indian Creek for all streamflow conditions.

Alternatives 7A and 7B: Conveyance to Douglas County Lake Tahoe Sewer Authority With Reuse in Nevada

No additional alternative information is provided in this appendix.

American River Watershed Alternative

Alternative 8: Discharge to South Fork American River

The only water quality objective for the South Fork American River is a TDS limitation of 125 mg/L (90th percentile of data).

A simple RPA was performed to determine the impacts of District effluent water on the existing water quality of the South Fork American River. The simple RPA performed uses the existing and anticipated District wastewater effluent data noted in Alternative 1, Table 2A.1, and calculates the anticipated water quality in the creek for low, high, and average monthly streamflow conditions. Water quality data for the South Fork American River were pulled from the CEDEN database and flow data were pulled from available USGS stream gages.

Details for performing an RPA can be found in the Alternative 4 section above. Results of the simple RPA for the existing and future District flows are shown in Table 2A.8 and Table 2A.9. Note that there was very minimal Cl data available for this area of the South Fork American River on CEDEN. In addition, the Central Valley Basin Plan does not have an objective for Cl.

Table 2A.8 RPA – South Fork American River and Existing District Flows

Flow Condition	Q_d (mgd)	C_d (mg/L)	Q_s (cfs)	Q_s (mgd)	C_s (mg/L)	Q_r (cfs)	C_r (mg/L)
TDS							
Low Monthly Average Streamflow	3.66	314	85.0	45.7	17.0	49.4	39.0
Average Monthly Streamflow	3.66	314	395.8	212.9	17.0	216.6	22.0
High Monthly Average Streamflow	3.66	314	1,240.0	667.1	17.0	667.1	18.6

Table 2A.9 RPA – South Fork American River and Future District Flows

Flow Condition	Q_d (mgd)	C_d (mg/L)	Q_s (cfs)	Q_s (mgd)	C_s (mg/L)	Q_r (cfs)	C_r (mg/L)
TDS							
Low Monthly Average Streamflow	5.4	314	85.0	45.7	17.0	51.1	48.4
Average Monthly Streamflow	5.4	314	395.8	212.9	17.0	218.3	24.3
High Monthly Average Streamflow	5.4	314	1,240.0	667.1	17.0	672.5	19.4

As demonstrated in the simple RPA, current and future effluent District flows and concentrations using the current level of treatment will not exceed TDS water quality objectives in South Fork American River for all streamflow conditions.

Truckee Watershed Alternatives

Alternatives 9A and 9B: Conveyance to Tahoe-Truckee Sanitation Agency and Discharge to Truckee River

No additional alternative information is provided in this appendix.

Lake Tahoe Watershed Alternative

Alternatives 10 and 11: Land Application (Landscape Irrigation and Snowmaking) in Lake Tahoe Basin

No additional alternative information is provided in this appendix.

Alternatives 12, 13, and 14: Discharge to Waters in Lake Tahoe Basin

Heavenly Valley Creek

There are no specified water quality objectives for Heavenly Valley Creek in the LRWQCB Basin Plan. Therefore, the Basin Plan electrical conductivity limitations for Lake Tahoe (95 micromhos per centimeter, equivalent to approximately 60 mg/L of TDS) was used as a surrogate objective for Heavenly Valley Creek since it is a tributary to Lake Tahoe.

A simple RPA was performed to determine the impacts of District effluent water on the existing water quality of Heavenly Valley Creek. The simple RPA performed uses the existing and anticipated District wastewater effluent data noted in Alternative 1, Table 2A.1, and calculates the anticipated water quality in the creek for low, high, and average monthly streamflow conditions. Water quality data for Heavenly Valley Creek was pulled from CEDEN and flow data was pulled from available USGS stream gages. Note that there was no Cl data available for Heavenly Valley Creek on CEDEN.

Details for performing an RPA can be found in the Alternative 4 section above. Results of the simple RPA for the existing and future District flows are shown in Table 2A.10 and Table 2A.11.

Table 2A.10 RPA – Heavenly Valley Creek and Existing District Flows

Flow Condition	Q_d (mgd)	C_d (mg/L)	Q_s (cfs)	Q_s (mgd)	C_s (mg/L)	Q_r (cfs)	C_r (mg/L)
TDS							
Low Monthly Average Streamflow	3.66	314	0.01	0.0	29.43	3.7	313.6
Average Monthly Streamflow	3.66	314	0.13	0.1	29.43	3.7	308.8
High Monthly Average Streamflow	3.66	314	0.45	0.2	29.43	3.9	296.3

Table 2A.11 RPA – Heavenly Valley Creek and Future District Flows

Flow Condition	Q_d (mgd)	C_d (mg/L)	Q_s (cfs)	Q_s (mgd)	C_s (mg/L)	Q_r (cfs)	C_r (mg/L)
TDS							
Low Monthly Average Streamflow	5.4	314	0.01	0.0	29.43	3.7	313.7
Average Monthly Streamflow	5.4	314	0.13	0.1	29.43	3.7	310.5
High Monthly Average Streamflow	5.4	314	0.45	0.2	29.43	3.9	301.8

As demonstrated in the simple RPA, current and future effluent District flows and concentrations using the current level of treatment will exceed TDS water quality objectives in Heavenly Valley Creek for all streamflow conditions.

Trout Creek

Water quality objectives for Trout Creek are shown in Table 2A.12.

Table 2A.12 Trout Creek Water Quality Objectives

Location	TDS (mg/L)	Cl (mg/L)	SO_4 (mg/L)	Total P (mg/L)	Boron (mg/L)	Total N (mg/L)	Fe
Trout Creek	50	0.15	-	0.015	-	0.19	0.03

Notes:
(1) Data Source: LRWQCB Basin Plan, Chapter 3 (2021).
Abbreviations: Fe - iron.

A simple RPA was performed to determine the impacts of District effluent water on the existing water quality of Trout Creek. The simple RPA performed uses the existing and anticipated District wastewater effluent data noted in Alternative 1, Table 2A.1 and calculates the anticipated water quality in the creek for low, high, and average monthly streamflow conditions. Water quality data for Trout Creek was pulled from CEDEN and flow data was pulled from available USGS stream gages.

Details for performing an RPA can be found in the Alternative 4 section above. Results of the simple RPA for the existing and future District flows are shown in Table 2A.13 and Table 2A.14.

Table 2A.13 RPA – Trout Creek and Existing District Flows

Flow Condition	Q_d (mgd)	C_d (mg/L)	Q_s (cfs)	Q_s (mgd)	C_s (mg/L)	Q_r (cfs)	C_r (mg/L)
TDS							
Low Monthly Average Streamflow	3.66	314	15.0	8.1	31.2	11.7	119.4
Average Monthly Streamflow	3.66	314	32.3	17.5	31.2	21.1	80.3
High Monthly Average Streamflow	3.66	314	79.0	42.5	31.2	46.7	53.6

Flow Condition	Q_d (mgd)	C_d (mg/L)	Q_s (cfs)	Q_s (mgd)	C_s (mg/L)	Q_r (cfs)	C_r (mg/L)
Cl							
Low Monthly Average Streamflow	3.66	314	15.0	8.1	0.36	11.7	23.8
Average Monthly Streamflow	3.66	314	32.3	17.5	0.36	21.1	13.4
High Monthly Average Streamflow	3.66	314	79.0	42.5	0.36	46.7	6.3

Table 2A.14 RPA – Trout Creek and Future District Flows

Flow Condition	Q_d (mgd)	C_d (mg/L)	Q_s (cfs)	Q_s (mgd)	C_s (mg/L)	Q_r (cfs)	C_r (mg/L)
TDS							
Low Monthly Average Streamflow	5.4	314	15.0	8.1	31.2	13.5	144.5
Average Monthly Streamflow	5.4	314	32.3	17.5	31.2	22.8	98.2
High Monthly Average Streamflow	5.4	314	79.0	42.5	31.2	47.9	63.0
Cl							
Low Monthly Average Streamflow	5.4	314	15.0	8.1	0.36	13.5	30.5
Average Monthly Streamflow	5.4	314	32.3	17.5	0.36	22.8	18.2
High Monthly Average Streamflow	5.4	314	79.0	42.5	0.36	47.9	8.8

As demonstrated in the simple RPA, current and future effluent District flows and concentrations using the current level of treatment will cause exceedances in the TDS and Cl water quality objectives for Trout Creek for all flow conditions.

Upper Truckee River

Water quality objectives for the Upper Truckee River are shown in Table 2A.15.

Table 2A.15 Upper Truckee River Water Quality Objectives

Location	TDS (mg/L)	Cl (mg/L)	SO_4 (mg/L)	Total P (mg/L)	Boron (mg/L)	Total N (mg/L)	Fe
Upper Truckee River	55	4.0	1.0	0.015	-	0.19	0.03

Notes:
(1) Data Source: LRWQCB Basin Plan, Chapter 3 (2021).

A simple RPA was performed to determine the impacts of District effluent water onto the existing water quality of Trout Creek. The simple RPA performed uses the existing and anticipated District wastewater effluent data noted in Alternative 1, Table 2A.1, and calculates the anticipated water quality in the creek for low, high, and average monthly streamflow conditions. Water quality data for the Upper Truckee River was pulled from CEDEN and flow data was pulled from available USGS stream gages.

Details for performing an RPA can be found in the Alternative 4 section above. Results of the simple RPA for the existing and future District flows are shown in Table 2A.16 and Table 2A.17.

Table 2A.16 RPA – Upper Truckee River and Existing District Flows

Flow Condition	Q_d (mgd)	C_d (mg/L)	Q_s (cfs)	Q_s (mgd)	C_s (mg/L)	Q_r (cfs)	C_r (mg/L)
TDS							
Low Monthly Average Streamflow	3.66	314	6.6	3.6	52.1	7.2	185.0
Average Monthly Streamflow	3.66	314	86.6	46.6	52.1	50.3	71.1
High Monthly Average Streamflow	3.66	314	282.0	151.7	52.1	155.4	58.2
Cl							
Low Monthly Average Streamflow	3.66	314	6.6	3.6	6.9	7.2	41.7
Average Monthly Streamflow	3.66	314	86.6	46.6	6.9	50.3	11.9
High Monthly Average Streamflow	3.66	314	282.0	151.7	6.9	155.4	8.5

Table 2A.17 RPA – Upper Truckee River and Future District Flows

Flow Condition	Q_d (mgd)	C_d (mg/L)	Q_s (cfs)	Q_s (mgd)	C_s (mg/L)	Q_r (cfs)	C_r (mg/L)
TDS							
Low Monthly Average Streamflow	5.4	314	6.6	3.6	52.1	9.0	210.1
Average Monthly Streamflow	5.4	314	86.6	46.6	52.1	52.0	79.2
High Monthly Average Streamflow	5.4	314	282.0	151.7	52.1	157.1	61.1
Cl							
Low Monthly Average Streamflow	5.4	314	6.6	3.6	6.9	9.0	48.3
Average Monthly Streamflow	5.4	314	86.6	46.6	6.9	52.0	14.0
High Monthly Average Streamflow	5.4	314	282.0	151.7	6.9	157.1	9.2

As demonstrated in the simple RPA, current and future effluent District flows and concentrations using the current level of treatment will cause exceedances in the TDS and Cl water quality objectives for the Upper Truckee River for all flow conditions.

Alternative 15: Indirect Potable Reuse in Lake Tahoe Basin

No additional alternative information is provided in this appendix.

Alternative 16: Direct Potable Reuse in Lake Tahoe Basin

No additional alternative information is provided in this appendix.

System Modifications

No additional alternative information regarding the system modifications is provided in this appendix.

Appendix C:

Technical Memorandum 3, Alternatives Evaluation

South Tahoe Public Utility District
Recycled Water Strategic Plan

Technical Memorandum 3
ALTERNATIVES EVALUATION

FINAL DRAFT | August 2024

South Tahoe Public Utility District
Recycled Water Strategic Plan

Technical Memorandum 3
ALTERNATIVES EVALUATION

FINAL DRAFT | August 2024

This document is released for the purpose of information exchange review and planning only under the authority of Elisa A. Garvey, August 20, 2024 California C-71690.

Contents

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Abbreviations

AB	aeration basin
AF	acre-feet
AFY	acre-feet per year
April 2013 Addendum	South Tahoe Public Utility District Recycled Water Facilities Master Plan Addendum of April 2013
August 2011 Final Supplemental EIR	South Tahoe Public Utility District Recycled Water Facilities Master Plan Environmental Impact Report of August 2011
AWTF	advanced water treatment facility
B	billion
BNR	biological nitrogen removal
BOD	biochemical oxygen demand
CA	California
Caltrans	California Department of Transportation
Carollo	Carollo Engineers
CDF	cloth disk filtration
CDFW	California Department of Fish and Wildlife
CO_2e	carbon dioxide equivalents
CPUC	California Public Utilities Commission
CWSD	Carson Water Subconservancy District
disinfected secondary-23	disinfected secondary 23 recycled water
District	South Tahoe Public Utility District
DVR	Diamond Valley Ranch
DCLTSA	Douglas County Lake Tahoe Sewer Authority
EPA	Environmental Protection Agency
EQ	equalization basin
FEPS	final effluent pump station
ft	foot/feet
GMF	granular media filtration
GHG	greenhouse gas
gpm	gallons per minute
GRGID	Gardnerville Ranchos General Improvement District
IFAS	Integrated Fixed Film Activated Sludge
IPR	indirect potable reuse
kg	kilogram(s)
KGID	Kingsbury General Improvement District
kW	kilowatt
LPPS	Luther Pass Pump Station

LRWQCB	Lahontan Regional Water Quality Control Board
M	million
MABR	membrane aerated biofilm reactor
MBR	membrane bioreactor
mgd	million gallons per day
mg/L	milligrams per liter
ML	mixed liquor
MLE	Modified Ludzak-Ettinger
mm	millimeter
MOB	mobile organic biofilm
MW	megawatt
N	nitrogen
NDEP	Nevada Division of Environmental Protection
NDOT	Nevada Department of Transportation
NDWR	Nevada Division of Water Resources
NPDES	National Pollutant Discharge Elimination System
NV	Nevada
O&M	operations and maintenance
OHWM	Ordinary High-Water Mark
P	phosphorus
PAT	Pumps-as Turbines
Plan	South Tahoe Public Utility District Recycled Water Strategic Plan
psi	pounds per square inch
Ranchers	contract irrigators
RMHQ	Requirement to Maintain High Quality
RO	reverse osmosis
ROC	reverse osmosis concentrate
ROWD	Report of Waste Discharge
RW	recycled water
SAG	Stakeholder Advisory Group
SNMP	Salt and Nutrient Management Plan
STPUD	South Tahoe Public Utility District
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
TM	technical memorandum
TM2	Tech Memo 2 Alternatives Identification
TMDL	total maximum daily load
TN	total nitrogen

TP	total phosphorus
TMWA	Truckee Meadows Water Authority
TRPA	Tahoe Regional Planning Agency
TSS	total suspended solids
USACE	United States Army Corps of Engineers
USFS	United States Forest Service
UV	ultraviolet
Vision Plan	West Fork Carson Vision Plan
Washoe Tribe	Washoe Tribe of Nevada and California
WDR	Waste Discharge Requirement
WQBELs	Water Quality-Based Effluent Limits
WRR	Water Reclamation Requirement
WWTP	wastewater treatment plant
yr	year

Technical Memorandum 3

ALTERNATIVES EVALUATION

The objective of the South Tahoe Public Utility District (District, STPUD) Recycled Water Strategic Plan (Plan) is to develop a long-term (50-year horizon) strategy for the District's wastewater effluent that incorporates viable alternatives to the existing system. These alternatives would be triggered for implementation by existing or future drivers, constraints, and/or opportunities.

There have been significant advances in the treatment and use of recycled water in California (CA) over the last 50 years. In addition, the District's existing recycled water system relies on recycled water use by contract irrigators (Ranchers) in Alpine County. The agreements associated with this end use of recycled water will expire in 2028. As such, the intent of the Plan is to evaluate both existing recycled water practices and potential alternative recycled water practices that may be implemented in the future.

This technical memorandum (TM) documents the development and evaluation of the existing system, eight alternatives, in addition to the Existing System ("No Project") alternative, and five system modifications. Six of the eight alternatives and all the system modifications were identified in TM2 Alternatives Identification (TM2). The two alternatives not previously identified, Alternatives 6C and 6D, were developed based on subsequent input with specific Stakeholder Advisory Group (SAG) members and the project team. These alternatives are described in detail in this TM.

The alternatives evaluation, described in this TM, generally expands upon the analysis provided in TM2. The alternative descriptions and details in this TM have been updated to reflect the additional analysis conducted, which built upon TM2, and was the result of the "further evaluation" of the suite of the most feasible alternatives that was conducted for this TM. This TM has the more accurate descriptions of these alternatives, although the information in TM2 is be used to provide further context and information on these alternatives. Where appropriate, this TM references specific sections of TM2.

The result of the alternatives evaluation is a list of alternatives and system modifications that are the most feasible options for the District to consider pursuing over the Plan's long-term 50-year planning horizon. However, it is important to recognize that there are a range of challenges associated with implementing the alternatives, and differences in the drivers for implementing the alternatives. The alternatives comparison and the trigger-based decision diagram highlight the differences in implementation drivers and feasibility, which is included in the recommendations.

This TM includes the following sections:

- Background.
- Alternatives and system modifications overview.
- Alternatives evaluation process.
- Detailed alternatives evaluations.

- Detailed system modifications evaluations.
- Alternatives comparison.
- Recommendations.

3.1 Background

The District supplies sewage collection, treatment, and disposal to approximately 17,000 residential and commercial customers in its service area, which includes the City of South Lake Tahoe and unincorporated areas of El Dorado County. The District began exporting treated effluent out of the Lake Tahoe Basin for reuse/disposal in Alpine County in 1967. Since 1988, the District has supplied recycled water to six contract irrigators whose current agreements expire in 2028. As of 2018, the District has also been irrigating 70 acres of District property in Alpine County using recycled water to grow and sell alfalfa.

The WWTP currently treats 3.8 million gallons per day (mgd) (4,260 acre-feet per year [AFY]). The estimated future WWTP effluent flow is 5.4 mgd (6,000 AFY). (For more information on how future flows were calculated, refer to TM2, Section 2.2.2). It should be noted that these flow projections are still below the permitted capacity in the District's current Waste Discharge Requirements (WDRs).

3.2 Alternatives and System Modifications Overview

As previously discussed, TM2 resulted in the development of sixteen alternatives, which were screened to six alternatives, in addition to the Existing System ("No Project") alternative. The alternatives numbering used in this TM is the same numbering used in TM2 to maintain consistency. During the process of evaluating these alternatives, two additional alternatives; Alternative 6C – Indirect Potable Reuse in Nevada and Alternative 6D – Expanded Reuse in Nevada via Direct Delivery, were identified and evaluated. The complexity of these alternatives varies, with Alternatives 1, 2, and 3 being generally less complex in comparison to Alternatives 4, 6A, 6B, 6C, 6D, and 7A.

The alternatives being further evaluated in this TM include the following and are described in further detail in Section 3.4 .

- Alternative 1 – Existing System "No Project".
- Alternative 2 – Expanded Disinfected Secondary 23 Delivery in Alpine County.
- Alternative 3 – Expanded Disinfected Tertiary Reuse in Alpine County.
- Alternative 4 – Discharge to West Fork Carson River and Use in Nevada.
- Alternative 6A – Expanded Class A or B Reuse in Nevada via Discharge to Indian Creek.
- Alternative 6B – Expanded Class A or B Reuse in Nevada via Discharge to Mud Lake.
- Alternative 6C – Indirect Potable Reuse in Nevada.
- Alternative 6D – Expanded Reuse in Nevada via Direct Delivery.
- Alternative 7A – Treated Effluent Conveyance to Douglas County Lake Tahoe Sewer Authority (DCLTSA) with Reuse in Nevada.

All these alternatives have end uses outside of the Lake Tahoe Basin, in the Upper Carson River Watershed, as shown in Figure 3.1.

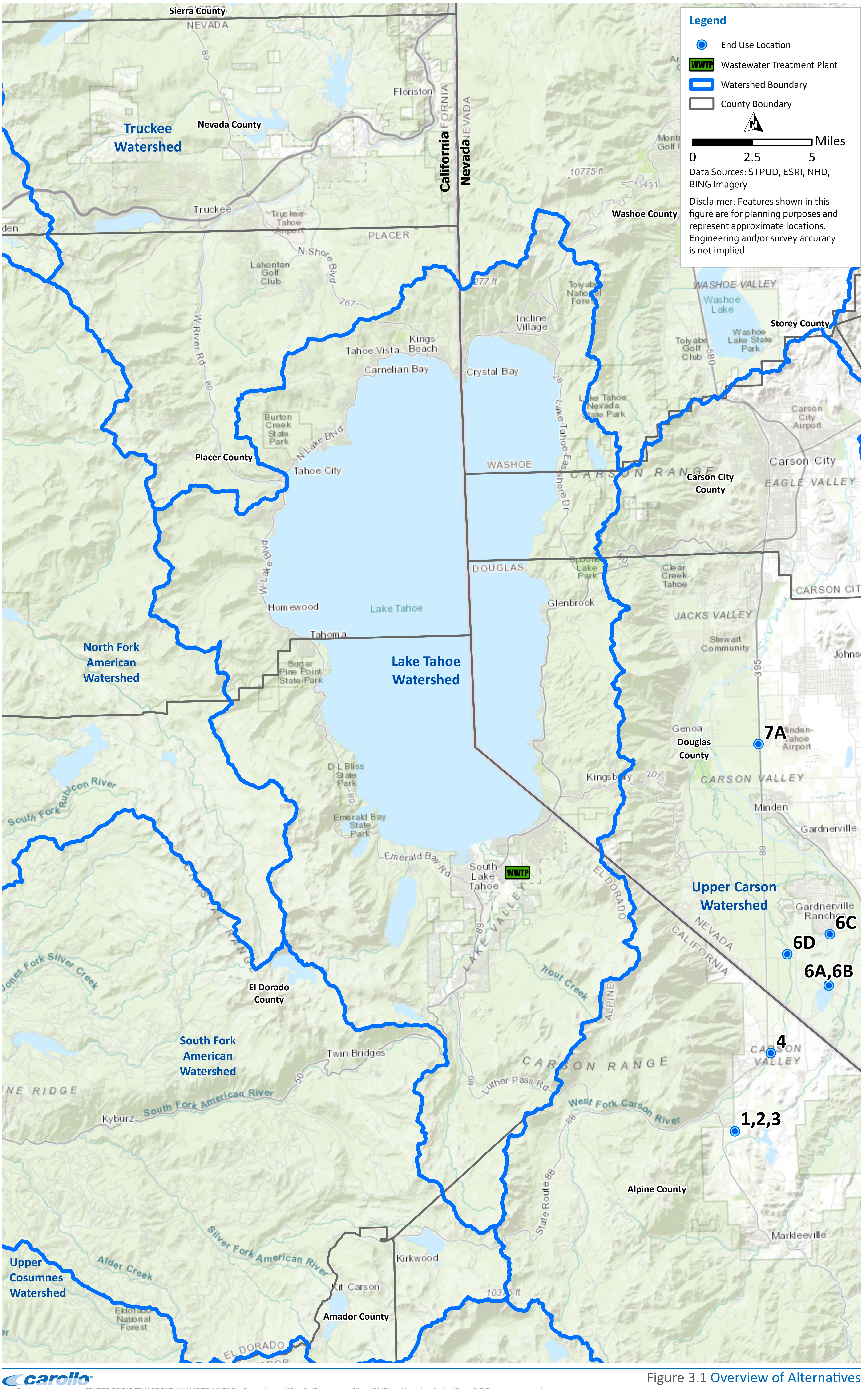


Figure 3.1 Overview of Alternatives

For some of the alternatives previously described, there are additional system modifications that could be implemented and not materially alter the alternatives, specifically with regards to the discharge location and end use. As discussed in TM2, Section 2.7, each system modification does not represent a standalone alternative that could replace the existing export and use of recycled water. Rather, these modifications may be considered as part of several alternatives. The five system modifications include the following and are described in further detail in Section 3.5 :

- Urban Fire Protection.
- Tunneling.
- Split Treatment.
- Export System Energy Recovery.
- Constructed Wetlands.

3.3 Alternatives Evaluation Process

The alternatives and system modifications screening process consisted of a more detailed analysis of the eight alternatives and five system modifications. Each alternative was evaluated in additional detail beyond the initial information presented in TM2 and contains the following sections with detailed information:

- Description.
- Potential users and associated demands.
- Triggers to implement alternative.
- Implementation components:
  - Treatment.
  - Infrastructure.
  - Cost Estimates and Economics:
    - Level 5 planning level costs were prepared for capital costs. Level 5 cost estimates are considered to be accurate to within plus 50 percent to minus 30 percent. Additional information regarding cost estimating and detailed cost estimates is in Appendix 3A.
  - Regulatory and permitting requirements.
  - Environmental and sustainability.
  - Local agency and public perception.

Additionally, as part of the alternative evaluation process, input has been received from District staff as well as members of the SAG, which include:

- Alpine Watershed Group.
- California Tahoe Conservancy.
- Carson Water Subconservancy District (CWSD).
- City of South Lake Tahoe.
- Douglas County Lake Tahoe Sewer Authority (DCLTSA).
- El Dorado County.
- Incline Village General Improvement District.
- Lahontan Regional Water Quality Control Board (LRWQCB).
- League to Save Lake Tahoe.
- Lukins Brothers (also representing Tahoe Keys Water).
- Nevada Division of Environmental Protection (NDEP).

- Nevada Division of Water Resources (NDWR).
- Sierra-at-Tahoe.
- Sierra Nevada Alliance.
- Tahoe Environmental Research Center.
- Tahoe Regional Planning Agency (TRPA).
- Tahoe Resource Conservation District.
- Tahoe Water Suppliers Association.
- United States Forest Service (USFS).
- Washoe Tribe of Nevada and California (Washoe Tribe).

The SAG and public meetings for Phase 2 of this project, as presented in Table 3.1, have provided valuable feedback and information that has been incorporated into the alternative's evaluation in this TM.

Table 3.1 Recycled Water Strategic Plan Meeting Summary – Phase 2

Meeting Date	Meeting Title	Meeting Description / Purpose
1/17/2024	Meeting with CWSD (virtual)	Discuss Plan with CWSD, including potential opportunities and constraints, in the Carson River Watershed.
1/17/2024	Meeting with DCLTSA (virtual)	Discuss Alternative 7A with DCLTSA, including understanding DCLTSA's existing system, potential opportunities, and potential constraints.
1/31/2024	Meeting with NDWR (virtual)	Discuss plan with NDWR, including water rights, potential opportunities, and potential constraints in the Carson River Watershed.
2/7/2024	Meeting with LRWQCB (virtual)	Discuss potential regulatory requirements with regards to treatment for alternatives in this TM.
3/13/2024	Meeting with NDEP (virtual)	Discuss potential regulatory requirements with regards to treatment for alternatives in this TM.
4/25/2024	Follow-up meeting with DCLTSA (virtual)	Follow-up meeting with DCLTSA to further refine Alternative 7A.
5/9/2024	District Alternatives Evaluation Workshop (in-person)	Meeting with District staff to discuss status of current alternatives evaluation and receive feedback.
5/15/2024	District Decision Diagram & Multi-Criteria Decision Analysis Tool Workshop (virtual)	Meeting with District staff to work through Decision Diagram and Multi-Criteria Decision Analysis tools and receive feedback.
6/6/2024	SAG Meeting (in-person)	Meeting with SAG members to discuss status of current alternatives evaluation and receive feedback.
6/13/2024	Follow-up Meeting with CWSD (virtual)	Follow-up meeting with CWSD to discuss additional potential users north of existing recycled water use.
7/15/2024	Multi-Criteria Decision Analysis Workshop (virtual)	Reviewed the Multi-Criteria Decision Analysis tool with District staff and utilized it for the alternatives in this TM.
7/22/2024	Meeting with Washoe Tribe (in-person)	Provide an overview of the Plan to the Washoe Tribe and identify potential recycled water options for the Washoe Tribe.

3.4 Detailed Alternatives Evaluations

The various alternatives described above in Section 3.2 are further detailed in the subsections below.

3.4.1 Alternative 1 – Existing System "No Project"

3.4.1.1 Description

Further details regarding the District's existing system can be found in TM2, Section 2.2. The existing system consists of primary and advanced secondary treatment of wastewater at the District Wastewater Treatment Plant (WWTP). The District's existing WWTP processes an annual average of 3.9 mgd of treated effluent. The treated effluent meets CA Title 22 regulations for disinfected secondary 23 recycled water (disinfected secondary-23). The recycled water is then exported out of the Lake Tahoe Watershed over Luther Pass through the export pipeline and discharged into Harvey Place Reservoir, which is in Alpine County and within the Carson River Watershed. Recycled water is stored in Harvey Place Reservoir and used in the summer months for irrigation supply.

The end uses of recycled water include:

- Irrigation of hay and alfalfa on the District's Diamond Valley Ranch (DVR) property.
- Irrigation supply for Ranchers in Alpine County.

Figure 3.2 shows a conceptual schematic of this alternative.

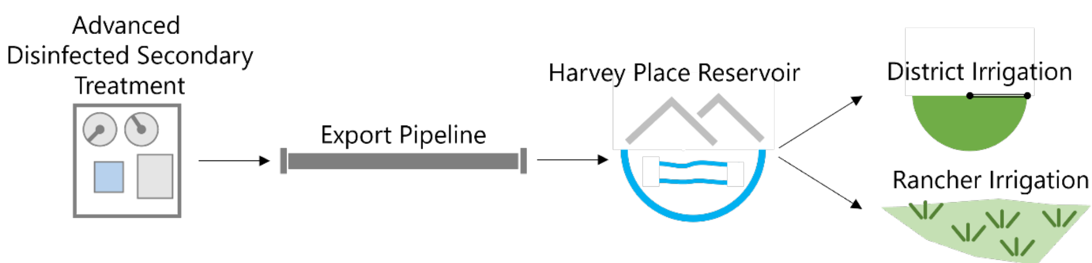


Figure 3.2 Alternative 1 Schematic

3.4.1.2 Existing Users and Associated Demands

Figure 3.3 shows the existing users of recycled water as well as an overview of the District's DVR property. These existing users are able to receive and utilize all the District's recycled water during the irrigation season.

The District owns the 1,400-acre DVR property and uses a portion of the site to grow and sell alfalfa. Since 2018, the District has used recycled water to irrigate alfalfa on 70 acres of the DVR property. The total average recycled water usage for alfalfa irrigation is approximately 200 AFY. In addition to the DVR property, the District manages BLM property in Alpine County. In total, the District manages approximately 3,000 acres of both District and BLM property.

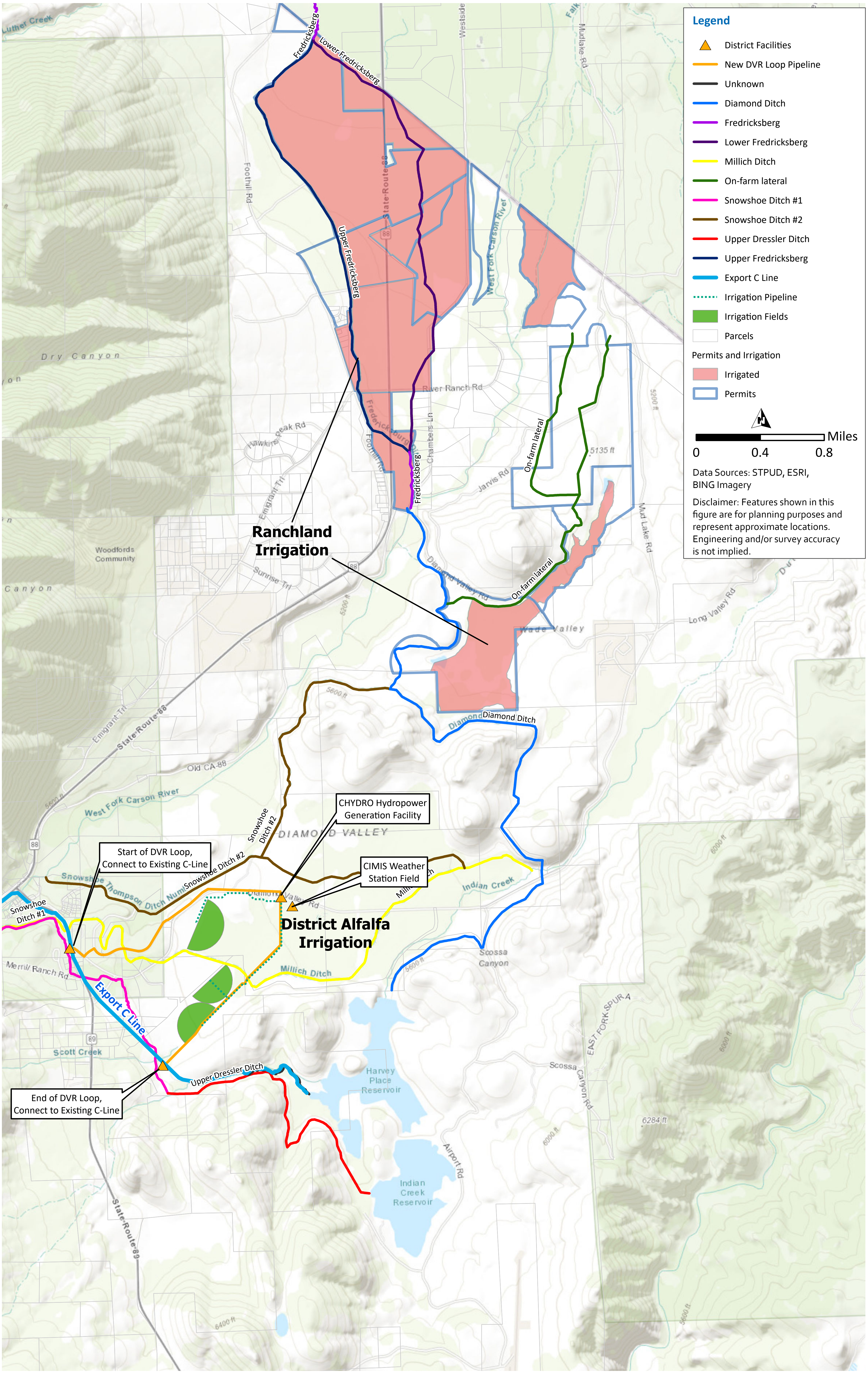
Recycled water is conveyed from Harvey Place Reservoir via Diamond Ditch for distribution to the six Ranchers. The total maximum (or capacity) for ranchland irrigation is 5,800 AFY.

3.4.1.3 Triggers to Implement Alternative

This alternative is currently in use and is therefore considered the “No Project” alternative.

The following triggers may give the District reason to continue implementing this alternative:

- Rancher contracts are renewed in 2028.
- Capacity for recycled water, between District irrigation and Rancher irrigation, continues to utilize all the District’s recycled water.


Legend
District Facilities
New DVR Loop Pipeline
Unknown
Diamond Ditch
Fredricksberg
Lower Fredricksberg
Millich Ditch
On-farm lateral
Snowshoe Ditch #1
Snowshoe Ditch #2
Upper Dressler Ditch
Upper Fredricksberg
Export C Line
Irrigation Pipeline
Irrigation Fields
Parcels
Permits and Irrigation
Irrigated
Permits
0 0.4 0.8 Miles
Data Sources: STPUD, ESRI, BING Imagery
Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.
Ranchland Irrigation
District Alfalfa Irrigation
CHYDRO Hydropower Generation Facility
CIMIS Weather Station Field
Start of DVR Loop, Connect to Existing C-Line
End of DVR Loop, Connect to Existing C-Line
Fredricksberg
Lower Fredricksberg
Upper Fredricksberg
On-farm lateral
Diamond Ditch
Snowshoe Ditch #2
Snowshoe Ditch #1
Upper Dressler Ditch
Export C Line
Millich Ditch
Harvey Place Reservoir
Indian Creek Reservoir
Diamond Valley Rd
Wade Valley
DIAMOND VALLEY
Woodfords Community
State Route 88
River Ranch Rd
Foothill Rd
Jarvis Rd
Mud Lake Rd
Long Valley Rd
Indian Creek
Scossa Canyon
West Fork Carson River
Dry Canyon
Emigrant Trl
Old CA-88
Scott Creek
Merrill Ranch Rd
Airport Rd
EAST FORK SPUR A
Scossa Canyon Rd
State Route 89

3.4.1.4 Key Components

Key components of the existing system include treatment, infrastructure, cost estimates and economics, regulatory and permitting requirements, environmental and sustainability, and local agency and public perception.

Treatment

The WWTP produces effluent that meets the Title 22 regulations for disinfected secondary-23. The treatment processes at the WWTP are illustrated in Figure 3.4 and shown in an aerial view in Figure 3.5, and consist of the following unit processes:

- Primary Treatment:
  - Mechanical Bar Screens.
  - Vortex Grit Removal.
  - Primary Clarifiers.
- Secondary Treatment:
  - Aeration Basins for biochemical oxygen demand (BOD) removal (no nutrient removal).
  - Secondary Clarifiers.
- Advanced Secondary Treatment:
  - Granular media filtration using pressure filters.
- Disinfection:
  - Sodium hypochlorite solution injected into the export pipeline.
- Solids Handling:
  - Screenings and grit are off hauled to landfill at Lockwood, Nevada.
  - Waste activated sludge and primary sludge are co-thickened in the primary clarifiers and dewatering using centrifuges prior to off-hauling to Bently composting facility in Nevada for disposal.

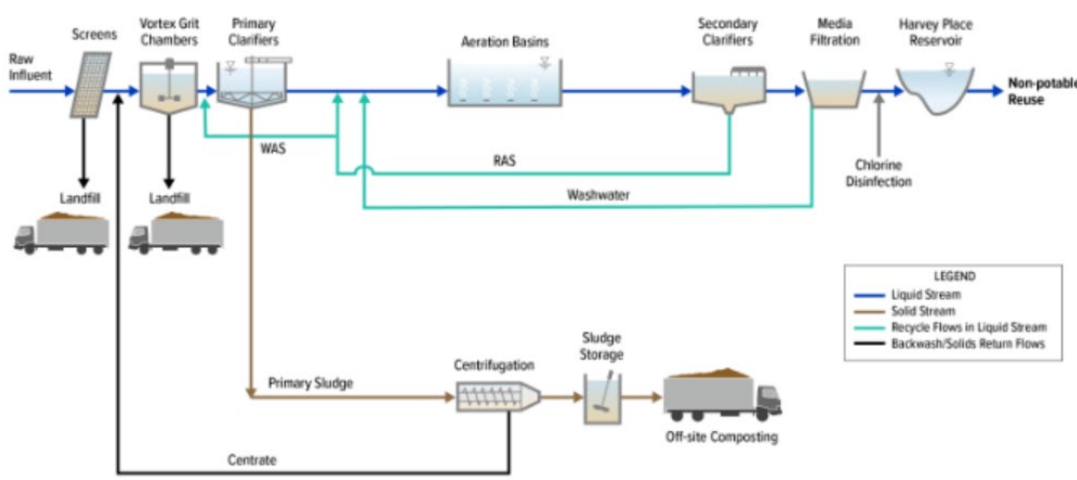


Figure 3.4 Alternative 1 – Existing Treatment Process Flow Diagram

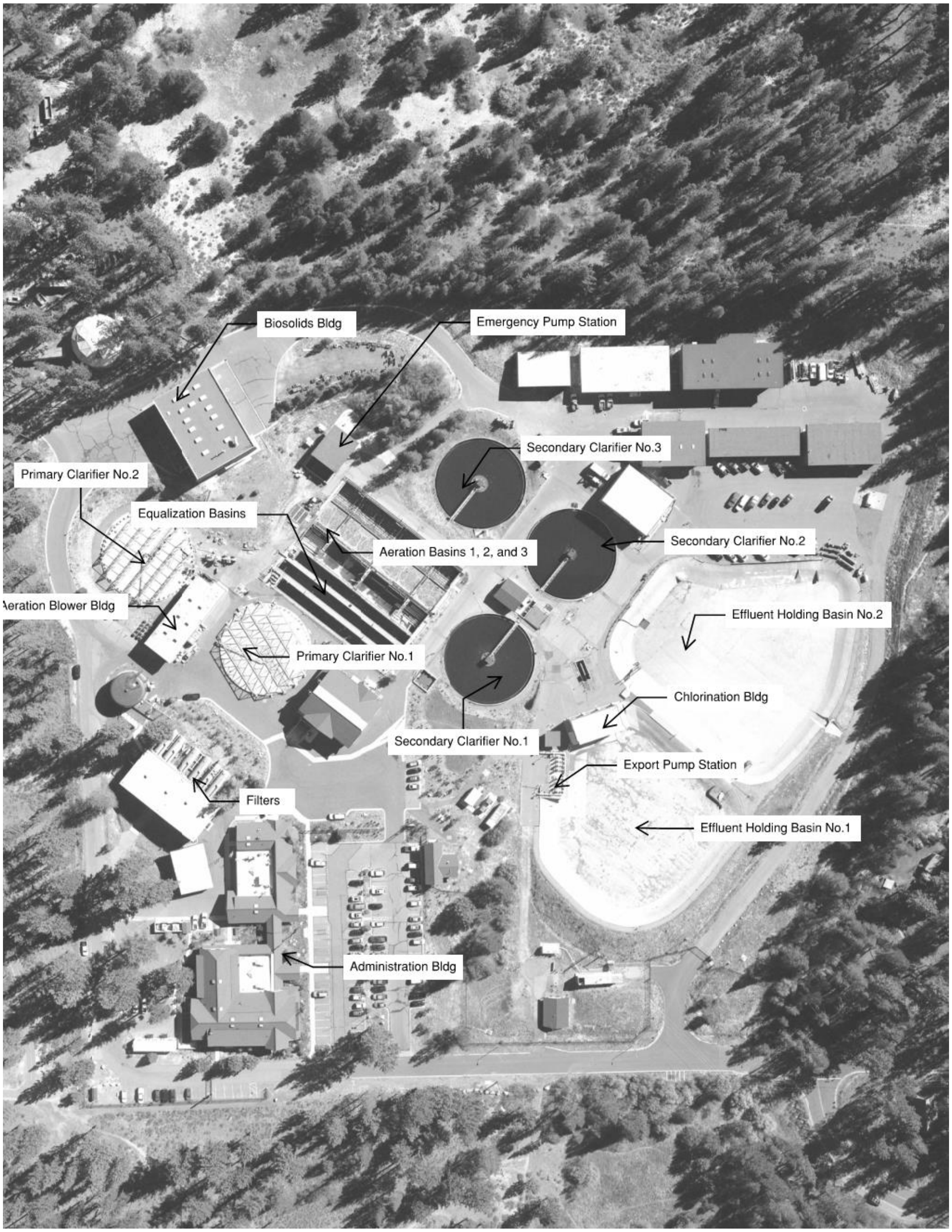


Figure 3.5 Alternative 1 – Existing Treatment Layout

Infrastructure

The following infrastructure components are needed for this alternative:

- Continued maintenance and investment in existing aging export system infrastructure would be required. The District's export system, shown in Figure 3.6, includes a 26-mile pipeline from the WWTP (approximately 6,250 feet [ft] elevation) over Luther Pass (approximately 7,750 ft elevation) to Harvey Place Reservoir (approximately 5,560 ft elevation). To convey water from the WWTP over Luther Pass (an approximate elevation gain of 1,500 ft), the final effluent pump station (FEPS) at the WWTP and the Luther Pass Pump Station (LPPS) pump recycled water through the first two segments of pipeline. The pipeline is composed of three main segments, which are constructed of cement mortar lined and coal tar epoxy-coated steel pipe. The export system has a capacity of 8 mgd. The specific facilities associated with the export system are described below:
  - FEPS – This pump station has a capacity of 8 mgd and pumps effluent from the WWTP through the A-Line. The FEPS was replaced in 2009.
  - A-Line Export Pipeline – The A-Line extends from the WWTP to LPPS. The A-Line is 10.5 miles long, 30 inches in diameter, and was replaced between 1996 and 2000.
  - LPPS – This pump station has a firm capacity of 5,800 gallons per minute (gpm) and lifts the recycled water approximately 1,250 ft (elevation gain from LPPS to the top of Luther Pass) in elevation through the B-Line.
  - B-Line Export Pipeline – The B-Line extends from LPPS to the top of Luther Pass. The B-Line is 4.9 miles long, 24 inches in diameter, and the majority of the B-Line was replaced in 2001, although other sections were replaced in 1996 and 2005.
  - C-Line Export Pipeline – The C-Line extends from Luther Pass to Harvey Place Reservoir. The C-Line is approximately 12 miles long and is a mix of 18-inch and 21-inch diameter pipe and was constructed in 1968. Treated effluent in the C-line flows by gravity from the top of Luther Pass to Harvey Place Reservoir. No improvements to the C-Line have been made, although the District has performed a condition assessment since its construction and found some deficiencies that have not yet been addressed[1].
- Continued maintenance and investment in existing DVR infrastructure would be required. This includes Harvey Place Reservoir, Diamond Ditch, and District irrigation infrastructure as shown in Figure 3.7.

[1] Tertiary Effluent "C-Line" Pipeline Condition Assessment FINAL REPORT, South Tahoe Public Utility District, Carollo Engineers, Inc., July 2012.

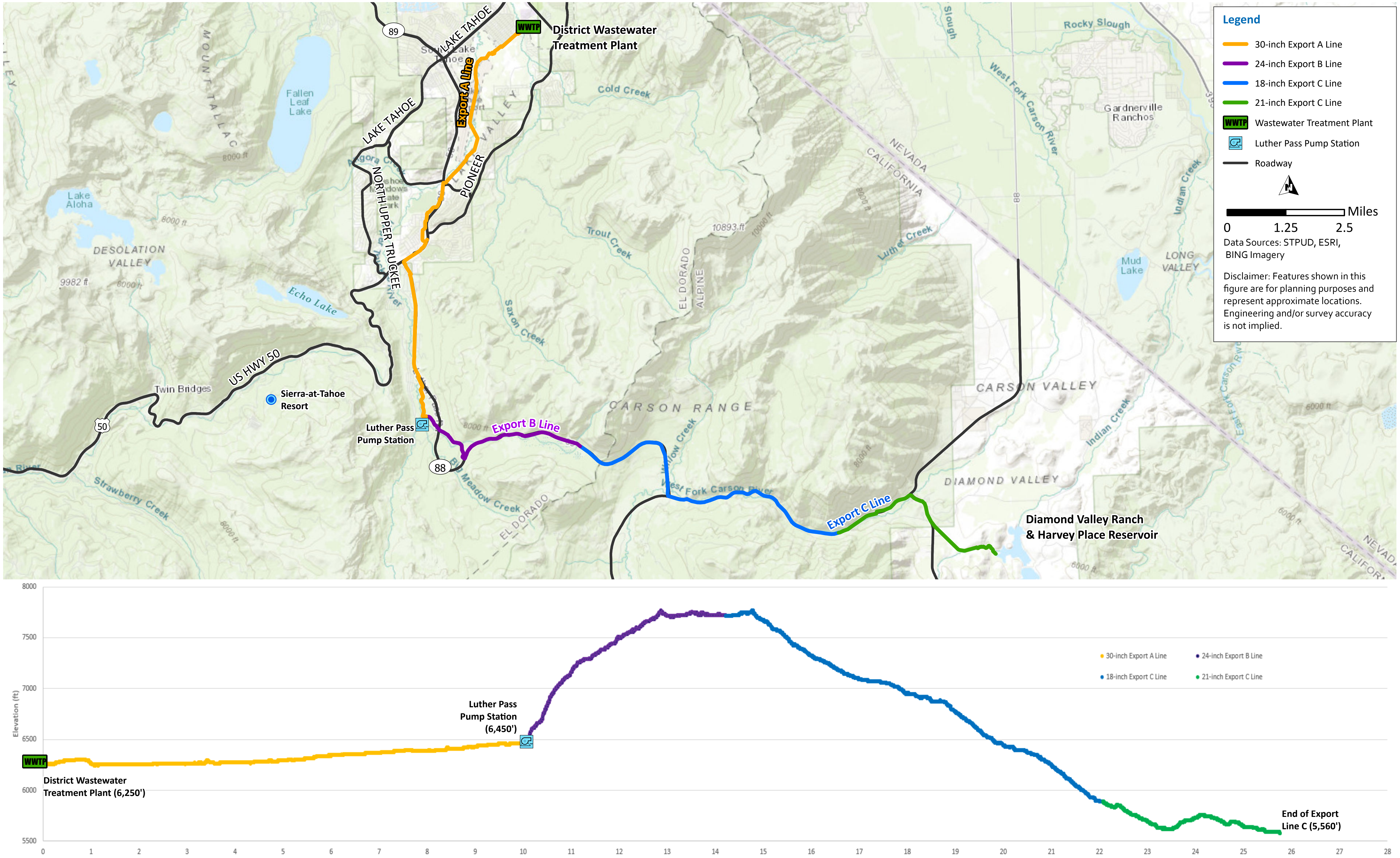


Figure 3.6 Existing System – Export Line Plan and Profile

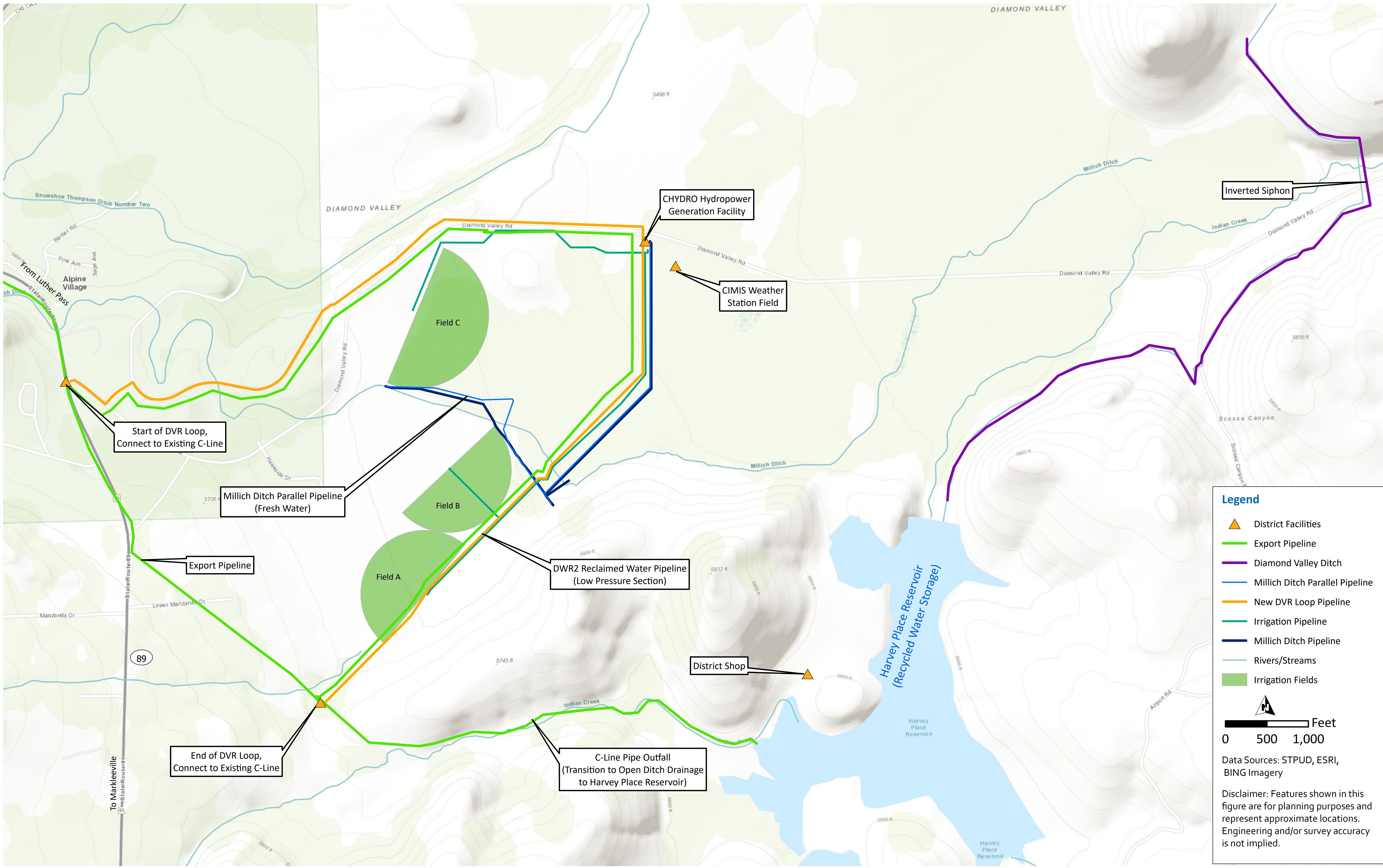


Figure 3.7 Existing System - Diamond Valley Ranch Operations

Cost Estimates and Economics

No capital costs have been prepared for this alternative, as these components are already in place and existing, and no new facilities are proposed. However, current annual operations and maintenance (O&M) costs are shown in Table 3.2.

Table 3.2 Alternative 1 – Existing System Cost Estimates

Component	Capital Costs ($M)	O&M Costs(1) ($M/yr)
Existing Treatment at WWTP	$0	$3.89
Export System	--	$1.61
TOTAL COSTS	**$0**	**$5.50**

Notes:
(1) These costs are based on the District's current adopted FY 24/25 budget as well as energy costs associated with these facilities.
Abbreviation: M = million, yr = year.

Additional economic considerations related to this alternative, which are not included in the cost estimate above, are listed below:

- Replacement costs associated with the existing export system.
- Replacement costs associated with existing DVR operations.
- The District does not receive revenue for recycled water used by Ranchers. It may be challenging to negotiate payment for recycled water in future contracts with the Ranchers.

Regulatory and Permitting

A number of regulatory and permitting requirements pertain to this alternative and have been grouped into the two sections below. Further detail on existing permits and regulations can be found in both TM1 Existing and Future Regulations and TM2 Alternatives Identification, Section 2.2.3.

1. Permits associated with recycled water use:
    a. WDRs and Water Reclamation Requirements (WRRs) from LRWQCB.
    b. State Water Resources Control Board (SWRCB) Title 22 Code of Regulations.
2. Other permits and institutional issues/agreements/processes:
    a. Continued involvement in ongoing Alpine County litigation.
    b. Contracts with existing Rancher users.

Environmental and Sustainability

Some of the environmental and sustainability components of this alternative include the following considerations:

- Sustained energy consumption and corresponding greenhouse gas (GHG) emissions associated with the export system. Approximate GHG emissions for the WWTP (including the final effluent pump station) and the LPPS system are 1,340 kilograms (kg) of carbon dioxide equivalents (CO_2e)/year and 1,550 kg CO_2e/year, respectively.

Note that for energy usage and GHG emissions, only major differences between the alternatives have been considered and these will not reflect a complete analysis of operational energy consumption and GHG emissions. The major differences include significant changes in energy demands due to water conveyance, additional energy for treatment, and limited chemicals (methanol for nutrient removal). The GHG emissions associated with recycled water distribution to users is relatively minimal and is not included in the estimated GHG emissions for the alternatives.

Local Agency and Public Perception

The following item has been identified as a possible concern regarding local agency and public perception:

- Potential concern that this recycled water could be used more beneficially elsewhere within the Tahoe Basin.

3.4.2 Alternative 2 – Expanded Disinfected Secondary-23 Delivery in Alpine County

3.4.2.1 Description

This alternative builds off the existing recycled water system with expanded reuse in Alpine County. Both the discharge and end uses of recycled water would be in the CA portion of the Carson watershed.

This alternative would involve providing disinfected secondary-23 to existing users, along with either providing recycled water to new users in the vicinity of the existing operations, and/or expanding recycled water use on District-owned properties. Disinfected secondary-23 is limited to the following approved uses:

- Pastureland for milking or non-milking animals.
- Restricted landscape irrigation.
- Landscape impoundment (i.e., water storage, not for recreational use).

Figure 3.8 shows a conceptual schematic of this alternative.

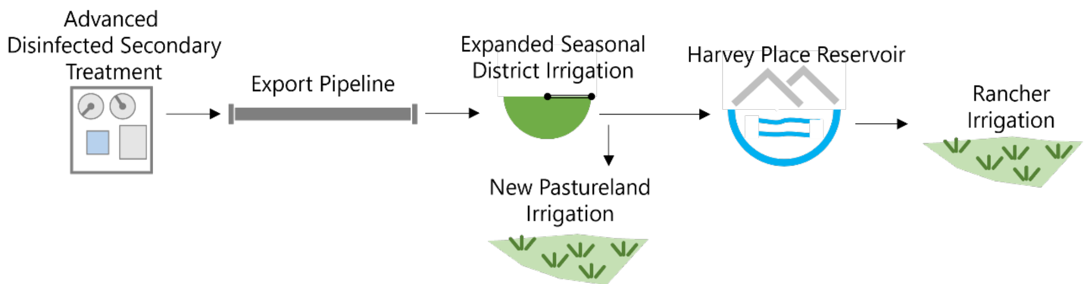


Figure 3.8 Alternative 2 Schematic

3.4.2.2 Potential Users and Associated Demands

Figure 3.9 depicts the site of District-owned facilities (including DVR), as well as seven additional potential new user parcels, including parcels owned by the Washoe Tribe, and the expansion of irrigation on District-owned property based on mapping in the District's Recycled Water

Facilities Master Plan Addendum of April 2013 (April 2013 Addendum)[2]. The acreage associated with additional District irrigation is 264 acres, which considers the wetlands delineation on DVR property that was performed for the April 2013 Addendum. Options for recycled water use at the District's DVR include expanded fodder crop cultivation.

The acreage associated with the four potential new users, which currently have existing pastureland, and that were identified by District staff is approximately 814 acres. Total acreage for both expansion of District irrigation and the four potential new user parcels is approximately 1,079 acres. Per the District's Recycled Water Facilities Master Plan Environmental Impact Report of August 2011 (August 2011 Final Supplemental EIR)[3], irrigation demands of 3.50 acre-feet (AF)/acre were assumed, allowing for up to approximately 3,774 AFY of new recycled water demands.

The Washoe Tribe has also expressed interest in potentially utilizing recycled water, and has identified three parcels, totaling 407 acres. Assuming 3.5 AF/acre of irrigation demands, this would allow for an additional potential demand of up to 1,424 AFY. However, this demand is theoretical since the amount of acreage that might be able to take recycled water is uncertain at this time.

This alternative assumes future demands of up to 3,774 AFY for disinfected secondary-23 recycled water, and future recycled water production of 6,000 AFY is expected. For this alternative to utilize all the District's existing and future recycled water, the District's existing irrigation fields and at least some of its existing Rancher contractors would need to remain in operation. It is also possible that additional potential users could be identified in the future, which would increase the demand. Another challenge with this alternative is that the recycled water would only be used seasonally during the growing season, and the District's existing recycled water storage at Harvey Place Reservoir would be needed when the water was not being used.

3.4.2.3 Triggers to Implement Alternative

The following triggers may give the District reason to implement this alternative:

- If there is insufficient capacity for the use of the District's recycled water provided by DVR irrigation operations and Rancher contracts/use.
- Expanding the District irrigation operations at the DVR site would lead to increased capacity for recycled water and increased revenue from the sale of fodder crops.
- It is possible that new users would be willing to pay for disinfected secondary-23. If there were modifications to the recycled water delivery system to the Ranchers, then there may be a greater potential to negotiate payment for recycled water with existing and new users. The sale of recycled water would generate revenue for the District.
- Implementation of this alternative could potentially provide the District with additional flexibility and capacity for recycled water uses.
- It is possible that additional users of disinfected secondary-23 water could be identified, which would increase demand and revenue.

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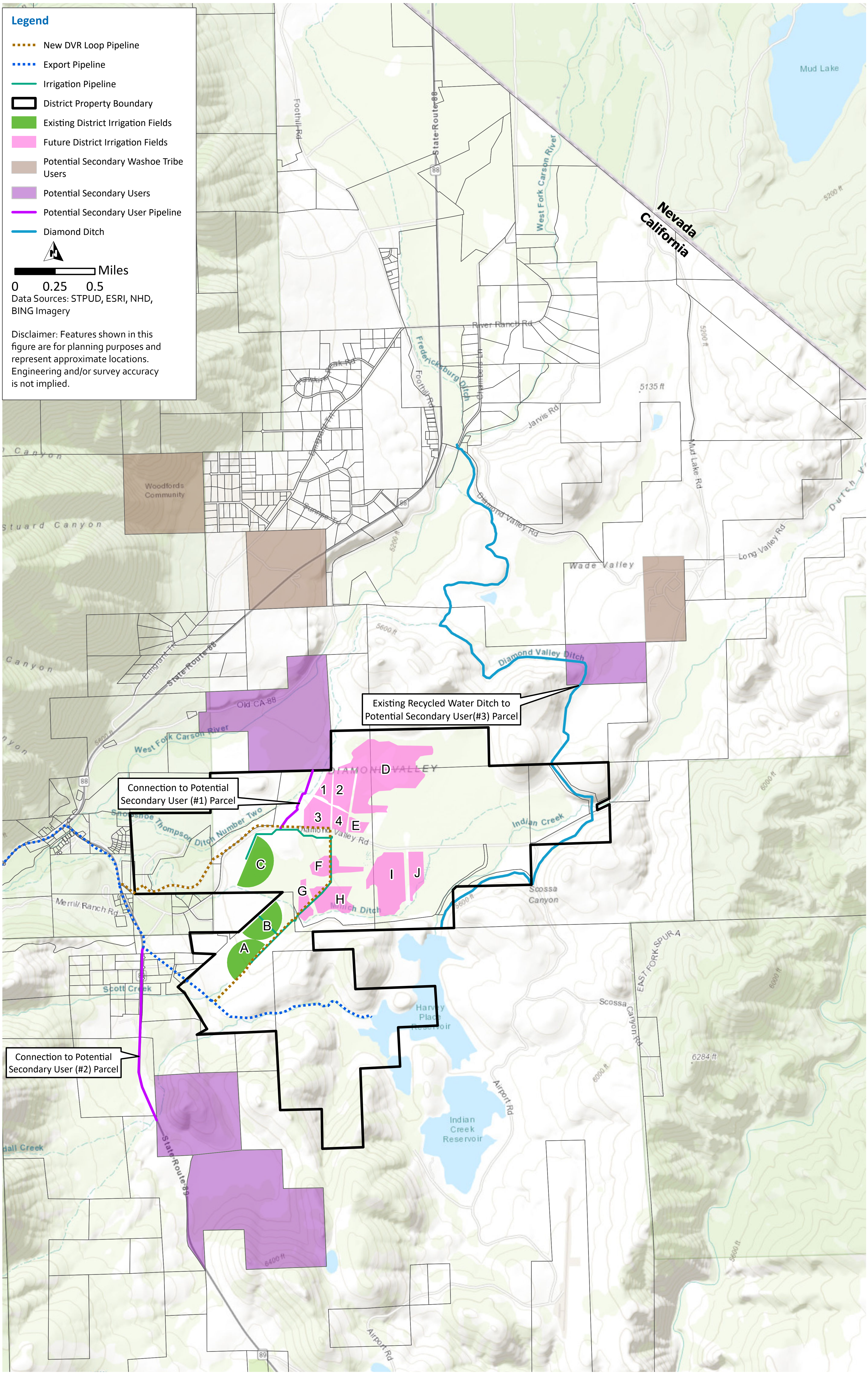
[2] South Tahoe Public Utility District Recycled Water Facilities Master Plan Addendum, April 2013, Hauge Brueck Associates.

[3] South Tahoe Public Utility District Recycled Water Facilities Master Plan Environmental Impact Report, Final Supplemental, August 2011, Hauge Brueck Associates.


Legend
New DVR Loop Pipeline
Export Pipeline
Irrigation Pipeline
District Property Boundary
Existing District Irrigation Fields
Future District Irrigation Fields
Potential Secondary Washoe Tribe Users
Potential Secondary Users
Potential Secondary User Pipeline
Diamond Ditch
Miles
0 0.25 0.5
Data Sources: STPUD, ESRI, NHD, BING Imagery
Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.
Existing Recycled Water Ditch to Potential Secondary User(#3) Parcel
Connection to Potential Secondary User (#1) Parcel
Connection to Potential Secondary User (#2) Parcel
Nevada
California
Mud Lake
Woodfords Community
Wade Valley
Diamond Valley Ditch
Indian Creek
Harvey Place Reservoir
Indian Creek Reservoir
A
B
C
D
E
F
G
H
I
J
1
2
3
4

3.4.2.4 Implementation Components

Implementation components for this alternative include infrastructure, cost estimates and economics, regulatory and permitting requirements, environmental and sustainability, and local agency and public perception.

Treatment

No treatment modifications to the existing WWTP are proposed for Alternative 2.

Infrastructure

The following infrastructure components are needed for this alternative:

- Continued maintenance and investment in existing aging export system infrastructure would be required.
- Additional infrastructure to expand District recycled water use in DVR would be required.
- Recycled water could be delivered either via the existing ditch system at DVR or through direct delivery via new irrigation pipelines off the new DVR loop pipeline or the C-Line. Delivery to water users from the C-Line is dependent on whether the LPPS is pumping, and whether the C-Line has water in it.
- Expansion of the ditch system may be required to deliver recycled water to one of the new users.
- New conveyance infrastructure to deliver recycled water to new users would also be required. Figure 3.10 and Figure 3.11 below show conceptual infrastructure alignments in both plan and profile views to serve the potential users identified. Approximately 1.53 miles of new irrigation piping would be required to serve these two users.
- New conveyance infrastructure to the Washoe Tribe parcels would also be required. Given the elevation of the western-most Washoe Tribe parcels, pumping may also be required. Due to the uncertainty of recycled water use for these parcels, conceptual infrastructure alignments and cost estimates have not been prepared at this time.

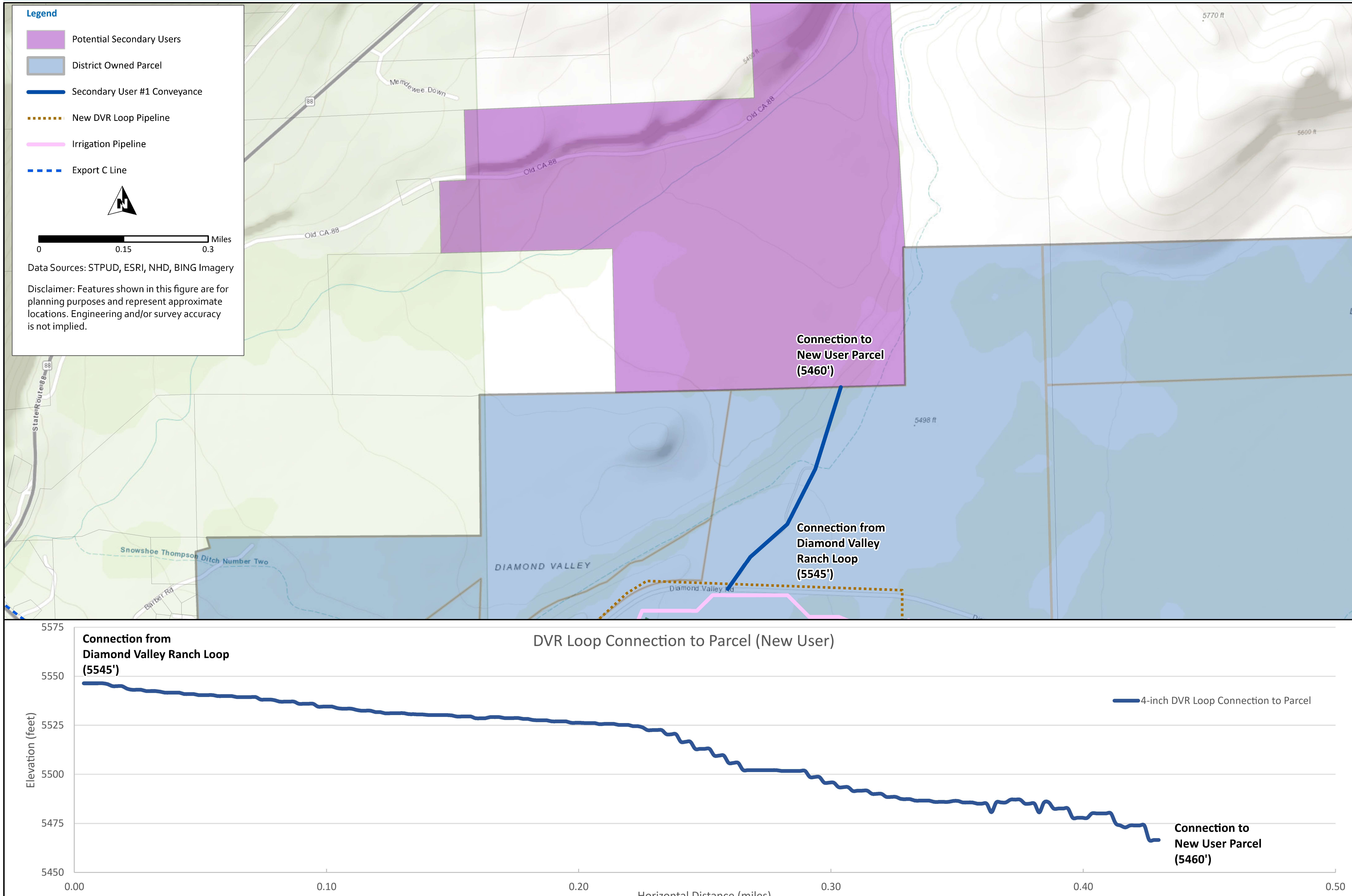


Figure 3.10 Conceptual Infrastructure Alignment Plan and Profile for User 1

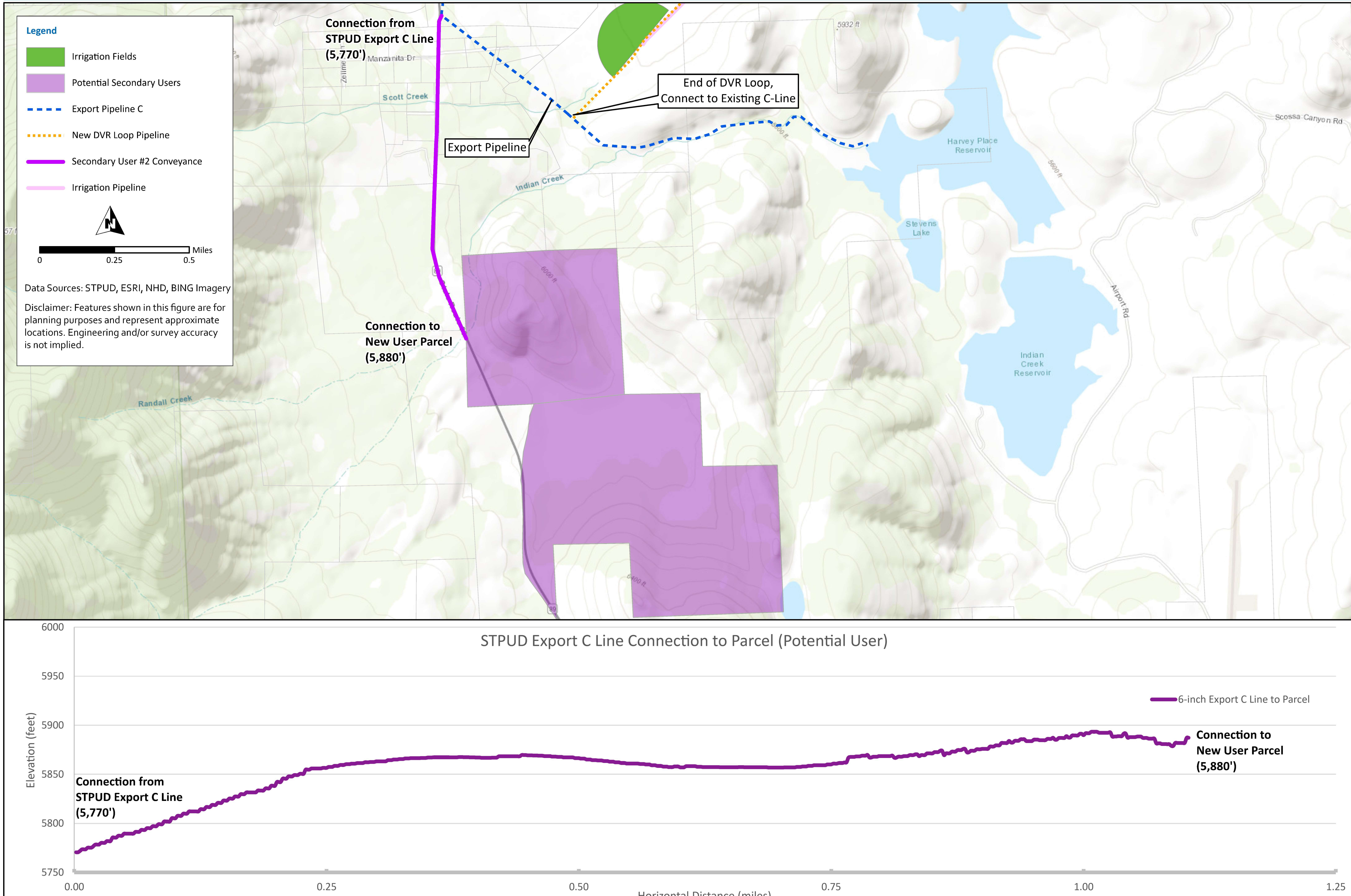


Figure 3.11 Conceptual Infrastructure Alignment Plan and Profile for User 2

Cost Estimates and Economics

A Level 5 cost estimate was prepared for the capital costs associated with this alternative as shown in Table 3.3.

Table 3.3 Alternative 2 – Cost Estimates

Component	Capital Costs(1) ($M)
New District irrigation fields at DVR	$13.61
Distribution pipelines	$4.15
TOTAL COSTS	**$17.76**

Notes:
(1) Level 5 cost estimates are considered to be accurate within plus 50 percent to minus 30 percent.

Additional economic considerations related to this alternative which are not included in the cost estimate above are listed below:

- Capital costs associated with conveyance to Washoe Trible parcels.
- Cost of energy and other O&M costs associated with the existing export system.
- Repair and replacement costs associated with the existing export system.
- Repair and replacement costs associated with existing DVR operations.
- O&M associated with new recycled water distribution system infrastructure is assumed to be minimal and is therefore not included in these costs.
- The District does not receive revenue for recycled water used by Ranchers, and it therefore may be challenging to negotiate recycled water fees with new users.

Regulatory and Permitting Requirements

A number of regulatory and permitting requirements pertain to this alternative and have been grouped into the three sections below and categorized by the anticipated complexity in obtaining the associated permit/approval. It is anticipated that these permits and approvals would require between 1 and 3 years to complete once designs have been developed. The permits required, level of complexity, and approval schedule represent a best estimate and will ultimately depend on the conditions of each regulatory agency.

1. Permits associated with recycled water use:

    a. Low:

        i. For new recycled water users or uses, the District would need to prepare an updated Report of Waste Discharge (ROWD) and obtain amended WDRs from LRWQCB.

            1) LRWQCB has not included the District's future Fields D through J in its amended WDRs for District operations in Diamond Valley, so the WDRs would need to be updated to include these fields.

        ii. Property owner permits with LRWQCB for use of recycled water.

        iii. Engineering report for the production, distribution, and use of recycled water (Title 22).

        iv. Environmental review and approval to support additional recycled water use.

b. Medium:
   i. A Salt and Nutrient Management Plan (SNMP) is likely required with amended WDRs. The District would need to meet all requirements associated with the findings of an adopted SNMP.

2. Permits associated with recycled water distribution pipeline infrastructure:

   a. Low:
      i. CA Construction General Permit.
      ii. Alpine County Building/Grading Permit.
      iii. Environmental review and approval for new conveyance infrastructure.
   b. Medium:
      i. Caltrans Encroachment Permit for conveyance infrastructure to potential secondary user (#2) parcel.
      ii. LRWQCB 401 Water Quality Certification, United States Army Corps of Engineers (USACE) Section 404 Permit, and California Department of Fish and Wildlife (CDFW) Lake and Streambed Alteration Agreement (if jurisdictional waters would be affected).

3. Other permits and institutional issues/agreements/processes:

   a. Low:
      i. Continued involvement in ongoing Alpine County litigation.
      ii. Requires renewal of contracts with existing Rancher users, and contracts with new users.

These regulatory and permitting requirements have been categorized by complexity as shown in Table 3.4 below.

Table 3.4 Alternative 2 – Range of Complexity for Regulations and Permits

Low	Medium	High
Recycled water permits/regulations: - Updated ROWD - Amended District WDRs - Property owner permits with LRWQCB - Engineering report for Title 22 unrestricted reuse - Environmental review and approval	Recycled water permits/regulations: - SNMP	
Construction related permits and approvals for recycled water distribution pipelines: - CA Construction General Permit - Alpine County Building/Grading Permit - Environmental review and approval	Construction related permits and approvals for recycled water distribution pipelines: - Caltrans Encroachment Permit - LRWQCB 401 Water Quality Certification - USACE Section 404 Permit - CDFW Lake and Streambed Alteration Agreement	
Other permits and institutional issues/agreements/processes: - Alpine County litigation - Renewal of Rancher contracts - New contracts with new users		

Notes:
(1) This table of regulations and permits is a simplified version of the text preceding this table. Details, assumptions, and caveats are described more thoroughly in the text preceding this table.

Environmental and Sustainability

Some of the environmental and sustainability components of this alternative include the following considerations:

- Potential environmental impacts associated with construction of new conveyance infrastructure.
- Sustained energy consumption and corresponding GHG emissions associated with the existing treatment and export system.

Local Agency and Public Perception

The following item has been identified as a possible concern regarding local agency and public perception:

- Public concern that this recycled water could be used more beneficially elsewhere within the Tahoe Basin.

3.4.3 Alternative 3 – Expanded Disinfected Tertiary Reuse in Alpine County

3.4.3.1 Description

This alternative would expand recycled water reuse in Alpine County through the use of disinfected tertiary recycled water. The discharge and end uses of recycled water would be in the CA portion of the Carson River Watershed.

By upgrading the treatment process to produce disinfected tertiary recycled water, the District would be able to implement unrestricted non-potable reuse. The disinfected tertiary recycled water could be used for the existing uses (currently served by disinfected secondary-23) as well as the following additional uses:

- Landscape irrigation.
- Surface and spray irrigation of food crops.
- Non-restricted recreational impoundment (i.e., water storage, appropriate for recreational use).

In this alternative, disinfected tertiary recycled water would be conveyed to Harvey Place Reservoir via the existing export system for Rancher irrigation and new landscape irrigation. Figure 3.12 shows a conceptual schematic of this alternative.

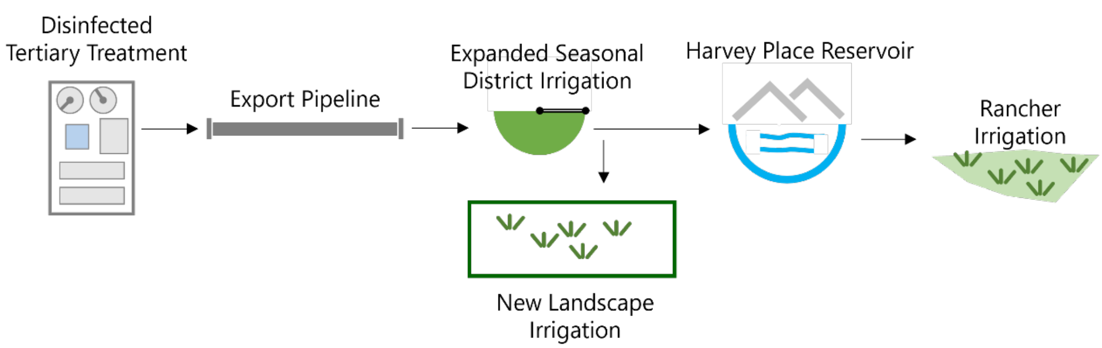


Figure 3.12 Alternative 3 Schematic

3.4.3.2 Potential Users and Associated Demands

Figure 3.13 shows three possible users of disinfected tertiary recycled water that have been identified. Assuming demands of 3.50 AF/acre and an area of 22.5 acres for potential disinfected tertiary users, there could be up to 79 AFY of new recycled water demands by implementing this alternative. None of these locations are adjacent to the existing ditch system; therefore, this alternative would require the construction of recycled water distribution infrastructure to deliver recycled water for use.

Any potential new user of disinfected secondary-23 could also use disinfected tertiary recycled water. As described in Section 3.4.2.2 , the potential additional disinfected secondary-23 demand is approximately 3,774 AFY. In combination with end uses that require disinfected tertiary recycled water, the total new potential demand is up to 3,852 AFY.

As previously discussed, the Washoe Tribe has also expressed interest in potentially utilizing recycled water, and has identified three parcels, totaling 407 acres. Assuming 3.5 AF/acre of irrigation demands, this would allow for an additional potential demand of up to 1,424 AFY. However, this demand is theoretical since the amount of acreage that might be able to utilize recycled water is uncertain at this time.

A drawback of this alternative is that the demand for disinfected tertiary recycled water is very low (79 AFY) compared to future recycled water production of 6,000 AFY. However, potential additional users could be identified in the future which would increase the demand. Another challenge with this alternative is that the recycled water would only be used seasonally during the growing season, and the District's existing recycled water storage at Harvey Place Reservoir would be needed when the water was not being used.

3.4.3.3 Triggers to Implement Alternative

The following triggers may give the District reason to implement this alternative:

- If there is insufficient capacity for the use of the District's recycled water provided by DVR irrigation operations and Rancher contracts/use.
- It is possible that the new users would be willing to pay for disinfected tertiary recycled water (a common practice in CA). The sale of recycled water would generate revenue for the District.
- Implementation of this alternative could potentially provide the District with additional flexibility and capacity for recycled water uses.
- It is possible that additional users of disinfected tertiary water could be identified, which would increase demand and revenue.
- If the District is required to revise its existing treatment system to meet disinfected tertiary treatment requirements for another reason, implementation of this alternative to serve additional users could be considered.

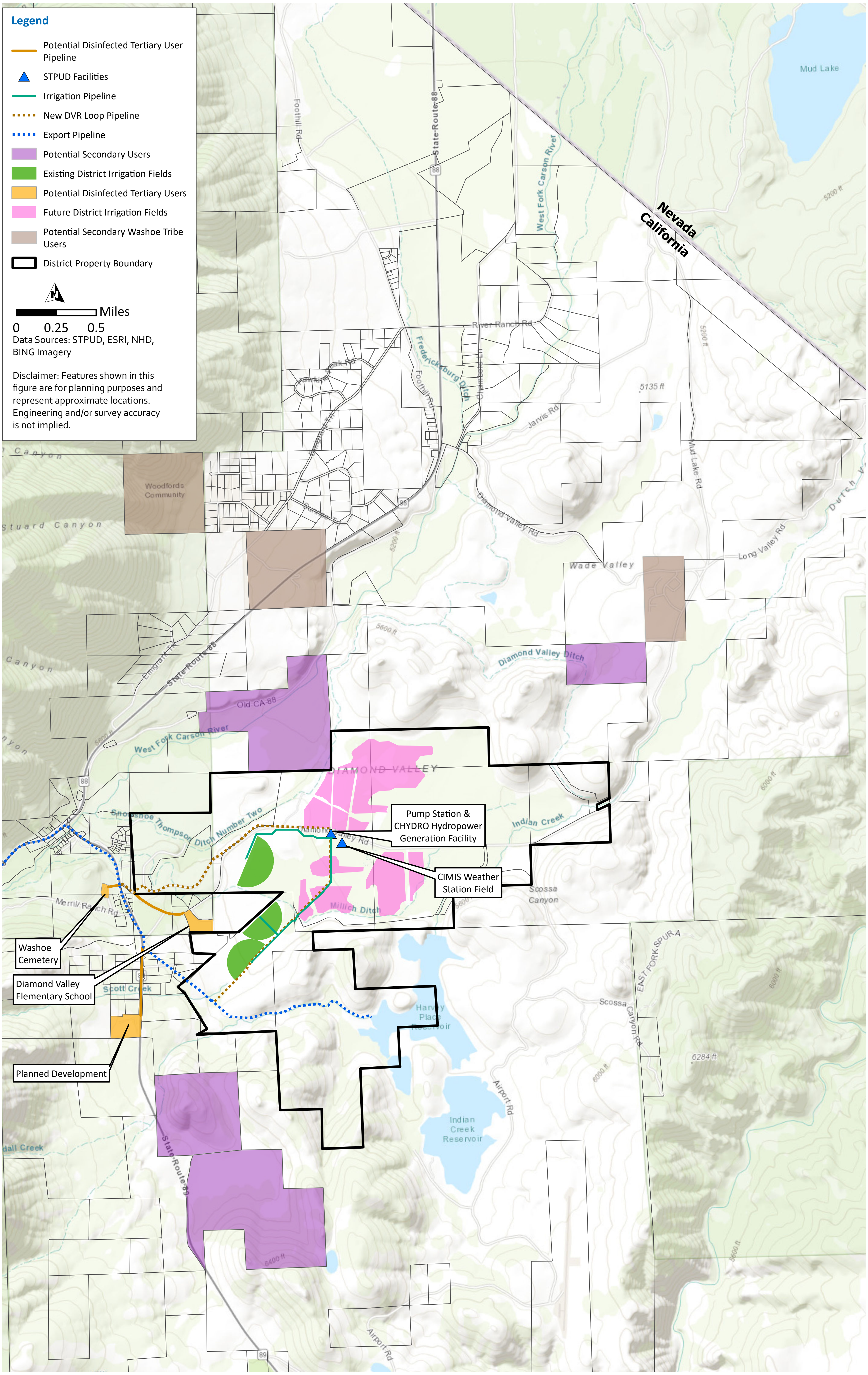


Figure 3.13 Alternative 3 Potential Users

3.4.3.4 Implementation Components

Implementation components for this alternative include treatment, infrastructure, cost estimates and economics, regulatory and permitting requirements, environmental and sustainability, and local agency and public perception.

Treatment

Treatment train upgrades to meet disinfected tertiary standards would likely consist of filter conditioning consisting of coagulation/flocculation/sedimentation of secondary effluent, replacement of existing pressure filters with granular media filtration (GMF) or cloth disk filtration (CDF) for improved performance for total suspended solids (TSS) removal, and potential disinfection modifications to confirm adequate disinfection contact time is achieved in the export pipeline. The treatment train upgrades add a degree of complexity as compared to the existing treatment process. The process flow diagram for Alternative 3 is shown in Figure 3.14.

There is limited space on the WWTP site for the anticipated process improvements, but a conceptual site plan is shown in Figure 3.15. This layout consists of constructing the new tertiary treatment facilities over effluent Holding Basin No.2. The secondary effluent would then be pumped out of Holding Basin No.2 through the new tertiary treatment train and discharged into Holding Basin No.1 prior to pumping it into the export pipeline. A monitoring point would be required along the export pipeline to confirm adequate disinfection contact time is achieved for Title 22 compliance.

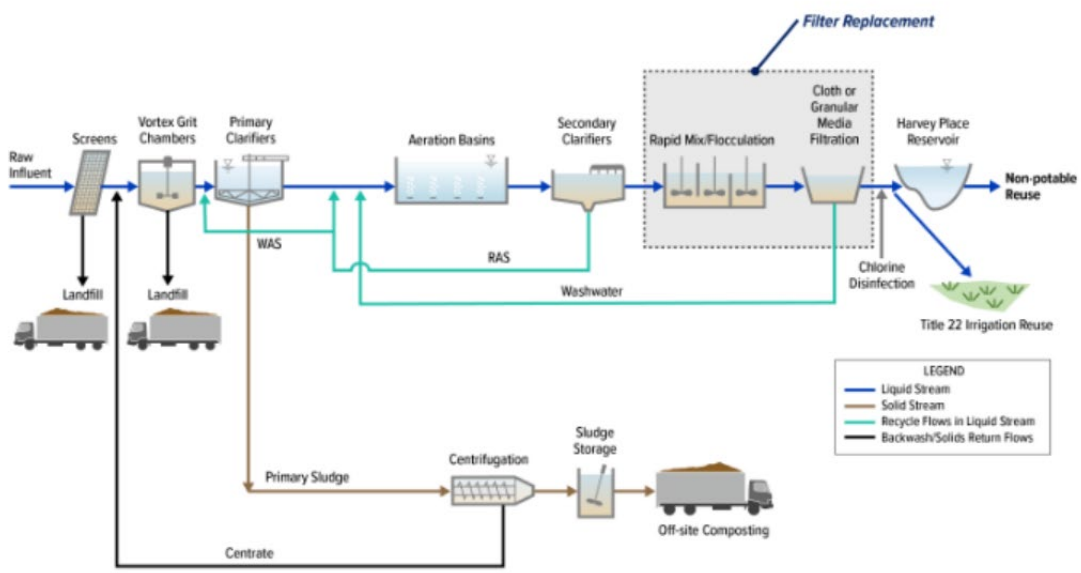


Figure 3.14 Alternative 3 – Treatment Process Flow Diagram at WWTP

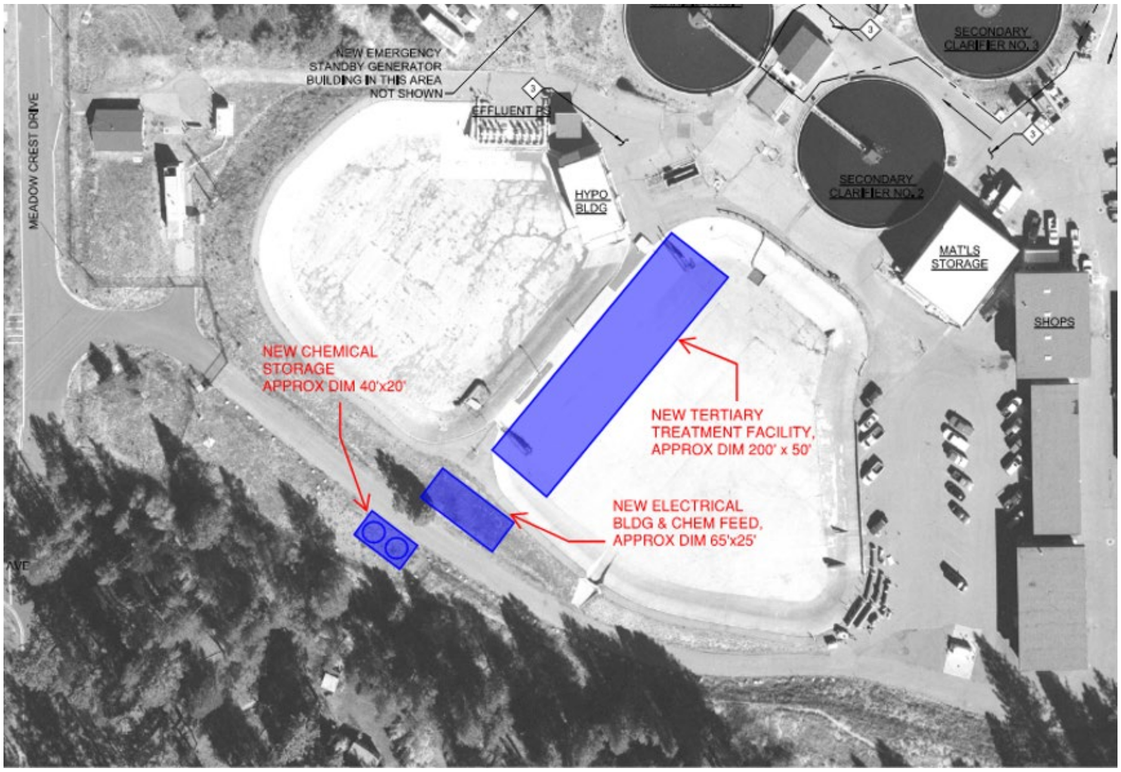


Figure 3.15 Alternative 3 - Conceptual Treatment Layout at WWTP

Alternatively, a split treatment approach could be implemented, in which a separate facility located at DVR could be constructed to produce disinfected tertiary recycled water only for the new users that require higher quality effluent. The process train for this split treatment Alternative 3 is illustrated in Figure 3.16. It would likely consist of a packaged treatment system that includes rapid mix coagulation, flocculation, sedimentation, followed by CDF and some additional disinfection for residual.

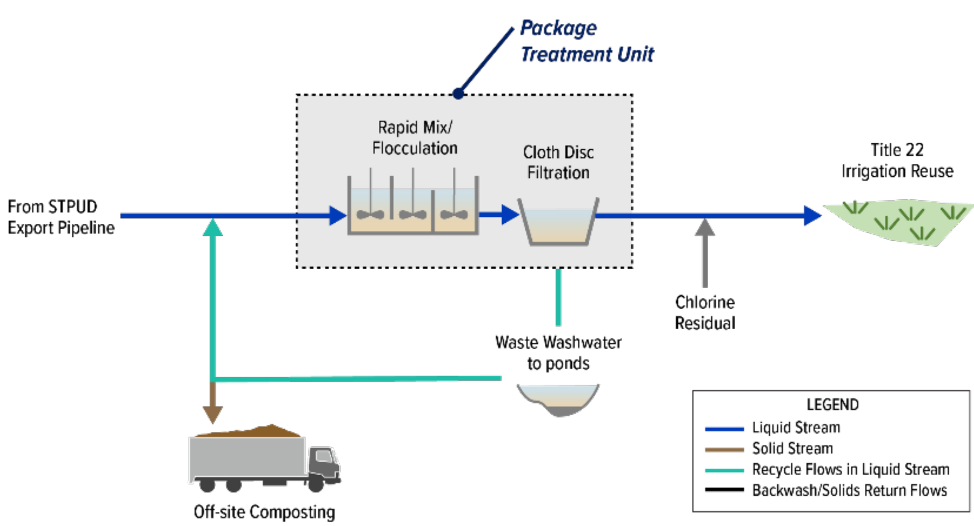


Figure 3.16 Alternative 3 – Split Treatment Process Flow Diagram at DVR

Infrastructure

The following infrastructure components are needed for this alternative:

- Continued maintenance and investment in existing aging export system infrastructure would be required.
- New conveyance infrastructure to deliver recycled water to new users would also be required. Figure 3.17, Figure 3.18, and Figure 3.19 below show conceptual infrastructure alignments in both plan and profile views to serve the potential users identified. Approximately 0.84 miles of new irrigation piping would be required to serve these three users.
  - These figures show the conceptual infrastructure alignments assuming treatment at the WWTP. If the split treatment option is pursued, additional small diameter and longer distribution pipelines and possibly pump stations would be required.
- New conveyance infrastructure to the Washoe Tribe parcels would also be required. Given the elevation of the western-most Washoe Tribe parcels, pumping may also be required. Due to the uncertainty of recycled water use for these parcels, conceptual infrastructure alignments and cost estimates have not been prepared at this time.

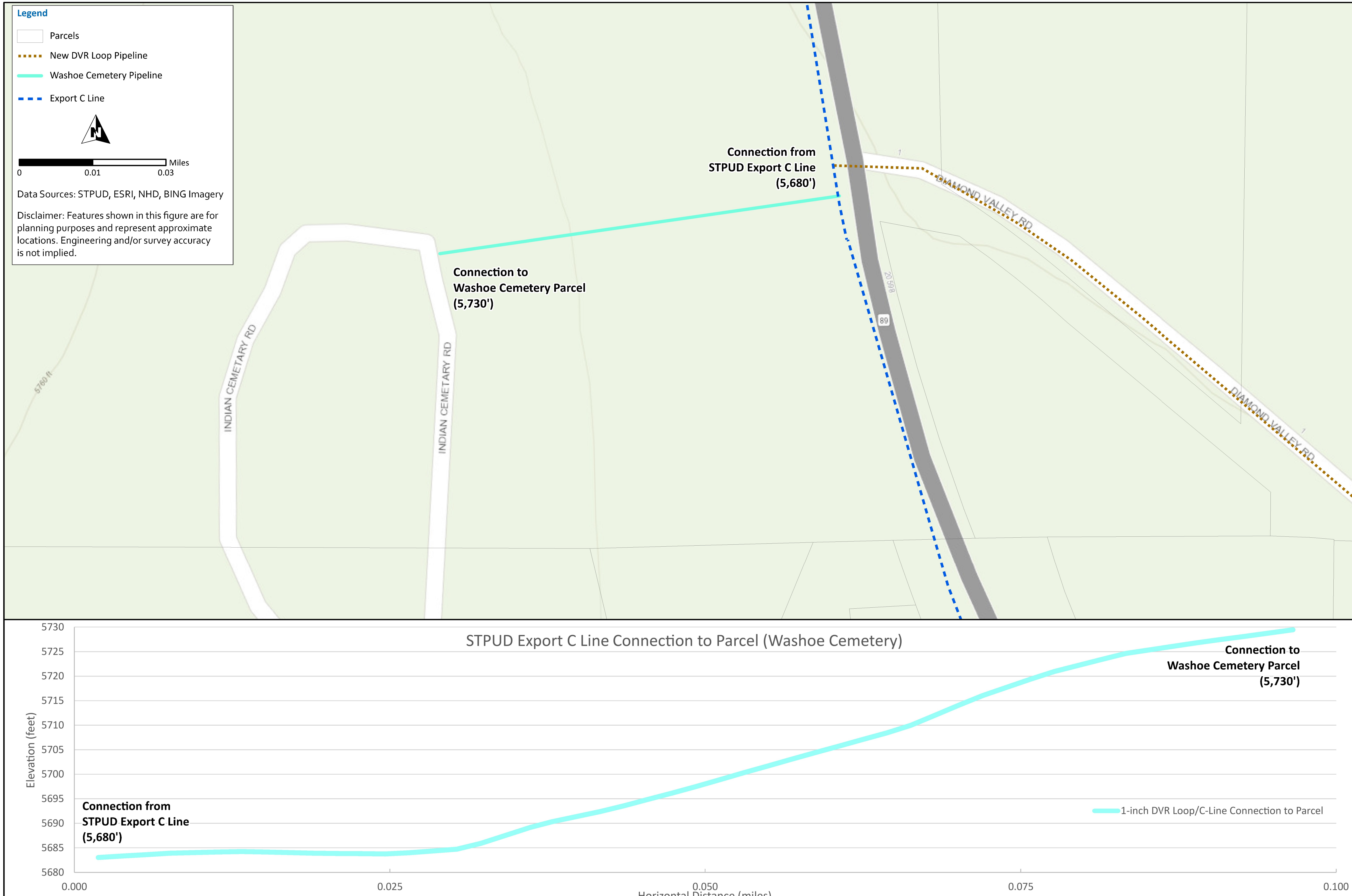


Figure 3.17 Conceptual Infrastructure Alignment Plan and Profile for Washoe Cemetery

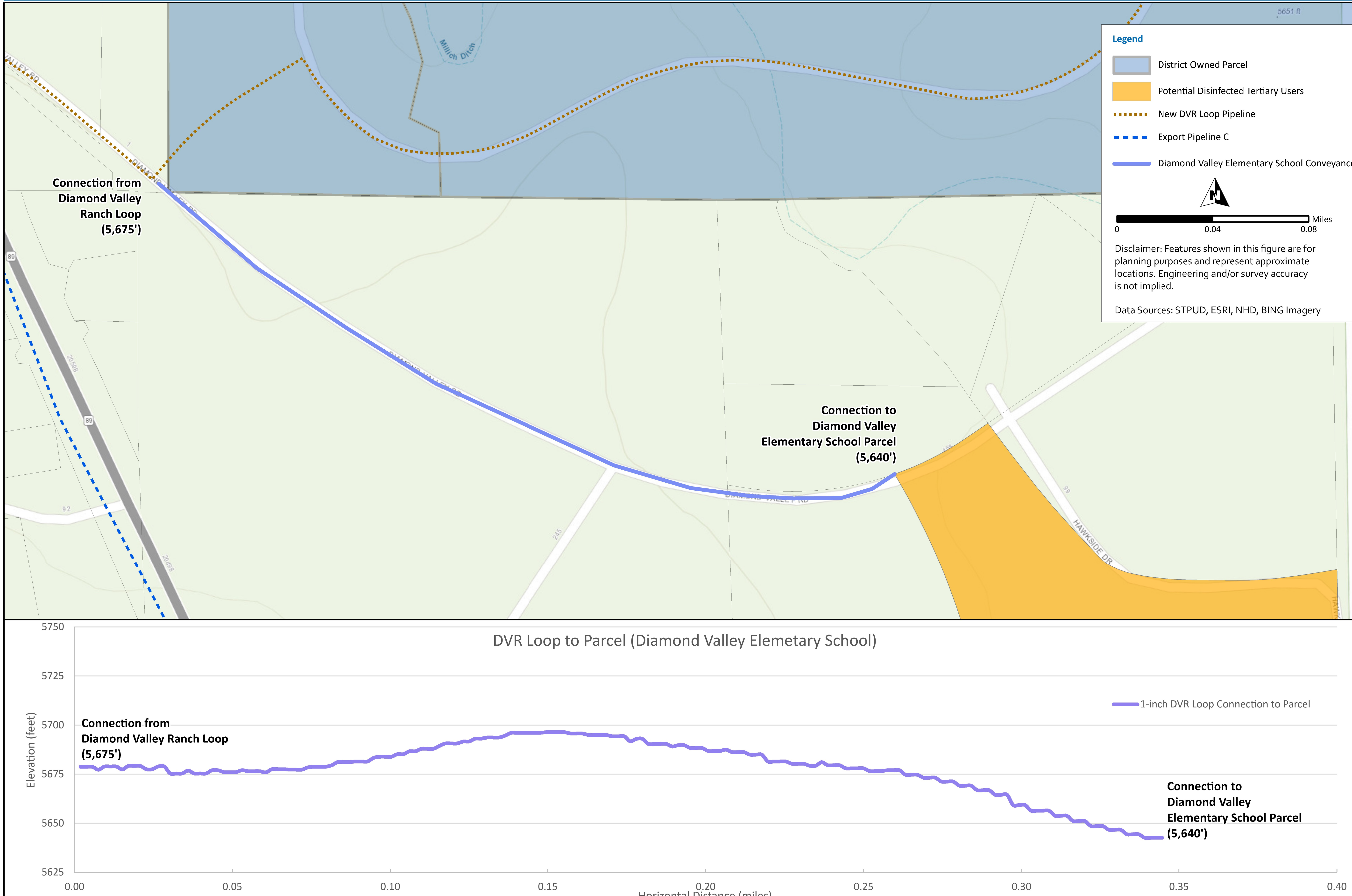


Figure 3.18 Conceptual Infrastructure Alignment Plan and Profile for Diamond Valley Elementary School

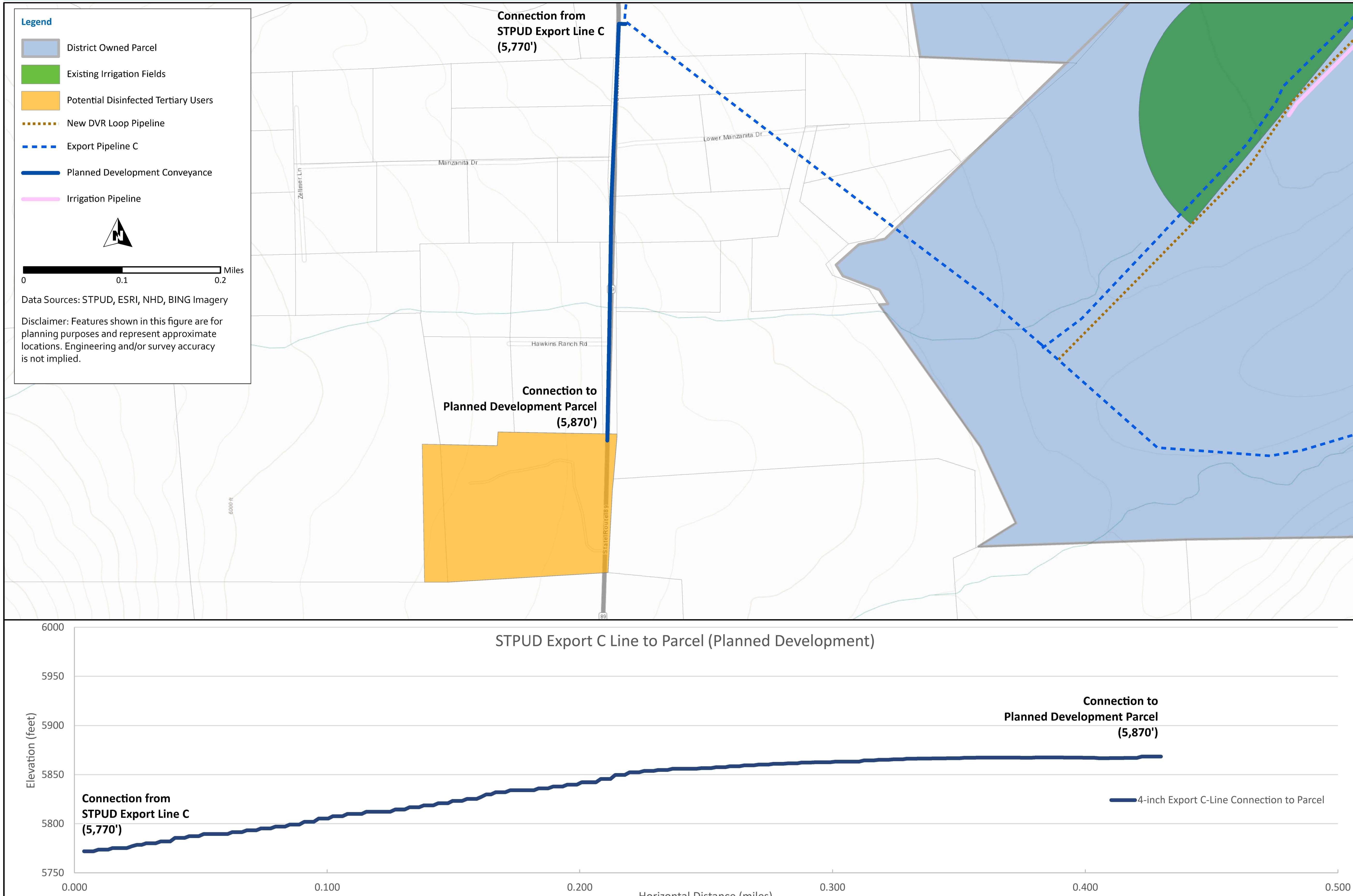


Figure 3.19 Conceptual Infrastructure Alignment Plan and Profile for Planned Development

Cost Estimates and Economics

A Level 5 cost estimate was prepared for the capital costs associated with this alternative as shown in Table 3.5. Additionally, annual O&M costs associated with this alternative are shown in Table 3.5. Given the two treatment options discussed above, two cost estimates were prepared.

Table 3.5 Alternative 3 – Cost Estimates

Component	Capital Costs[1] ($M)	O&M Costs[2] ($M/yr)
Cost estimate for treatment at WWTP		
Treatment at WWTP	$86.00	$0.75
Distribution pipelines	$1.66	-
TOTAL COSTS	**$87.66**	**$0.75**
Cost estimate for split treatment at DVR[3]		
Split treatment at DVR	$13.00	$0.07
Distribution pipelines[4]	$1.66	-
TOTAL COSTS	**$14.66**	**$0.07**

Notes:
(1) Level 5 cost estimates are considered to be accurate within plus 50 percent to minus 30 percent.
(2) O&M associated with new recycled water distribution system infrastructure is assumed to be minimal.
(3) This cost estimate is for a 0.25 mgd facility, which would meet the demands associated with the disinfected tertiary parcels, plus irrigation on the District's existing and future fields.
(4) This cost estimate is based on treatment at the WWTP. If the split treatment option is pursued, additional small diameter and longer distribution pipelines and possibly pump stations would be required.

Additional economic considerations related to this alternative which are not included in the cost estimate above are listed below:

- Cost of energy and other O&M costs associated with export system.
- Repair and replacement costs associated with export system.
- Repair and replacement costs associated with existing DVR operations.
- O&M associated with new recycled water distribution system infrastructure is assumed to be minimal and is therefore not included in these costs.
- The District does not receive revenue for recycled water used by Ranchers, and it therefore may be challenging to negotiate recycled water fees even with the increased level of treatment.
- The demand for tertiary disinfected recycled water may not support the investment in required treatment upgrades.

Regulatory and Permitting Requirements

A number of regulatory and permitting requirements pertain to this alternative and have been grouped into the three sections below and categorized by the anticipated complexity obtaining the associated permit/approval. It is anticipated that these permits and approvals would require between 1 and 3 years to complete once designs have been developed. The permits required, level of complexity, and approval schedule represent a best estimate and will ultimately depend on the conditions of each regulatory agency.

1. Permits associated with treatment upgrades and recycled water use:
   a. Low:
      i. Engineering report for the production, distribution, and use of recycled water (Title 22).
      ii. Property owner permits with LRWQCB for use of recycled water.
      iii. TRPA Permit for WWTP facility footprint expansion.
      iv. Alpine County Building/Grading Permit for split treatment facility. (Note that this would be in lieu of the TRPA Permit.)
      v. Compliance with Title 17.
      vi. Environmental review and approval for WWTP or DVR upgrades.
   b. Medium:
      i. For new recycled water users or uses, the District would need to prepare an updated ROWD, obtain amended/new WDRs from LRWQCB, and meet all requirements including any associated with findings of an adopted SNMP.
2. Permits associated with recycled water distribution pipeline infrastructure:
   a. Low:
      i. CA Construction General Permit.
      ii. Alpine County Building/Grading Permit.
      iii. Environmental review and approval for conveyance infrastructure.
   b. Medium:
      i. Caltrans Encroachment Permit for conveyance infrastructure to Washoe Cemetery and planned development parcel uses.
      ii. LRWQCB 401 Water Quality Certification, USACE Section 404 Permit, and CDFW Lake and Streambed Alteration Agreement (if jurisdictional waters would be affected).
3. Other permits and institutional issues/agreements/processes:
   a. Low:
      i. Continued involvement in ongoing Alpine County litigation.
      ii. Requires renewal of contracts with existing Rancher users, and new contracts with new users.

These regulatory and permitting requirements have been categorized by complexity as shown in Table 3.6 below:

Table 3.6 Alternative 3 – Range of Complexity for Regulations and Permits

Low	Medium	High
Recycled water permits/regulations: - Engineering report for Title 22 unrestricted reuse - Property owner permits with LRWQCB - Compliance with Title 17	Recycled water permits/regulations: - Updated ROWD - New WDRs - SNMP	
Construction related permits and approvals for modifications at existing WWTP: - TRPA Permit - Environmental review and approval		
Construction related permits and approvals for split treatment facility at DVR: - Alpine County Building/Grading Permit - Environmental review and approval		
Construction related permits and approvals for recycled water distribution pipelines: - CA Construction General Permit - Alpine County Building/Grading Permit - Environmental review and approval	Construction related permits and approvals for recycled water distribution pipelines: - Caltrans Encroachment Permit - LRWQCB 401 Water Quality Certification - USACE Section 404 Permit - CDFW Lake and Streambed Alteration Agreement	
Other permits and institutional issues/agreements/processes: - Alpine County litigation - Renewal of Rancher contracts - New contracts with new users		

Notes:
(1) This table of regulations and permits is a simplified version of the text preceding this table. Details, assumptions, and caveats are described more thoroughly in the text preceding this table.

Environmental and Sustainability

Some of the environmental and sustainability components of this alternative include the following considerations:

- Potential environmental impacts associated with construction of new recycled water treatment facilities and conveyance infrastructure.
- Sustained energy consumption and corresponding GHG emissions associated with the export system.
- Energy consumption and corresponding GHG emissions associated with the upgraded treatment process.
- GHG emissions for this alternative, in addition to the existing system, are estimated to be 200 kg CO_2e/year. GHG emissions for the split treatment variation, in addition to the existing system, are estimated to be 10 kg CO_2e/year.

Local Agency and Public Perception

The following items have been identified as possible concerns regarding local agency and public perception:

- Public concern with justification for investment in WWTP upgrades.
- Public concern that the water could be used more beneficially elsewhere within the Tahoe Basin, especially given the higher level of treatment.

3.4.4 Alternative 4 – Discharge to West Fork Carson River and Use in Nevada

3.4.4.1 Description

This alternative consists of direct surface water discharge of recycled water to the West Fork Carson River. The water, once discharged to the West Fork Carson River, could potentially be utilized by downstream users. Figure 3.20 shows a conceptual schematic of this alternative.

As described in TM2, Section 2.6.1.4, the original concept for this alternative was to take advantage of the proximity of the existing export pipeline and several crossings and/or close alignment of the West Fork Carson River. However, per the Alpine County 1965 Ordinance for Recycled Water (TM1 Section IV.B.3.a), discharge to the West Fork Carson River is prohibited if located upstream of 1/2 mile below the County Highway bridge on the Diamond Valley Road crossing of the West Fork Carson River (TM1 Section IV.B.2). Figure 3.23 shows the location of the referenced bridge crossing with the West Fork Carson River. To comply with the Alpine County 1965 Ordinance for Recycled Water, this alternative conservatively assumes discharge downstream of this location. The amount of flow discharged to the West Fork Carson in this location would depend on regulatory approval and permitting requirements. Any water in excess of the permitted discharge could be used for District irrigation and/or conveyed to Harvey Place Reservoir for downstream use by Ranchers.

As described in TM2, Section 2.6.1.4, Segment 4 of the West Fork Carson River is listed as an impaired water (303(d) List) and key water quality issues include bacteria, metals, murky water, nitrogen (N), and/or phosphorus (P), and salts (TM1 Section IV.B.2.b). Total Maximum Daily Loads (TMDLs) have not been developed for the West Fork Carson River, but the West Fork Vision Plan (Vision Plan) is being implemented as an alternative approach to restoring water quality in the river. Per discussion with the LRWQCB, there would be significant challenges to obtaining a permit to discharge to the West Fork Carson River based on the existing impairments and very stringent water quality objectives. It is important to consider the most conservative regulatory scenario, where the discharge would be required to meet the water quality objectives of the West Fork Carson River at the point of discharge, in absence of studies/permit negotiations that would allow a mixing zone, allowance for a seasonal discharge, and/or modifications to the West Fork water quality objectives. In addition to meeting discharge requirements for the discharge into the West Fork Carson River in CA, the river would need to meet Nevada (NV) water quality standards at the CA/NV state line. The West Fork Carson River is a NDEP classified surface water and the nearest downstream water quality standards would apply. The potential to attain these standards would depend on the discharge location, the flow and water quality of the river, degree of mixing, and contributions of flow and constituents from other sources.

Table 3.7 presents key water quality objectives for the West Fork Carson River and average District effluent concentrations. The existing effluent concentrations range between several times and an order of magnitude greater than the West Fork Carson Water quality objectives. Additional treatment would be required to produce treated effluent that meets the water quality objectives of the West Fork Carson River.

The evaluation of treatment upgrades considered the limits of industry standard treatment technologies with exception of incorporating a reverse osmosis (RO) process. RO is a very effective treatment process for total dissolved solids (TDS) and chloride. In addition, it can be effective at removing some dissolved organic nitrogen (a component of total nitrogen [TN]). However, this process generates a waste stream, known as reverse osmosis concentrate (ROC), at approximately 20 percent of the influent flow. The most cost effective and energy efficient approach to ROC disposal is via an ocean outfall. Both the distance to the ocean and absence of an existing ocean discharge pipeline eliminate ocean outfall as an option for the District. Other options generally include trucking to a landfill, and/or various physical/thermal treatment processes to reduce the ROC volume, followed by evaporation in ponds and/or crystallization. These options are all high cost and/or energy intensive industrial processes. Discussion with District staff and management led to the decision that RO should not be included as part of any proposed treatment train, due to the complexities associated with ROC disposal.

The treatment upgrades are described in detail in Section 3.4.4.4 . The general approach involves a proposed treatment train that is based on incorporating processes that represent industry standard limits of technology, with the exception of RO. The estimated effluent water quality produced by this treatment train is presented in Table 3.7. As shown in Table 3.7, even with this proposed treatment train, the projected effluent quality would not meet the water quality objectives of the West Fork Carson River. Consequently, additional negotiation with regulators along with supporting studies would need to be pursued to determine if a permit could be obtained and the specific conditions of the permit. The LRWQCB, NDEP, and resources agencies would be involved in the permitting process.

As part of the process of further evaluating discharge to the West Fork Carson River, other discharge options were considered, including discharge to the West Fork Carson River in NV, or discharge to rapid infiltration basins which are designed to recharge the river. Based on discussions with LRWCB and NDEP, these alternatives did not provide advantages with respect to obtaining regulatory approval and associated permits for the following reasons:

- Discharge to the West Fork Carson in NV would be subject to similar constraints based on stringent water quality objectives and the NDEP anti-degradation policy. The limits of technology approach would not produce treated effluent that could meet the objectives at the point of discharge. This is a similar outcome to the evaluation of discharge to the West Fork Carson in CA.
- Discharge to rapid infiltration basins with recharge to the West Fork Carson would be subject to the outcome of the United States Supreme Court case; the County of Maui v. Hawaii Wildlife Fund, 140 S. Ct. 1462 (2020) and related Environmental Protection Agency (EPA) Guidance Document (EPA, 2023)[4]. The guidance document outlines the factors that should be used to determine if a discharge to ground is the functional equivalent to a surface water discharge. A rapid infiltration basin that is designed with the intent of recharging a surface water would potentially be considered the functional equivalent of a surface water discharge, in which case, the permit would be based on the water quality objectives of the surface water. The potential permitting of a groundwater discharge as functionally equivalent to a surface water discharge would apply regardless of whether the rapid infiltration basin was located in CA or NV.

Table 3.7 Comparison of Average Effluent Quality, Future Potential Effluent Water Quality, and West Fork Carson River Objectives

Description	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)	Total Dissolved Solids (mg/L)	Chloride (mg/L)
West Fork Carson River Objectives	0.03	0.25	70	2.5
Existing Average Effluent Quality	3.6	30	270	58
Future Potential Effluent Quality	0.5	2	270(1)	58(1)

Notes:
(1) Conversion from chlorine disinfection to ultraviolet (UV) disinfection may reduce the TDS and chloride concentrations. However, in absence of additional analysis of the process change impacts on water quality, it is conservatively assumed that TDS and chloride concentrations will not change.
Abbreviations: mg/L = milligrams per liter.

[4] Applying the Supreme Court's County of Maui v. Hawaii Wildlife Fund Decision in the Clean Water Act Section 402 National Pollutant Discharge Elimination System Permit Program to Discharges through Groundwater, Environmental Protection Agency, December 2023.

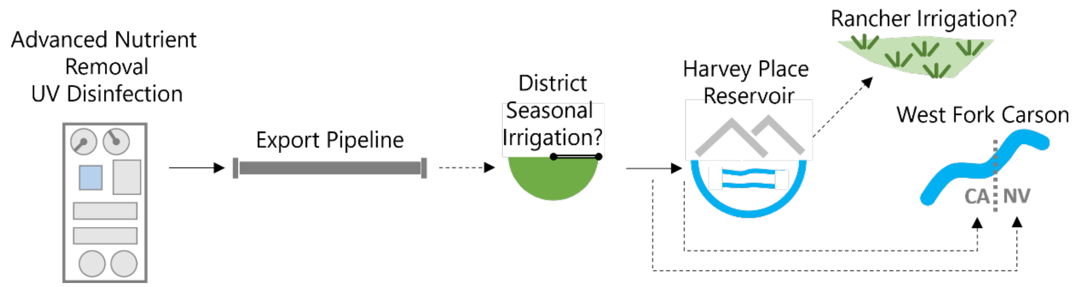


Figure 3.20 Alternative 4 Schematic

3.4.4.2 Potential Users and Associated Demands

No specific potential users have been identified for this alternative. However, there may be potential users downstream of the discharge location to the West Fork Carson River by users that have obtained a water right for a specific use. Potential demands in the Carson Valley include cattle ranching and other animal production as well as agricultural irrigation. Irrigators in the Carson Valley currently use surface water from the West Fork Carson River and East Fork Carson River and then shift to groundwater wells when surface water is less available (seasonally or based on hydrologic conditions). These downstream water right holders could potentially benefit from additional flow in the West Fork Carson River.

While there are potential downstream users of recycled water that is discharged to the West Fork Carson River, there is a high level of uncertainty in obtaining a permit for all, or even a portion, of the District's future flows. For this reason, it is assumed that while a discharge to the West Fork Carson River could be designed for the future District flows, there is the significant caveat of regulatory approval.

3.4.4.3 Triggers to Implement Alternative

The following triggers may give the District reason to implement this alternative:

- If there is insufficient capacity for the use of the District's recycled water provided by DVR irrigation operations and Rancher contracts/use.
- This alternative could potentially reduce or eliminate the existing recycled water system in DVR and Alpine County, depending on the discharge approach.
- Water right holders in the West Fork Carson may benefit from additional flow available in the river.
- This alternative could augment water supply for the Carson Watershed, which may provide drought resiliency for NV end users.

3.4.4.4 Implementation Components

Implementation components for this alternative include treatment, infrastructure, cost estimates and economics, regulatory and permitting requirements, environmental and sustainability, and local agency and public perception.

Treatment

It is anticipated that significant upgrades of the existing WWTP facility would be required to meet the future discharge permit requirements. While these permit requirements have not been established at this time, it is anticipated that best available technologies would be necessary to provide sufficient nutrient (N and P) removal and decrease TSS and TDS to the extent possible without having to implement RO or microfiltration. RO is considered a no-go approach as there are no good options for disposal within a reasonable distance of the facility. This is in addition to the high energy use and operational costs for this type of facility.

The treatment train upgrades add a significant degree of complexity as compared to the existing treatment process. The treatment additions associated with this alternative consist of the following process components as illustrated in Figure 3.21:

- Additional fine screening (2 millimeters [mm]) - This is required after primary clarification to prevent damage to the membrane bioreactor (MBR).
- Convert Equalization (EQ) Basins into additional Aeration Basin (AB) – Additional tank volume is necessary to achieve nutrient removal, including enhanced biological phosphorus removal, nitrification, and denitrification within the aeration basins. The use of MBRs will help reduce the total tank volumes required, but at a minimum, the existing EQ basins will need to be converted into additional Aeration Basin capacity and AB3 will need to be placed into service.
- Aeration Basin Upgrades:
  - Baffles for anoxic, anaerobic, and aerobic zones needed for 5-stage Barden-Pho process:
    - Replacement of aeration diffusers to provide adequate aeration zone control and additional air for aeration zones.
    - Mixers for anoxic and anaerobic zones to keep solids in suspension.
    - Mixed Liquor (ML) Return Pumps.
- MBR at end of ABs.
- Secondary Clarifiers would no longer be needed.
- New Advanced Water Purification Facility:
  - Permeate pump station, would pump membrane permeate through UV disinfection.
  - UV disinfection to reduce TDS.
  - Potential partial TDS and chloride removal (not included in cost):
    - RO based with advances in concentrate management.
    - Non-RO based technology.

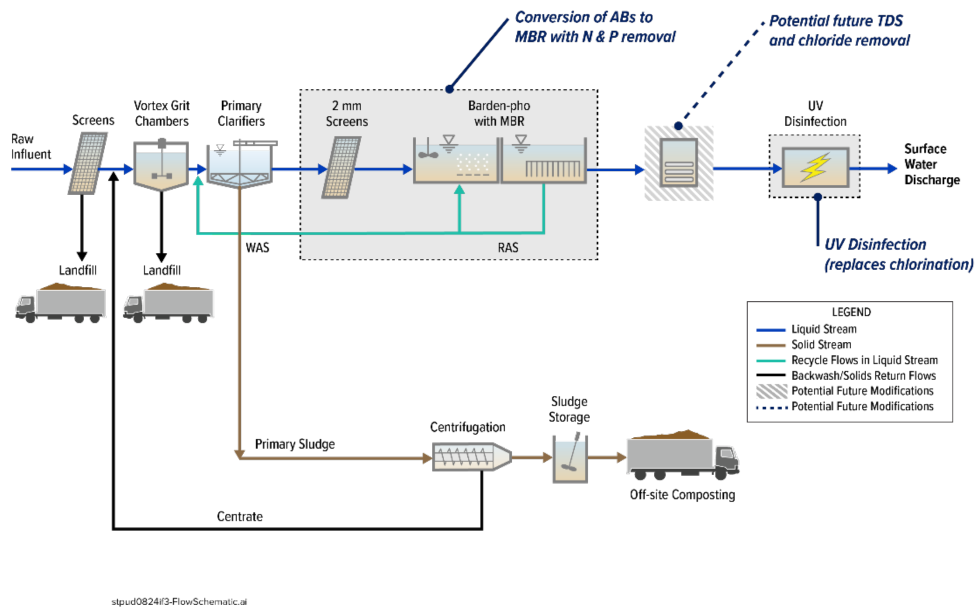


Figure 3.21 Alternative 4 – Treatment Process Flow Diagram

Figure 3.22 provides a conceptual layout for the proposed WWTP process improvements associated with Alternative 4. Similar to Alternative 3, the advanced water treatment facilities would be located above Holding Basin No.2 due to the limited space available. Once the new facilities are constructed, the secondary clarifiers could be removed, freeing up space for future expansion of the facilities. Alternately, other nutrient removal intensification processes should be evaluated during preliminary design including Integrated Fixed Film Activated Sludge (IFAS), mobile organic biofilm (MOB), and membrane aerated biofilm reactor (MABR) processes. Any of these technologies can reduce the overall footprint of nutrient removal processes and are able to achieve low total nitrogen and phosphorus limits in cold climates.

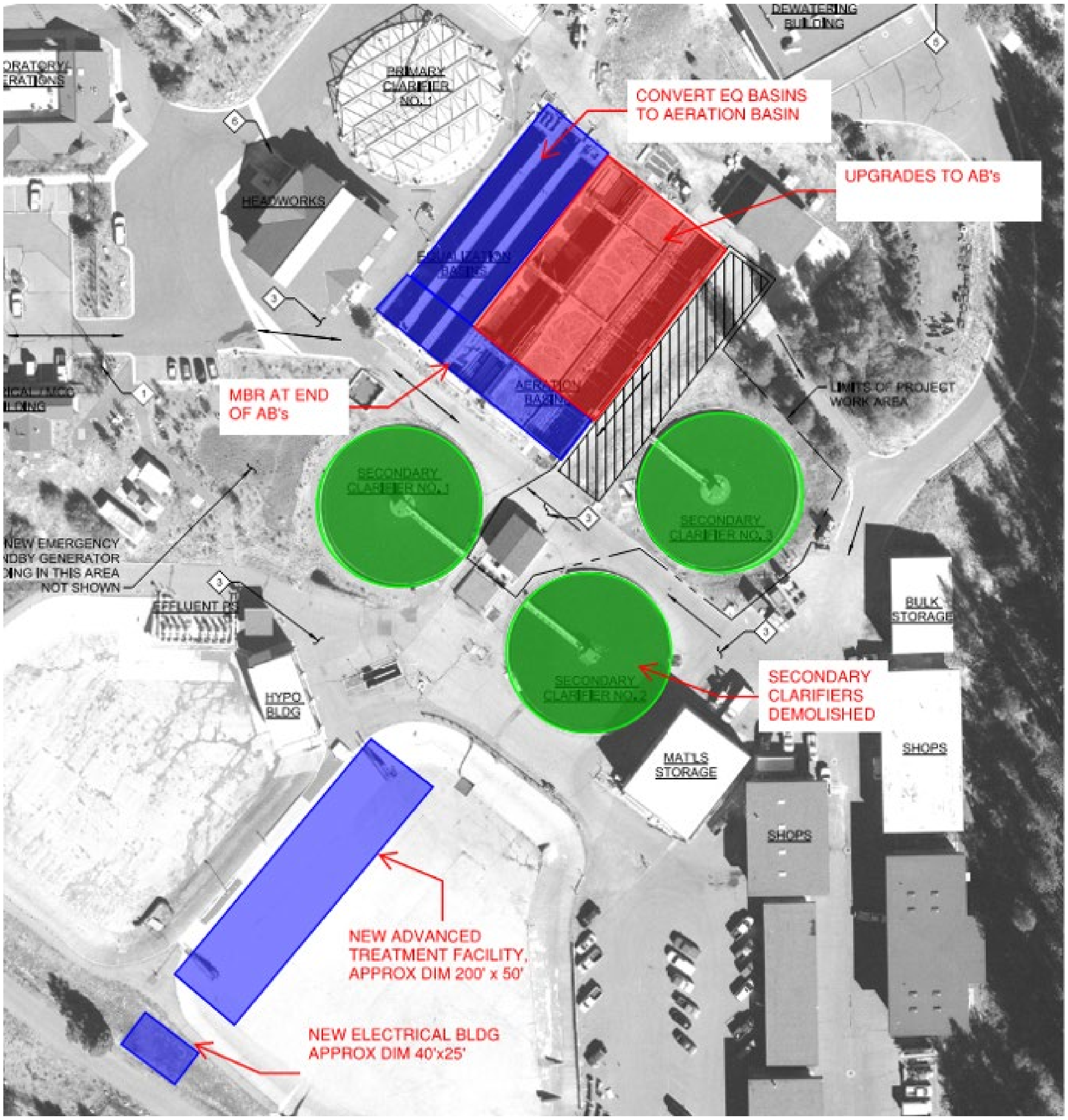


Figure 3.22 Alternative 4 – Conceptual Treatment Layout

Infrastructure

The following infrastructure components are needed for this alternative:

- Continued maintenance and investment in existing aging export system infrastructure would be required.
- Construction and maintenance of approximately 4.58 miles of recycled water transmission piping from the existing Export C-Line to a new outfall on the West Fork Carson River. Figure 3.23 shows a conceptual alignment of this conveyance piping.
- Construction and maintenance of a new outfall structure to discharge to the West Fork Carson River.

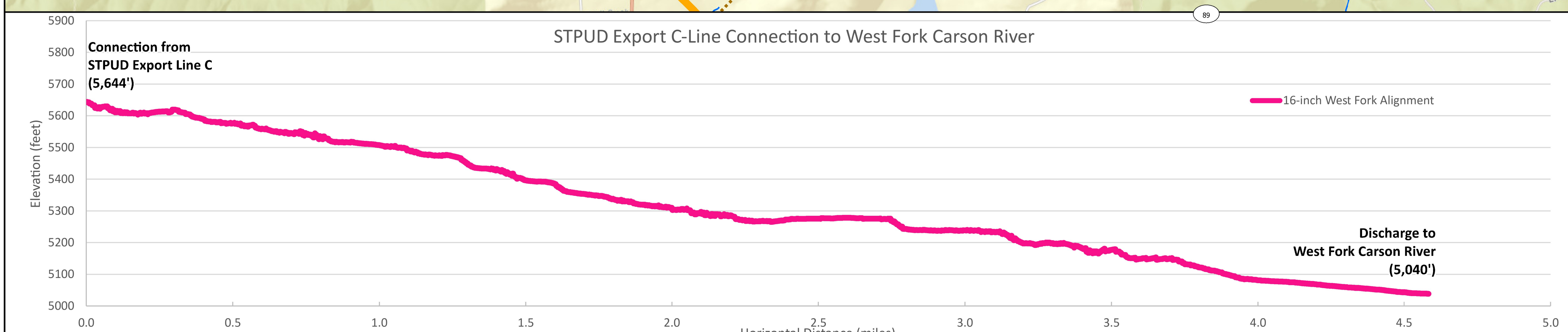


Figure 3.23 Conceptual Infrastructure Alignment Plan and Profile for Discharge to West Fork Carson River

Cost Estimates and Economics

A Level 5 cost estimate was prepared for the capital costs associated with this alternative as shown in Table 3.8. Additionally, annual O&M costs associated with this alternative are shown in Table 3.8.

Table 3.8 Alternative 4 – Cost Estimates

Component	Capital Costs(1) ($M)	O&M Costs(2) ($M/yr)
Treatment at WWTP	$224.00	$3.08
Conveyance pipeline and Outfall to West Fork Carson River	$21.22	-
TOTAL COSTS	**$245.22**	**$3.08**

Notes:
(1) Level 5 cost estimates are considered to be accurate within plus 50 percent to minus 30 percent.
(2) O&M associated with new recycled water distribution system infrastructure is assumed to be minimal.

Additional economic considerations related to this alternative which are not included in the cost estimate above are listed below:

- Cost of energy and other O&M costs associated with export system.
- Repair and replacement costs associated with export system.
- O&M associated with new recycled water distribution system infrastructure is assumed to be minimal and is therefore not included in these costs.
- Challenges and uncertainty with receiving revenue due to West Fork Carson River adjudication and accounting of water delivery.

Regulatory and Permitting Requirements

A number of regulatory and permitting requirements pertain to this alternative and have been grouped into the three sections below and categorized by the anticipated complexity in obtaining the associated permit/approval. It is anticipated that these permits and approvals would require between 3 and 5 years, if even possible, to complete once designs have been developed. The permits required, level of complexity, and approval schedule represent a best estimate and will ultimately depend on the conditions of each regulatory agency.

1. Permits associated with recycled water use, discharge to the West Fork Carson River, and new outfall to the West Fork Carson River:
    a. Low:
        i. Engineering report for the production, distribution, and use of recycled water in CA (Title 22), for any recycled water which would not go in the West Fork Carson River.
    b. Medium:
        i. For new recycled water users or uses, the District would need to prepare an updated ROWD, obtain new WDRs from the LRWQCB, and meet all requirements including any associated with findings of an adopted SNMP.
    c. High:
        i. LRWQCB Basin Plan amendment to allow discharge of effluent in the West Fork Hydrologic Unit.

ii. The new outfall to the West Fork Carson River will require a new National Pollutant Discharge Elimination System (NPDES) Permit, subject to stringent Water Quality-Based Effluent Limits (WQBELs) for TDS, chloride, TN, and total P (TP).
iii. NDEP approval based on attainment of water quality standards at the State line.
iv. Consistency with the Vision Plan, and associated implementation actions.
v. CDFW Lake and Streambed Alteration Agreement for new outfall to West Fork Carson River (if jurisdictional waters would be affected).
vi. USACE Section 404 Permit for new outfall to West Fork Carson River (if work occurs below the Ordinary High-Water Mark [OHWM] of West Fork Carson River).
vii. LRWQCB 401 Water Quality Certification for new outfall to West Fork Carson River (if work occurs below the OHWM of West Fork Carson River).
viii. Environmental review and approval for new outfall to the West Fork Carson River. Because of the complexity, high potential for significant environmental effects, and anticipated potential for legal challenge associated with this alternative, a more robust and higher-level environmental document would likely be needed.

2. Permits associated with WWTP modifications and recycled water distribution pipeline infrastructure:

   a. Low:
      i. TRPA Permit for WWTP facility footprint expansion.
      ii. Tahoe Construction General Permit (if WWTP upgrades are over 1 acre).
      iii. California Construction General Permit for pipeline from C-Line to discharge point.
      iv. Alpine County Building/Grading Permit for pipeline from C-Line to discharge point.
      v. Environmental review and approval for WWTP modifications and pipeline from C-Line to discharge point.
   b. Medium:
      i. Caltrans Encroachment Permit for pipeline from C-Line to discharge point.
      ii. LRWQCB 401 Water Quality Certification, USACE Section 404 permit, and CDFW Lake and Streambed Alteration Agreement if jurisdictional waters would be affected.

3. Other permits and institutional issues/agreements/processes:

   a. Low:
      i. Continued involvement in ongoing Alpine County litigation.

These regulatory and permitting requirements have been categorized by complexity as shown in Table 3.9 below:

Table 3.9 Alternative 4 – Range of Complexity for Regulations and Permits

Low	Medium	High
Recycled water permits/regulations: - Engineering report for Title 22 unrestricted reuse	Recycled water permits/regulations: - Updated ROWD - New WDRs - SNMP	
		Discharge to West Fork Carson River permits/regulations: - LRWQCB Basin Plan amendment - NPDES Permit - NDEP approval - Consistency with the Vision Plan
		Construction related permits and approvals for new outfall to West Fork Carson River: - CDFW Lake and Streambed Alteration Agreement - USACE Section 404 permit - LRWQCB 401 Water Quality Certification - LRWQCB Basin Plan amendment - NDEP approval - Environmental review and approval
Construction related permits and approvals for WWTP modifications: - TRPA Permit - Tahoe Construction General Permit - Environmental review and approval		
Construction related permits and approvals for pipeline from C-Line to discharge point: - CA Construction General Permit - Alpine County Building/Grading Permit - Environmental review and approval	Construction related permits and approvals for pipeline from C-Line to discharge point: - Caltrans Encroachment Permit - USACE Section 404 Permit - LRWQCB 401 Water Quality Certification - CDFW Lake and Streambed Alteration Agreement	
Other permits and institutional issues/agreements/processes: - Alpine County litigation		

Notes:
(1) This table of regulations and permits is a simplified version of the text preceding this table. Details, assumptions, and caveats are described more thoroughly in the text preceding this table.

Environmental and Sustainability

Some of the environmental and sustainability components of this alternative include the following considerations:

- Potential environmental impacts associated with construction of new recycled water treatment facilities and infrastructure, including potential impacts to sensitive species during construction of outfall and conveyance infrastructure between Harvey Place Reservoir and the discharge location on the West Fork Carson River.
- Sustained energy consumption and corresponding GHG emissions associated with the export system.
- Energy consumption and corresponding GHG emissions associated with the upgraded treatment process.
- GHG emissions for this alternative, in addition to the existing system, are estimated to be 1,030 kg CO_2e/year.

Local Agency and Public Perception

The following items have been identified as possible concerns regarding local agency and public perception:

- Public concern about putting recycled water into a water body.
- Public concern that water resources/supply augmentation benefits are being provided to NV rather than CA.
- Public concern that the water could be used more beneficially elsewhere within the Tahoe Basin, especially given the higher level of treatment.
- Public concern with justification for investment in WWTP upgrades and infrastructure improvements.

3.4.5 Alternative 6A – Expanded Class A or B Reuse in Nevada via Discharge to Indian Creek

3.4.5.1 Description

This alternative involves discharge to Indian Creek, which flows across the CA/NV border, past Mud Lake and ultimately joins the East Fork Carson River. Treated water discharged into Indian Creek could be subsequently used via direct use off Indian Creek or further downstream use off the East Fork Carson River. This alternative would include the existing export infrastructure over Luther Pass and new conveyance pipelines to Indian Creek, at the location of the infrastructure that allows Harvey Place Reservoir to release into Indian Creek. The water, once discharged to Indian Creek, could potentially be utilized by downstream users in in the Carson River Watershed. Figure 3.24 shows a conceptual schematic of this alternative.

Figure 3.25 shows the location of new conveyance pipelines to the outfall of Harvey Place Reservoir. There is existing infrastructure that allows release of water from Harvey Place Reservoir to Indian Creek. This existing infrastructure would be used to discharge effluent into Indian Creek. Because of stringent water quality discharge limits, a direct discharge to Indian Creek from the DVR Loop Line via the Harvey Place Reservoir discharge structure is assumed for this alternative to avoid any potential water quality degradation that could occur during storage in Harvey Place Reservoir. The amount of flow discharged to Indian Creek in this location would depend on regulatory approval and permitting requirements. Any water in excess of the permitted discharge could be used for District irrigation and/or conveyed to Harvey Place Reservoir for downstream use by Ranchers.

It is important to consider the most conservative regulatory scenario. There are no specific water quality objectives for Indian Creek. The LRWQCB indicated that governing downstream objectives would apply. There are no objectives for Indian Creek in NV, but Indian Creek is tributary to the East Fork Carson River, and per the tributary rule, the applicable water quality objectives are the objectives for the East Fork Carson River (East Fork Carson River at Muller Lane, the reach where Indian Creek Flows into the East Fork Carson River). The most conservative assumption is that the discharge would be required to meet the water quality objectives of the East Fork Carson River at the point of discharge, in absence of studies/permit negotiations that would allow a mixing zone, allowance for a seasonal discharge, and/or modifications to the East Fork Carson River water quality objectives.

Table 3.10 presents key water quality objectives for the East Fork Carson River and average District effluent concentrations. The most restrictive objectives are based on the Requirement to Maintain High Quality (RMHQ), which is associated with NV anti-degradation policy. The existing effluent concentrations are several times greater than the RMHQs. Additional treatment would be required to produce treated effluent that meets the RMHQs for the East Fork Carson River.

The treatment train for this alternative is based on incorporating processes that represent industry standard limits of technology, with the exception of RO. This is the same approach as for Alternative 4, (see Section 3.4.4.1 for discussion on elimination of RO as a treatment process), and Section 3.4.4.4 for discussion of the treatment process. The estimated effluent water quality produced by this treatment train is presented in Table 3.10. As shown in Table 3.10, even with this proposed treatment train, the projected effluent quality would not meet the RMHQs for the East Fork Carson River. Consequently, an antidegradation analysis and additional negotiation with regulators along with supporting studies, would need to be pursued to determine if a permit could be obtained and the specific conditions of the permit. The LRWQCB, NDEP, and resources agencies would be involved in the permitting process.

As part of the process of further evaluating discharge to Indian Creek, other discharge options were considered, including discharge to Indian Creek in NV, discharge to rapid infiltration basins which are designed to recharge the East Fork Carson River, and discharge to Indian Creek Reservoir. Based on additional analyses and discussions with LRWCB and NDEP, these alternatives did not provide advantages with respect to obtaining regulatory approval and associated permits for the following reasons:

- Discharge to Indian Creek in NV would be subject to the same constraints, as the East Fork Carson Objectives are applicable in the reach of Indian Creek in NV.
- Discharge to rapid infiltration basins with recharge to Indian Creek may be subject to the outcome of the County of Maui v. Hawaii Wildlife Fund, 140 S. Ct. 1462 (2020) and related EPA Guidance Document (EPA 2023). See Section 3.4.4.1 for a discussion of regulation of a groundwater discharge that is determined to be the functional equivalent of a surface water discharge.

- Discharge to Indian Creek Reservoir to provide additional storage prior to downstream use for DVR irrigation, Rancher irrigation, or release into Indian Creek for downstream use in NV would require attainment of Title 22 regulations for unrestricted reuse (i.e., associated with storage in recreational impoundment), water quality based effluent limits in a discharge permit, and meet load limitations based on the TP TMDL for Indian Creek Reservoir. The District effluent previously discharged effluent to Indian Creek. The implementation of the TP TMDL led to the implementation of Harvey Place Reservoir, and the change in discharge location from Indian Creek Reservoir to Harvey Place Reservoir. As of the 2015 TMDL Implementation Status Report, some targets have been met and some have not. It is anticipated that moving the District effluent discharge back to Indian Creek would be problematic from a regulatory approval/permitting perspective. Even with treatment for P removal, the discharge would include some additional load of TP to Indian Creek Reservoir, which would potentially set back attainment of implementation targets and the overall progress towards attainment of water quality objectives in Indian Creek Reservoir.

Table 3.10 Comparison of Average Effluent Quality, Future Potential Effluent Water Quality, and East Fork Carson River RMHQs

Description	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)	Total Dissolved Solids (mg/L)	Chloride (mg/L)
East Fork Carson River - RMHQs	-	0.5	180	8
Existing Average Effluent Quality	3.6	30	270	58
Future Potential Effluent Quality	0.5	2	270 (1)	58 (1)

Notes:
(1) Conversion from chlorine disinfection to UV disinfection may reduce the TDS and chloride concentrations. However, in absence of additional analysis of the process change impacts on water quality, it is conservatively assumed that TDS and chloride concentrations will not change.

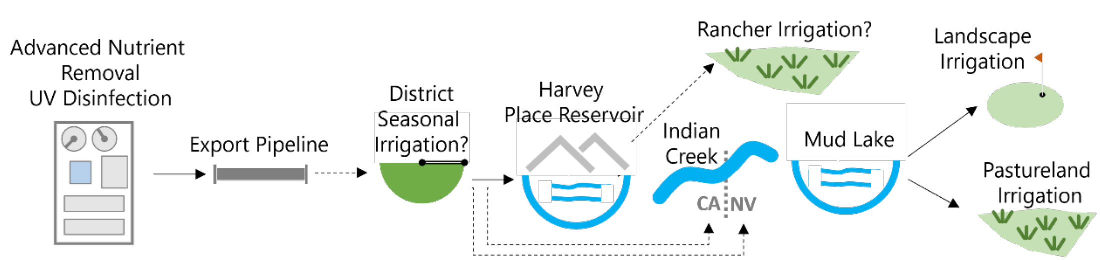


Figure 3.24 Alternative 6A Schematic

3.4.5.2 Potential Users and Associated Demands

No specific potential users have been identified for this alternative. However, there may be potential users downstream of the discharge location to Indian Creek by users that have obtained a water right for a specific use. These downstream water right holders could potentially benefit from additional flow in Indian Creek. Potential demands in the Carson Valley include cattle ranching and other animal production as well as agricultural irrigation. Irrigators in the Carson Valley currently use surface water from the East Fork Carson River and then shift to groundwater wells when surface water is less available (seasonally or based on hydrologic condition). The use of recycled water would offset use of surface water or groundwater supplies. Water right holders could potentially benefit from additional flow in the East Fork Carson River.

While there are potential downstream users of recycled water that is discharged to Indian Creek, there is a high level of uncertainty in obtaining a permit for all, or even a portion, of the District's future flows. For this reason, it is assumed that while a discharge to Indian Creek could be designed for the future District flows, there is the significant caveat of regulatory approval.

3.4.5.3 Triggers to Implement Alternative

The following triggers may give the District reason to implement this alternative:

- If there is insufficient capacity for the use of the District's recycled water provided by DVR irrigation operations and Rancher contracts/use.
- This alternative could potentially reduce or eliminate the existing recycled water system in DVR and Alpine County, depending on the discharge approach.
- Water right holders in the East Fork Carson may benefit from additional flow available in the river. It is possible that water rights agreements may provide a source of revenue for the District.
- This alternative could augment water supply for the Carson Watershed, which may provide drought resiliency for NV end users.

3.4.5.4 Implementation Components

Implementation components for this alternative include treatment, infrastructure, cost estimates and economics, regulatory and permitting requirements, environmental and sustainability, and local agency and public perception.

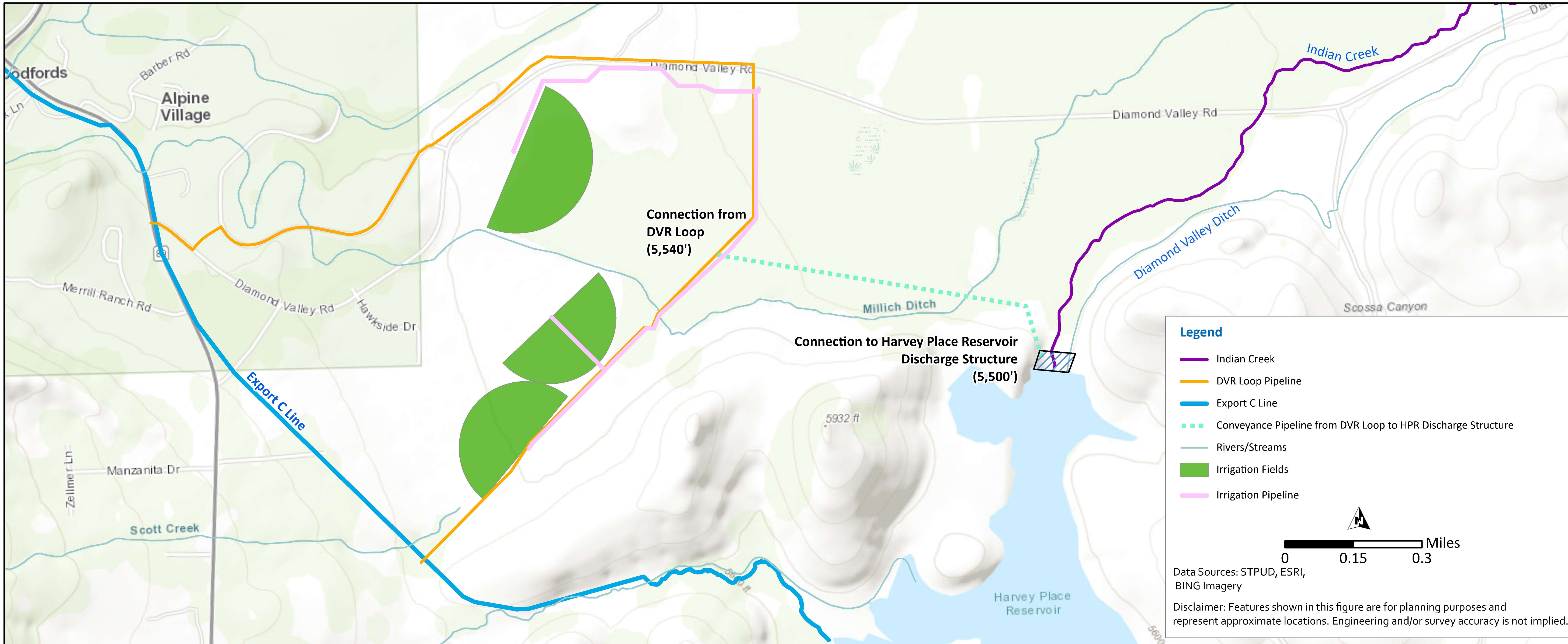
Treatment

Treatment requirements for this alternative are the same as those for Alternative 4, described in Section 3.4.4.4 .

Infrastructure

The following infrastructure components are needed for this alternative:

- Continued maintenance and investment in existing aging export system infrastructure would be required.
- Construction and maintenance of approximately 0.74 miles of recycled water transmission piping from the New DVR Loop Pipeline to the existing Harvey Place Reservoir outfall structure to Indian Creek. Figure 3.25 shows a conceptual alignment of this conveyance piping.



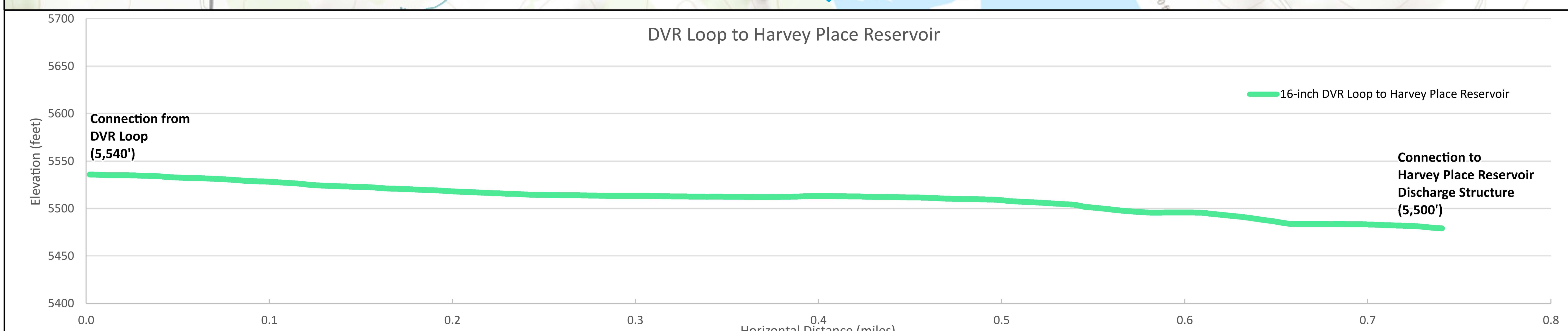


Figure 3.25 Conceptual Infrastructure Alignment Plan and Profile for Discharge to Indian Creek

Cost Estimates and Economics

A Level 5 cost estimate was prepared for the capital costs associated with this alternative as shown in Table 3.11. Additionally, annual O&M costs associated with this alternative are shown in Table 3.11.

Table 3.11 Alternative 6A – Cost Estimates

Component	Capital Costs(1) ($M)	O&M Costs(2) ($M/yr)
Treatment at WWTP	$224.00	$3.08
Conveyance pipeline	$2.91	-
TOTAL COSTS	**$226.91**	**$3.08**

Notes:
(1) Level 5 cost estimates are considered to be accurate within plus 50 percent to minus 30 percent.
(2) O&M associated with new recycled water distribution system infrastructure is assumed to be minimal.

Additional economic considerations related to this alternative which are not included in the cost estimate above are listed below.

- Cost of energy and other O&M costs associated with export system.
- Repair and replacement costs associated with export system.
- O&M associated with new recycled water distribution system infrastructure is assumed to be minimal and is therefore not included in these costs.
- Challenges and uncertainty with receiving revenue due to East Fork Carson River adjudication and accounting of water delivery.

Regulatory and Permitting Requirements

A number of regulatory and permitting requirements pertain to this alternative and have been grouped into the three sections below and categorized by the anticipated complexity in obtaining the associated permit/approval. It is anticipated that these permits and approvals would require between 2 and 4 years to complete once designs have been developed. The permits required, level of complexity, and approval schedule represent a best estimate and will ultimately depend on the conditions of each regulatory agency.

1. Permits associated with recycled water use and discharge to Indian Creek:
   a. Low:
      i. Engineering Report for the production, distribution, and use of recycled water (Title 22). The Engineering Report pertains to any continued/new use of recycled water in CA.
   b. Medium:
      i. For new recycled water users or uses, the District would need to prepare an updated ROWD, obtain new WDRs from LRWQCB, and meet all requirements including any associated with findings of an adopted SNMP.
   c. High:
      i. Attainment of the most immediate downstream water quality objectives for the East Fork Carson River, at the state line (East Fork Carson at Muller Lane).
      ii. NDEP approval, based on attainment of water quality standards at the State line.

iii. Existing outfall to Indian Creek may require a new NPDES Permit, subject to stringent WQBELs for TDS, chloride, TN, and TP.
iv. CDFW Lake and Streambed Alteration Agreement.
v. USACE Section 404 Permit (if work occurs below the OHWM of Indian Creek).
vi. LRWQCB 401 Water Quality Certification (if work occurs below the OHWM of Indian Creek).
vii. Environmental review and approval for existing outfall to Indian Creek. Because of the complexity, high potential for significant environmental effects, and anticipated potential for legal challenge associated with this alternative, a more robust and higher-level environmental document would likely be needed.

2. Permits associated with recycled water distribution pipeline infrastructure and WWTP modifications:

   a. Low:
      i. TRPA Permit for WWTP facility footprint expansion.
      ii. Tahoe Construction General Permit (if WWTP facility improvements are over 1 acre).
      iii. Environmental review and approval for WWTP modifications.
      iv. CA Construction General Permit for new conveyance pipeline.
      v. Alpine County Building/Grading Permit for new conveyance pipeline.
      vi. Environmental review and approval for new conveyance pipeline.
   b. Medium:
      i. LRWQCB 401 Water Quality Certification, USACE Section 404 Permit, and CDFW Lake and Streambed Alteration Agreement for new conveyance pipeline (if jurisdictional waters would be affected).

3. Other permits and institutional issues/agreements/processes:

   a. Low:
      i. Continued involvement in ongoing Alpine County litigation.
   b. Medium:
      i. Development of water rights agreements for users in NV.

These regulatory and permitting requirements have been categorized by complexity as shown in Table 3.12 below:

Table 3.12 Alternative 6A – Range of Complexity for Regulations and Permits

Low	Medium	High
Recycled water permits/regulations: - Engineering report for Title 22 unrestricted reuse	Recycled water permits/regulations: - Updated ROWD - New WDRs - SNMP	
		Discharge permits / regulations: - Attainment of East Fork Carson River water quality objectives - NDEP approval - New NPDES Permit - CDFW Lake and Streambed Alteration Agreement - USACE Section 404 Permit - LRWQCB 401 Water Quality Certification - Environmental review and approval
Construction related permits and approvals for WWTP modifications: - TRPA Permit - Tahoe Construction General Permit - Environmental review and approval		
Construction related permits and approvals for pipeline from DVR Loop to Harvey Place Reservoir's existing Indian Creek discharge structure: - CA Construction General Permit - Alpine County Building/Grading Permit - Environmental review and approval	Construction related permits and approvals for pipeline from DVR Loop to Harvey Place Reservoir's existing Indian Creek discharge structure: - LRWQCB 401 Water Quality Certification - USACE Section 404 Permit - CDFW Lake and Streambed Alteration Agreement	
Other permits and institutional issues/agreements/processes: - Alpine County litigation	Other permits and institutional issues/agreements/processes: - Water rights agreements for NV users	

Notes:
(1) This table of regulations and permits is a simplified version of the text preceding this table. Details, assumptions, and caveats are described more thoroughly in the text preceding this table.

Environmental and Sustainability

Some of the environmental and sustainability components of this alternative include the following considerations:

- Potential environmental impacts associated with construction of new recycled water treatment facilities and infrastructure.
- Sustained energy consumption and corresponding GHG emissions associated with the export system.
- Energy consumption and corresponding GHG emissions associated with the upgraded treatment process.
- GHG emissions for this alternative, in addition to the existing system, are estimated to be 1,030 kg CO_2e/year.

Local Agency and Public Perception

The following items have been identified as possible concerns regarding local agency and public perception:

- Public concern about putting recycled water into a water body.
- Public concern that water resources/supply augmentation benefits are being provided to NV rather than CA.
- Public concern that the water could be used more beneficially elsewhere within the Tahoe Basin, especially given the higher level of treatment.
- Public concern with justification for investment in WWTP upgrades and infrastructure improvements.

3.4.6 Alternative 6B – Expanded Class A or B Reuse in Nevada via Discharge to Mud Lake

3.4.6.1 Description

This alternative involves export of District effluent for beneficial reuse in the NV portion of the Carson River Watershed. This alternative would include the existing export infrastructure over Luther Pass, storage in Harvey Place Reservoir, and conveyance into NV and storage in Mud Lake for recycled water use. Figure 3.26 shows a conceptual schematic of this alternative.

This option involves a new pipeline to convey stored water from Harvey Place Reservoir across the NV state line, with direct discharge to Mud Lake, as shown in Figure 3.27. Once the water is conveyed to Mud Lake, it would then be diverted from Mud Lake for use in NV. Mud Lake, which is comprised of a small pool at the dam face and a larger dead pool to the southeast of the dam, has a total capacity of approximately 5,500 AF, per communication with NDWR. Both the discharge and end use locations for this alternative are in NV. The amount of flow discharged to Mud Lake would depend on regulatory approval and permitting requirements. Any water in excess of the permitted discharge could be used for District irrigation and/or conveyed to Harvey Place Reservoir for downstream use by Ranchers. Mud Lake is owned by Bently Properties, so use of Mud Lake for storage would need to be coordinated with the property owner.

It is important to consider the most conservative regulatory scenario. The discharge into Mud Lake would be permitted by NDEP. Mud Lake is not a classified surface water; as such, there are no existing water quality objectives. Mud Lake is hydrologically connected to both the East Fork Carson River and West Fork Carson River. Per discussion with NDEP, the tributary rule would apply in absence of specific objectives for Mud Lake. The most conservative assumption is that the RMHQs for the West Fork Carson River would be applied.

Table 3.13 presents the RMHQs for the West Fork Carson River and average District effluent concentrations. The existing effluent concentrations are several times greater than the RMHQs. Additional treatment would be required to produce treated effluent that meets the RMHQs for the West Fork Carson River.

The treatment train for this alternative is based on incorporating processes that represent industry standard limits of technology, with the exception of RO. This is the same approach as for Alternative 4, (see Section 3.4.4.1 for discussion on elimination of RO as a treatment process), and Section 3.4.4.4 for discussion of the treatment process. The estimated effluent water quality produced by this treatment train is presented in Table 3.13. As shown in Table 3.13, even with this proposed treatment train, the projected effluent quality would not meet the RMHQs for the West Fork Carson River. Consequently, an antidegradation analysis and additional negotiation with regulators along with supporting studies, would need to be pursued to determine if a permit could be obtained and the specific conditions of the permit. The LRWQCB, NDEP, and resources agencies would be involved in the permitting process.

Table 3.13 Comparison of Average Effluent Quality, Future Potential Effluent Water Quality, and West Fork Carson River RMHQs

Description	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)	Total Dissolved Solids (mg/L)	Chloride (mg/L)
West Fork Carson River - RMHQs	0.016	0.4	70	3
Existing Average Effluent Quality	3.6	30	270	58
Future Potential Effluent Quality	0.5	2	270 (1)	58(1)

Notes:
(1) Conversion from chlorine disinfection to UV disinfection may reduce the TDS and chloride concentrations. However, in absence of additional analysis of the process change impacts on water quality, it is conservatively assumed that TDS and chloride concentrations will not change.

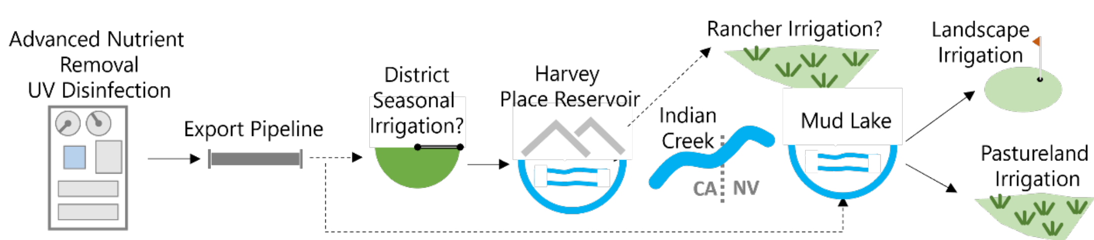


Figure 3.26 Alternative 6B Schematic

3.4.6.2 Potential Users and Associated Demands

Delivery of recycled water to Mud Lake would provide a source of water for several users. Bently Properties owns Mud Lake and uses water from the lake for irrigation. Recycled water could be used to augment the water supply for Bently Properties. There may also be potential users that that have obtained a water right for a specific use rely on conveyance from Mud Lake. In addition, with connectivity to the East Fork Carson River and West Fork Carson With irrigation demands in Carson Valley include cattle ranching, other animal production and agriculture. Irrigators in the Carson Valley currently use surface water from the East Fork Carson River and then shift to groundwater wells when surface water is less available (seasonally or based on hydrologic conditions). Alternative 6D, which is discussed in Section 3.4.8 shows direct delivery to Bently Properties, via a conveyance pipeline. (Given the potentially stringent water quality requirements for discharge to Mud Lake, the treatment requirements for Alternative 6B are higher than those for Alternative 6D, which is why these alternatives are considered separately.)

While there are potential downstream users of recycled water that is discharged to Mud Lake, there is a high level of uncertainty in obtaining a permit for all, or even a portion, of the District's future flows. For this reason, it is assumed that while a discharge to Mud Lake could be designed for the future District flows, there is the significant caveat of regulatory approval.

3.4.6.3 Triggers to Implement Alternative

The following triggers may give the District reason to implement this alternative:

- If there is insufficient capacity for the use of the District's recycled water provided by DVR irrigation operations and Rancher contracts/use.
- This alternative could potentially reduce or eliminate the existing recycled water system in DVR and Alpine County, depending on the discharge approach.
- Water right holders in the East Fork Carson River may benefit from additional flow available in the river. It is possible that water rights agreements may provide a source of revenue for the District.
- This alternative could augment water supply for the Carson Watershed, which may provide drought resiliency for NV end users.

3.4.6.4 Implementation Components

Implementation components for this alternative include treatment, infrastructure, cost estimates and economics, regulatory and permitting requirements, environmental and sustainability, and local agency and public perception.

Treatment

Treatment requirements for this alternative are the same as those for Alternative 4, described in Section 3.4.4.4 .

Infrastructure

The following infrastructure components are needed for this alternative:

- Continued maintenance and investment in existing aging export system infrastructure would be required.

- Construction and maintenance of approximately 12.69 miles of recycled water transmission piping from the DVR Loop to the existing Harvey Place Reservoir outfall structure to Mud Lake. Figure 3.27 shows a conceptual alignment of this conveyance piping.
- Construction and maintenance of a new outfall structure discharge to Mud Lake.

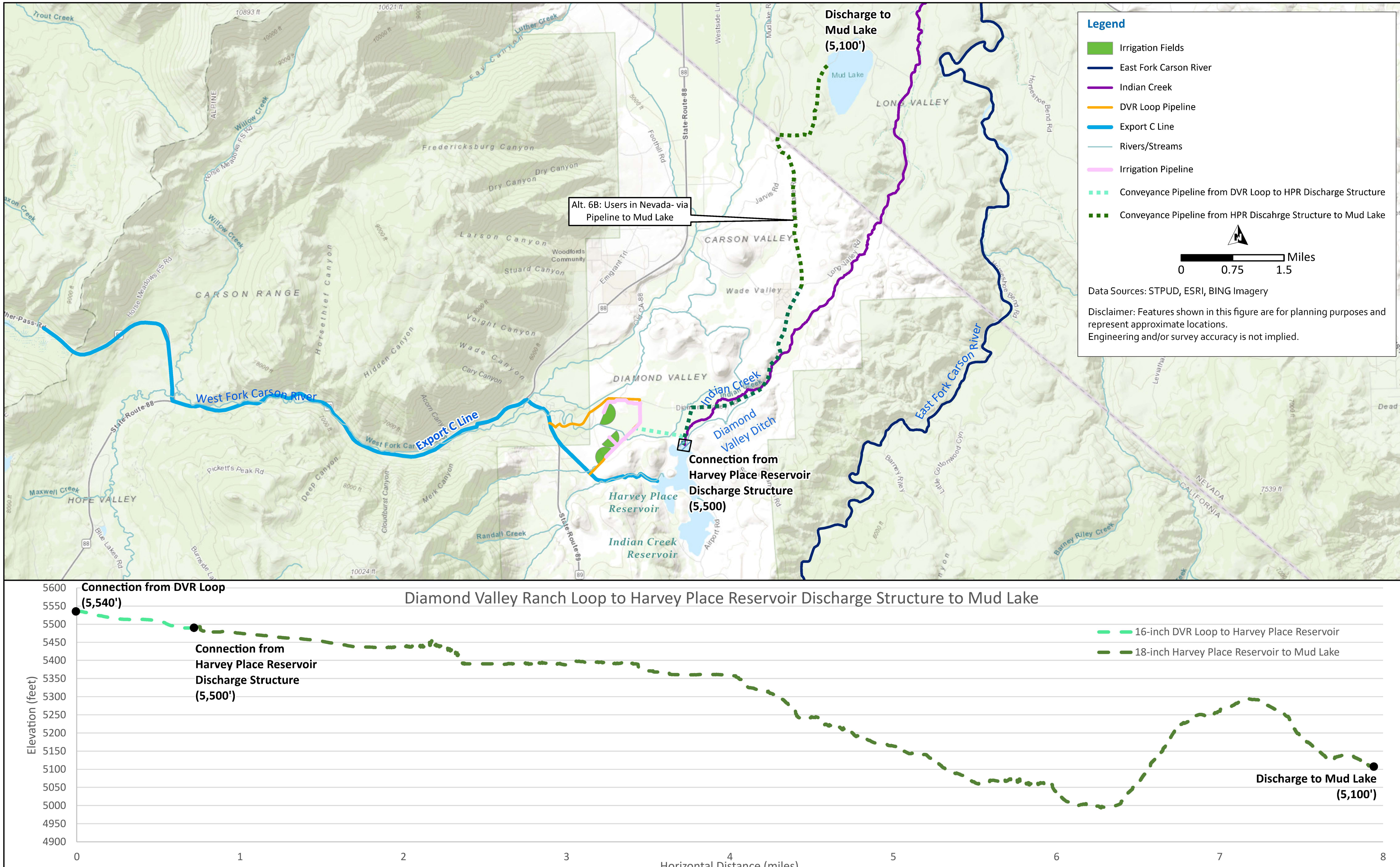


Figure 3.27 Conceptual Infrastructure Alignment Plan and Profile for Discharge to Mud Lake

Cost Estimates and Economics

A Level 5 cost estimate was prepared for the capital costs associated with this alternative as shown in Table 3.14. Additionally, annual O&M costs associated with this alternative are shown in Table 3.14.

Table 3.14 Alternative 6B – Cost Estimates

Component	Capital Costs[1] ($M)	O&M Costs[2] ($M/yr)
Treatment at WWTP	$224.00	$3.08
Conveyance pipeline and Outfall to Mud Lake	$38.19	-
TOTAL COSTS	**$262.19**	**$3.08**

Notes:
(1) Level 5 cost estimates are considered to be accurate within plus 50 percent to minus 30 percent.
(2) O&M associated with new recycled water distribution system infrastructure is assumed to be minimal.

Additional economic considerations related to this alternative which are not included in the cost estimate above are listed below:

- Cost of energy and other O&M costs associated with export system.
- Repair and replacement costs associated with export system.
- O&M associated with new recycled water distribution system infrastructure is assumed to be minimal and is therefore not included in these costs.
- Challenges and uncertainty with receiving revenue due to East Fork Carson River adjudication and accounting of water delivery.

Regulatory and Permitting Requirements

A number of regulatory and permitting requirements pertain to this alternative and have been grouped into the three sections below and categorized by the anticipated complexity in obtaining the associated permit/approval. It is anticipated that these permits and approvals would require between 3 and 5 years to complete once designs have been developed. The permits required, level of complexity, and approval schedule represent a best estimate and will ultimately depend on the conditions of each regulatory agency.

1. Permits associated with recycled water use and discharge to Mud Lake, including new outfall to Mud Lake:
   a. Low:
      i. Engineering Report for the production, distribution, and use of recycled water (Title 22). The Engineering Report pertains to any continued/new use of recycled water in CA.
   b. Medium:
      i. For new CA recycled water users or uses, the District would need to prepare an updated ROWD, obtain new WDRs from the LRWQCB, and meet all requirements including any associated with findings of an adopted SNMP.
   c. High:
      i. Attainment of the most immediate downstream water quality objectives for the West Fork Carson River, at the State line.

ii. A new discharge to Mud Lake will require a new Discharge Permit from the NDEP. The Discharge Permit may potentially include limits for nutrients and other constituents.
iii. The new outfall to Mud Lake will require a new NPDES Permit, subject to stringent WQBELs for TDS, chloride, total N, and TP.
iv. LRWQCB 401 Water Quality Certification, USACE Section 404 Permit, and CDFW Lake and Streambed Alteration Agreement, and NDEP Working in Waterways Permit (if jurisdictional waters would be affected).
v. Environmental review and approval for additional recycled water use. Because of the complexity, high potential for significant environmental effects, and anticipated potential for legal challenge associated with this alternative, a more robust and higher-level environmental document would likely be needed.

2. Permits associated with WWTP modifications and recycled water distribution pipeline infrastructure to Mud Lake:
   a. Low:
      i. TRPA Permit for WWTP facility footprint expansion.
      ii. Tahoe Construction General Permit (if WWTP facility footprint is over 1 acre).
      iii. Environmental review and approval for WWTP modifications.
      iv. California Construction General Permit for new recycled water distribution pipeline infrastructure.
      v. Alpine County Building/Grading Permit for new recycled water distribution pipeline infrastructure.
      vi. Douglas County Building/Grading Permit for new recycled water distribution pipeline infrastructure.
      vii. NDEP Stormwater General Permit (if pipeline disturbs over 1 acre).
      viii. Environmental review and approval for new conveyance infrastructure in CA.
   b. Medium:
      i. LRWQCB 401 Water Quality Certification, USACE Section 404 Permit, and CDFW Lake and Streambed Alteration Agreement, NDEP Working in Waterways Permit (if jurisdictional waters would be affected).

3. Other permits and institutional issues/agreements/processes:
   a. Low:
      i. Continued involvement in ongoing Alpine County litigation.
   b. Medium:
      i. Agreement with Bently Properties to store recycled water in Mud Lake.
      ii. Development of water rights agreements for users in NV.

These regulatory and permitting requirements have been categorized into a range of complexity as shown in Table 3.15 below.

Table 3.15 Alternative 6B – Range of Complexity for Regulations and Permits

Low	Medium	High
Recycled water permits/regulations: - Engineering report for Title 22 unrestricted reuse	Recycled water permits/regulations: - Updated ROWD - New WDRs - SNMP	
		Discharge permits / regulations: - Attainment of West Fork Carson River water quality objectives - NDEP Discharge Permit - NPDES Permit - Lahontan 401 Water Quality Certification - USACE Section 404 Permit - CDFW Lake and Streambed Alteration Agreement - NDEP Working in Waterways Permit - Environmental review and approval
Construction related permits and approvals for WWTP modifications: - TRPA Permit - Tahoe Construction General Permit - Environmental review and approval		
Construction related permits and approvals for pipeline from DVR Loop to Mud Lake and outfall to Mud Lake: - CA Construction General Permit - Alpine County Building/Grading Permit - Douglas County Building/Grading Permit - NDEP Stormwater General Permit - Environmental review and approval	Construction related permits and approvals for pipeline from DVR Loop to Mud Lake and outfall to Mud Lake: - LRWQCB 401 Water Quality Certification - USACE Section 404 Permit - CDFW Lake and Streambed Alteration Agreement - NDEP Working in Waterways Permit	
Other permits and institutional issues/agreements/processes: - Alpine County litigation	Other permits and institutional issues/agreements/processes: - Bently Properties agreement for Mud Lake storage - Water rights agreements for NV users	

Notes:
(1) This table of regulations and permits is a simplified version of the text preceding this table. Details, assumptions, and caveats are described more thoroughly in the text preceding this table.

Environmental and Sustainability

Some of the environmental and sustainability components of this alternative include the following considerations:

- Potential environmental impacts associated with construction of new recycled water treatment facilities and infrastructure.
- Sustained energy consumption and corresponding GHG emissions associated with the export system.
- Energy consumption and corresponding GHG emissions associated with the upgraded treatment process.
- GHG emissions for this alternative, in addition to the existing system, are estimated to be 1,030 kg CO_2e/year.

Local Agency and Public Perception

The following items have been identified as possible concerns regarding local agency and public perception:

- Public concern about putting recycled water into a water body.
- Public concern that water resources/supply augmentation benefits are being provided to NV rather than CA.
- Public concern that the water could be used more beneficially elsewhere within the Tahoe Basin, especially given the higher level of treatment.

3.4.7 Alternative 6C – Indirect Potable Reuse in Nevada

3.4.7.1 Description

Alternative 6C consists of treating the District's WWTP effluent to Nevada A+ standards for indirect potable reuse (IPR) in Nevada. This alternative would include the existing treatment at the District's WWTP followed by conveyance to Nevada for further treatment at an advanced water treatment facility (AWTF). The existing export line would provide a portion of the conveyance between the District's WWTP and an advanced treatment facility in NV. Following treatment, the advanced treated effluent would be injected into the ground via injection wells, providing residence time in the aquifer before being extracted for municipal drinking water use. Figure 3.28 illustrates a conceptual schematic of this alternative, and Figure 3.30 shows the conveyance pipeline alignment to a potential location in NV.

As shown in Figure 3.28, the District irrigation operations at DVR, Harvey Place Reservoir, and irrigation by Ranchers would be eliminated. The concept for this alternative is that it would be implemented to take all the District's future effluent.

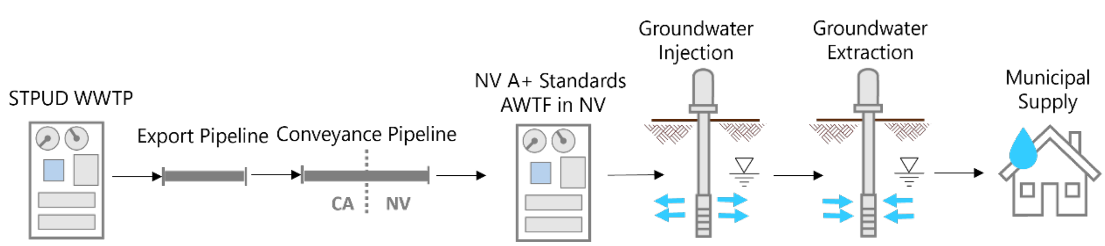


Figure 3.28 Alternative 6C Schematic

3.4.7.2 Potential Users and Associated Demands

One potential end user for IPR that has been identified is the Gardnerville Ranchos General Improvement District (GRGID). Although there could be other potential users of IPR, for the purposes of this evaluation, GRGID has been assumed to be the IPR end user. GRGID relies exclusively on groundwater for water supply. GRGID has 5,054 AF of water rights. GRGID uses a portion of these water rights and the rights not used have been dedicated by developers for future growth (Lumos and Associates , 2014)[5]. Assuming that the planned growth occurs, there is potential that GRGID demands could match GRGID water rights.

Another potential user of IPR is the Washoe Tribe, who has expressed interest in potentially utilizing recycled water, although that amount has not yet been quantified. A potable reuse project could also be implemented as a joint project by GRGID and the Washoe Tribe, and/or as a regional project that would involve partnering with other water suppliers in the area.

GRGID's future demands of 5,054 AF are less than the projected District effluent flows of approximately 6,000 AFY. Implementation of this alternative would require identification of demands to meet future District effluent flows. Additional demands may need to be identified depending on District effluent flows. The location of these demands may influence the location of the treatment facilities and infrastructure.

3.4.7.3 Triggers to Implement Alternative

The following triggers may give the District reason to implement this alternative:

- If there is insufficient capacity for the use of the District's recycled water provided by DVR irrigation operations and Rancher contracts/use.
- This alternative could potentially reduce or eliminate the existing recycled water system in DVR and Alpine County, depending on the demands for IPR.
- This alternative could augment potable water supply for the Carson Watershed, which may help meet demands and provide resiliency for NV end users, such as GRGID.
- Potential users, such as GRGID, could purchase the District's recycled water as a source to treat Nevada A+ standards for indirect potable reuse. These potential users may also be able to sell water rights to other users.

3.4.7.4 Implementation Components

Implementation components for this alternative include treatment, infrastructure, cost estimates and economics, regulatory and permitting requirements, environmental and sustainability, and local agency and public perception.

[5] Gardnerville Ranchos General Improvement District Water Resource Plan, July 2014, Lumos & Associates.

Treatment

The conceptualized new A+ Advanced Water Treatment Facility in Nevada is based on the design of a proposed A+ AWTF facility currently being developed by the City of Reno in conjunction with the Truckee Meadows Water Authority (TMWA), which is the first-of-its-kind facility in Nevada designed to treat wastewater effluent to A+ standards without RO. The treatment train unit processes are illustrated in Figure 3.29 and consist of the following:

- Coagulation/Flocculation/Clarification – For additional solids removal and conditioning ahead of filtration.
- Granular Media Filtration – For additional removal of TSS, turbidity, as well as significant log removal of viruses.
- Ozone reactor – Pathogen inactivation and breakdown of unregulated constituents such as pharmaceuticals and other constituents of emerging concern.
- Biological Activated Carbon Filtration – Removes unregulated constituents and ozonation byproducts.
- Granular Activated Carbon – Removes refractory organics and provides polishing for a wide range of bulk and trace organics.
- UV Disinfection – Additional pathogen inactivation and breakdown of unregulated constituents.
- 1-micron filter – Additional TSS and pathogen removal.
- Groundwater blending – provides natural buffer required per Nevada A+ regulations for indirect potable reuse.
- Solids handling – including filter waste washwater lagoons and solids drying prior to offsite disposal.

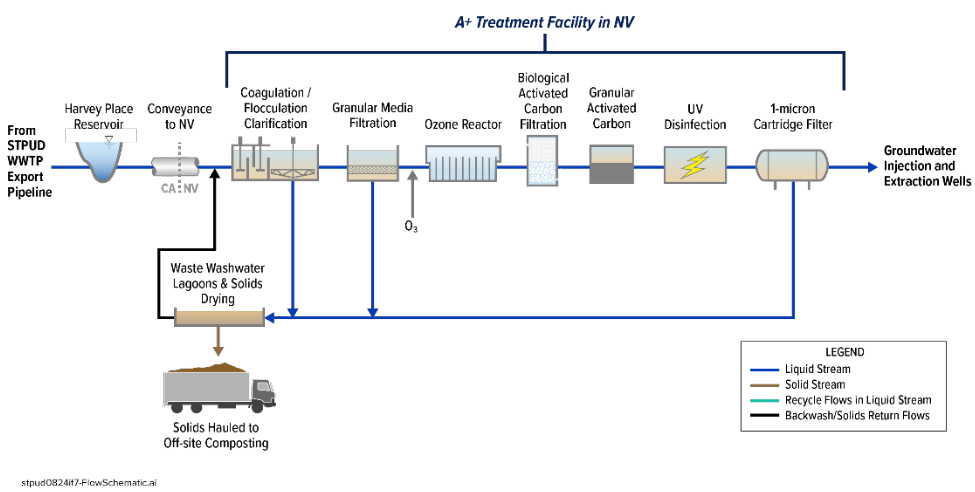


Figure 3.29 Alternative 6C – Treatment Process Flow Diagram

It is anticipated that approximately 5 acres of land will be required for this facility. A large portion of this space will be for the solids handling facilities. A smaller area could work if mechanical dewatering is implemented but this would likely increase the overall project cost.

Infrastructure

The following infrastructure components are needed for this alternative:

- Continued maintenance and investment in existing aging export system infrastructure would be required.
- Construction and maintenance of approximately 9.98 miles of recycled water transmission piping from the New DVR Loop Pipeline to GRGID. Figure 3.30 shows a conceptual alignment of this conveyance piping.

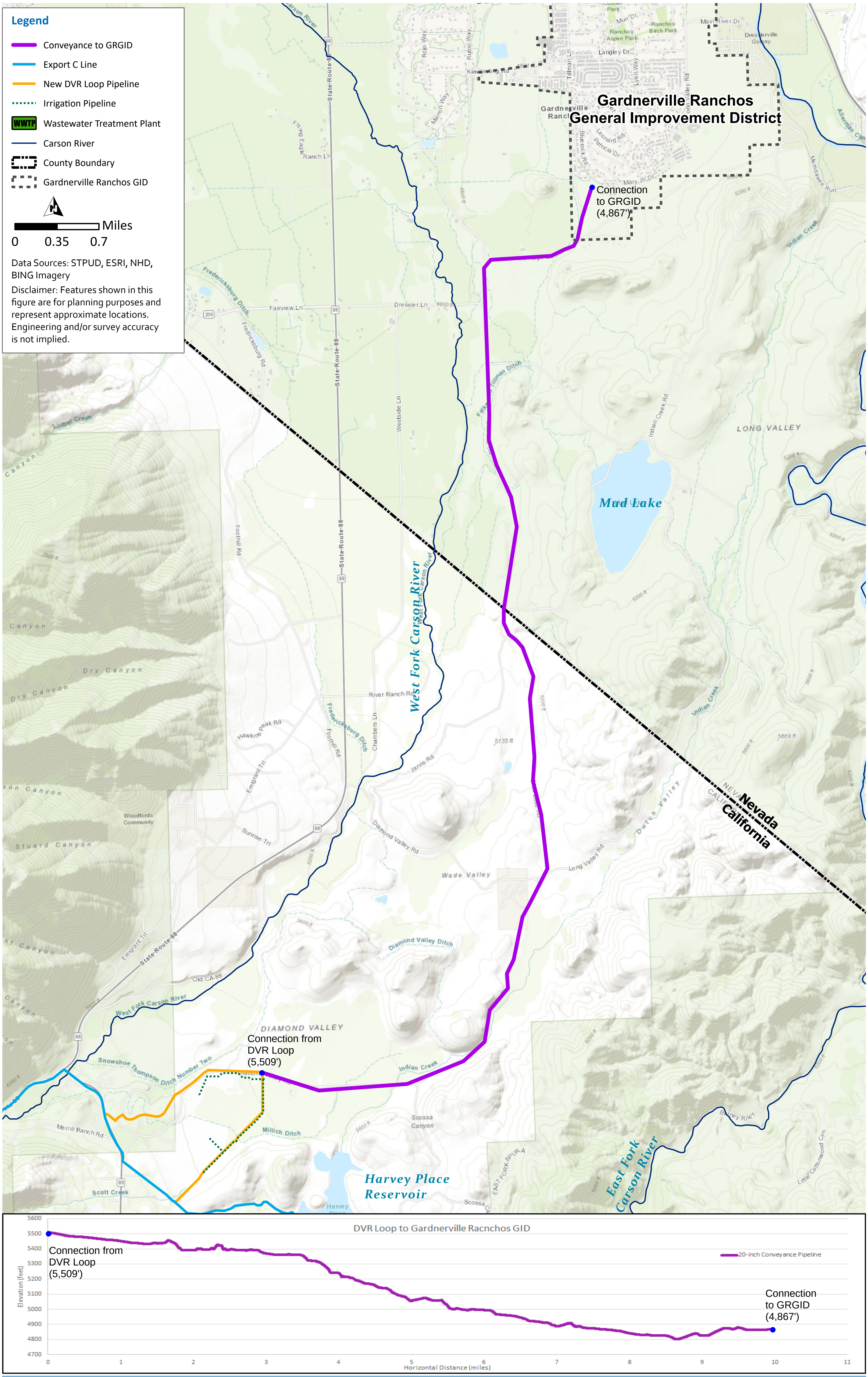


Figure 3.30 Conceptual Infrastructure Alignment Plan and Profile for Conveyance to GRGID

Cost Estimates and Economics

A Level 5 cost estimate was prepared for the capital costs associated with this alternative as shown in Table 3.16. For this alternative, these capital costs could potentially be either shared with GRGID or another end user of IPR, or completely paid for by GRGID or another end user of IPR. Additionally, annual O&M costs associated with this alternative are shown in Table 3.16.

Table 3.16 Alternative 6C – Cost Estimates

Component	Capital Costs(2) ($M)	O&M Costs(3) ($M/yr)
Conveyance pipeline	$54.80	--
A+ Advanced Water Treatment Facility in Nevada(1)	$265.00	$7.52
TOTAL COSTS	**$319.80**	**$7.52**

Notes:
(1) Land acquisition is not included in the treatment costs.
(2) Level 5 cost estimates are considered to be accurate within plus 50 percent to minus 30 percent.
(3) O&M associated with new recycled water distribution system infrastructure is assumed to be minimal.

Additional economic considerations related to this alternative which are not included in the cost estimate above are listed below:

- Cost of energy and other O&M costs associated with export system.
  - These costs could potentially be shared with GRGID or another end user of IPR.
- Repair and replacement costs associated with export system.
  - These costs could potentially be shared with GRGID or another end user of IPR.
- O&M associated with new recycled water distribution system infrastructure is assumed to be minimal and is therefore not included in these costs.
  - These costs would likely be borne by GRGID or another end user of IPR.
- O&M costs associated with new treatment systems would likely be borne by GRGID or another end user of IPR.
- The potential for revenue from GRGID or another end user of IPR would be impacted due to the end user's need as well as other considerations that would be worked out with the District in an operating agreement.

Regulatory and Permitting Requirements

A number of regulatory and permitting requirements pertain to this alternative and have been grouped into the four sections below and categorized by the anticipated complexity in obtaining the associated permit/approval. It is anticipated that these permits and approvals would require between 5 and 10 years to complete once designs have been developed. The permits required, level of complexity, and approval schedule represent a best estimate and will ultimately depend on the conditions of each regulatory agency.

1. Permits associated with groundwater injection and drinking water wells:
   a. High:
      i. For IPR in Nevada, attainment of NDEP A+ Standards would be required (pathogen log reduction, Engineering Report).
      ii. Permitting associated with NDEP's Underground Injection Control Program for groundwater injection wells.

iii. Permitting associated with groundwater extraction wells (entails compliance with all Federal and State Drinking Water Standards, Nevada Board of Health Approval).

2. Permits associated with Construction of A+ AWTF:
   a. Medium:
      i. Douglas County Building/Grading Permit.
      ii. NDEP Stormwater General Permit (if AWTF disturbs over 1 acre).
3. Permits associated with recycled water distribution pipeline infrastructure:
   a. Low:
      i. California Construction General Permit.
      ii. Alpine County Building/Grading Permit.
      iii. Douglas County Building/Grading Permit.
      iv. NDEP Stormwater General Permit (if pipeline disturbs over 1 acre).
      v. Environmental review and approval for new conveyance infrastructure in California.
   b. Medium:
      i. LRWQCB/NDEP 401 Water Quality Certification, USACE Section 404 Permit, and CDFW Lake and Streambed Alteration Agreement, NDEP Working in Waterways Permit (if jurisdictional waters would be affected).
4. Other permits and institutional issues/agreements/processes:
   a. Medium:
      i. Operating agreement(s) with IPR user(s), which would cover cost sharing, operations, etc., to utilize the District's recycled water as a source for IPR.

These regulatory and permitting requirements have been categorized by complexity as shown in Table 3.17 below:

Table 3.17 Alternative 6C – Range of Complexity for Regulations and Permits

Low	Medium	High
		Permits associated with groundwater injection and drinking water wells: - Attainment of NDEP A+ Standards - NDEP Underground Injection Control Program permits - Groundwater Extraction Well Permits
	Construction related permits and approvals for A+ AWTF: - Douglas County Building/Grading Permit - NDEP Stormwater General Permit	
Construction related permits and approvals for recycled water distribution pipeline infrastructure: - CA Construction General Permit - Alpine County Building/Grading Permit - Douglas County Building/Grading Permit - NDEP Stormwater General Permit - Environmental review and approval	Construction related permits and approvals for recycled water distribution pipeline infrastructure: - LRWQCB/NDEP 401 Water Quality Certification - USACE Section 404 Permit - CDFW Lake and Streambed Alteration Agreement - NDEP Working in Waterways Permit	
	Other permits and institutional issues/agreements/processes: - Operating agreement(s) with IPR users	

Notes:
(1) This table of regulations and permits is a simplified version of the text preceding this table. Details, assumptions, and caveats are described more thoroughly in the text preceding this table.

Environmental and Sustainability

Some of the environmental and sustainability components of this alternative include the following considerations:

- Potential environmental impacts associated with construction of new recycled water treatment facilities and infrastructure.
- Sustained energy consumption and corresponding GHG emissions associated with the export system.
- Significant energy consumption and corresponding GHG emissions associated with the new treatment systems, groundwater injection wells, potential extraction wells.
- GHG emissions for this alternative, in addition to the existing system, are estimated to be 7,320 kg CO_2e/year.

Local Agency and Public Perception

The following items have been identified as possible concerns regarding local agency and public perception:

- NV residents using recycled water from CA residents.
- Public concern that water resources/supply augmentation benefits are being provided to NV rather than CA.
- Public concern that the water could be used more beneficially elsewhere within the Tahoe Basin, especially given the higher level of treatment.
- Public concern with justification for investment in WWTP upgrades and infrastructure improvements.

3.4.8 Alternative 6D – Expanded Reuse in Nevada via Direct Delivery

3.4.8.1 Description

This alternative consists of conveying water through the existing export pipeline and delivering it to potential new users in NV, located north of the location of existing recycled water use by Ranchers. Figure 3.31 is a schematic of this alternative. Figure 3.35 shows the locations of the Fredericksburg Ditch, existing ditches just north of CA/NV border, a potential conveyance pipeline alignment, and the general areas of potential recycled water use. Two general areas of potential recycled water use have been identified; one area is west of State Route 88 and south of the Centerville Lane, and the second area is property owned by Bently.

It is assumed that a recycled water distribution system would be constructed to deliver water directly to users in NV. One approach would be a conveyance pipeline that would deliver water from Harvey Place Reservoir into the Fredericksburg Ditch and from there it would get to users via the existing ditch system. Alternatively, if the Bently Properties were the recipients of the recycled water, the conveyance pipeline would convey the water from Harvey Place Reservoir to Bently Properties; the current Figure 3.35 shows a potential alignment which would be refined depending on which area of Bently Properties would be using the water.

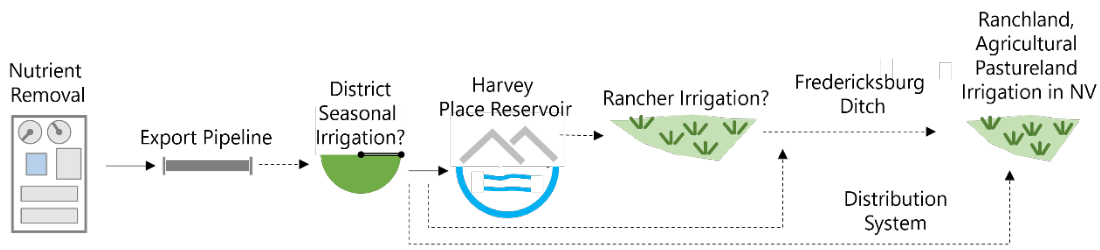


Figure 3.31 Alternative 6D Schematic

3.4.8.2 Potential Users and Associated Demand

Figure 3.32 shows two general areas of potential recycled water users that have been identified for this alternative. One general area of potential recycled water use is west of State Route 88 and south of Centerville Lane. Additional water in this region could be used by irrigators for supplemental water. In addition, if there are users that have existing water rights then it is possible that these users could sell their water rights to other new or existing users in the Carson Watershed. Approximately 1,450 acres of agricultural parcels are located in this vicinity. Assuming a recycled water demand of 3.5 AF/acre, the potential demand for this area is 5,075 AFY.

A second general area of potential recycled water use is the Bently properties. Approximately 4,110 acres of agricultural parcels are within the Bently property boundary. Assuming a recycled water demand of 3.50 AF/acre, the potential demand for this area is 14,385 AFY.

Given the District's future recycled water production of 6,000 AFY, it is possible that Bently could use all the recycled water and therefore only require conveyance to the Bently property. Alternatively, the recycled water could be used by the combination of the area west of State Route 88 and south of Centerville Lane, and the Bently property.

A third potential area for recycled water use is located west of Mud Lake, within Nevada, but near the CA/NV stateline. In the future, the Washoe Tribe may own land in this region and there could be another potential demand for recycled water.

3.4.8.3 Triggers to Implement Alternative

The following triggers may give the District reason to implement this alternative:

- If there is insufficient capacity for the use of the District's recycled water provided by DVR irrigation operations and Rancher contracts/use.
- This alternative could potentially reduce or eliminate the existing recycled water system in DVR and Alpine County, depending on the demands.
- This alternative could augment water supply for the Carson Watershed, which may help meet demands and provide drought resiliency for NV end users.

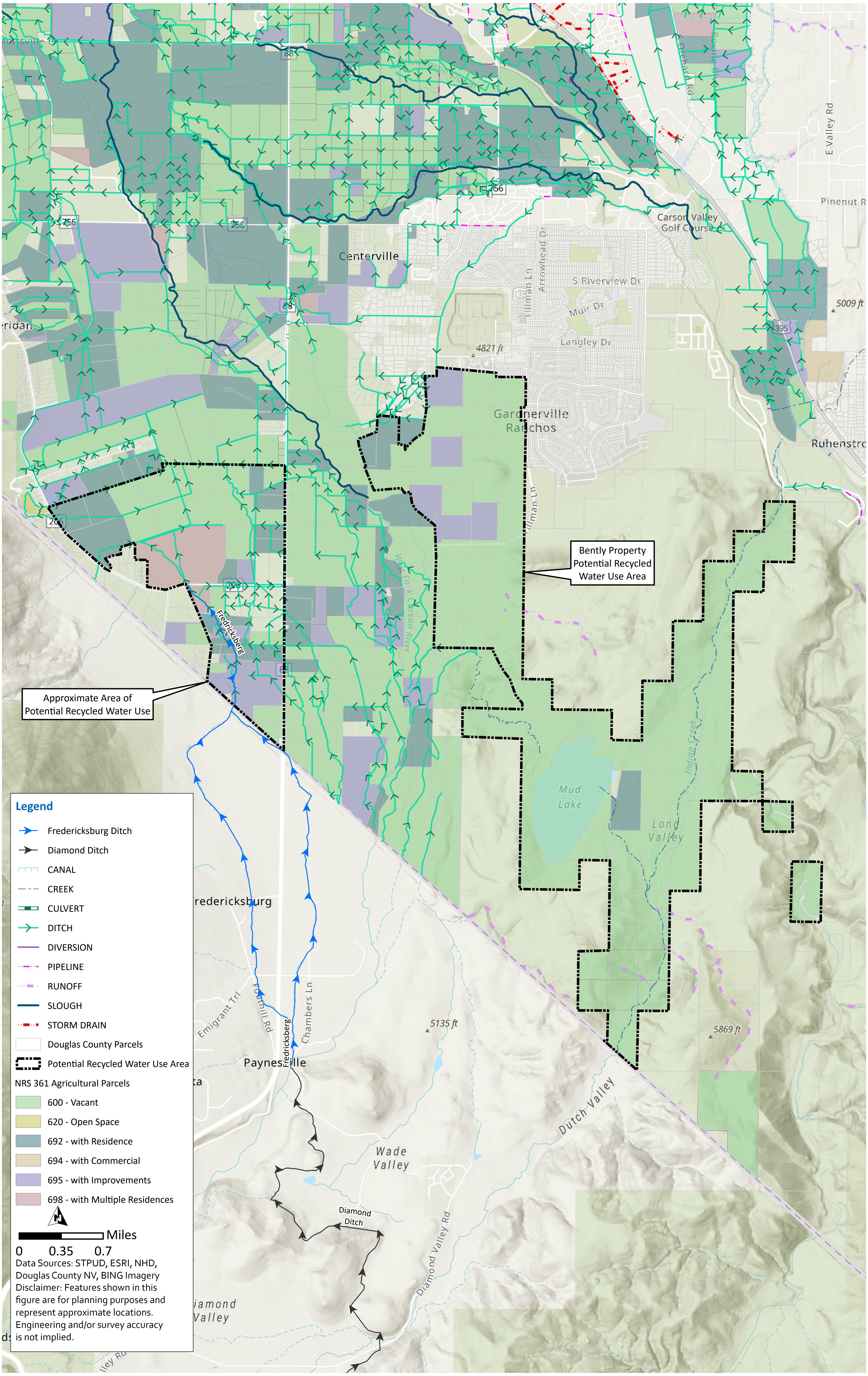


Figure 3.32 Alternative 6D Potential Users

3.4.8.4 Implementation Components

Implementation components for this alternative include treatment, infrastructure, cost estimates and economics, regulatory and permitting requirements, environmental and sustainability, and local agency and public perception.

Treatment

For this alternative, the treatment of District wastewater would be provided at the District's existing WWTP, and the treated effluent would be exported to Nevada via a new recycled water distribution system, and possibly the Fredericksburg Ditch. Regulatory approvals and permits associated with this alternative will depend on whether the recycled water is conveyed solely via a new recycled water distribution system directly to users in NV, or partially through the Fredericksburg Ditch. Permits and approvals may need to be obtained through the LRWQCB and/or NDEP.

It is assumed that the permit would include, at a minimum, effluent limits that are similar to those required for the DCLTSA facility which operates its facility for similar reuse in Nevada. DCLTSA recently upgraded their facility to include nitrogen removal in anticipation of future changes in their permit requirements. Therefore, it is assumed that the District would need to implement nitrogen removal to provide effluent with similar quality to meet Nevada Class B standards. Upgrades to the WWTP include biological nitrogen removal (BNR) and potentially other processes to meet permit and recycled water requirements. The addition of BNR and possible other treatment processes increases the complexity of the treatment train as compared to the existing system. These process improvements would consist of the following as illustrated in Figure 3.33:

- Retrofit of existing ABs to operate in a Modified Ludzak-Ettinger (MLE) configuration which includes internal recycle of ML.
- Addition of anoxic zone and swing zones using baffling and mixers.
- Modifications to the aeration diffuser grids.
- Conversion of the existing EQs into additional ABs to provide the additional required volume necessary for N removal.

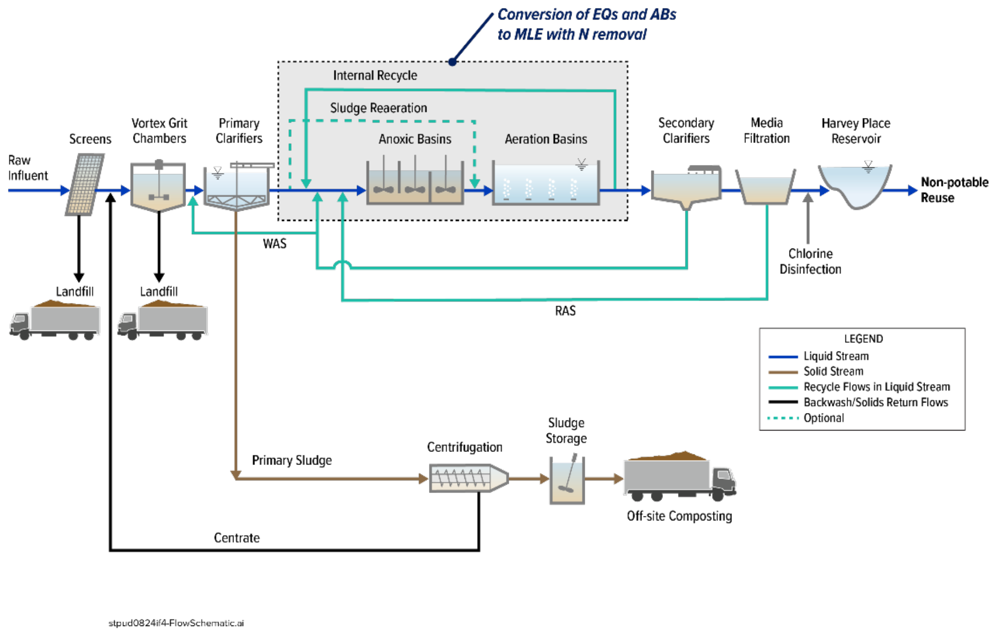


Figure 3.33 Alternative 6D – Treatment Process Flow Diagram

Figure 3.34 provides a conceptual layout of the proposed facilities including the AB upgrades and repurposing of the EQs to provide additional AB capacity.

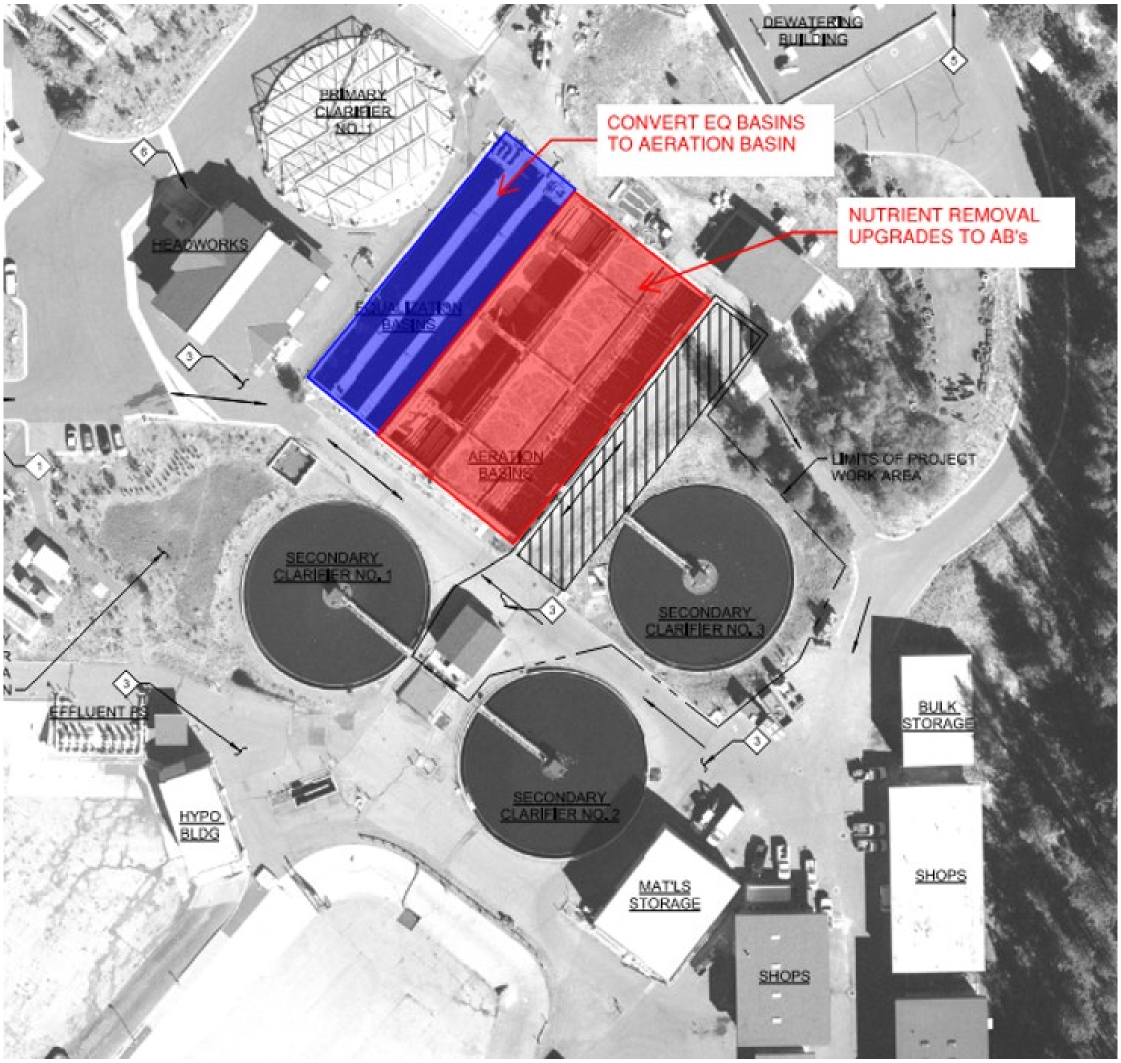


Figure 3.34 Alternative 6D – Conceptual Treatment Layout

Infrastructure

The following infrastructure components are needed for this alternative:

- Continued maintenance and investment in existing aging export system infrastructure would be required.
- Construction and maintenance of approximately 8.87 miles of recycled water transmission piping from Harvey Place Reservoir to Fredericksburg Ditch, and another 3.05 miles of recycled water transmission piping from the Fredericksburg Ditch junction to Bently Properties. Figure 3.35 shows a conceptual alignment of this conveyance piping, the existing ditch system, and potential recycled water users.

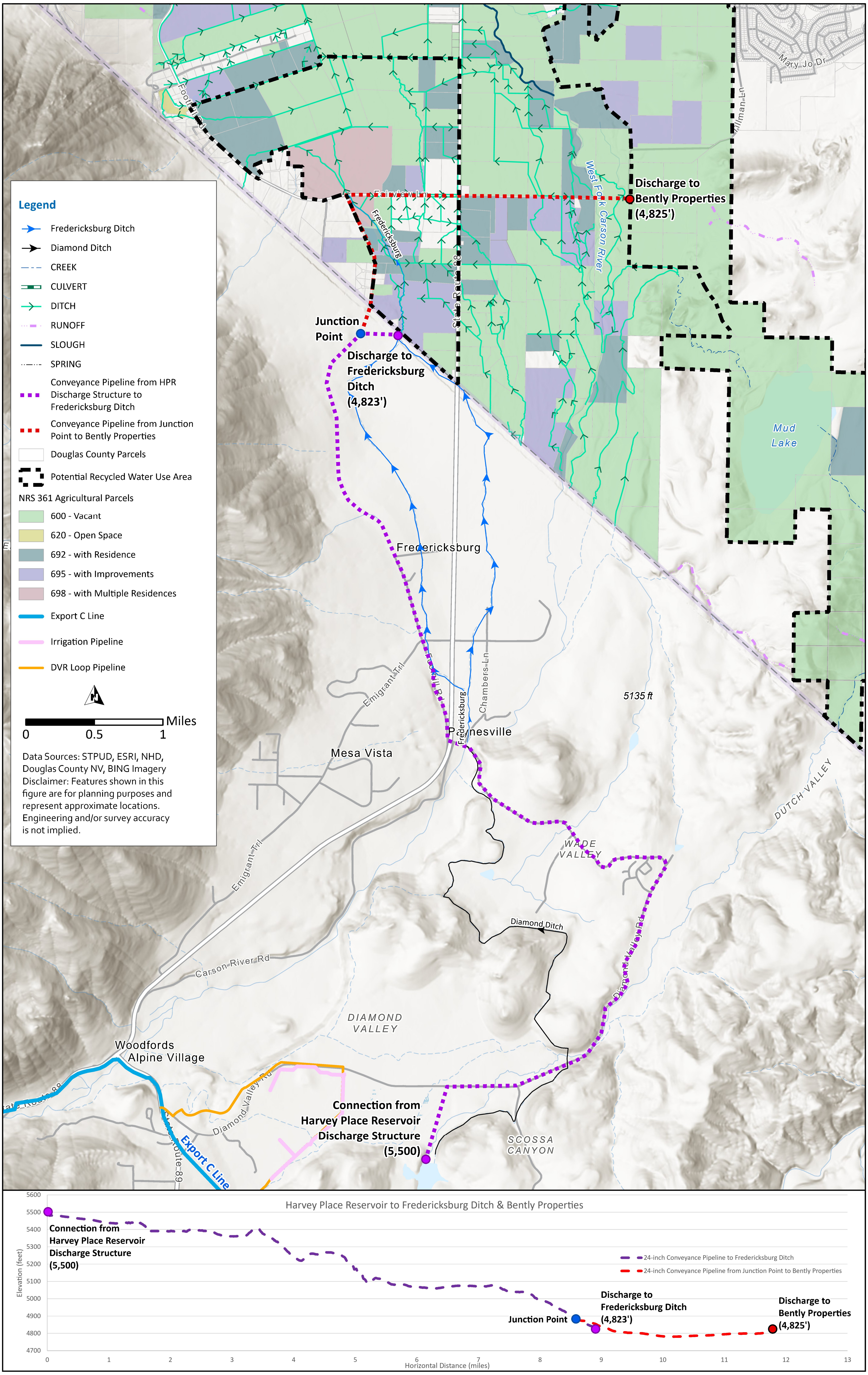


Figure 3.35 Conceptual Infrastructure Alignment Plan and Profile for Conveyance to NV

Cost Estimates and Economics

A Level 5 cost estimate was prepared for the capital costs associated with this alternative as shown in Table 3.18. Additionally, annual O&M costs associated with this alternative are shown in Table 3.18.

Table 3.18 Alternative 6D – Cost Estimates

Component	Capital Costs(1) ($M)	O&M Costs ($M/yr)(2)
Treatment at WWTP	$32.00	$1.21
Conveyance Pipeline(3)	$87.53	--
TOTAL COSTS	**$119.53**	**$1.21**

Notes:
(1) Level 5 cost estimates are considered to be accurate within plus 50 percent to minus 30 percent.
(2) O&M associated with new recycled water distribution system infrastructure is assumed to be minimal.
(3) This assumes that the conveyance pipeline goes all the way to the Bently Properties.

Additional economic considerations related to this alternative which are not included in the cost estimate above are listed below:

- Cost of energy and other O&M costs associated with export system.
- Repair and replacement costs associated with export system.
- O&M associated with new recycled water distribution system infrastructure is assumed to be minimal and is therefore not included in these costs.
- Repair and replacement costs associated with existing DVR operations.
- Potential revenue from downstream users.

Regulatory and Permitting Requirements

A number of regulatory and permitting requirements pertain to this alternative and have been grouped into the three sections below and categorized by anticipated complexity in obtaining the associated permit/approval. It is anticipated that these permits and approvals would require between 2 and 5 years to complete once designs have been developed. The permits required, level of complexity, and approval schedule represent a best estimate and will ultimately depend on the conditions of each regulatory agency.

1. Permits associated with recycled water use and direct delivery to NV:
    a. Low:
        i. Amended District WDRs for recycled water irrigation on new properties.
        ii. Property owner permits with NDEP.
    b. Medium:
        i. NDEP and LRWQCB coordination on approval of treatment process to meet NDEP recycled water standards.
2. Permits associated with WWTP modifications, recycled water distribution pipeline infrastructure, and potential ditch improvements:
    a. Low:
        i. TRPA Permit for WWTP facility footprint expansion.
        ii. Tahoe Construction General Permit (if WWTP facility footprint is over 1 acre).
        iii. Environmental review and approval associated with construction of WWTP upgrades.

iv. California Construction General Permit (if improvements to ditches disturb over 1 acre).
v. Alpine County Building/Grading Permit.
vi. Douglas County Building/Grading Permit.
vii. NDEP Stormwater General Permit (if improvements to ditches disturb over 1 acre).
viii. Environmental review and approval for new conveyance infrastructure in CA.

b. Medium:
   i. NDEP approval for new users to utilize Fredericksburg Ditch. The Discharge Permit may potentially include limits for nutrients and other constituents.
   ii. Caltrans Encroachment Permit.
   iii. Nevada Department of Transportation (NDOT) Encroachment Permit.
   iv. LRWQCB/NDEP 401 Water Quality Certification, USACE Section 404 Permit, and CDFW Lake and Streambed Alteration Agreement, NDEP Working in Waterways Permit (if jurisdictional waters would be affected).

3. Other permits and institutional issues/agreements/processes:

   a. Low:
      i. Continued involvement in ongoing Alpine County litigation.
      ii. New contracts with new users.
   b. Medium:
      i. Coordination with NDWR related to water rights for new users.

These regulatory and permitting requirements have been categorized into a range of complexity as shown in Table 3.19 below:

Table 3.19 Alternative 6D – Range of Complexity for Regulations and Permits

Low	Medium	High
Recycled water permits/regulations: - Amended WDRs - NDEP property owner permits	Recycled water permits/regulations: - NDEP and LRWQCB treatment process approval coordination	
Construction related permits and approvals for WWTP modifications: - TRPA Permit - Tahoe Construction General Permit - Environmental review and approval		
Construction related permits and approvals for recycled water distribution pipeline infrastructure and potential ditch improvements: - CA Construction General Permit - Alpine County Building/Grading Permit - Douglas County Building/Grading Permit - NDEP Stormwater General Permit - Environmental review and approval	Construction related permits and approvals for recycled water distribution pipeline infrastructure and potential ditch improvements: - NDEP approval for new users to use Fredericksburg Ditch - Caltrans Encroachment Permit - NDOT Encroachment Permit - LRWQCB/NDEP 401 Water Quality Certification - USACE Section 404 Permit - CDFW Lake and Streambed Alteration Agreement - NDEP Working in Waterways Permit	
Other permits and institutional issues/agreements/processes: - Alpine County litigation - Contracts with new users	Other permits and institutional issues/agreements/processes: - NDWR water rights coordination	

Notes:
(1) This table of regulations and permits is a simplified version of the text preceding this table. Details, assumptions, and caveats are described more thoroughly in the text preceding this table.

Environmental and Sustainability

Some of the environmental and sustainability components of this alternative include the following considerations:

- Potential environmental impacts associated with construction of new recycled water treatment facilities and infrastructure.
- Sustained energy consumption and corresponding GHG emissions associated with the export system.
- Energy consumption and corresponding GHG emissions associated with the upgraded treatment process.
- GHG emissions for this alternative, in addition to the existing system, are estimated to be 770 kg CO_2e/year.

Local Agency and Public Perception

The following items have been identified as possible concerns regarding local agency and public perception:

- Public concern that water resources/supply augmentation benefits are being provided to NV rather than CA.
- Public concern that the water could be used more beneficially elsewhere within the Tahoe Basin, especially given the higher level of treatment.
- Public concern with justification for investment in WWTP upgrades and infrastructure improvements.

3.4.9 Alternative 7A – Treated Effluent Conveyance to DCLTSA with Reuse in Nevada

3.4.9.1 Description

This alternative would involve conveying treated recycled water from the District's WWTP to DCLTSA, downstream of DCLTSA's treatment facility, and into the gravity section of DCLTSA's existing effluent export pipeline. Per conversations with DCLTSA, their WWTP does not have the capacity to treat additional wastewater, nor does their WWTP site have room to construct additional processes to increase their WWTP capacity. DCLTSA also indicated that the pressurized section of their export pipeline, from their WWTP to the top of Kingsbury Grade, has limited capacity. For these reasons, this alternative requires conveyance of treated recycled water from the District's WWTP to the gravity section of DCLTSA's export pipeline.

DCLTSA's export pipeline conveys between 1.6 and 1.9 mgd (depending on the season) of recycled water from DCLTSA, over Kingsbury Grade, and into Carson Valley. Recycled water from DCLTSA is stored in the Bently Agrodynamics Reservoir which is shared with the Minden Gardnerville Sanitation District. DCLTSA also owns the Buckeye Creek Effluent Storage Facility to hold additional recycled water. Recycled water in the Carson Valley is used for alfalfa and pastureland/livestock irrigation. For this alternative, the recycled water would be routed to DCLTSA facilities in NV, and the end use would be in the NV portion of the Carson Watershed.

Figure 3.36 shows a conceptual schematic of this alternative.

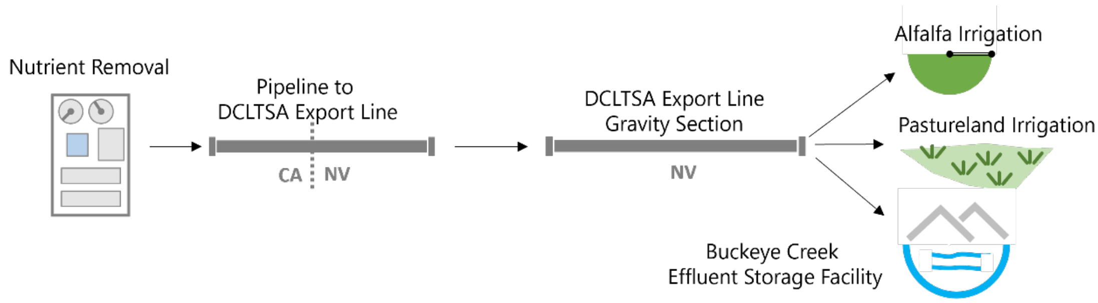


Figure 3.36 Alternative 7A Schematic

3.4.9.2 Potential Users and Associated Demands

DCLTSA currently provides recycled water to portions of the Park Cattle Ranch and portions of the Bently Ranch in Carson Valley. Potential additional demands in the Carson Valley include existing livestock and fodder crop irrigation (currently provided by DCLTSA) and possible new agricultural users. Conversations with DCLTSA staff have identified three potential users of recycled water: Tieg Family Investments, Charney, and the Settelmeyer Ranches. Figure 3.37 shows both the existing DLCTSA users and the potential users of recycled water that have been identified.

Assuming demands of 3.50 AF/acre and an area of 4,757 acres for the potential recycled water users, there could be up to 16,650 AFY of new recycled water demands by implementing this alternative, which is much greater than the District's expected future recycled water production of 6,000 AFY.

Although the potential demands identified could utilize all future recycled water produced by the District, a challenge with this this alternative is that the recycled water would only be used seasonally during the growing season. Therefore, the recycled water would need to be stored during the winter months. This is similar to the District's current operations, which involve storing the recycled water in Harvey Place Reservoir over the winter months. One option for storage of recycled water is the Bently Agrodynamics Reservoir, which has a maximum storage capacity of 1,784 AF of which only 500 AF is used for normal storage, leaving 1,284 AF available for recycled water storage[6]. The Buckeye Creek Effluent Storage Facility could also be utilized for up to 1,890 AF of storage; however, it would need to be lined per NDEP requirements[7]. Utilizing both the Bently Agrodynamics Reservoir and the Buckeye Creek Effluent Storage Facility would provide a combined recycled water storage capacity of 3,177 AF.

For reference, Harvey Place Reservoir has a capacity of 3,800 AF, so additional seasonal storage would likely be needed for this alternative, or year-round users (likely non-irrigation use) would need to be identified, depending on effluent flows and time of use. Another recycled water storage option would be to expand the storage facilities on the Buckeye Creek Effluent Storage Facility site, which has plenty of land in the northeast corner. Given projected flows and assuming storage for all the District's flows through the winter months (October through May), an additional 1,600 AF of storage would likely need to be constructed.

[6] https://data.news-leader.com/dam/nevada/douglas-county/bently-reservoir-dam/nv10605/
[7] Douglas County Sewer Improvement District No. 1, Buckeye Creek Effluent Storage Facility Reservoir Improvements – Feasibility Report, April 2004. JWA Consulting Engineers, Inc.

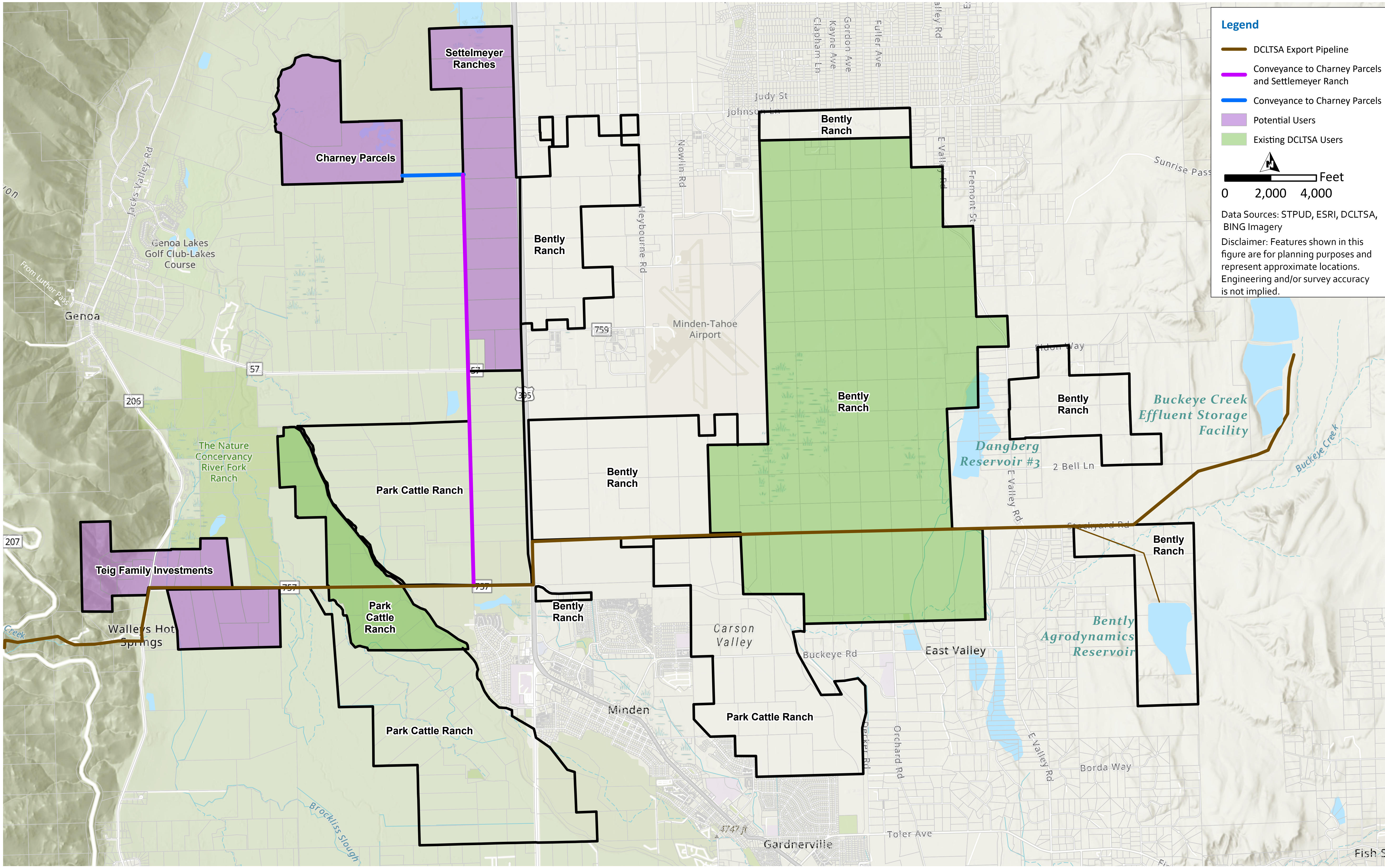


Figure 3.37 Alternative 7A Potential Users

3.4.9.3 Triggers to Implement Alternative

The following triggers may give the District reason to implement this alternative:

- If there is insufficient capacity for the use of the District's recycled water provided by DVR irrigation operations and Rancher contracts/use.
- It is possible that the new users would be willing to pay for the recycled water. The sale of recycled water would generate revenue for the District.
- This alternative would potentially eliminate the need for the District's existing export system, irrigation operations, and Rancher irrigation in Alpine County.
- It may also provide an opportunity for shared costs (between DCLTSA and the District) in maintenance and repair of export infrastructure, and revenue opportunity to sell recycled water to new customers in NV.
- An additional benefit includes augmenting water supply for the Carson Watershed, which may provide drought resiliency for NV end users.
- Future pumping costs may be reduced if an agricultural energy rate is provided by the energy utility.

3.4.9.4 Implementation Components

Implementation components for this alternative include treatment, infrastructure, cost estimates and economics, regulatory and permitting requirements, environmental and sustainability, and local agency and public perception.

Treatment

For this alternative, the treatment of District wastewater would be provided at the District's existing WWTP, and the recycled water would be combined with DCLTSA recycled water in their export infrastructure. This alternative was discussed with NDEP, who noted that the District would need a permit from NDEP to add effluent to the DCLTSA export system. The permit would include, at a minimum, effluent limits that are the same as those required for the DCLTSA facility. Recently, DCLTSA upgraded their facility to include N removal in anticipation of future changes in their permit requirements. The District would need to implement N removal to provide effluent with similar quality. DCLTSA effluent meets the requirements for Class B recycled water. These improvements would be similar to those shown for Alternative 6D (Section 3.4.8).

Since Harvey Place Reservoir would not be utilized for this alternative and recycled water would instead be stored in the Carson Valley, the process flow diagram has been updated as shown in Figure 3.38 below:

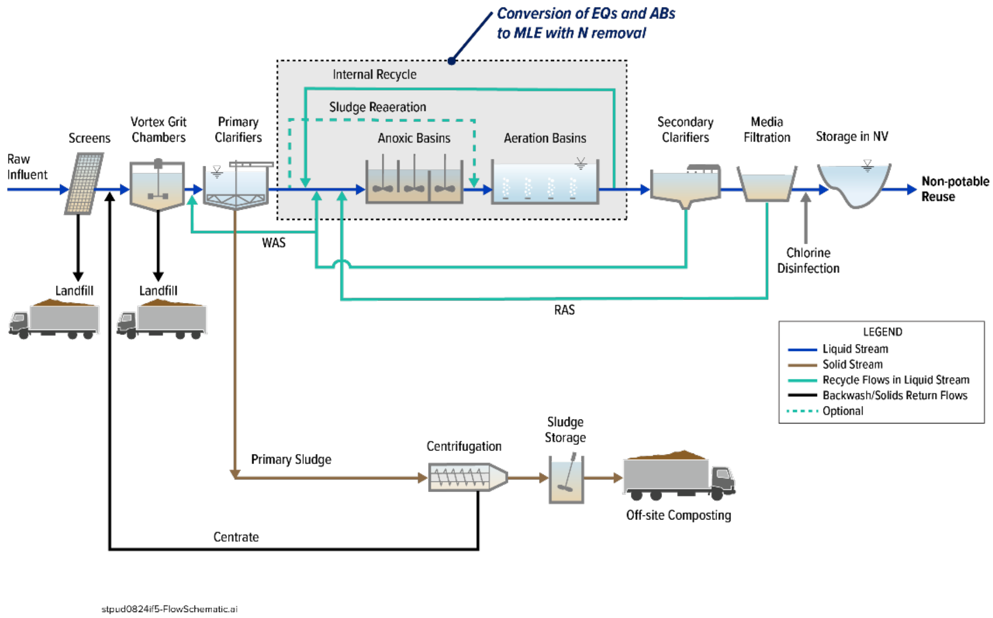


Figure 3.38 Alternative 7A – Treatment Process Flow Diagram

Infrastructure

The following infrastructure components are needed for this alternative:

- Construction of a new 24-inch, 8.3-mile transmission pipeline and 2 pump stations, within the Lake Tahoe Watershed, from the District's WWTP to the gravity portion of DCLTSA's export line. The District's existing FEPS would be used as well. Figure 3.39 shows the conceptual horizontal alignment and profile of this pipeline and pump stations.
- The gravity section of DCLTSA's existing export pipeline has segments that are 10-inch, 12-inch, and 14-inch diameter, as shown in Figure 3.40. Given the age and size of these segments, they would need to be replaced with approximately 3.64 miles of new 20-inch pipe.
- As discussed in Section 3.4.9.2 , the Buckeye Creek Effluent Storage Facility would need to be lined for storage of the District's recycled water.
- Development of 1,600 AF of additional storage would likely be required for the District's recycled water.
- Expansion or modification of the ditch system may be required to deliver recycled water to the Tieg Family Investments property.
- To serve the Charney Parcels and Settelmeyer Ranches, approximately 3.91 miles of new irrigation piping would be required, as shown in Figure 3.41.

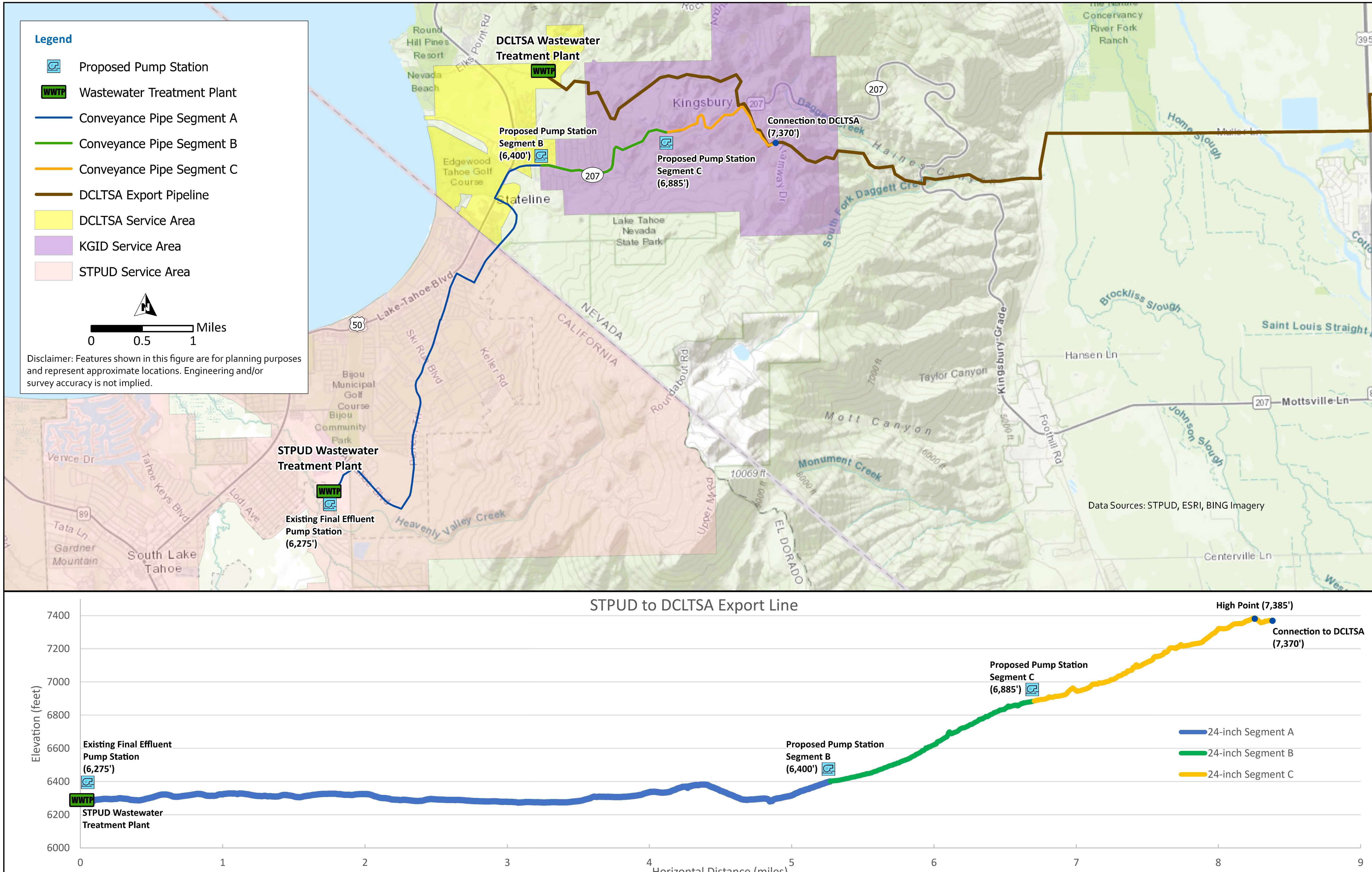


Figure 3.39 Conceptual Infrastructure Alignment Plan and Profile for Conveyance from STPUD to DCLTSA

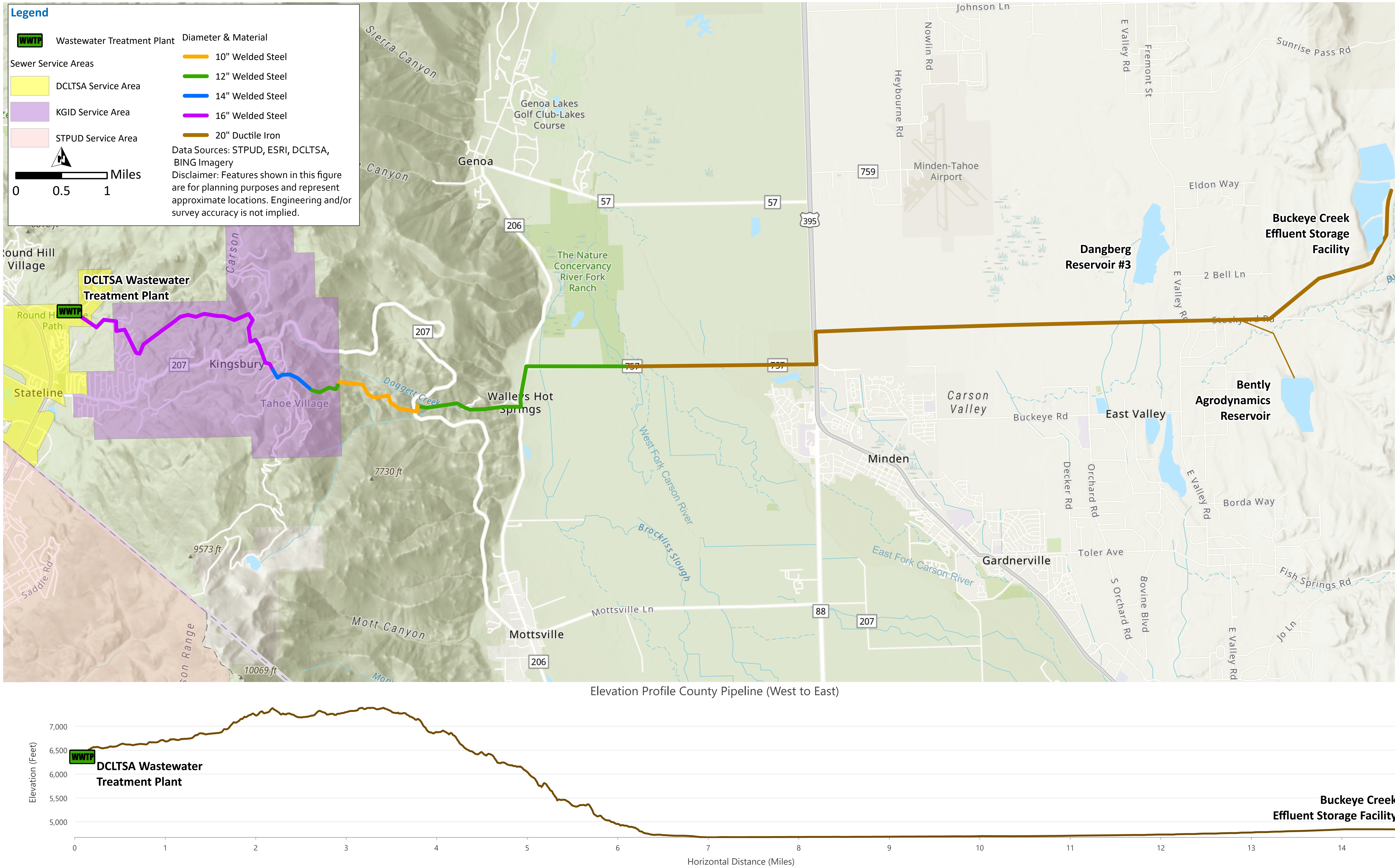
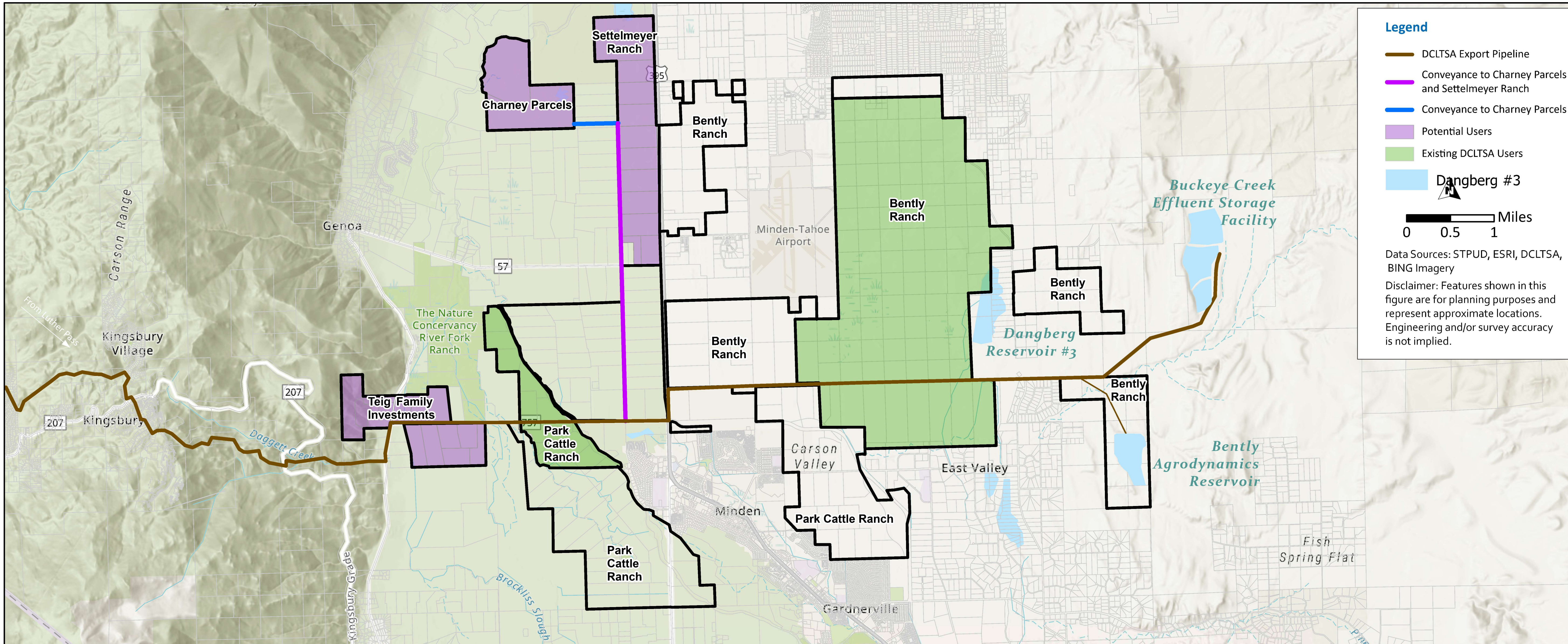


Figure 3.40 Existing DCLTSA Export System – Export Line Plan and Profile



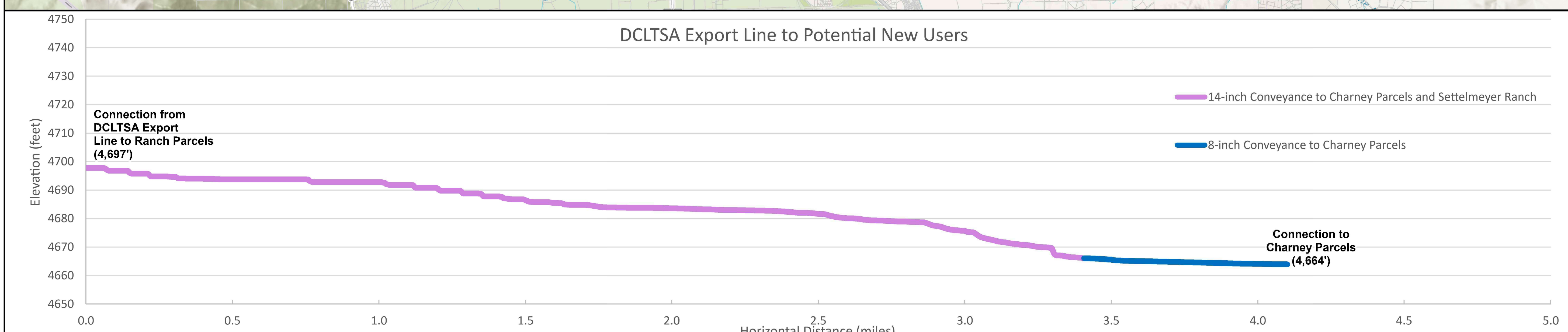


Figure 3.41 Conceptual Infrastructure Alignment Plan and Profile for Potential Irrigation Users

Cost Estimates and Economics

A Level 5 cost estimate was prepared for the capital costs associated with this alternative as shown in Table 3.20. Additionally, annual O&M costs associated with this alternative are shown in Table 3.20. It should be noted that if this alternative was implemented, the District's O&M costs associated with the existing export system to DVR would no longer be incurred; the annual O&M costs shown in Table 3.20 do not reflect the net difference in O&M costs, they are just for the O&M costs associated with this alternative.

Table 3.20 Alternative 7A – Cost Estimates

Component	Capital Costs(1) ($M)	O&M Costs(2) ($M/yr)
Treatment at WWTP	$32.00	$1.21
Conveyance from District to DCLTSA	$150.61	$1.73(3)
Replacement of DCLTSA pipeline segments	$31.58	--
Distribution pipelines	$13.26	--
Lining of Buckeye Creek Effluent Storage Facility	$15.20	--(4)
Additional Recycled Water Storage Facility	$5.88	--(4)
TOTAL COSTS	**$248.53**	**$2.94**

Notes:
(1) Level cost estimates are considered to be accurate within plus 50 percent to minus 30 percent.
(2) O&M associated with new recycled water distribution system infrastructure is assumed to be minimal.
(3) These costs are associated with the FEPS and the proposed new pump stations.
(4) O&M associated with the storage facilities is assumed to be minimal.

Additional economic considerations related to this alternative which are not included in the cost estimate above are listed below:

- Cost of energy and other O&M costs associated with export system.
  - These costs would likely be shared proportionally with DCLTSA.
- O&M associated with new conveyance infrastructure pipelines from District to DCLTSA is assumed to be minimal and is therefore not included in these costs.
- Repair and replacement costs associated with export system at the District/DCLTSA connection point.
  - These costs would likely be shared proportionally with DCLTSA.
- O&M associated with new recycled water distribution system infrastructure is assumed to be minimal and is therefore not included in these costs.
  - These costs could potentially be shared with DCLTSA.
- O&M associated with the Buckeye Creek Effluent Storage Facility is assumed to be minimal and is therefore not included in these costs. However, given the flows from the District in addition to the existing DCLTSA flows, there could be an increase in O&M for this facility.
  - These costs could potentially be shared with DCLTSA.
- O&M associated with additional storage facilities located on the Buckeye Creek Effluent Storage Facility site is assumed to be minimal and is therefore not included in these costs.
- Limited potential for revenue from sale of recycled water, and potential water rights after the District effluent is combined with the DCLTSA export system.

- Potential for agricultural energy rates related to energy requirements for pumping recycled water to Carson Valley.

Regulatory and Permitting Requirements

A number of regulatory and permitting requirements pertain to this alternative and have been grouped into the three sections below and categorized by the anticipated complexity in obtaining the associated permit/approval. It is anticipated that these permits and approvals would require between 3 and 8 years to complete once designs have been developed. The permits required, level of complexity, and approval schedule represent a best estimate and will ultimately depend on the conditions of each regulatory agency.

1. Permits associated with treatment upgrades and recycled water use:
   a. Low:
      i. TRPA Permit for WWTP facility footprint expansion.
      ii. Environmental review and approval for WWTP upgrades.
      iii. Modification of the DCLTSA Reclaimed Water Management Plan (recycled water permit requirement for NDEP).
   b. Medium:
      i. NDEP and LRWQCB coordination on approval of treatment processes to meet NDEP recycled water standards.
      ii. New DCLTSA Discharge Permit with NDEP, to add effluent to the DCLTSA export system, with additional requirements for STPUD effluent at the point of connection.
2. Permits associated with recycled water transmission, export, and distribution pipeline infrastructure and Buckeye Creek Effluent Storage Facility and Additional Recycled Water Storage Facility:
   a. Low:
      i. NDEP Stormwater General Permit for distribution pipelines in NV.
      ii. Douglas County Grading Permit for distribution pipelines in NV.
   b. Medium:
      i. NDEP Stormwater General Permit for replacement pipeline infrastructure in NV.
      ii. USFS Special Use Permits for replacement pipeline infrastructure in NV. (USFS Lake Tahoe Basin Management Unit and Humboldt-Toiyabe National Forest, if National Forest Service lands affected).
      iii. Nevada Division of State Lands Right of Entry for replacement pipeline infrastructure in NV.
      iv. NDOT Encroachment Permit for replacement pipeline infrastructure in NV.
      v. USACE 404 permits.
      vi. LRWQCB and NDEP 401 Water Quality Certifications and CDFW Lake and Streambed Alteration Agreement (if jurisdictional waters would be affected).
      vii. NDEP Working in Waterways Permit.
      viii. Permit to line Buckeye Creek Effluent Storage Facility.
      ix. Permit to construct new Additional Recycled Water Storage Facility.
   c. High:
      i. CA Construction General Permit.

ii. NDEP Stormwater General Permit for pipeline from STPUD to DCLTSA point of connection and pump stations.
iii. TRPA Permit (including grading season restrictions).
iv. USFS Special Use Permit(s) for pipeline from STPUD to DCLTSA point of connection and pump stations. (USFS Lake Tahoe Basin Management Unit and Humboldt-Toiyabe National Forest, if National Forest Service lands affected).
v. City of South Lake Tahoe Encroachment Permit.
vi. Caltrans Encroachment Permit (pending final pipeline alignment).
vii. Douglas County Encroachment Permit.
viii. NDOT Encroachment Permit.
ix. Environmental review and approval for work in the Tahoe Basin. Because of the complexity, high potential for significant environmental effects, and anticipated potential for legal challenge associated with this alternative, a more robust and higher-level environmental document would likely be needed.

3. Other permits and institutional issues/agreements/processes:

   a. Medium:
      i. Operating agreement with DCLTSA to accept the District effluent in their system. Cost sharing, operations, etc.
      ii. Contracts with new users – may be with DCLTSA but could require District to coordinate/facilitate/pay legal fees to get implemented.

These regulatory and permitting requirements have been categorized into a range of complexity as shown in Table 3.21 below.

Table 3.21 Alternative 7A – Range of Complexity for Regulations and Permits

Low	Medium	High
Recycled water permits/regulations: - Updated DCLTSA Reclaimed Water Management Plan	Recycled water permits/regulations: - NDEP and LRWQCB treatment process approval coordination - NDEP DCLTSA Discharge Permit	
Construction related permits and approvals for WWTP modifications: - TRPA Permit		
Construction related permits and approvals for NV distribution pipelines to new users: - NDEP Stormwater General Permit - Douglas County Grading Permit		
	Construction related permits and approvals for replacement pipeline in NV from connection point to Carson Valley: - NDEP Stormwater General Permit - USFS Special Use Permit(s) - Nevada Division of State Lands Right of Entry - NDOT Encroachment Permit - USACE Section 404 Permit - LRWQCB/NDEP 401 Water Quality Certifications - CDFW Lake and Streambed Alteration Agreement - NDEP Working in Waterways Permit	
-	Construction related permits and approvals for recycled water storage facilities: - Permit to line Buckeye Creek Effluent Storage Facility - Permit to construct new Additional Recycled Water Storage Facility	
		Construction related permits and approvals for pipeline from STPUD to DCLTSA point of connection and pump stations: - CA Construction General Permit - NDEP Stormwater General Permit - TRPA Permit - USFS Special Use Permit(s) - City of South Lake Tahoe Encroachment Permit Caltrans Encroachment Permit - Douglas County Encroachment Permit - NDOT Encroachment Permit - Environmental review and approval
	Other permits and institutional issues/agreements/processes: - Operating agreement with DCLTSA - New user contracts	

Notes:
(1) This table of regulations and permits is a simplified version of the text preceding this table. Details, assumptions, and caveats are described more thoroughly in the text preceding this table.

Environmental and Sustainability

Some of the environmental and sustainability components of this alternative include the following considerations:

- Potential environmental impacts associated with construction of new recycled water treatment facilities and infrastructure. Specifically, those associated with construction of an 8.3-mile transmission pipeline in the Lake Tahoe Watershed. The pipeline will cross multiple creeks and thus may disrupt sensitive species and/or habitats.
- Sustained energy consumption and corresponding GHG emissions associated with the export system.
- Energy consumption and corresponding GHG emissions associated with the upgraded treatment process and new recycled water delivery infrastructure, including pump stations.
- GHG emissions for this alternative, in addition to the existing system, are estimated to be 1,450 kg CO_2e/year.

Local Agency and Public Perception

The following items have been identified as possible concerns regarding local agency and public perception:

- Public concern that CA is not using its water resources and sending to NV instead.
- Public concern with the need for this alternative, given that the District already has an existing export system.
- Public sensitivities to the anticipated environmental impacts associated with constructing the new conveyance to DCLTSA.
- Public concern with justification for investment in WWTP upgrades.
- Public concern that the water could be used more beneficially elsewhere within the Tahoe Basin, especially given the higher level of treatment.

3.5 Detailed System Modification Evaluations

The various system modifications described above in Section 3.2 , as well as which alternatives these could be applied to, are further detailed in the subsections below.

3.5.1 Urban Fire Protection

The concept for the urban fire protection system modification is to use recycled water for fire water supply in the event that wildfires are threatening infrastructure and/or developed areas. This system modification is a form of land application in the Lake Tahoe Basin.

The Water Code includes language that allows the District to use recycled water in the Lake Tahoe Basin to protect the LPPS from catastrophic fire. During the Caldor Fire, recycled water was used for the purpose of protecting the LPPS from wildfire.

Potential modifications to expand use of recycled water for urban fire protection include obtaining approval for use of recycled water for fire flow to protect the District WWTP and/or other infrastructure and developed areas in South Lake Tahoe. In this case, the existing treatment facility and/or the existing access points along the export line would be used to access recycled water.

Another concept is construction of additional pipeline and hydrant infrastructure to provide access to recycled water at more locations along the wildland-urban interface for firefighting needs. The amount and extent of infrastructure constructed would be determined based on both the needs and the recommendations of local firefighting agencies.

However, for urban fire protection in the Lake Tahoe Basin to be implemented, an amendment to the Porter-Cologne Act, the Basin Plan, and TRPA Ordinances would be required, which would be extremely challenging to pursue and highly unlikely to be approved. It is also possible that broader use of recycled water for urban fire protection may require a higher level of treatment. Additionally, this system modification is not a standalone alternative, given that recycled water is produced daily but would only be used rarely for urban fire protection. An additional challenge is justifying the cost of constructing and maintaining new infrastructure constructed for the purpose of urban fire protection given that the system would be used infrequently.

For all the above reasons, the urban fire protection system modification has been eliminated from further discussion and is not recommended for implementation by the District.

3.5.2 Trenchless Installation Methods

This system modification would involve using trenchless installation as part of the export infrastructure. The specific approach would depend on topography, subsurface properties, diameter, and other influencing factors. Trenchless installations include tunneling as well as other technologies such as horizontal directional drilling, auger boring, microtunneling, etc.

One reason to consider a trenchless installation approach is to reduce the elevation gain, or portion of the elevation gain, along an alignment. Reducing the elevation gain in the existing export system (over Luther Pass) would potentially lead to reduced energy demands and costs. The challenge with the existing export line is that the topography would require a significant horizontal length of tunneling to appreciably reduce the elevation gain. For example, the longitudinal distance between LPPS and Harvey Place Reservoir is greater than 10 miles. Typically, for installations approximately 2 miles or greater, existing technologies that are typically used in the transportation and energy industries would be employed. These approaches include cut and cover, tunnel boring, drill and blast, and others. These approaches are not typically used for water utility applications because they are only used on larger diameter installations, on the order of 10 ft diameter or greater. The cost of this type of tunneling ranges from tens of millions of dollars per mile to hundreds of millions of dollars per mile (e.g., tens of thousands of dollars per LF). Assuming a range of $10M to $100M per mile, a 10-mile tunnel could range from $100M to $1 billion ($B). In addition, the regulatory approvals and permits associated with this type of tunnel present significant challenges. A tunnel designed to significantly reduce or eliminate the elevation gain of the existing export line is not recommended for further consideration as part of the existing system or other alternatives that rely on the export line, due to the cost and regulatory complexity.

However, trenchless installation methods, such as horizontal directional drilling, auger boring, microtunneling, open shield pipe jacking, pipe ramming, and others may be suitable for shorter distances to reduce a portion of the elevation gain, reduce horizontal distances, avoid open cut construction in sensitive environmental areas, avoid high traffic areas, minimize road closures and associated traffic and public disruptions, avoid utility conflicts, and avoid impacts to buildings. The trenchless methods are typically appropriate for longitudinal distances from less than 250 ft to 3,000 ft. Typical parameters for each method are provided in Appendix 3B; however, depending on site specific-alignments and soil conditions, longer installations could be possible. Geotechnical investigations would be required to assess the feasibility of applying these trenchless tunneling methods to any given construction project.

Costs vary for these trenchless tunneling methods based on the many variables involved, including depth, length of installation, soil/groundwater properties, size of pipe, etc. However, some methods cost more than others, and costs generally vary comparatively as shown below:

- Horizontal Directional Drilling, $.
- Auger Boring, $$.
- Open Shield Pipe Jacking, $$.
- Pipe Ramming, $$.
- Microtunneling, $$$.

For example, horizontal directional drilling usually costs much less than microtunneling, since microtunneling is mostly used in groundwater conditions where construction may be more costly than dry conditions where horizontal directional drilling is used.

Additional information about these various trenchless tunneling methods, including the general parameters of each method and soil conditions each method is appropriate for, is provided in Appendix 3B.

Applicable Alternatives

Trenchless tunneling approaches could be combined with any of the alternatives in this TM, as they all require the conveyance of recycled water to Alpine County or Douglas County. Tunneling in sections of the alignment would be evaluated as an alternative to buried pipelines that generally follow the topography. Some portion of tunneling along the existing or new infrastructure alignments may be incorporated into the following alternatives:

- District Export Line:
  - No. 1: Existing System.
  - No. 2: Expanded Disinfected Secondary-23 Delivery in Alpine County.
  - No. 3: Expanded Disinfected Tertiary Reuse in Alpine County.
  - No. 4: Discharge to West Fork Carson River and Use in NV.
  - No. 6A, No. 6B, and No. 6D: Expanded Class A or B Reuse in NV.
  - No. 6C: IPR in NV

The District's existing export line is aging and will need to be replaced at some point in the future. As part of the replacement of the export line, it may be appropriate for the District to consider utilizing trenchless tunneling methods for some of these segments.

- DCLTSA Export Line:
  - No. 7A: Treated Effluent Conveyance to DCLTSA with Reuse in NV.

Trenchless tunneling methods could be evaluated for application on the new segment of pipeline from the District to DCLTSA's export pipeline and on the existing DCLTSA export pipeline from the point of the District connection to NV. The existing DCLTSA export pipeline would need to be upsized to accommodate the additional flow from the District, so the alignment and method of construction could be evaluated as part of the upsizing and replacement.

Additionally, when constructing the necessary infrastructure to serve users for all these alternatives, it may be useful to evaluate whether trenchless tunneling would be appropriate for all or portions of the conveyance piping, specifically with regards to avoiding sensitive environmental areas, high traffic areas, and other utilities.

3.5.3 Split Treatment

This system modification involves splitting the treatment train process to accommodate two levels of treatment aimed at serving different end uses. The concept includes the use of District-owned property at the existing WWTP site and another location, such as DVR. The general approach would be to produce advanced secondary recycled water at the existing WWTP site. For alternatives that require a higher level of treatment, all or some of the additional treatment processes would be located at the DVR site.

Applicable Alternatives

The applicable alternatives for this system modification initially included all alternatives that use the existing export system into Alpine County, where DVR is located, and may potentially require treatment upgrades. These alternatives include:

- No. 3: Expanded Disinfected Tertiary Reuse in Alpine County.
- No. 4: Discharge to West Fork Carson River and Use in NV.
- No. 6A, No. 6B, and No. 6D: Expanded Class A or B Reuse in NV.
- No. 6C: IPR in NV

However, based on the treatment trains developed for the alternatives, this system modification would be most applicable for the following alternatives:

- No. 3: Expanded Disinfected Tertiary Reuse in Alpine County:
  - Given the small potential demands for disinfected tertiary recycled water, constructing a small package treatment unit at DVR to meet those demands, rather than upgrading the treatment processes for all the flow at the WWTP, may be a better financial option for the District. For more information regarding this alternative and how split treatment could be applied, see Section 3.4.3 .
- No. 6C: IPR in NV:
  - This alternative involves the construction of a new A+ Water Treatment Facility in NV for indirect potable reuse in NV. Given the approximate footprint of 5 acres needed for this new facility, the limited available acreage at the WWTP, and the importance of having the facility close to where the injection wells would be located, it makes sense for this alternative to utilize split treatment. Recycled water would be initially treated to secondary treatment levels at the WWTP, then conveyed to NV, where it would be treated at a new A+ Water Treatment Facility in NV. For more information, see Section 3.4.7.4

The other four alternatives all require upgrades to the existing biological treatment process to provide increased levels of nutrient removal (N and P). Split treatment of a biological nutrient removal process is neither practical nor cost effective to implement compared to retrofit of the existing secondary treatment process at the WWTP.

3.5.4 Export System Energy Recovery

Energy recovery could be implemented as part of the District's or DCLTSA's export infrastructure. A high-level conceptual analysis was conducted to estimate potential energy recovery and costs. The energy recovery analysis for both systems is based on limited information and assumptions. For either system, a feasibility analysis would need to be conducted to refine the energy recovery system sizing and location, supporting infrastructure improvements, estimated energy recovery and pay-back, use of energy generated, and regulatory approvals/permits.

District Energy Recovery Analysis

The District has performed feasibility studies in the past to assess the idea of generating hydroelectric power along the C-Line. The last feasibility study for generating hydroelectric power along the C-Line was performed by Sunrise Engineering in June 2012[8]. This study analyzed the idea of placing a hydroelectric generator along a new section of pipeline to DVR. This study found that an 84-kilowatt (kW) facility could be developed using a reverse-pump turbine without the need to replace sections of the C-Line with a higher pipe class. This study was the basis for implementation of the existing energy recovery system located in DVR.

This conceptual analysis explores two options for increasing energy recovery from flow in the C-Line, a Pelton Wheel Station near Harvey Place Reservoir, and a series of Pumps-as Turbines (PATs) along the C-Line. Additional details on these alternatives are included in Appendix 3B, and a summary of the alternatives is presented as follows.

Option A includes installing a Pelton wheel at the bottom of the C-Line (Harvey Place Reservoir). This alternative is based on the following assumptions:

- The transition structure will be placed near the top of Luther Pass and the start of the C- Line at an elevation of 7,720 ft.
- The hydroelectric generator will be placed near Harvey Place Reservoir at an elevation of 5,545 ft.
- Based on the of the transition structure and Harvey Place Reservoir, the total static head would be 2,175 ft.
- Friction and minor headlosses are approximately 5 percent of the static head for a total of 110 ft.
- The total dynamic head at the Pelton wheel would be approximately 2,065 ft (895 pounds per square inch [psi]).

Based on a net pressure of 900 psi and a design flow of 5.4 mgd, the expected system production is 1.23 megawatts (MW). However, for this option to be viable, the entire length of the C-Line will need to be replaced in order to meet the high system pressure. The total project cost of this alternative is $123M (see Appendix 3B for a cost estimate breakdown). This total project cost

[8] C-Line Hydraulic Power Generation Final Feasibility Analysis, South Tahoe Public Utility District, Sunrise Engineering, June 2012.

could range from $86M to $185M, based on the planning level cost estimate accuracy of -30% to + 50 percent. If the District decides to pursue this option further, it is highly recommended to conduct a detailed feasibility analysis. The recommended element of this feasibility analysis as well as additional assumptions and details of the analysis is included in Appendix 3B. It is approximately 16 miles from the location of the proposed energy recovery system to the LPPS. Assuming a cost of $760,000 per mile (Source: California Public Utilities Commission [CPUC]), the additional cost of routing power back to LPPS would be approximately $12M.

Option B includes installing 6 power generation stations along the pipe alignment. Each power generation station will be equipped with PATs. This alternative is based on the following assumptions:

- The 6 power generation stations would be spread out so that the static pressure in the pipeline does not exceed 130 psi. This gives the District the option of re-using the existing pipe to generate power due to the lesser pressure experienced in the system.
- A transition structure will be placed at an elevation of 7,045 ft which would transition the C-Line from a gravity line to a pressurized line.
- The hydroelectric generators will be placed every 300 vertical feet with the first generator being located at an elevation of 7,045 ft and the last generator being located at Harvey Place Reservoir at an elevation of 5,545 ft.
- Due to the age of the pipe, it has been assumed a total of 20 percent of the pipeline (8,240 linear feet) would need to be replaced due to age and condition.

Based on a net pressure of 130 psi and a design flow of 5.4 mgd, the expected system production for each station would be 152kW for a total recovery of 0.91MW. The total project cost of this alternative is $52M (see Appendix 3B for a cost estimate breakdown). This total project cost could range from $36M to $78M, based on the planning level cost estimate accuracy of -30% to + 50%. It is approximately 16 miles from the location of the last proposed energy recovery system to the LPPS. Assuming a cost of $760,000 per mile (Source: California Public Utilities Commission [CPUC]), the additional cost of routing power back to LPPS would be approximately $12 M.

DCLTSA Energy Recovery Analysis

Alternative 7A involves conveying treated recycled water from the District's WWTP to the DCLTSA export system. As discussed in Section 3.4.9, this alternative requires replacement of a portion of the DCLTSA export pipeline. The energy recovery analysis assumes replacement of this pipeline.

DCLTSA conducted a previous study on energy recovery potential alternatives (Report of Initial Investigation, 2009)[9]. The previous study evaluated multiple energy recovery systems in series, including Pelton Wheels and PATs. The proposed approach included four Pelton wheels located in series; however, the energy recovery capacity of the proposed system was limited, and low flow was cited as a primary limitation.

This conceptual analysis explores two options for increasing energy recovery from flow in the DCLTSA export line, a Pelton Wheel Station near State Route 206 crossing, and a series of PATs along the export line. Additional details on these options are included in Appendix 3B, and a summary of the options is presented as follows.

Option A includes installing a Pelton wheel at the bottom of the new effluent export pipeline near the State Route 206 crossing. This system modification is based on the following assumptions:

- The transition structure will be placed near the top of Kingsbury Grade Pass where the District's proposed pressurized effluent line connects with the DCLTSA's effluent pipeline. The elevation of this transition structure has been assumed to be 7,380 ft.
- The hydroelectric generator will be placed near the State Route 206 crossing at an elevation of 5,250 ft.
- Based on the elevation of the transition structure and power generator elevations, the total static head would be 2,130 feet.
- Friction and minor headlosses are approximately 5 percent of the static head for a total of 110 feet.
- The total dynamic head at the Pelton wheel would be approximately 2,020 feet (875 psi).
- The existing DCLTSA effluent pipe will be abandoned in place. A new alignment would be used for the proposed effluent pipe. It has been assumed the new alignment would parallel the existing effluent pipe.

The expected system production for the system, assuming a design flow of 7 mgd, is 1.4 MW. However, for this option to be viable, the entire length of the DCLTSA pipeline (from the District point of connection) will need to be replaced in order to meet the high system pressure. The total project cost of this option as shown in Appendix 3B is $45M. Planning level cost estimates can range from -30% to +50%. In this case, the total project cost range is $32M to $68M. If the District decides to pursue this option further, it is highly recommended to conduct a detailed feasibility analysis. The recommended element of this feasibility analysis as well as additional assumptions and details of the analysis is included in Appendix 3B.It is approximately 6 miles from the location of the proposed energy recovery system to the DCLTSA WWTP. Assuming a cost of $760,000 per mile (source: CPUC), the additional cost of routing power back to the DCLTSA treatment plant would be approximately $4.6M.

Option B includes installing 4 power generation stations along the pipe alignment. Each power generation station will be equipped with PATs. This alternative is based on the following assumptions:

- The four power generation stations would be spread out so that the static pressure in the pipeline does not exceed 250 psi. This gives the District the option of procuring and installing standard 20-inch Class 250 ductile iron pipe.
- The transition structure will be placed near the top of Kingsbury Grade Pass where the District's proposed pressurized effluent line connects with the DCLTSA's effluent pipeline. The elevation of this transition structure has been assumed to be 7,380 ft.
- The hydroelectric generators will be placed every 530 vertical feet with the first generator being located at an elevation of 6,850 ft and the last generator being located at the State Route 206 crossing at an elevation of 5,250 ft.

- The existing DCLTSA effluent pipe will be abandoned in place. A new alignment would be used for the proposed effluent pipe. It has been assumed the new alignment would parallel the existing effluent pipe.

Based on a net pressure of 250 psi and a design flow of 7 mgd, the expected system production for each station would be 260 kW for a total recovery of 1.04 MW. The total project cost of this option as shown in Appendix 3B is $40 M. The total project cost range is $28M to $60M (based on planning level cost accuracy range of -30% to +50%). If the District decides to pursue this option further, it is highly recommended to conduct a detailed feasibility analysis. The recommended element of this feasibility analysis as well as additional assumptions and details of the analysis is included in Appendix 3B. It is approximately 6 miles from the location of the proposed energy recovery system to the DCLTSA WWTP. Assuming a cost of $760,000 per mile (source: CPUC), the additional cost of routing power back to the DCLTSA treatment plant would be approximately $4.6M.

Applicable Alternatives

Export system energy recovery could be combined with any of the alternatives in this TM, as they all require the conveyance of recycled water to Alpine County or Douglas County using an export line.

- District Export Line:
  - No. 1: Existing System.
  - No. 2: Expanded Disinfected Secondary-23 Delivery in Alpine County.
  - No. 3: Expanded Disinfected Tertiary Reuse in Alpine County.
  - No. 4: Discharge to West Fork Carson River and Use in NV.
  - No. 6A, No. 6B, and No. 6D: Expanded Class A or B Reuse in NV.
  - No. 6C: IPR in NV
- DCLTSA Export Line:
  - No. 7A: Treated Effluent Conveyance to DCLTSA with Reuse in NV.

3.5.5 Constructed Wetlands

This system modification involves the addition of constructed wetlands in Alpine County on existing District property. The primary purpose of the wetlands would be to provide additional capacity for recycled water, in particular during periods when release from Harvey Place Reservoir is prohibited. In addition, wetlands may be designed to also provide water quality polishing, wetland habitat/ecological benefits, and possibly be used as a wetland mitigation bank.

Potential areas for constructed wetlands were identified based on the following constraints:

- Areas within District property in DVR.
- Areas that are not planned for future recycled water use or emergency application.
- Areas that are not within or adjacent to existing jurisdictional wetlands due to permitting challenges.

The area identified as a potential site for constructed treatment wetlands is the area located at the end of the Export C-line, where there is open channel conveyance into Harvey Place Reservoir, as shown in Figure 3.42.

There are approximately 30 acres in the identified area. The concept is that the wetlands would be designed to be supported by flow-through of recycled water under normal conditions. If there was anticipated need for additional short-term storage, then the wetlands could be temporarily inundated with up to 6 ft of recycled water. Under these circumstances, approximately 180 AF of additional temporary storage could be provided. At a future flow of 5.4 mgd, the wetlands could provide an additional 10 days of storage. The additional storage may provide the District with the additional time necessary to determine if early release of Harvey Place Reservoir was needed.

Obtaining regulatory approvals and permits may be challenging for constructed treatment wetlands. The key issue is whether the treatment wetland would affect existing aquatic resources. If existing aquatic resources could be affected, then permitting could be extremely challenging. Permit needs (if no aquatic resources are affected) include:

- CA Construction General Permit (>1 acre).
- Alpine County Building Permit.
- WDR amendment.

Permit needs (if aquatic resources are affected) include:

- CA Construction General Permit (>1 acre).
- Alpine County Building/Grading Permit.
- WDR amendment.
- Clean Water Act 404, 401 compliance.
- Lake or Streambed Alteration Agreement, State Wetland Procedures, Porter-Cologne Act compliance.

Much of the area downstream of C-Line is mapped as aquatic resources in the National Wetlands Inventory mapping maintained by the US Fish & Wildlife Service. Field verification would be necessary to determine if these areas meet the definition of jurisdictional aquatic resources, and to determine if the existing wetlands are "established treatment wetlands" adjacent to upland areas (not aquatic resources). If these are determined to be "established treatment wetlands" then permitting their expansion may be easier.

Applicable Alternatives

The applicable alternatives include all alternatives that convey effluent to Alpine County, where some portion of the water could be used to flow through wetlands prior to flowing into Harvey Place Reservoir. Applicable alternatives include:

- No. 1: Existing System.
- No. 2: Expanded Disinfected Secondary-23 Delivery in Alpine County.
- No. 3: Expanded Disinfected Tertiary Reuse in Alpine County.
- No. 4: Discharge to West Fork Carson River and Use in NV.
- No. 6A, No. 6B, and No. 6D: Expanded Class A or B Reuse in NV.
- No. 6C: IPR in NV

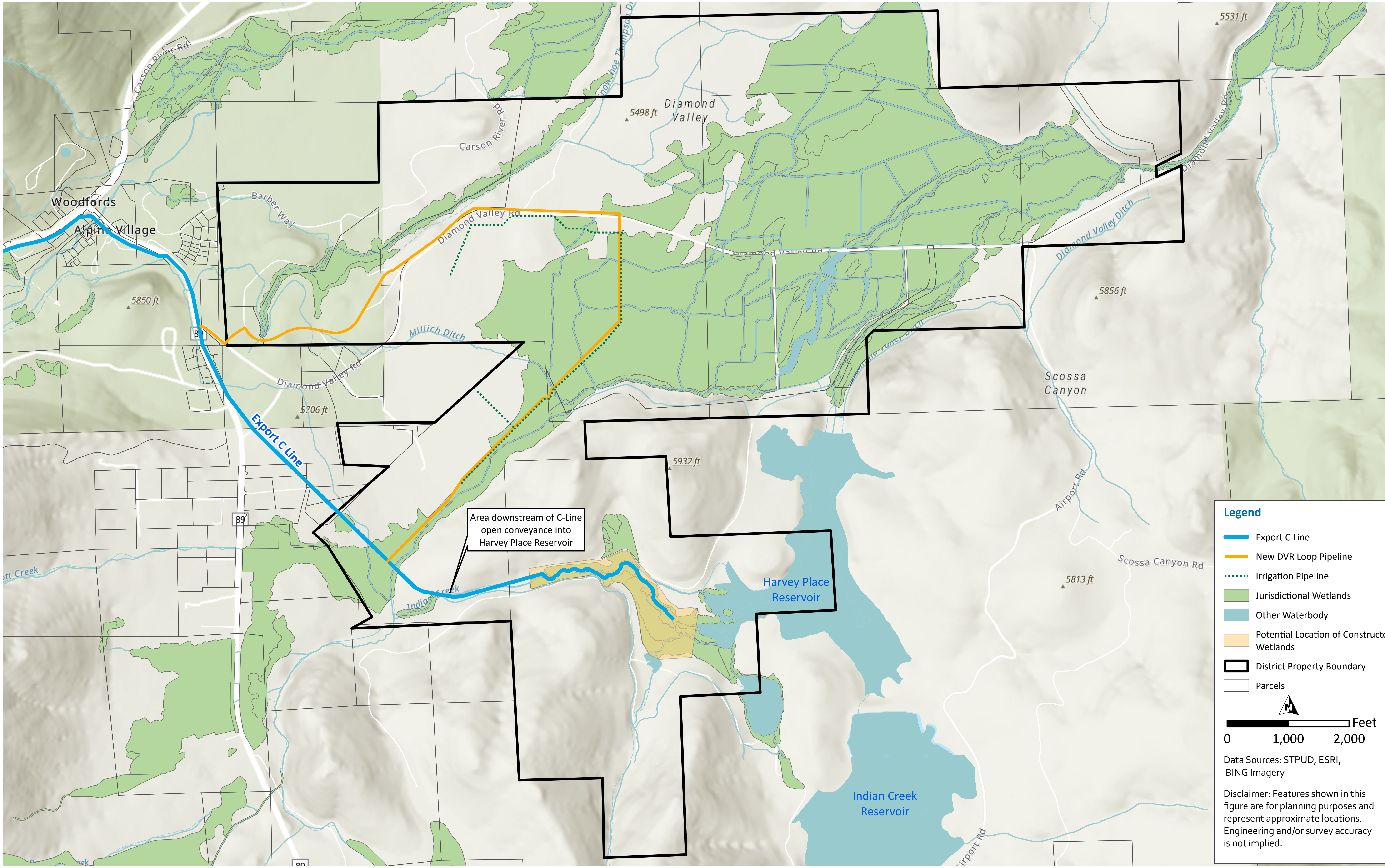


Figure 3.42 National Wetlands Mapping and Potential Location of Constructed Wetlands

3.6 Alternatives Comparison

Table 3.22 provides a comparison of the cost estimates for the alternatives presented in this TM. As noted in Table 3.22, the capital cost for Alternative 1 is $0 because there is no additional capacity provided in this alternative. However, the O&M cost reflects the existing O&M cost of the WWTP, export system and recycled water facilities. This is a baseline O&M cost for the system. The capital costs for all the other alternatives (i.e., all except Alternative 1) is based on the additional capacity provided by the alternative. The O&M costs for all the other alternatives should be considered as additive to the O&M costs for Alternative 1.

Table 3.22 Alternative Comparisons Cost Estimates

Alternative	Total Capital Costs ($M)(1)	Total O&M Costs ($M/yr)(2)
Alt 1 – Existing System "No Project" (3)	$0	$5.50
Alt 2 – Expanded Disinfected Secondary-23 Delivery in Alpine County	$17.76	$0
Alt 3 – Expanded Disinfected Tertiary Reuse in Alpine County (treatment at WWTP)	$87.66	$0.75
Alt 3 – Expanded Disinfected Tertiary Reuse in Alpine County (split treatment at DVR)	$14.66	$0.07
Alt 4 – Discharge to West Fork Carson River and Use in NV	$245.22	$3.08
Alt 6A – Expanded Class A or B Reuse in NV via Discharge to Indian Creek	$226.91	$3.08
Alt 6B – Expanded Class A or B Reuse in NV via Discharge to Mud Lake	$262.19	$3.08
Alt 6C – IPR in NV	$319.80	$7.52
Alt 6D – Expanded Reuse in Nevada via Direct Delivery	$119.53	$1.21
Alt 7A – Treated Effluent Conveyance to DCLTSA with Reuse in NV	$248.53	$2.94

Notes:
(1) Level 5 cost estimates are considered to be accurate within plus 50 percent to minus 30 percent.
(2) O&M associated with new recycled water distribution system infrastructure is assumed to be minimal and is therefore not included, with the exception of the pumping required for Alt 7A.
(3) The capital cost for Alternative 1 is $0 because there is no additional capacity provided in this alternative. However, the O&M cost reflects the existing O&M cost of the WWTP, export system and recycled water facilities. This is the baseline O&M cost for the system. The capital costs for all the other alternatives (i.e., all except Alternative 1) is based on the additional capacity provided by the alternative. The O&M costs for all the other alternatives should be considered as additive to the O&M costs for Alternative 1.

3.6.1 Decision Diagram

A decision diagram was developed to provide an approach for considering implementation of the alternatives in response to potential constraints or opportunities presented to the District. This decision diagram is presented in Figure 3.43. To use this decision diagram, find the "Start" location on the top left, which is followed by a series of questions that lead to the consideration of one or more alternatives. Table 3.23 presents a description of these questions and the pathways to various alternatives.

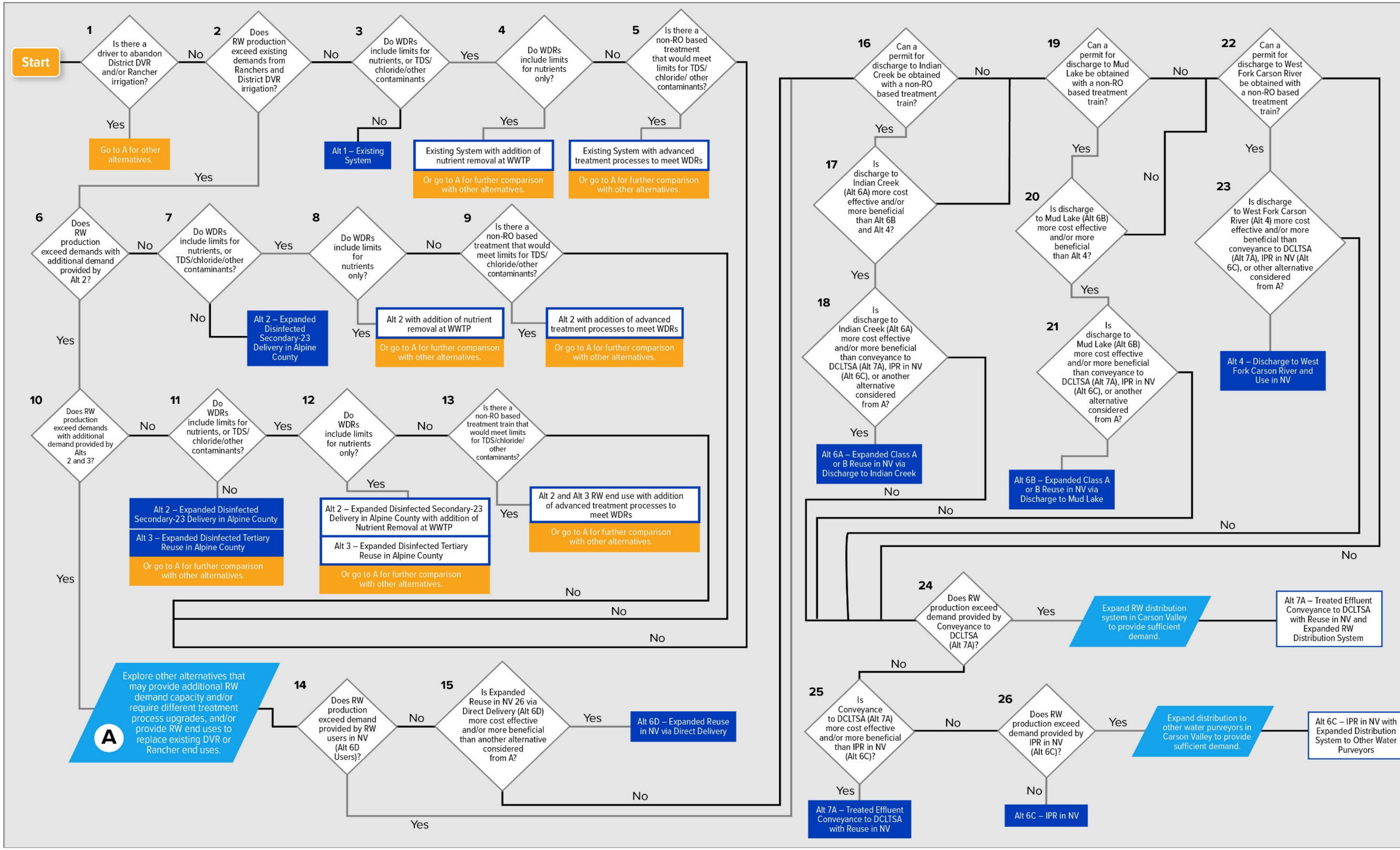


Figure 3.43 Decision Diagram

Table 3.23 Decision Diagram Questions and Pathways

Question/Description	If Yes	If No
Question 1 - Is there a driver to abandon District DVR and/or Rancher irrigation?	Go to A to consider other alternatives.	**Question 2** *Initial question in a series that considers recycled water end uses that are similar to existing operations.*
Question 2 - Does recycled water (RW) production exceed existing demands from Ranchers and District DVR irrigation?	Question 6	**Question 3** *Initial question in a series that considers the need for treatment upgrades to meet permitting requirements.*
Question 3 - Do WDRs include limits for nutrients, or TDS/chloride/other contaminants?	Question 4	Implement the Existing System (Alt 1).
Question 4 - Do WDRs include limits for nutrients only? *Limits for nutrients would be in addition to existing permit requirements.*	Implement the Existing System (Alt 1) with the addition of nutrient removal at the WWTP. Or go to **A** for further comparison with other alternatives. *The need for treatment upgrades may be a driver to consider other options.*	**Question 5**
Question 5 - Is there a non-RO based treatment that would meet limits for TDS/chloride/other contaminants? *Limits for other contaminants would be in addition to existing permit requirements.*	Implement the Existing System (Alt 1) with advanced treatment processes to meet WDRs. Or go to **A** for further comparison with other alternatives. *The need for treatment upgrades may be a driver to consider other options.*	Go to **A**
Question 6 – Does RW production exceed demands with additional demand provided by Alt 2?	**Question 10**	**Question 7** *Initial question in a series that considers the need for treatment upgrades to meet permit requirements.*
Question 7 - Do WDRs include limits for nutrients, or TDS/chloride/other contaminants?	**Question 8**	Implement Alt 2 – Expanded Disinfected Secondary-23 Delivery in Alpine County.
Question 8 - Do WDRs include limits for nutrients only? *Nutrient limits would be in addition to existing permit requirements*	Implement Alt 2 with the addition of nutrient removal at the WWTP. Or go to **A** for further comparison with other alternatives. *The need for treatment upgrades may be a driver to consider other options.*	**Question 9**
Question 9 - Is there a non-RO based treatment that would meet limits for TDS/chloride/other contaminants? *Limits for other contaminants would be in addition to existing permit requirements*	Implement Alt 2 with the addition of advanced treatment processes to meet WDRs. Or go to **A** for further comparison with other alternatives. *The need for treatment upgrades may be a driver to consider other options.*	Go to **A**
Question 10 - Does RW production exceed demands with additional demand provided by Alts 2 and 3?	Go to **A**	**Question 11**
Question 11 - Do WDRs include limits for nutrients, or TDS/chloride/other contaminants?	**Question 12**	Implement Alt 2 and Alt 3 – Expanded Disinfected Tertiary Reuse in Alpine County. Or go to **A** for further comparison with other alternatives. *The need for treatment upgrades associated with Alt 3 may be a driver to consider other options.*
Question 12 - Do WDRs include limits for nutrients only? *Nutrient limits would be in addition to permit requirements associated with the end uses for Alt 3.*	Implement Alt 2 with addition of nutrient removal at the WWTP and Alt 3. Or go to **A** for further comparison with other alternatives. *The need for treatment upgrades may be a driver to consider other options.*	**Question 13**

Question/Description	If Yes	If No
Question 13 - Is there a non-RO based treatment that would meet limits for TDS/chloride/other contaminants? *Limits for other contaminants would be in addition to existing permit requirements.*	Implement Alt 2 and Alt 3 with the addition of advanced treatment processes to meet WDRs. Or go to **A** for further comparison with other alternatives. *The need for treatment upgrades may be a driver to consider other options.*	Go to **A**
A - Explore other alternatives that may provide additional RW demand capacity, and/or require different treatment process upgrades, and/or provide RW end uses to replace existing DVR or Rancher end uses.	- ***A** leads into Question 14.*	- ***A** leads into Question 14*
Question 14 - Does recycled water production exceed demand provided by recycled water users in NV (near State Route 88/south of Centerville Lane)?	**Question 16**	**Question 15**
Question 15 - Is Expanded Reuse in NV via Direct Delivery (Alt 6D) more cost effective and/or provide greater benefits than another alternative considered from **A**?	Implement Alternative 6D – Expanded Reuse in NV via Direct Delivery	**Question 16** *Leads to consideration of other options for comparison cost effectiveness and benefits.*
Question 16 - Can a permit for discharge to Indian Creek be obtained with a non-RO based treatment train? *Initial question in a series of questions that consider alternatives that involve discharge to surface waters.*	**Question 17**	**Question 19**
Question 17 - Is discharge to Indian Creek (Alt 6A) more cost effective and/or provide greater benefits than Alt 6B and Alt 4?	**Question 18**	**Question 19**
Question 18 - Is discharge to Indian Creek (Alt 6A) more cost effective and/or provide greater benefits than Conveyance to DCLTSA (Alt 7A), IPR in NV (Alt 6C), or another alternative considered from **A**?	Implement Alternative 6B – Expanded Class A or B Reuse in NV via Discharge to Indian Creek.	**Question 24**
Question 19 - Can a permit for discharge to Mud Lake be obtained with a non-RO based treatment train?	**Question 20**	**Question 22**
Question 20 - Is discharge to Mud Lake (Alt 6B) more cost effective and/or provide greater benefits than Alt 4?	**Question 21**	**Question 22**
Question 21 - Is discharge to Mud Lake (Alt 6B) more cost effective and/or provide greater benefits than Conveyance to DCLTSA (Alt 7A), IPR in NV (Alt 6C), or another alternative considered from **A**?	Implement Alternative 6B – Expanded Class A or B Reuse in NV via Discharge to Mud Lake.	**Question 24**
Question 22 - Can a permit for discharge to West Fork Carson River be obtained with a non-RO based treatment train?	**Question 23**	**Question 24**
Question 23 - Is discharge to West Fork Carson River (Alt 4) more cost effective and/or provide greater benefits than Conveyance to DCLTSA (Alt 7A), IPR in NV (Alt 6C), or other alternatives considered from **A**?	Implement Alternative 4 – Discharge to West Fork Carson River and Use in NV	**Question 24**
Question 24 - Does RW production exceed demand provided by conveyance to DCLTSA (Alt 7A)? *Initial question in a series that explores uses with significant changes in conveyance infrastructure to deliver water to NV end users.*	Expand RW distribution system in Carson Valley to provide sufficient demand. Implement Alternative 7A – Treated Effluent Conveyance to DCLTSA with Reuse in NV and Expanded Recycled Water Distribution System.	**Question 25**
Question 25 - Is Conveyance to DCLTSA (Alt 7A) more cost effective and/or provide greater benefits than IPR in NV (Alt 6C)?	Implement Alternative 7A – Treated Effluent Conveyance to DCLTSA with Reuse in NV.	**Question 26**
Question 26 - Does RW production exceed demand provided by IPR in NV (Alt 6C)?	Implement Alternative 6C – IPR in NV.	Expand distribution to other water purveyors in Carson Valley to provide sufficient demand. Implement Alternative 6C – IPR in NV with expanded distribution to other water purveyors.

Notes:
(1) Italicized text provides additional description on the decision diagram steps

3.6.2 Multi-Criteria Decision Analysis

A multi-criteria decision analysis method was developed to assist the District in making decisions regarding ranking the various alternatives. This method was reviewed with District staff on July 15, 2024, and refined per the District's feedback.

The multi-criteria decision analysis method involves the use of multiple criteria, which each have associated sub-criteria. The criteria and sub-criteria utilized in this analysis are listed below:

- Economics/Cost:
  - Capital.
  - O&M.
  - District revenue potential.
- Technical:
  - Treatment level (complexity of treatment.
  - Infrastructure (complexity of infrastructure).
- Capacity and Demands:
  - Total capacity (amount of recycled water capacity).
  - Demand interest.
- Regulatory and Permitting:
  - Permitting feasibility.
  - Permitting timeline.
- Environmental and Sustainability:
  - Value of recycled water beneficial use (hydrologic system).
  - Energy usage and GHG emissions.
- Local Agency and Public Perception:
  - Interagency participation.
  - Public acceptance of recycled water end use (at the point of use).

Each of the sub-criteria can be scored from 0 to 10, with 0 being the lowest score and 10 being the highest score. For each sub-criteria, at least one alternative must be scored "0" and at least one alternative must be scored "10". For the quantitative sub-criteria (capital, O&M, total capacity, permitting timeline, and energy usage and GHG emissions), specific values can be used to score the various alternatives relative to each other. For the remaining qualitative sub-criteria, the alternatives are scored relative to each other. Appendix 3C further describes the scoring metrics of each sub-criteria.

Some criteria and sub-criteria were more important than others, and therefore were weighted differently to reflect that consideration. For example, Economics / Cost, Technical, and Capacity & Demands were all weighted higher than the other criteria. Weighting of the criteria and sub-criteria was refined through feedback from the District and is shown in Table 3.24 below:

Table 3.24 Decision Analysis Criteria and Sub-Criteria Weighting

Criteria	Criteria Weight	Sub-Criteria	Sub-Criteria Weight
Economics / Cost	25%	Capital	40%
		O&M	40%
		District revenue potential	20%
Technical	25%	Treatment level	70%
		Infrastructure	30%
Capacity & Demands	25%	Total capacity	50%
		Demand interest	50%
Regulatory & Permitting	8.33%	Permitting feasibility	50%
		Permitting timeline	50%
Environmental & Sustainability	8.33%	Value of RW beneficial use (hydrologic system)	40%
		Energy usage and GHG emissions	60%
Local Agency & Public Perception	8.33%	Interagency participation	50%
		Public acceptance of RW end use (at the point of use)	50%

Notes:
(1) Weighting per July 2024 workshop with the District.

Weighted scores for each criterion are calculated by multiplying the sum product of the sub-criteria score (0-10) by the weights for the sub-criteria, and then multiplying that amount by the weight for that criterion. The total scores for the criteria are added for each alternative to produce a total score for that alternative.

The Multi-Criteria Decision Analysis Tool is in Appendix 3C.

3.7 Summary and Recommendations

This TM presents the analysis of eight alternatives, plus the additional alternative of the split treatment option for Alternative 3. While these alternatives are the most feasible options considered, the alternatives vary widely with respect to cost, recycled water capacity, treatment/infrastructure needs, and regulatory feasibility.

On July 15, 2024, a workshop was held with District staff to utilize the multi-criteria decision analysis tool. The recommended alternative was selected in a workshopping process with the District, which included a ranking of alternatives and consideration of near-term constraints and opportunities (i.e., triggers for implementation). The District is faced with potential changes in the existing Rancher contracts in the next few years, which may impact the recycled water capacity of the system.

It is important to recognize the existing condition was not specifically evaluated in the July 2024 workshop. Under existing conditions, the Decision Diagram would lead to Alternative 1 – Existing System, via the following logic:

- Question 1 – Is there a driver to abandon District DVR and/or Rancher irrigation?
  - Under existing conditions, the response is "No".
- Question 2 – Does recycled water (RW) production exceed existing demands from Ranchers and District DVR?
  - Under existing conditions, the response is "No", which leads to Alternative 1– Existing System.

In the July 2024 workshop, the potential near-term constraint of reducing recycled water system capacity was a key consideration in the process of employing the Decision Diagram and ranking the alternatives. The evaluation was conducted from the hypothetical assumption that additional recycled water capacity would be needed. Under this assumption, the Decision Diagram would lead to the consideration of multiple alternatives, via the following logic:

- Question 1 – Is there a driver to abandon District DVR and/or Rancher irrigation?
  - The response is "No", as there are no foreseeable drivers.
- Question 2 – Does recycled water (RW) production exceed existing demands from Ranchers and District DVR?
  - Under the hypothetical assumption of a capacity need, the response is "Yes", which leads to Alternative 2 or several other alternatives.

The multi-criteria decision analysis was used to compare and rank the alternatives with consideration of the potential near-term limitation on recycled water system capacity. Under these assumptions, the recommended alternative is Alternative 2 – Expanded Disinfected Secondary-23 Delivery in Alpine County, as shown in Table 3.25 and Figure 3.44 below. The detailed scoring and notes regarding this analysis are in Appendix 3C.

Table 3.25 Multi-Criteria Decision Analysis Results (July 2024)

Alternative	Total Weighted Score(1)	Ranking(1)
Alt 1 – Existing System	8.18	2
Alt 2 – Expanded Disinfected Secondary-23 Delivery in Alpine County	**8.68**	**1**
Alt 3 – Expanded Disinfected Tertiary Reuse in Alpine County (split treatment at DVR)	6.44	4
Alt 3 – Expanded Disinfected Tertiary Reuse in Alpine County (treatment at WWTP)	6.24	5
Alt 4 – Discharge to West Fork Carson River and Use in NV	4.05	9
Alt 6A – Expanded Class A or B Reuse in NV via Discharge to Indian Creek	4.84	7
Alt 6B – Expanded Class A or B Reuse in NV via Discharge to Mud Lake	4.78	8

Alternative	Total Weighted Score[1]	Ranking[1]
Alt 6C – IPR in NV	2.34	10
Alt 6D – Expanded Reuse in Nevada via Direct Delivery	7.05	3
Alt 7A – Treated Effluent Conveyance to DCLTSA with Reuse in NV	5.48	6

Notes:
(1) Scores are out of a total possible score of 10.00. The highest/best rank is "1", with the lowest/worst rank equal to "10".

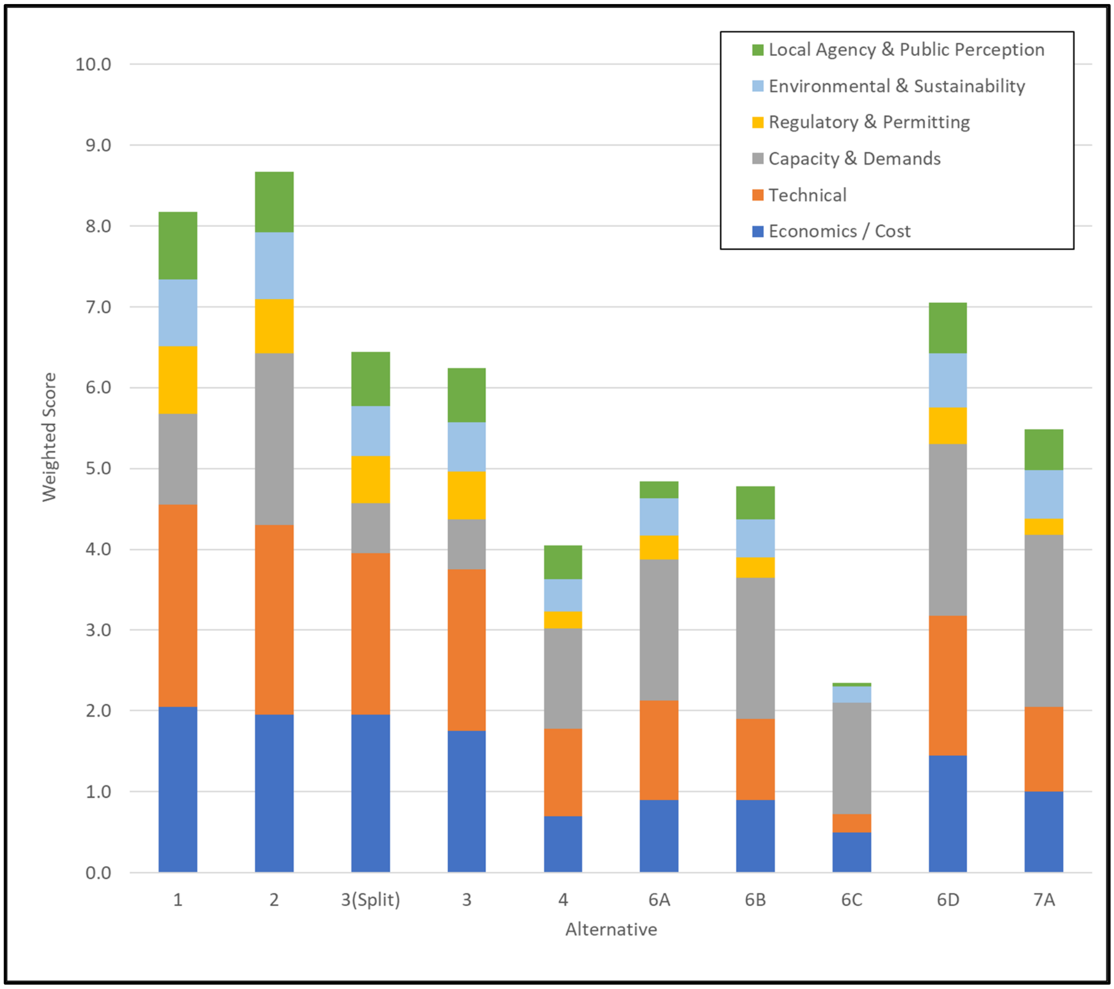


Figure 3.44 Multi-Criteria Decision Analysis Results (July 2024)

In the future the District may want to revisit the comparison and ranking of alternatives under the assumption of other drivers and constraints. The recommendations include use of the tools developed in the TM to support decisions to implement one or more of the alternatives in the future. The recommended process includes:

- *Revisiting the Decision Diagram* – This would involve revisiting the decision diagram based on the triggers for implementation that reflect the opportunities or constraints at the time of re-evaluation.
- *Updating the Multi-Criteria Decision Analysis* – This would involve revisiting the criteria, sub-criteria, and scoring of the alternatives. Steps include:
  - Modifying (as needed) the list of criteria and associated weights.
  - Modifying (as needed) the list of sub-criteria and associated weights.
  - Updating the alternatives with any new information associated with the scoring metrics. For example, updated costs or new information on potential recycled water users / capacity, etc.
  - Revising the scoring of alternatives.

Appendix 3A

COST ESTIMATING

South Tahoe Public Utility District
Recycled Water Strategic Plan

Appendix 3A
COST ESTIMATING

FINAL DRAFT | August 2024

South Tahoe Public Utility District
Recycled Water Strategic Plan

Appendix 3A
COST ESTIMATING

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Abbreviations

$M	million dollars
AACE	Association for the Advancement of Cost Engineering
AF	acre-ft
CCI	Construction Cost Institute
DCLTSA	Douglas County Lake Tahoe Sewer Authority
DVR	Diamond Valley Ranch
ENR	Engineering News Record
EPA	Environmental Protection Agency
FEPS	Final Effluent Pump Station
HDPE	high-density polyethylene
kWh	kilowatt-hours
LPPS	Luther Pass Pump Station
MG	million gallons
mgd	million gallons per day
O&M	operations and maintenance
STPUD	South Tahoe Public Utility District
WWTP	wastewater treatment plant
US	United States

Appendix3A

COST ESTIMATING

This appendix contains information about cost estimating.

3A.1 Background Information on Cost Estimating

The cost estimates presented in the Recycled Water Master Plan have been prepared for general master planning purposes and for guidance in project evaluation and implementation. Final costs of a project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors such as preliminary alignment generation, investigation of alternative routings, and detailed utility and topography surveys.

The Association for the Advancement of Cost Engineering (AACE) defines an Order of Magnitude Estimate, deemed appropriate for master plan studies, as an approximate estimate made without detailed engineering data. It is normally expected that an estimate of this type would be accurate within plus 50 percent to minus 30 percent. This section presents the assumptions used in developing order of magnitude cost estimates for recommended facilities. The costs are based on an Engineering News Record (ENR) 20-City Average Construction Cost Index (CCI) of 13,532 (May 2024).

3A.2 Construction Unit Costs

The construction costs are representative of wastewater treatment and conveyance facilities under normal construction conditions and schedules. Costs have been estimated for public works construction.

3A.2.1 Unit Costs

Unit costs for relevant improvements are shown in Table 3A.1. The unit costs are for "typical" field conditions with construction in stable soil. These costs are based off similar projects completed by Carollo.

Table 3A.1 Unit Costs

Project Category	Unit	Replacement Unit Cost(1)
1-inch Recycled Water Pipeline, majority undeveloped area	linear foot	$15
1-inch Recycled Water Pipeline, paved roadway	linear foot	$102
4-inch Recycled Water Pipeline, majority undeveloped area	linear foot	$86
4-inch Recycled Water Pipeline, paved roadway	linear foot	$145
6-inch Recycled Water Pipeline, paved roadway	linear foot	$190
8-inch Recycled Water Pipeline, undeveloped area	linear foot	$134
14-inch Recycled Water Pipeline, undeveloped area	linear foot	$212
16-inch Recycled Water Pipeline, undeveloped area	linear foot	$234

Project Category	Unit	Replacement Unit Cost(1)
16-inch Recycled Water Pipeline, paved roadway	linear foot	$272
18-inch Recycled Water Pipeline, paved roadway	linear foot	$290
20-inch Recycled Water Pipeline, paved roadway (Diamond Valley Road)	linear foot	$327
24-inch Recycled Water Pipeline, paved roadway, non-highway	linear foot	$437
24-inch Recycled Water Pipeline, paved roadway (Highway 50 and Kingsbury Grade Road)	linear foot	$587
Booster Pump Station 1,000 horsepower	each	$10,800,000

Notes:
(1) ENR 20-City Average Construction Cost Index for May 2024 is 13,532.

3A.3 Project Costs and Contingencies

Project cost estimates are calculated based on elements such as the project location, size, length, and other factors. Allowances for project contingencies consistent with an "Order of Magnitude" estimate are also included in the project costs prepared as part of this study, as outlined in this section.

3A.3.1 Direct Costs

Direct Cost is the total estimated construction cost, in dollars, of the proposed improvements for pipelines and appurtenances, pump stations, and treatment process upgrades. When the unit costs were known, Direct Costs were developed by multiplying the number of units to be replaced or newly installed by the unit cost. For other items, Direct Costs were developed on a case-by-case basis.

3A.3.2 Estimating Contingency

Given the long-term (50 year) timeframe of the Strategic Plan and the many uncertainties associated with future costs, a 50 percent estimating contingency was applied to the direct cost.

Contractor General Conditions, Overhead, and Profit were assumed to be 40 percent, and 50 percent of sales tax on the Total Direct Costs was also applied.

Other project contingency costs were assumed for engineering services (10 percent), construction management (8 percent), and legal and permitting (10 percent).

3A.3.3 Project Costs

As shown in the following sample calculation of the Project Cost, the total cost of all project construction contingencies (construction, engineering services, construction management, and project administration) is 277 percent of the Direct Cost. Calculation of the 277 percent is the overall mark-up on the direct cost to arrive at the project cost. It is not an additional contingency. Table 3A.2 shows an example of how this project markup is calculated for a hypothetical project with a $1,000,000 direct cost.

Table 3A.2 Example Project Markup

Markup	Percentage	Value
Direct Cost		$1,000,000
Total Direct Cost		**$1,000,000**
Estimating Contingency	50%	$ 500,000
Baseline Construction Cost Markup	*150%*	
Baseline Construction Cost		**$1,500,000**
Contractor General Conditions, Overhead, and Profit	40%	$ 600,000
50% of Sales Tax on Baseline Construction Cost	8.25%	$ 62,000
Total Construction Markup	*216%*	
Engineering	10%	$ 217,000
Construction Management	8%	$ 173,000
Legal & Permitting	10%	$ 217,000
Total Project Markup	*277%*	
Total Project Cost		**$2,769,000**

3A.4 Specific Alternatives Capital Costs

Capital cost estimates were prepared for each alternative, as described in TM03 Alternatives Evaluation. Cost estimates for required treatment upgrades, recycled water conveyance infrastructure (including piping and pump stations), and other costs required for each alternative have been prepared using the assumptions and contingencies described above. Detailed cost estimates for the treatment and conveyance costs are shown on Attachment 3A1 – Treatment Capital Cost Estimates and Attachment 3A2 – Conveyance Capital Cost Estimates.

3A.4.1 Alternative 2 – New District Irrigation Fields at Diamond Valley Ranch

The cost to install the new District irrigation fields and associated infrastructure at Diamond Valley Ranch (DVR) was based on costs from the District. Per the District's 2013 Recycled Water Facilities Master Plan Addendum[1], the additional District irrigation fields at DVR would be constructed in three phases:

- Phase 1 – Irrigation fields A, B, C (totaling 70 acres) – constructed and currently in use.
- Phase 2 – Areas 1, 2, 3, 4 (totaling 51 acres), and related improvements, and Snowshoe Thompson ditch improvements.
- Phase 3 – Irrigation fields F, G, H (totaling 50 acres), and related improvements.
- Phase 4 – Irrigation fields D, E, I, J (totaling 163 acres), and related improvements.

Costs for the Phase 2 improvements were in the District's Capital Improvement Program in years past; the latest costs from June 2018 equated to $6.5M. These costs were scaled to May 2024 costs (using the ENR 20-City Average CCI for June 2018 of 11,069 and May 2024 of 13,532), equating to $7.95M.

Costs for the Phase 3 and Phase 4 improvements were based on the District's actual costs to construct the Phase 1 irrigation fields and related improvements and then scaled from 2023 costs

[1] South Tahoe Public Utility District Recycled Water Facilities Master Plan Addendum, Hauge Brueck Associates, LLC, April 2013.

to present (May 2024). Information from the 2013 Recycled Water Facilities Master Plan Addendum was also utilized to confirm infrastructure requirements and quantities for these improvements. Prices per line item for Phase 3 and Phase 4 improvements were scaled to May 2024 costs (using the ENR 20-City Average CCI for December 2023 of 13,515 and May 2024 of 13,532). The costs for Phases 3 and 4 were therefore estimated to be $5.66M.

3A.4.2 Alternative 7A

3A.4.2.1 Lining Buckeye Creek Effluent Storage Facility

The cost estimate for lining the Buckeye Creek Effluent Storage Facility required for Alternative 7A was prepared based on the Buckeye Creek Effluent Storage Facility Reservoir Improvements – Feasibility Report prepared for Douglas County Lake Tahoe Sewer Authority (DCLTSA) by JWA Consulting Engineers, dated April 15, 2004. In this report, a cost summary for various alternatives to line the reservoir was prepared (Table VI.C.3). For the purposes of the Recycled Water Strategic Plan, the costs to line to Upper, Middle, and Lower reservoirs using high-density polyethylene (HDPE) liners were escalated from April 2004 dollars to May 2024 dollars, as shown below in Table 3A.3.

Table 3A.3 Buckeye Creek Effluent Storage Facility Cost Estimate

Item	Original Cost Estimate ($M)(1)	Updated Cost Estimate ($M) (2)
1A – Line Upper Reservoir, including riprap removal and Dam Face, HDPE liner	$2.59	$5.07
2A – Line Middle Reservoir, including riprap removal and Dam Face, HDPE liner	$3.42	$6.69
3A – Line Lower Reservoir, including riprap removal and Dam Face, HDPE liner	$1.76	$3.44
Total	**$7.77**	**$15.20**

Notes:
(1) Original cost estimate was in April 2004 dollars; ENR CCI 20-City Average for April 2004 is 6,916.
(2) Updated cost estimate is in May 2024 dollars; ENR CCI 20-City Average for May 2024 is 13,532.
Abbreviations: $M = million dollars.

3A.4.2.2 Expanding Buckeye Creek Effluent Storage Facility

The cost estimate for expanding the Buckeye Creek Effluent Storage Facility required for Alternative 7A was prepared based on the following. The total amount of storage required for this alternative was calculated assuming that a flow of 5.4 million gallons per day (mgd) would need to be stored for the winter months of October through May, equating to 1,318 million gallons (MG) or 4,705 acre-ft (AF). The total amount of existing storage available was assumed to be 3,174 AF based on 1,284 AF in the Bently Reservoir (a maximum capacity of 1,784 AF minus a normal storage amount of 500 AF), plus 1,890 AF in Buckeye Creek Effluent Storage Facility per the Buckeye Creek Effluent Storage Facility Reservoir Improvements – Feasibility Report. Therefore, the total amount of additional storage needed was calculated to be 1,531 AF (4,705 AF minus 3,174 AF), which was rounded to 1,600 AF.

The cost to expand the Buckeye Creek Effluent Storage Facility was calculated using the cost comparison of water projects for reservoir expansion, per the Water in the West – Understanding

California's Groundwater article[2]. The cost per AF to expand reservoir capacity ranged from $1,700/AF to $2,700/AF; and given the uncertainties associated with expanding the Buckeye Creek Effluent Storage Facility, the high end of this range was utilized. This amount was escalated from December 2014 dollars to May 2024 dollars, using the associated ENR CCI 20-City Averages of 9,936 and 13,532 respectively, to be $3,677/AF.

Multiplying the amount of additional storage needed (1,600 AF) by the cost per AF ($3,677/AF) resulted in the total cost of $5.88M to expand the Buckeye Creek Effluent Storage Facility.

3A.5 O&M Costs

Operation and maintenance (O&M) costs were estimated for each alternative as described below.

3A.5.1 Existing System O&M Cost Estimates

The cost of O&M for the District's existing system was estimated based on the District's current adopted FY24/25 budget.[3]

Existing wastewater treatment plant (WWTP) costs were based on the costs for Department 12 – Operations, minus benefits, travel and meetings, tuition, dues, and capital projects. Energy costs for the WWTP and the Final Effluent Pump Station (FEPS) were also added. These costs were based on the District's energy costs for the 2020-21 year and escalated from June 2021 to May 2024 using the using the associated ENR CCI 20-City Averages of 12,112 and 13,532, respectively.

Existing Export System costs were based on the following costs; Department 16 – Heavy Maintenance force mains (A-Line mileage divided by total mileage of force mains multiplied by the force main costs), Department 22 – Underground Repair Sewer (B-Line mileage divided by total mileage of force mains multiplied by inspection port costs), Department 26 – Pumps (Luther Pass Pump Station [LPPS] line item costs), and Department 34 – Water Reuse minus benefits, travel and meetings, dues, permits, and capital projects. Energy costs for LPPS and DVR were also added. These costs were based on the District's energy costs for the 2020-21 year and escalated from June 2021 to May 2024 using the using the associated ENR CCI 20-City Averages of 12,112 and 13,532, respectively.

3A.5.2 Treatment O&M Cost Estimates

Treatment O&M costs were estimated based on estimates from other facilities with similar treatment trains and/or processes. O&M costs for other facilities were scaled accordingly. In addition, the May 2013 Technical Support Document prepared for Ohio Environmental Protection Agency (EPA)[4] and the 2023 Life Cycle and Cost Assessments of Nutrient Removal

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[2] Water in the West – Understanding California's Groundwater, December 2014. https://waterinthewest.stanford.edu/groundwater/recharge/

[3] https://stpud.specialdistrict.org/files/6b07b6008/24-25+BudgetBook.pdf

[4] Cost Estimate of Phosphorus Removal at Wastewater Treatment Plants, a Technical Support Document prepared for Ohio EPA by Tetra Tech, May 2013. https://dam.assets.ohio.gov/image/upload/epa.ohio.gov/Portals/35/wqs/nutrient_tag/OhioTSDNutrientRemovalCostEstimate_05_06_13.pdf

Technologies in Wastewater Treatment Plants prepared for the United States (US) EPA[5] were used for reference. For the Alternative 6C (Indirect Potable Reuse in Nevada), the 30-percent design cost estimates for the One Water Nevada Advanced Purified Water Facility were used to estimate treatment O&M costs.

3A.5.3 Conveyance O&M Cost Estimates

For conveyance costs, the O&M associated with the new recycled water distribution system infrastructure was assumed to be minimal and was therefore not included in the cost estimates.

However, Alternative 7A – Treated Effluent Conveyance to DCLTSA with Reuse in Nevada included the use of the existing FEPS plus two additional pump stations to convey the recycled water from the District's WWTP to the point of connection with DCLTSA. O&M costs for this alternative were based on the pump station energy usage, which was estimated based on a flow of 5.4 mgd multiplied by the power output over the year, to produce an estimated energy use of 11.97 million kilowatt-hours (kWh), which was multiplied by the energy cost. Energy costs for these pump stations were based on the District's energy costs ($/kWh) for the LPPS for the 2020-21 year and escalated from June 2021 to May 2024 using the associated ENR CCI 20-City Averages of 12,112 and 13,532, respectively.

[5] 2023 Revision to Life Cycle and Cost Assessment of Nutrient Removal Technologies in Wastewater Treatment Plants, prepared for US EPA by Eastern Research Group, Inc., August 2021. https://www.epa.gov/system/files/documents/2023-06/life-cycle-nutrient-removal-2023-update.pdf

Attachment 3A1

TREATMENT CAPITAL COST ESTIMATES

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SOUTH TAHOE PUBLIC UTILITY DISTRICT

Recycled Water Strategic Plan

TASK :	Alternatives Evaluation	**ESTIMATE PREPARATION DATE :**	5/1/2024
JOB # :	200689	**PREPARED BY :**	RLG
LOCATION :	STPUD WWTP	**REVIEWED BY :**	SEP

Summary Table

Project ID	Project	Total	
ALT_02	Expanded Disinfected Secondary 23 Delivery in Alpine County	$ -	
ALT_03	Expanded Disinfected Tertiary Reuse in Alpine County	$ 86,000,000	
ALT_03 Decentralized	Expanded Disinfected Tertiary Reuse in Alpine County - Decentralized 0.25 mgd	$ 13,000,000	
ALT_04	Discharge to West Fork Carson River and Use in NV	$ 224,000,000	
ALT_06A	Expanded Class A or B Reuse in NV via Discharge to Indian Creek	$ 224,000,000	
ALT_06B	Expanded Class A or B Reuse in NV via Discharge to Mud Lake	$ 224,000,000	
ALT_06C	IPR in Nevada	$ 265,000,000	
ALT_06D	Expanded Reuse in NV via Direct Delivery	$ 32,000,000	
ALT_07A	Treated Effluent Conveyance to DCLTSA with Reuse in NV	$ 32,000,000	

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SOUTH TAHOE PUBLIC UTILITY DISTRICT

Recycled Water Strategic Plan

TASK : Alternatives Evaluation
JOB # : 200689
LOCATION : STPUD WWTP
PROJECT ID: ALT_02
TITLE : Expanded Disinfected Secondary 23 Delivery in Alpine County

ESTIMATE PREPARATION DATE : 5/1/2024
PREPARED BY : RLG
REVIEWED BY : SEP

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	SUBTOTAL	TOTAL
1	**No WWTP Modifications**					
	Total					**$0**
2						
3						
4						
	ITEMIZED SUBTOTAL					**$0**
	TOTAL DIRECT COST					**$0**
	Contingency	50	%			$0
	SUBTOTAL					**$0**
	Contractor General Conditions, Overhead, and Profit	40	%			$0
	SUBTOTAL					**$0**
	Sales Tax on 50% of Total Direct Cost	8.25	%			$0
	CONSTRUCTION COST SUBTOTAL					**$0**
	Engineering, Management, and Legal	28	%			$0.00
	PROJECT COST (May 2024 Dollars)					**$0**

Notes:

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SOUTH TAHOE PUBLIC UTILITY DISTRICT

Recycled Water Strategic Plan

TASK :	Alternatives Evaluation	**ESTIMATE PREPARATION DATE :**	5/1/2024
JOB # :	200689	**PREPARED BY :**	RLG
LOCATION :	STPUD WWTP	**REVIEWED BY :**	SEP
PROJECT ID:	ALT_03		
TITLE :	Expanded Disinfected Tertiary Reuse in Alpine County		

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	SUBTOTAL	TOTAL
1	**Treatment Process Equipment Costs**					
	Coagulation/Flocculation/Clarification	1	LS	$3,500,000	$3,500,000	
	Granular Media Filtration	1	LS	$3,600,000	$3,600,000	
	Chemical Systems	1	LS	$1,100,000	$1,100,000	
	Total					**$8,200,000**
2	**Treatment Facility Items**					
	Process Equipment Installation (25% of unit process costs)	1	LS	$2,050,000	$2,050,000	
	Holding Basin No.2 Structural Modifications	1	LS	$1,000,000	$1,000,000	
	Sitework	1	LS	$1,000,000	$1,000,000	
	Piping and Valves	1	LS	$3,000,000	$3,000,000	
	HVAC	1	LS	$200,000	$200,000	
	Treatment Building	7000	SF	$900	$6,300,000	
	Total					**$13,550,000**
	ITEMIZED SUBTOTAL					**$21,750,000**
	Allowances					
	Electrical and Instrumentation Allowance	30	%		$6,525,000	
	Mobilization/Demobilization	10	%		$2,175,000	
	Commissioning	3	%		$652,500	
						$9,352,500
	TOTAL DIRECT COST					**$31,102,500**
	Contingency	50	%			$15,551,250
	SUBTOTAL					**$46,653,750**
	Contractor General Conditions, Overhead, and Profit	40	%			$18,661,500
	SUBTOTAL					**$65,315,250**
	Sales Tax on 50% of Total Direct Cost	8.25	%			$1,282,978
	CONSTRUCTION COST SUBTOTAL					**$67,000,000**
	Engineering, Management, and Legal	28	%			$19,000,000
	PROJECT COST (May 2024 Dollars)					**$86,000,000**

Notes:

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SOUTH TAHOE PUBLIC UTILITY DISTRICT

Recycled Water Strategic Plan

TASK : Alternatives Evaluation
JOB # : 200689
LOCATION : STPUD WWTP
PROJECT ID: ALT_03
TITLE : Expanded Disinfected Tertiary Reuse in Alpine County - Decentralized 0.25 mgd

ESTIMATE PREPARATION DATE : 6/4/2024
PREPARED BY : RLG
REVIEWED BY :

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	SUBTOTAL	TOTAL
1	**Treatment Process Equipment Costs**					
	0.25 mgd Packaged Treatment Skid with Cloth Filters and UV	1	LS	$1,350,000	$1,350,000	
	Total					**$1,350,000**
2	**Treatment Facility Items**					
	Sitework	1	LS	$200,000	$200,000	
	Solids Lagoons	1	LS	$500,000	$500,000	
	Treatment Building	1400	SF	$900	$1,260,000	
	Total					**$1,960,000**
	ITEMIZED SUBTOTAL					**$3,310,000**
	Allowances					
	Electrical and Instrumentation Allowance	30	%		$993,000	
	Mobilization/Demobilization	10	%		$331,000	
	Commissioning	3	%		$99,300	
						$1,423,300
	TOTAL DIRECT COST					**$4,733,300**
	Contingency	50	%			$2,366,650
	SUBTOTAL					**$7,099,950**
	Contractor General Conditions, Overhead, and Profit	40	%			$2,839,980
	SUBTOTAL					**$9,939,930**
	Sales Tax on 50% of Total Direct Cost	8.25	%			$195,249
	CONSTRUCTION COST SUBTOTAL					**$10,000,000**
	Engineering, Management, and Legal	28	%			$3,000,000
	PROJECT COST (May 2024 Dollars)					**$13,000,000**

Notes:

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SOUTH TAHOE PUBLIC UTILITY DISTRICT

Recycled Water Strategic Plan

TASK :	Alternatives Evaluation	**ESTIMATE PREPARATION DATE :**	5/1/2024
JOB # :	200689	**PREPARED BY :**	RLG
LOCATION :	STPUD WWTP	**REVIEWED BY :**	SEP
PROJECT ID:	ALT_04		
TITLE :	Discharge to West Fork Carson River and Use in NV		

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	SUBTOTAL	TOTAL
1	**Treatment Process Equipment Costs**					
	Perforated Screens (2 mm) Prior to AT's	1	LS	$2,000,000	$2,000,000	
	Existing AT's and EQ Conversion to 5-stage Bardenpho	1	LS	$15,000,000	$15,000,000	
	MBR Equipment	1	LS	$15,000,000	$15,000,000	
	UV Disinfection	1	LS	$2,100,000	$2,100,000	
	Chemical Systems	1	LS	$1,500,000	$1,500,000	
	Total					**$35,600,000**
2	**Treatment Facility Items**					
	Process Equipment Installation (25% of unit process costs)	1	LS	$8,900,000	$8,900,000	
	Sitework	1	LS	$1,000,000	$1,000,000	
	Piping and Valves	1	LS	$5,000,000	$5,000,000	
	HVAC	1	LS	$200,000	$200,000	
	Treatment Building	7000	SF	$900	$6,300,000	
	Total					**$21,400,000**
	ITEMIZED SUBTOTAL					**$57,000,000**
	Allowances					
	Electrical and Instrumentation Allowance	30	%		$17,100,000	
	Mobilization/Demobilization	10	%		$5,700,000	
	Commissioning	3	%		$1,710,000	
						$24,510,000
	TOTAL DIRECT COST					**$81,510,000**
	Contingency	50	%			$40,755,000
	SUBTOTAL					**$122,265,000**
	Contractor General Conditions, Overhead, and Profit	40	%			$48,906,000
	SUBTOTAL					**$171,171,000**
	Sales Tax on 50% of Total Direct Cost	8.25	%			$3,362,288
	CONSTRUCTION COST SUBTOTAL					**$175,000,000**
	Engineering, Management, and Legal	28	%			$49,000,000
	PROJECT COST (May 2024 Dollars)					**$224,000,000**

Notes:

SOUTH TAHOE PUBLIC UTILITY DISTRICT

Recycled Water Strategic Plan

TASK : Alternatives Evaluation
JOB # : 200689
LOCATION : STPUD WWTP
PROJECT ID: ALT_06A
TITLE : Expanded Class A or B Reuse in NV via Discharge to Indian Creek

ESTIMATE PREPARATION DATE : 5/1/2024
PREPARED BY : RLG
REVIEWED BY : SEP

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	SUBTOTAL	TOTAL
1	**Treatment Process Equipment Costs**					
	Perforated Screens (2 mm) Prior to AT's	1	LS	$2,000,000	$2,000,000	
	Existing AT's and EQ Conversion to 5-stage Bardenpho	1	LS	$15,000,000	$15,000,000	
	MBR Equipment	1	LS	$15,000,000	$15,000,000	
	UV Disinfection	1	LS	$2,100,000	$2,100,000	
	Chemical Systems	1	LS	$1,500,000	$1,500,000	
	Total					**$35,600,000**
2	**Treatment Facility Items**					
	Process Equipment Installation (25% of unit process costs)	1	LS	$8,900,000	$8,900,000	
	Sitework	1	LS	$1,000,000	$1,000,000	
	Piping and Valves	1	LS	$5,000,000	$5,000,000	
	HVAC	1	LS	$200,000	$200,000	
	Treatment Building	7000	SF	$900	$6,300,000	
	Total					**$21,400,000**
	ITEMIZED SUBTOTAL					**$57,000,000**
	Allowances					
	Electrical and Instrumentation Allowance	30	%		$17,100,000	
	Mobilization/Demobilization	10	%		$5,700,000	
	Commissioning	3	%		$1,710,000	
						$24,510,000
	TOTAL DIRECT COST					**$81,510,000**
	Contingency	50	%			$40,755,000
	SUBTOTAL					**$122,265,000**
	Contractor General Conditions, Overhead, and Profit	40	%			$48,906,000
	SUBTOTAL					**$171,171,000**
	Sales Tax on 50% of Total Direct Cost	8.25	%			$3,362,288
	CONSTRUCTION COST SUBTOTAL					**$175,000,000**
	Engineering, Management, and Legal	28	%			$49,000,000
	PROJECT COST (May 2024 Dollars)					**$224,000,000**

Notes:

SOUTH TAHOE PUBLIC UTILITY DISTRICT

Recycled Water Strategic Plan

TASK :	Alternatives Evaluation	**ESTIMATE PREPARATION DATE :**	5/1/2024
JOB # :	200689	**PREPARED BY :**	RLG
LOCATION :	STPUD WWTP	**REVIEWED BY :**	SEP
PROJECT ID:	ALT_06B		
TITLE :	Expanded Class A or B Reuse in NV via Discharge to Mud Lake		

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	SUBTOTAL	TOTAL
1	**Treatment Process Equipment Costs**					
	Perforated Screens (2 mm) Prior to AT's	1	LS	$2,000,000	$2,000,000	
	Existing AT's and EQ Conversion to 5-stage Bardenpho	1	LS	$15,000,000	$15,000,000	
	MBR Equipment	1	LS	$15,000,000	$15,000,000	
	UV Disinfection	1	LS	$2,100,000	$2,100,000	
	Chemical Systems	1	LS	$1,500,000	$1,500,000	
	Total					**$35,600,000**
2	**Treatment Facility Items**					
	Process Equipment Installation (25% of unit process costs)	1	LS	$8,900,000	$8,900,000	
	Sitework	1	LS	$1,000,000	$1,000,000	
	Piping and Valves	1	LS	$5,000,000	$5,000,000	
	HVAC	1	LS	$200,000	$200,000	
	Treatment Building	7000	SF	$900	$6,300,000	
	Total					**$21,400,000**
	ITEMIZED SUBTOTAL					**$57,000,000**
	Allowances					
	Electrical and Instrumentation Allowance	30	%		$17,100,000	
	Mobilization/Demobilization	10	%		$5,700,000	
	Commissioning	3	%		$1,710,000	
						$24,510,000
	TOTAL DIRECT COST					**$81,510,000**
	Contingency	50	%			$40,755,000
	SUBTOTAL					**$122,265,000**
	Contractor General Conditions, Overhead, and Profit	40	%			$48,906,000
	SUBTOTAL					**$171,171,000**
	Sales Tax on 50% of Total Direct Cost	8.25	%			$3,362,288
	CONSTRUCTION COST SUBTOTAL					**$175,000,000**
	Engineering, Management, and Legal	28	%			$49,000,000
	PROJECT COST (May 2024 Dollars)					**$224,000,000**

Notes:

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SOUTH TAHOE PUBLIC UTILITY DISTRICT

Recycled Water Strategic Plan

TASK :	Alternatives Evaluation	**ESTIMATE PREPARATION DATE :**	5/1/2024
JOB # :	200689	**PREPARED BY :**	RLG
LOCATION :	STPUD WWTP	**REVIEWED BY :**	SEP
PROJECT ID:	ALT_06C		
TITLE :	IPR in Nevada		

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	SUBTOTAL	TOTAL
1	**Treatment Process Equipment Costs**					
	Coagulation/Flocculation/Clarification	1	LS	$3,500,000	$3,500,000	
	Granular Media Filtration	1	LS	$3,600,000	$3,600,000	
	Ozone	1	LS	$5,300,000	$5,300,000	
	Biological Activated Carbon Filtration	1	LS	$7,500,000	$7,500,000	
	Granular Activated Carbon	1	LS	$1,200,000	$1,200,000	
	UV Disinfection	1	LS	$2,100,000	$2,100,000	
	Ultrafiltration	1	LS	$4,100,000	$4,100,000	
	Chemical Systems	1	LS	$1,100,000	$1,100,000	
	Total					**$28,400,000**
2	**Treatment Facility Items**					
	Process Equipment Installation (25% of unit process costs)	1	LS	$7,100,000	$7,100,000	
	Solids Lagoons (Concrete Lined)	1	LS	$2,000,000	$2,000,000	
	Sitework (5 acres)	1	LS	$1,000,000	$1,000,000	
	Injection Wells	10	EA	$200,000	$2,000,000	
	Recovery Wells	10	EA	$200,000	$2,000,000	
	Piping and Valves	1	LS	$6,000,000	$6,000,000	
	HVAC	1	LS	$1,000,000	$1,000,000	
	Treatment Building	20000	SF	$900	$18,000,000	
	Total					**$39,100,000**
	ITEMIZED SUBTOTAL					**$67,500,000**
	Allowances					
	Electrical and Instrumentation Allowance	30	%		$20,250,000	
	Mobilization/Demobilization	10	%		$6,750,000	
	Commissioning	3	%		$2,025,000	
						$29,025,000
	TOTAL DIRECT COST					**$96,525,000**
	Contingency	50	%			$48,262,500
	SUBTOTAL					**$144,787,500**
	Contractor General Conditions, Overhead, and Profit	40	%			$57,915,000
	SUBTOTAL					**$202,702,500**
	Sales Tax on 50% of Total Direct Cost	8.25	%			$3,981,656
	CONSTRUCTION COST SUBTOTAL					**$207,000,000**
	Engineering, Management, and Legal	28	%			$58,000,000
	PROJECT COST (May 2024 Dollars)					**$265,000,000**

Notes:

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SOUTH TAHOE PUBLIC UTILITY DISTRICT

Recycled Water Strategic Plan

TASK :	Alternatives Evaluation		**ESTIMATE PREPARATION DATE :**	5/1/2024
JOB # :	200689		**PREPARED BY :**	RLG
LOCATION :	STPUD WWTP		**REVIEWED BY :**	SEP
PROJECT ID:	ALT_06D	May 2024 ENR	**13532.44**	
TITLE :	Expanded Reuse in NV via Direct Delivery	October 2015 ENR	**10128**	

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	SUBTOTAL	TOTAL
1	**Treatment Process Equipment Costs**					
	Existing AT's and EQ Conversion to MLE with N Removal	1	LS	$5,000,000	$5,000,000	
	Total					**$5,000,000**
2	**Treatment Facility Items**					
	Process Equipment Installation (25% of unit process costs)	1	LS	$1,250,000	$1,250,000	
	Sitework	1	LS	$1,000,000	$1,000,000	
	Piping and Valves	1	LS	$1,000,000	$1,000,000	
	Total					**$3,250,000**
	ITEMIZED SUBTOTAL					**$8,250,000**
	Allowances					
	Electrical and Instrumentation Allowance	30	%		$2,475,000	
	Mobilization/Demobilization	10	%		$825,000	
	Commissioning	3	%		$247,500	
						$3,547,500
	TOTAL DIRECT COST					**$11,797,500**
	Contingency	50	%			$5,898,750
	SUBTOTAL					**$17,696,250**
	Contractor General Conditions, Overhead, and Profit	40	%			$7,078,500
	SUBTOTAL					**$24,774,750**
	Sales Tax on 50% of Total Direct Cost	8.25	%			$486,647
	CONSTRUCTION COST SUBTOTAL					**$25,000,000**
	Engineering, Management, and Legal	28	%			$7,000,000
	PROJECT COST (May 2024 Dollars)					**$32,000,000**

Notes:

SOUTH TAHOE PUBLIC UTILITY DISTRICT
Recycled Water Strategic Plan

TASK :	Alternatives Evaluation		**ESTIMATE PREPARATION DATE :**	5/1/2024
JOB # :	200689		**PREPARED BY :**	RLG
LOCATION :	STPUD WWTP		**REVIEWED BY :**	SEP
PROJECT ID:	ALT_07A	May 2024 ENR	**13532.44**	
TITLE :	Treated Effluent Conveyance to DCLTSA with Reuse in NV	October 2015 ENR	**10128**	

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	SUBTOTAL	TOTAL
1	**Treatment Process Equipment Costs**					
	Existing AT's and EQ Conversion to MLE with N Removal	1	LS	$5,000,000	$5,000,000	
	Total					**$5,000,000**
2	**Treatment Facility Items**					
	Process Equipment Installation (25% of unit process costs)	1	LS	$1,250,000	$1,250,000	
	Sitework	1	LS	$1,000,000	$1,000,000	
	Piping and Valves	1	LS	$1,000,000	$1,000,000	
	Total					**$3,250,000**
	ITEMIZED SUBTOTAL					**$8,250,000**
	Allowances					
	Electrical and Instrumentation Allowance	30	%		$2,475,000	
	Mobilization/Demobilization	10	%		$825,000	
	Commissioning	3	%		$247,500	
						$3,547,500
	TOTAL DIRECT COST					**$11,797,500**
	Contingency	50	%			$5,898,750
	SUBTOTAL					**$17,696,250**
	Contractor General Conditions, Overhead, and Profit	40	%			$7,078,500
	SUBTOTAL					**$24,774,750**
	Sales Tax on 50% of Total Direct Cost	8.25	%			$486,647
	CONSTRUCTION COST SUBTOTAL					**$25,000,000**
	Engineering, Management, and Legal	28	%			$7,000,000
	PROJECT COST (May 2024 Dollars)					**$32,000,000**

Notes:

Attachment 3A2

CONVEYANCE CAPITAL COST ESTIMATES

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SOUTH TAHOE PUBLIC UTILITY DISTRICT
Recycled Water Strategic Plan

TASK : Alternatives Evaluation

ESTIMATE PREPARATION DATE: 7/2/2024

JOB # : 200689

PREPARED BY: JV

LOCATION : STPUD Conveyance Alternatives

REVIEWED BY: CT

Summary Table

Project ID	Project	Total
ALT_02	Expanded Disinfected Secondary 23 Delivery in Alpine County	**$ 4,152,160**
ALT_03	Expanded Disinfected Tertiary Reuse in Alpine County	**$ 1,662,246**
ALT_04	Discharge to West Fork Carson River and Use in NV	**$ 21,223,078**
ALT_06A	Expanded Class A or B Reuse in NV via Discharge to Indian Creek	**$ 2,912,928**
ALT_06B	Expanded Class A or B Reuse in NV via Discharge to Mud Lake	**$ 38,187,386**
ALT_06C	Expanded Class A or B Reuse in NV via Discharge to Gardnerville Ranchos General Improvement District	**$ 54,802,835**
ALT_06D	Expanded Reuse in NV via Direct Delivery	**$ 87,529,696**
ALT_07A	STPUD to DCLTSA Conveyance	**$ 150,605,171**
ALT_07A	Remove & Replace DCLTSA Pipeline	**$ 31,582,029**
ALT_07A	DCLTSA Export Line Connection/Conveyance to New Users	**$ 13,261,190**

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PROJECT SUMMARY

Project:	**South Tahoe Public Utility District Recycled Water Strategic Plan**	**Estimate Class:**	**5**
Client:	**South Tahoe Public Utility District**	**PIC:**	**EG**
Location:	**El Dorado County**	**PM:**	**CT**
Zip Code:	**96150**	**Date:**	**August 15, 2024**
Carollo Job #	**200689**	**By:**	**JV**
Project Alt:	**Alternative 2: Disinfected Secondary RW in Alpine County**	**Reviewed:**	

NO.	DESCRIPTION			TOTAL
01	General Conditions			$195,600
02	Recycled Water Pipelines			$1,304,000
		TOTAL DIRECT COST		**$1,499,600**
	Contingency		50.0%	$749,800
		Subtotal		**$2,249,400**
	General Contractor Overhead, Profit & Risk		40.0%	$899,760
		Subtotal		**$3,149,160**
	Sales Tax (8.25% on half the direct cost)		8.25%	$93,000
		Subtotal		**$3,242,160**
	TOTAL ESTIMATED CONSTRUCTION COST			**$3,242,160**
	Engineering		10.0%	$325,000
	Construction Management		8.0%	$260,000
	Legal & Permitting		10.0%	$325,000
	TOTAL ESTIMATED PROJECT COST			**$4,152,160**

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

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PROJECT SUMMARY

Project:	**South Tahoe Public Utility District Recycled Water Strategic Plan**	**Estimate Class:**	**5**
Client:	**South Tahoe Public Utility District**	**PIC:**	**EG**
Location:	**El Dorado County**	**PM:**	**CT**
Zip Code:	**96150**	**Date:**	**August 15, 2024**
Carollo Job #	**200689**	**By:**	**JV**
Project Alt:	**Alternative 3: Disinfected Tertiary RW in Alpine County**	**Reviewed:**	

NO.	DESCRIPTION			TOTAL
01	General Conditions			$78,300
02	Recycled Water Pipelines			$522,000
		TOTAL DIRECT COST		**$600,300**
	Contingency		50.0%	$300,150
		Subtotal		**$900,450**
	General Contractor Overhead, Profit & Risk		40.0%	$360,180
		Subtotal		**$1,260,630**
	Sales Tax (8.25% on half the direct cost)		8.25%	$38,000
		Subtotal		**$1,298,630**
	TOTAL ESTIMATED CONSTRUCTION COST			**$1,298,630**
	Engineering		10.0%	$129,863
	Construction Management		8.0%	$103,890
	Legal & Permitting		10.0%	$129,863
	TOTAL ESTIMATED PROJECT COST			**$1,662,246**

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

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PROJECT SUMMARY

Project:	**South Tahoe Public Utility District Recycled Water Strategic Plan**	**Estimate Class:**	**5**
Client:	**South Tahoe Public Utility District**	**PIC:**	**EG**
Location:	**El Dorado County**	**PM:**	**CT**
Zip Code:	**96150**	**Date:**	**August 15, 2024**
Carollo Job #	**200689**	**By:**	**JV**
Project Alt:	**Alternative 4: West Fork Carson River**	**Reviewed:**	

NO.	DESCRIPTION		TOTAL
01	General Conditions		$987,300
02	Recycled Water Pipeline		$6,582,000
03	Outfall Structure		$100,000
	TOTAL DIRECT COST		**$7,669,300**
	Contingency	50.0%	$3,834,650
	Subtotal		**$11,503,950**
	General Contractor Overhead, Profit & Risk	40.0%	$4,601,580
	Subtotal		**$16,105,530**
	Sales Tax (8.25% on half the direct cost)	8.25%	$475,000
	Subtotal		**$16,580,530**
	TOTAL ESTIMATED CONSTRUCTION COST		**$16,580,530**
	Engineering	10.0%	$1,658,053
	Construction Management	8.0%	$1,326,442
	Legal & Permitting	10.0%	$1,658,053
	TOTAL ESTIMATED PROJECT COST		**$21,223,078**

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

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PROJECT SUMMARY

Project:	**South Tahoe Public Utility District Recycled Water Strategic Plan**	**Estimate Class:**	**5**
Client:	**South Tahoe Public Utility District**	**PIC:**	**EG**
Location:	**El Dorado County**	**PM:**	**CT**
Zip Code:	**96150**	**Date:**	**August 15, 2024**
Carollo Job #	**200689**	**By:**	**JV**
Project Alt:	**Alternative 6A: DVR to Harvey Place Reservoir Discharge to Indian Creek**	**Reviewed:**	

NO.	DESCRIPTION			TOTAL
01	General Conditions			$137,250
02	Recycled Water Pipeline			$915,000
		TOTAL DIRECT COST		**$1,052,250**
	Contingency		50.0%	$526,125
		Subtotal		**$1,578,375**
	General Contractor Overhead, Profit & Risk		40.0%	$631,350
		Subtotal		**$2,209,725**
	Sales Tax (8.25% on half the direct cost)		8.25%	$66,000
		Subtotal		**$2,275,725**
	TOTAL ESTIMATED CONSTRUCTION COST			**$2,275,725**
	Engineering		10.0%	$227,573
	Construction Management		8.0%	$182,058
	Legal & Permitting		10.0%	$227,573
	TOTAL ESTIMATED PROJECT COST			**$2,912,928**

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

PROJECT SUMMARY

Engineers...Working Wonders With Water®

Project:	**South Tahoe Public Utility District Recycled Water Strategic Plan**	**Estimate Class:**	**5**
Client:	**South Tahoe Public Utility District**	**PIC:**	**EG**
Location:	**El Dorado County**	**PM:**	**CT**
Zip Code:	**96150**	**Date:**	**August 15, 2024**
Carollo Job #	**200689**	**By:**	**JV**
Project Alt:	**Alternative 6B: Harvey Place Reservoir to Mud Lake**	**Reviewed:**	

NO.	DESCRIPTION			TOTAL
01	General Conditions			$1,786,950
02	Recycled Water Pipeline			$11,913,000
03	Outfall Structure			$100,000
		TOTAL DIRECT COST		**$13,799,950**
	Contingency		50.0%	$6,899,975
		Subtotal		**$20,699,925**
	General Contractor Overhead, Profit & Risk		40.0%	$8,279,970
		Subtotal		**$28,979,895**
	Sales Tax (8.25% on half the direct cost)		8.25%	$854,000
		Subtotal		**$29,833,895**
	TOTAL ESTIMATED CONSTRUCTION COST			**$29,833,895**
	Engineering		10.0%	$2,983,390
	Construction Management		8.0%	$2,386,712
	Legal & Permitting		10.0%	$2,983,390
	TOTAL ESTIMATED PROJECT COST			**$38,187,386**

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

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PROJECT SUMMARY

Project:	**South Tahoe Public Utility District Recycled Water Strategic Plan**	**Estimate Class:**	**5**
Client:	**South Tahoe Public Utility District**	**PIC:**	**EG**
Location:	**El Dorado County**	**PM:**	**CT**
Zip Code:	**96150**	**Date:**	**August 15, 2024**
Carollo Job #	**200689**	**By:**	**JV**
Project Alt:	**Alternative 6C: DVR to Gardnerville Ranchos GID**	**Reviewed:**	

NO.	DESCRIPTION			TOTAL
01	General Conditions			$2,583,150
02	Recycled Water Pipeline			$17,221,000
		TOTAL DIRECT COST		**$19,804,150**
	Contingency		50.0%	$9,902,075
		Subtotal		**$29,706,225**
	General Contractor Overhead, Profit & Risk		40.0%	$11,882,490
		Subtotal		**$41,588,715**
	Sales Tax (8.25% on half the direct cost)		8.25%	$1,226,000
		Subtotal		**$42,814,715**
	TOTAL ESTIMATED CONSTRUCTION COST			**$42,814,715**
	Engineering		10.0%	$4,281,472
	Construction Management		8.0%	$3,425,177
	Legal & Permitting		10.0%	$4,281,472
	TOTAL ESTIMATED PROJECT COST			**$54,802,835**

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

Engineers...Working Wonders With Water®

PROJECT SUMMARY

Project:	**South Tahoe Public Utility District Recycled Water Strategic Plan**	**Estimate Class:**	**5**
Client:	**South Tahoe Public Utility District**	**PIC:**	**EG**
Location:	**El Dorado County**	**PM:**	**CT**
Zip Code:	**96150**	**Date:**	**August 16, 2024**
Carollo Job #	**200689**	**By:**	**JV**
Project Alt:	**Alternative 6D: Harvey Place Reservoir to Frederickburg Ditch & Bently Properties**	**Reviewed:**	

NO.	DESCRIPTION			TOTAL
01	General Conditions			$4,125,750
02	Recycled Water Pipeline			$27,505,000
		TOTAL DIRECT COST		**$31,630,750**
	Contingency		50.0%	$15,815,375
		Subtotal		**$47,446,125**
	General Contractor Overhead, Profit & Risk		40.0%	$18,978,450
		Subtotal		**$66,424,575**
	Sales Tax (8.25% on half the direct cost)		8.25%	$1,958,000
		Subtotal		**$68,382,575**
	TOTAL ESTIMATED CONSTRUCTION COST			**$68,382,575**
	Engineering		10.0%	$6,838,258
	Construction Management		8.0%	$5,470,606
	Legal & Permitting		10.0%	$6,838,258
	TOTAL ESTIMATED PROJECT COST			**$87,529,696**

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

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PROJECT SUMMARY

Project:	**South Tahoe Public Utility District Recycled Water Strategic Plan**	**Estimate Class:**	**5**
Client:	**South Tahoe Public Utility District**	**PIC:**	**EG**
Location:	**El Dorado County**	**PM:**	**CT**
Zip Code:	**96150**	**Date:**	**August 15, 2024**
Carollo Job #	**200689**	**By:**	**JV**
Project Alt:	**Alternative 7A: STPUD to Douglas County Lake Tahoe Sewer Authority**	**Reviewed:**	

NO.	DESCRIPTION			TOTAL
01	General Conditions			$7,098,900
02	Recycled Water Pipeline			$25,726,000
03	Pump Stations			$21,600,000
		TOTAL DIRECT COST		**$54,424,900**
	Contingency		50.0%	$27,212,450
		Subtotal		**$81,637,350**
	General Contractor Overhead, Profit & Risk		40.0%	$32,654,940
		Subtotal		**$114,292,290**
	Sales Tax (8.25% on half the direct cost)		8.25%	$3,368,000
		Subtotal		**$117,660,290**
	TOTAL ESTIMATED CONSTRUCTION COST			**$117,660,290**
	Engineering		10.0%	$11,766,029
	Construction Management		8.0%	$9,412,823
	Legal & Permitting		10.0%	$11,766,029
	TOTAL ESTIMATED PROJECT COST			**$150,605,171**

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

Engineers...Working Wonders With Water®

PROJECT SUMMARY

Project:	**South Tahoe Public Utility District Recycled Water Strategic Plan**	**Estimate Class:**	**5**
Client:	**South Tahoe Public Utility District**	**PIC:**	**EG**
Location:	**El Dorado County**	**PM:**	**CT**
Zip Code:	**96150**	**Date:**	**August 15, 2024**
Carollo Job #	**200689**	**By:**	**JV**
Project Alt:	**Alternative 7A: Douglas County Lake Tahoe Sewer Authority Replacement Line**	**Reviewed:**	

NO.	DESCRIPTION			TOTAL
01	General Conditions			$1,488,600
02	Recycled Water Pipeline			$9,924,000
		TOTAL DIRECT COST		**$11,412,600**
	Contingency		50.0%	$5,706,300
		Subtotal		**$17,118,900**
	General Contractor Overhead, Profit & Risk		40.0%	$6,847,560
		Subtotal		**$23,966,460**
	Sales Tax (8.25% on half the direct cost)		8.25%	$707,000
		Subtotal		**$24,673,460**
	TOTAL ESTIMATED CONSTRUCTION COST			**$24,673,460**
	Engineering		10.0%	$2,467,346
	Construction Management		8.0%	$1,973,877
	Legal & Permitting		10.0%	$2,467,346
	TOTAL ESTIMATED PROJECT COST			**$31,582,029**

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

Engineers...Working Wonders With Water®

PROJECT SUMMARY

Project:	**South Tahoe Public Utility District Recycled Water Strategic Plan**	**Estimate Class:**	**5**
Client:	**South Tahoe Public Utility District**	**PIC:**	**EG**
Location:	**El Dorado County**	**PM:**	**CT**
Zip Code:	**96150**	**Date:**	**August 15, 2024**
Carollo Job #	**200689**	**By:**	**JV**
Project Alt:	**Alternative 7A: Douglas County Lake Tahoe Sewer Authority - New Users**	**Reviewed:**	

NO.	DESCRIPTION			TOTAL
01	General Conditions			$625,050
02	Recycled Water Pipelines			$4,167,000
		TOTAL DIRECT COST		**$4,792,050**
	Contingency		50.0%	$2,396,025
		Subtotal		**$7,188,075**
	General Contractor Overhead, Profit & Risk		40.0%	$2,875,230
		Subtotal		**$10,063,305**
	Escalation to Mid-Point		0.0%	$0
		Subtotal		**$10,063,305**
	Sales Tax (8.25% on half the direct cost)		8.25%	$297,000
		Subtotal		**$10,360,305**
	Bid Market Allowance		0.0%	$0
	TOTAL ESTIMATED CONSTRUCTION COST			**$10,360,305**
	Engineering		10.0%	$1,036,031
	Construction Management		8.0%	$828,824
	Legal & Permitting		10.0%	$1,036,031
	TOTAL ESTIMATED PROJECT COST			**$13,261,190**

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

Appendix 3B

ADDITIONAL ALTERNATIVE AND SYSTEM MODIFICATION INFORMATION

South Tahoe Public Utility District
Recycled Water Strategic Plan

Appendix 3B
ADDITIONAL ALTERNATIVE AND SYSTEM MODIFICATION INFORMATION

FINAL DRAFT | August 2024

South Tahoe Public Utility District
Recycled Water Strategic Plan

Appendix 3B
ADDITIONAL ALTERNATIVE AND SYSTEM MODIFICATION INFORMATION

FINAL DRAFT | August 2024

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Abbreviations

DCLTSA	Douglas County Lake Tahoe Sewer Authority
DIP	ductile iron pipe
District	South Tahoe Public Utility District
FRP	fiberglass reinforced plastic
ft	foot/feet
HDD	horizontal directional drilling
HDPE	high-density polyethylene
in	inch(es)
kW	kilowatt
MTBM	microtunnel boring machine
MW	megawatt
NASTT	North American Society of Trenchless Technology
OD	outside diameter
PCP	polychloroprene
PVC	polyvinyl chloride
RCP	reinforced concrete pipe
TM	technical memorandum
VCP	vitrified clay pipe

Appendix 3B

ADDITIONAL ALTERNATIVE AND SYSTEM MODIFICATION INFORMATION

This appendix contains additional information related to some of the alternatives and system modifications discussed in the South Tahoe Public Utility District's (District) Recycled Water Strategic Plan, Technical Memorandum (TM)3 Alternatives Evaluation.

3B.1 Alternatives

3B.1.1 Alternative 1: Existing System

No additional alternative information is provided in this appendix.

3B.1.2 Alternative 2: Expanded Disinfected Secondary 23 Delivery in Alpine County

No additional alternative information is provided in this appendix.

3B.1.3 Alternative 3: Expanded Disinfected Tertiary Reuse in Alpine County

No additional alternative information is provided in this appendix.

3B.1.4 Alternative 4: Discharge to West Fork Carson River and Use in Nevada

No additional alternative information is provided in this appendix.

3B.1.5 Alternative 6A: Expanded Class A or B Reuse in Nevada via Discharge to Indian Creek

No additional alternative information is provided in this appendix.

3B.1.6 Alternative 6B: Expanded Class A or B Reuse in Nevada via Discharge to Mud Lake

No additional alternative information is provided in this appendix.

3B.1.7 Alternative 6C: Indirect Potable Reuse in Nevada

No additional alternative information is provided in this appendix.

3B.1.8 Alternative 6D: Expanded Reuse in Nevada via Direct Delivery

No additional alternative information is provided in this appendix.

3B.1.9 Alternative 7A: Treated Effluent Conveyance to DCLTSA with Reuse in Nevada

No additional alternative information is provided in this appendix.

3B.2 System Modifications

3B.2.1 Urban Fire Protection

No additional system modification information is provided in this appendix.

3B.2.2 Trenchless Installation Methods

3B.2.2.1 Overall Description of Trenchless Installation Methods

The following trenchless installation methods are described in this document.

- Horizontal directional drilling (HDD).
- Auger boring.
- Microtunneling.
- Open shield pipe jacking.
- Pipe ramming.

Depending on the unique conditions of each site, one or more of these methods may be an appropriate way to optimize construction. HDD is installed from surface to surface, and the remaining four methods are installed via shafts. The following sections are based on information from the North American Society of Trenchless Technology (NASTT) and go into further detail regarding each of the above trenchless tunneling methods. Typical parameters for each method are included in the following sections; however, depending on site specific-alignments and soil conditions, longer installations are possible.

3B.2.2.2 Trenchless Installation Methods

Horizontal Directional Drilling

HDD is defined as a steerable trenchless method for installing underground pipes, conduits, or cables in a shallow arc along a prescribed bore path by using a surface-launched drilling rig. Figure 3B.1 shows a rendition of HDD and Table 3B.1 lists typical parameters of HDD.

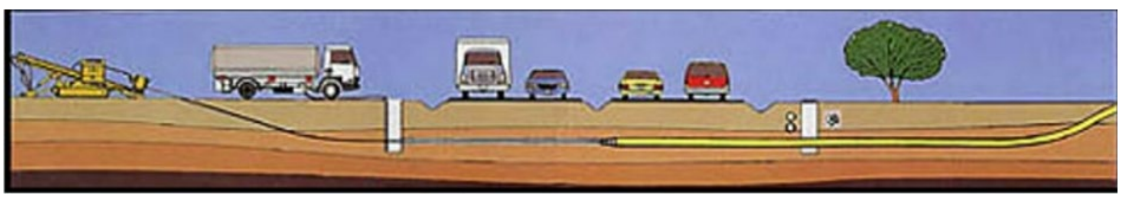

Figure 3B.1 Horizontal Directional Drilling Schematic

Table 3B.1 Horizontal Directional Drilling Parameters

Parameter	Value
Typical Diameter	2 – 48 in
Typical Length	≤ 3,000 ft
Pipe Materials	steel HDPE PVC DIP
Typical Accuracy	± 1 – 5 ft
Radial Overcut (1)	2 – 6 in

Notes:
(1) Radial Overcut is defined as the theoretical difference between the radial measurement of the gauge cut and the MTBM shield; equal to [gauge cut outside diameter (OD) – MTBM OD]/2. Actual overcut is reduced as the gauge cutter is worn and because of the differential cut.
Abbreviations: in = inch(es); ft = feet; HDPE = high-density polyethylene; PVC = polyvinyl chloride; DIP = ductile iron pipe; MTBM = microtunnel boring machine.

HDD has the following limitations which should be taken into consideration when evaluating whether this method would be appropriate in a specific application:

- Geometry influenced by steel drill pipe or product pipe stresses.
- Setback distances may be significant.
- Large required overcut results in a risk of settlement.
- On-grade installations are challenging (≥ 2 percent).
- Risk of hydrofracture.
- Accuracy is dependent on depth; greater depths result in more challenging tracking and less accuracy of pipe location.

HDD works well in the following "favorable" ground conditions:

- Cohesive sands.
- Silts.
- Low plasticity clays.
- Soft to medium rock.
- Groundwater.

However, HDD should not be utilized in the following "unfavorable" ground conditions:

- Soft or loose soils.
- Gravels.
- Cobbles and boulders.
- Mixed-face conditions:
  - Face is defined as: The location where the excavation is taking place. Uniform face conditions are when the soil matrix is uniform in the path of drilling/excavating.
  - Mixed-face is defined as: An interface within the excavated tunnel zone between two geological units that have a significant contrast in engineering properties (e.g., rock overlain by soft ground, or very soft, low-strength soil overlain or underlain by a very stiff, high-strength soil).
- Hard or fractured rock.

Auger *Boring*

Auger boring is defined as a technique for forming a bore from a drive shaft to a reception shaft, by means of a rotating cutting head. Spoil is removed back to the drive shaft by helically wound auger flights rotating in a steel casing. Figure 3B.2 shows a rendition of auger boring and Table 3B.2 lists typical parameters of auger boring.

Figure 3B.2 Auger Boring

Table 3B.2 Auger Boring Parameters

Parameter	Value
Typical Diameter	8 – 72 in
Typical Length	≤ 350 ft
Pipe Materials	steel
Typical Accuracy	1 – 2 % of length
Radial Overcut	0.50 – 1 in

Auger boring has the following limitations which should be taken into consideration when evaluating whether this method would be appropriate in a specific application:

- Relatively crude steering capability.
- Precise on-grade installations require carrier pipe on spacers.
- Settlement risk in unstable soils.
- Not appropriate for conditions with groundwater above casing.

Auger boring works well in the following "favorable" ground conditions:

- Cohesive sands and gravels.
- Firm to stiff clays.
- Cobbles and boulders less than 1/3 of the casing diameter.

However, auger boring should not be utilized in the following "unfavorable" ground conditions:

- Loose sands.
- Very soft clays.
- Hard rock.
- Mixed-face conditions.
- Groundwater.

Microtunneling

Microtunneling is defined as a remote-controlled guided pipe jacking method that provides continuous face support. The guidance system is typically a laser mounted in the jacking shaft that projects onto a target in the shield. Slurry is used to counterbalance earth and groundwater pressures and stabilize the face. The ability to provide precise face control distinguishes microtunneling from open-shield pipe jacking. Figure 3B.3 shows a rendition of microtunneling and Table 3B.3 lists typical parameters of microtunneling.

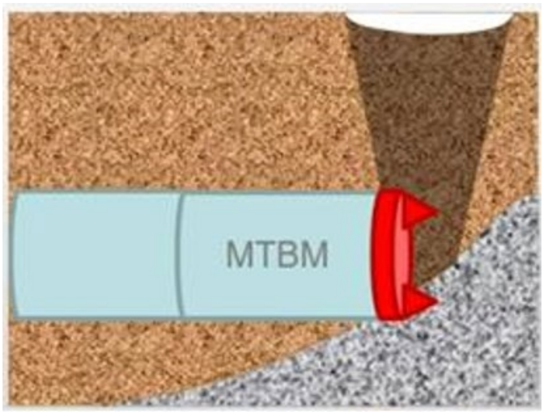

Figure 3B.3 Microtunneling

Table 3B.3 Microtunneling Parameters

Parameter	Value
Typical Diameter	30 – 96 in (42 – 48 in preferred)
Max Length	± 1,500 ft
Pipe Materials	steel RCP FRP VCP PCP
Typical Accuracy	± 1 – 2 in
Radial Overcut	0.50 – 1 in

Abbreviations: RCP = reinforced concrete pipe; FRP = fiberglass reinforced plastic; VCP = vitrified clay pipe; PCP = polychloroprene.

Microtunneling has the following limitations which should be taken into consideration when evaluating whether this method would be appropriate in a specific application:

- Can only excavate objects up to 1/4 or 1/3 of MTBM diameter.
- Does not work for small diameters (< 30 in), due to soil material variance and lack of cutting power.
- High percentage of gravel, cobbles, or boulders can obstruct MTBM.
- Requires large work area.
- Spoils with high liquid content can present disposal challenges.
- Can deviate upward if ground conditions are hard below and soft above.
- Mixed face ground conditions can cause sinkholes.

Microtunneling works well in the following “favorable” ground conditions:

- Loose to dense sands.
- Stiff to hard clays.
- Soft rock.
- High groundwater.

However, microtunneling should not be utilized in the following “unfavorable” ground conditions:

- Cobbles and boulders.
- Clean gravel.
- Hard rock.
- Mixed-face conditions.
- Very soft / very loose soils.
- High plasticity clays.

Open Shield Pipe Jacking

Open shield pipe jacking is defined as a pipe jacking method where the excavation face is open to the ground. Soil is ingested into the face and is removed via conveyor belt to muck carts. An operator sits near the face of the machine. The guidance system is typically a laser mounted in the jacking shaft that projects onto a target in the shield. The shield is typically articulated for steering control. Figure 3B.4 shows a rendition of open shield pipe jacking and Table 3B.4 lists typical parameters of open shield pipe jacking.

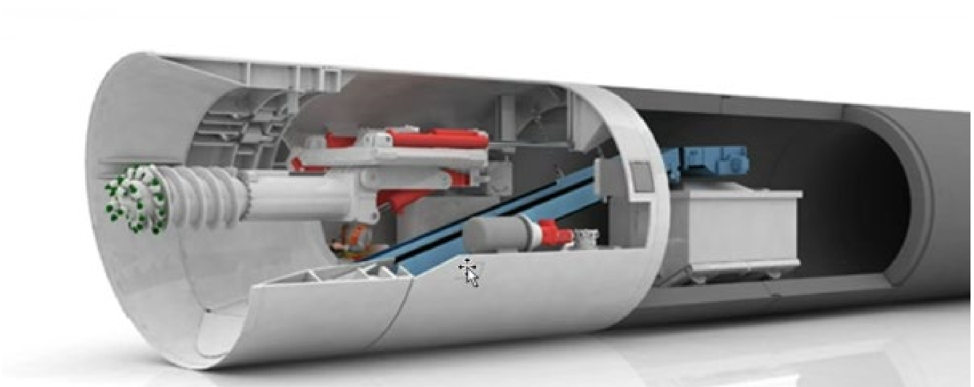

Figure 3B.4 Open Shield Pipe Jacking

Table 3B.4 Open Shield Pipe Jacking Parameters

Parameter	Value
Typical Diameter	48 – 120 in
Typical Length	< 1,000 ft
Pipe Materials	steel RCP FRP PCP
Typical Accuracy	± 2 – 3 in
Radial Overcut	0.50 – 1 in

Open shield pipe jacking has the following limitations which should be taken into consideration when evaluating whether this method would be appropriate in a specific application:

- Limited ability to control groundwater inflows.
- Limited face stabilization.
- Can result in over-excavation in soft clays and silts or loose sands, which can lead to settlement.

Open shield pipe jacking works well in the following "favorable" ground conditions:

- Stable, cohesive soils.
- Some cobbles and boulders.
- Soft rock.
- Groundwater below invert:
  - When the ground conditions are above the groundwater table, open shield pipe jacking is faster than auger boring.

However, open shield pipe jacking should not be utilized in the following "unfavorable" ground conditions:

- Loose, running sands.
- Very soft clays.
- Groundwater above invert.

Pipe Ramming

Pipe ramming is defined as a non-steerable installation method of driving an open-ended steel casing using a percussive hammer. The soil may be removed from the casing by augering, jetting, or using compressed air after completion or at intervals during the bore. Figure 3B.5 shows a rendition of pipe ramming and Table 3B.5 lists typical parameters of pipe ramming.

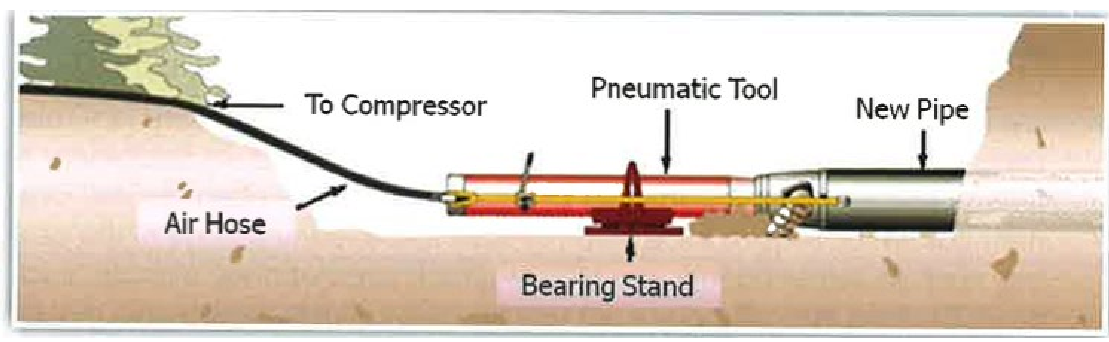

Figure 3B.5 Pipe Ramming Schematic

Table 3B.5 Pipe Ramming Parameters

Parameter	Value
Typical Diameter	8 – 120 in
Typical Length	< 250 ft(1)
Pipe Materials	steel
Typical Accuracy	± 2 – 5 ft
Radial Overcut	0.50 – 1 in

Notes:
(1) "Telescoping" allows for different casing sizes to be used for installations over 250 ft.

Pipe ramming has the following limitations which should be taken into consideration when evaluating whether this method would be appropriate in a specific application:

- Non-steerable.
- Precise, on-grade installations require carrier pipes on spacers.
- Requires long launch shaft/work area (~ 50 ft).
- Hammer produces noise, vibration, and dust.
- Friction between pipe and soil.
- No removal until after installation.

Pipe ramming works well in the following "favorable" ground conditions:

- Sands and gravels.
- Soft to stiff clays.
- Cobbles and boulders less than ½ pipe diameter.
- Low groundwater.

However, pipe ramming should not be utilized in the following "unfavorable" ground conditions:

- Loose, running sands.
- Very soft clays.
- High plasticity/hard clays.
- Rock.
- High groundwater.

3B.2.2.3 Summary of Trenchless Installation Methods

The typical parameters, favorable soil conditions, and unfavorable soil conditions for the five trenchless installation methods are summarized below in Table 3B.6.

Some additional considerations to keep in mind when evaluating which method is the most appropriate for given conditions are the following:

- When the pipe invert will be above the groundwater table, open shield pipe jacking is faster than auger boring.
- Both auger boring and pipe ramming are non-steerable.

Costs for these five trenchless installation methods vary based on the many variables involved, including depth, length of installation, soil/groundwater properties, size of pipe, etc. However, some methods do generally cost more than others; therefore, relative costs are included in Table 3B.6 on the next page.

Table 3B.6 Comparison of Trenchless Installation Methods

Method	Typical Diameter (in)	Typical Length (ft)	Pipe Materials	Typical Accuracy (ft)	Radial Overcut (in)	Favorable Ground Conditions	Unfavorable Ground Conditions	Does method work when groundwater is above pipe invert?	Relative Costs
HDD	2 – 48	≤ 3,000	steel HDPE PVC DIP	± 1 – 5	2 – 6	Cohesive sands Silts Low plasticity clays Soft to medium rock	Soft or loose soils Gravels Cobbles & boulders Mixed-face conditions Hard or fractured rock	Yes	$
Auger Boring	8 – 72	≤ 350	steel	1 – 2 % of length	0.50 – 1	Cohesive sands & gravels Firm to stiff clays Cobbles & boulders < 1/3 casing diameter	Loose sands Very soft clays Hard rock Mixed-face conditions	No	$$
Microtunneling	30 – 96 (42 – 48 preferred)	± 1,500	steel RCP FRP VCP PCP	± 1 – 2	0.50 – 1	Loose to dense sands Stiff to hard clays Soft rock	Cobbles & boulders Clean gravels Hard rock Mixed-face conditions Very soft / very loose soils High plasticity clays	Yes	$$
Open Shield Pipe Jacking	48 – 120	< 1,000	steel RCP FRP PCP	± 2 – 3	0.50 – 1	Stable, cohesive soils Some cobbles & boulders Soft rock	Loose, running sands Very soft clays	No	$$
Pipe Ramming	8 – 120	< 250(1)	steel	± 2 – 5	0.50 – 1	Sands & gravels Soft to stiff clays Cobbles & boulders < 1/2 pipe diameter	Loose, running sands Very soft clays High plasticity/hard clays Rock	Somewhat; dry conditions preferred	$$$

Notes:
(1) "Telescoping" allows for different casing sizes to be used for installations over 250 ft.

3B.2.3 Split Treatment

No additional system modification information is provided in this appendix.

3B.2.4 Export System Energy Recovery

3B.2.4.1 District Energy Recovery Analysis

See Attachment 3B1 for District C-Line Power Generation Options.

3B.2.4.2 DCLTSA Energy Recovery Analysis

See Attachment 3B2 for Alternative 7A Power Generation Conceptual Options.

3B.2.5 Constructed Wetlands

No additional system modification information is provided in this appendix.

Attachment 3B1

STPUD C-LINE POWER GENERATION CONCEPTUAL REVIEW

PROJECT MEMORANDUM

SOUTH TAHOE PUD

C-Line Power Generation Options

Project No.:	200689
Date:	6/25/24
Prepared By:	Nicolas Lozano Ordonez & Josh Viray
Reviewed By:	Darren Baune
Subject:	STPUD C-Line Power Generation Conceptual Review

Purpose

The purpose of this technical memorandum (TM) is to perform a conceptual review of implementing hydroelectric power generation on the C-Line pipeline owned by the South Tahoe Public Utility District (District).

The TM evaluates installing a single hydroelectric generator near Harvey Place Reservoir using the Pelton wheel power generation technology or using up to six (6) hydroelectric generators in series along the C-Line alignment using the Pumps-as-Turbines (PATs) power generation technology. This TM summarizes key considerations for each option and provides recommendations for additional studies if the District decide to continue investigating these options.

Background

The District's WWTP generates an annual average of 3.9 million gallons per day (mgd) of recycled water. The future annual average recycled water flows are estimated at 5.4 mgd. The District pumps the treated effluent 1,505 feet over Luther Pass and out of the Lake Tahoe Basin. From Luther Pass, the reclaimed water continues by gravity 12 miles and drops 2,175 feet in elevation along the C-Line to Harvey Place Reservoir. The 1968 C-Line pipeline record drawings indicate the pipeline is a cement-mortar lined ductile iron pipeline that is composed of the following sizes and pressure classes:

- 41,200 linear feet of 18-inch diameter of Class 150 pipe.
- Approximately 14,300 linear feet of 21-inch diameter Class 125 pipe.
- 4,800 linear feet of 21-inch diameter Class 150 pipe.
- 3,200 linear feet of 21-inch diameter Class 175 pipe.

The District has performed feasibility studies in the past to assess the idea of generating hydroelectric power along the C-Line. The last feasibility study for generating hydroelectric power along the C-Line was performed by Sunrise Engineering in June 2012. This study analyzed the concept of placing a hydroelectric generator along a new section of pipeline along Diamond Valley Ranch (DVR). This study found that an 84-kilowatt (kW) facility could be developed using a reverse-pump turbine without the need to replace sections of the C-Line with a higher pipe class.

In addition, Carollo completed a condition assessment of parts of the C-Line in conjunction with the District in July 2012. The condition assessment encompassed approximately 13,200 linear feet of the C-Line (approximately 21 percent of the overall alignment). This condition assessment found only one critical area within the studied alignment that posed an emergency threat to either public health or safety which was identified as a collapsed pipe. In general, the assessment found wall thicknesses ranging between 0.079 to 0.194 inches (~5/64 to 3/16 inch) in the areas studied.

Option A: Pelton Wheel Station at Harvey Place Reservoir

Pelton Wheel Power Generation Technology

Pelton wheels are a hydroelectric power generating technology where pressurized flow in the pipe is routed through one or more nozzles and directed at a wheel with cups on the perimeter. The impulse of the water causes a wheel to spin and turn a generator. A key advantage and disadvantage of this technology in general are:

- Pelton wheel nozzles are adjustable with an electrical control system. This means Pelton wheels can operate over a wide range of flows.
- Pelton wheels must discharge at zero pressure and, therefore, can only be located in the system where a zero-pressure discharge is possible which limits the placement of the power-generator.

The Pelton wheel station will require the following components:

- A transition structure along the pipeline to convert the flows from a gravity system to a pressurized system.
- A building or structure to house the Pelton wheel, as well as mechanical and electrical equipment.
- A bypass line to take the turbine out of service.
- Pressure relief valves and possibly surge tanks to ensure that the system is not over pressurized.
- A step-up transformer.
- Transmission lines to take the electrical energy either back to the plant or to an acceptable location.
- A telemetry monitoring system may also be useful. This system is particularly important if the turbine is located where winter access is difficult.

Option A Description

Option A includes installing a Pelton wheel at the bottom of the C-Line (Harvey Place Reservoir). This option is based on the following assumptions:

- The transition structure will be placed near the top of Luther pass and the start of the C-Line at an elevation of 7,720 feet.
- The hydroelectric generator will be placed near Harvey Reservoir at an elevation of 5,545 feet.
- Based on the of the transition structure and Harvey Reservoir, the total static head would be 2,175 feet.
- Friction and minor headlosses are approximately 5 percent of the static head for a total of 110 feet.
- The total dynamic head at the Pelton wheel would be approximately 2,065 feet (895 pounds per square inch [psi]).

Based on a net pressure of 900 psi and a design flow of 5.4 mgd, the expected system production is 1.23 megawatts (MW) with an estimated equipment package cost of $925,000 for a Custom Canyon Pelton turbine wheel.

However, for this option to be a viable option for the District, the entire length of the C-Line will need to be replaced in order to meet the high system pressure. The implications of designing and constructing a single power generation station at the bottom of the C-Line are as follows:

- A steel pipeline with varying thicknesses would be installed for the entire C-Line alignment. The lengths and thickness of the steel pipe would be as follows:
  - ~15,400 linear feet of 21-in pipe at 0.25-inch thickness.
  - ~15,300 linear feet of 21-inch pipe at 0.5-inch thickness.
  - ~32,800 linear feet of 21-inch pipe at 0.75-inch thickness or greater.
- Additional easements will likely be needed along the proposed pipeline alignment and land acquisition may be necessary for the hydroelectric power generation station.
- Surge pressure analysis of the entire line will be required.
- Special fittings and appurtenance that can meet the high-pressure demands are required.
- Bypass lines with series of pressure reducing valves will be required to break head for cases when the Pelton wheel is out of service.

The total project cost of this option as shown in Attachment A is $123M. Planning level cost estimates can range from -30% to +50%. In this case, the total project cost range is $86 million to $185 million.

If the District decides to pursue this option further, it is highly recommended to conduct a detailed feasibility analysis. This detailed analysis should at a minimum review:

- Potential pipeline alignments, environmental impacts, land acquisition, and right-of-way easements.
- Evaluation of potential power generation turbine technologies and site design.
- Detailed surge analysis throughout the pipeline.
- Bypass options for when system is out of power.
- Operation and maintenance required to maintain a power generation station.
- Options to distribute the hydroelectric power generated. Options for the District could include:
  - Selling power back to a utility owner.
  - Routing electricity back to the Luther Pass Pump Station (costs to furnish and install a power conduit were not included as part of this cost estimate).
- Cash flow analysis with timeline for a return on investment.

Option B: PATs along Pipeline Alignment

Pumps-as-Turbines (PATs) Power Generation Technology

PATs are a hydroelectric power generating technology where a centrifugal pump is used with curved vanes running backwards. As the pressurized water enters the center of impeller and flows radially, the water flows against the curved impeller vanes causing the impeller to spin and turn the generator. Some advantages and disadvantages of this technology in general are:

- PATs do not require a zero-pressure discharge and, therefore, the location on the pipeline is not as critical as the location of Pelton wheels.
- PATs are designed for a specific flow and pressure and do not operate outside of that range. If the flows are less than the design flow, no energy would be recovered by the system. If flows exceed that of the design, the additional flow would be bypassed, and no energy would be recovered from that additional flow.

The PAT stations will require the same components as the Pelton wheel station. These components include:

- A single transition structure along the pipeline to convert the flows from a gravity system to a pressurized system.
- A building or structure to house at each station to house the PAT, and mechanical and electrical equipment.
- A bypass line at each station to take the turbine out of service.
- Pressure relief valves and possibly surge tanks at each station to ensure that the system is not over pressurized.
- A step-up transformer at each station.
- Transmission lines to take the electrical energy either back to the plant or to an acceptable location.
- A telemetry monitoring system may also be useful. This system is particularly important if the turbine is located where winter access is difficult.

Option B Description

Option B includes installing six (6) power generation stations along the pipe alignment. Each power generation station will be equipped with PATs. This option is based on the following assumptions:

- The six power generation stations would be spread out so that the static pressure in the pipeline does not exceed 130 psi. This gives the District the option of re-using the existing pipe to generate power due to lesser pressure experienced in the system.
- A transition structure will be placed at an elevation of 7,045 feet which would transition the C-Line from a gravity line to a pressurized line.
- The hydroelectric generators will be placed every 300 vertical feet with the first generator being located at an elevation of 7,045 feet and the last generator being located at Harvey Place Reservoir at an elevation of 5,545 feet.
- Due to the age of the pipe, it has been assumed a total of 20 percent of the pipeline (8,240 linear feet) would need to be replaced due to age and condition.

Based on a net pressure of 130 psi and a design flow of 5.4 mgd, the expected system production for each station would be 152kW for a total recovery of 0.91MW. The estimated equipment package cost of each station is $475,000 for a Custom Canyon inline Francis turbine.

The key considerations of designing and constructing the six power generators along the alignment are as follows:

- An updated and detailed condition assessment of the entire pipeline alignment will be required to decide if this option is feasible. The last condition assessment done by Carollo in 2012 only looked at approximately 20 percent of the pipeline.

  - For this cost estimate, it was assumed 20 percent of the total pipeline alignment would need to be replaced due to condition and age. This number may increase or decrease as a result of a condition assessment.
- A transient surge pressure analysis of the pipeline and system is required. Each station would likely have pressure reducing valves that reduce the pressure in the pipeline when the turbines are out of service.
- Land acquisition will be needed for the six different power generation sites. Additional easements could be necessary to replace parts of the pipeline as well.
- Operation and maintenance strategies will be critical as the six sites would be located along a mountain pass road. Snow removal and wintertime operations will be necessary.

The total project cost of this option as shown in Attachment B is $52 M. The total project cost range is $36 million to $78 million (based on planning level cost accuracy range of -30% to +50%).

If the District decides to pursue this option further, it is highly recommended to conduct a detailed feasibility analysis. This detailed analysis should, at a minimum, review the following:

- Condition assessment for the entire pipeline alignment.
- Potential generation sites, the environmental impacts, and any land acquisition or right-of-way easements necessary.
- Detailed transient pressure surge analysis of the pipeline.
- Bypass options for when system is out of power.
- Study of power generation turbine technologies.
- Operation and maintenance strategies to maintain a power generation station along a mountain pass road.
- Options for the hydroelectric power generated. Options for the District could include:
  - Selling power back to a utility owner.
  - Routing electricity back to the Luther Pass Pump Station (costs to furnish and install a power transmission line were not included as part of this cost estimate).
- Cash flow analysis with timeline for a return on investment.

Summary

In summary, this memorandum explored the feasibility of using either a single hydroelectric generator at the bottom of the C-Line or using up to six (6) hydroelectric generators in series along the C-Line alignment using different technologies.

Option A is estimated to have a total power recovery of 1.23 MW and a total project cost of $123M (with an accuracy range from $86 million to $185 million). This cost includes:

- Installation of a single Pelton wheel turbine at Harvey Place Reservoir.
- Replacement of the entire C-Line pipeline (41,200 linear feet).
- Additional allowances and contingencies for the project.

Option B is estimated to have a total power recovery of 0.91MW and a total project cost of $52 M (with an accuracy range from $36 million to $78 million). This cost includes:

- Installation of six (6) PAT stations along the C-Line alignment .
- Replacement of approximately 20 percent of the C-Line pipeline.
- Additional allowances and contingencies for the project.

ATTACHMENT 3B1A

OPTION A – PELTON WHEEL STATION CONCEPTUAL COST ESTIMATE

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TASK : 1
JOB # : 200689
LOCATION : STPUD
PROCESS: Pelton Turbine
CAPACITY: 1.23 MW one site 5.4 MGD at 900 psig

LOCATION FACTOR : 1
20 CITY AVERAGE ENR DECEMBER 2018:
ESTIMATE PREPARATION DATE : 6/25/2024
PREPARED BY : NLO
REVIEWED BY :

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	SUBTOTAL	TOTAL
1	**Power Generator System**					
	1.23 MW Pelton turbine Power Generation CanyonHydro	1	EA	$925,000	$925,000	
	Misc. Mechanical Equipment	1	LS	$100,000	$100,000	
	Misc. pumps, valves, piping	1	LS	$160,000	$160,000	
	Ancillery Facilities (building, site development)	1	LS	$2,000,000	$2,000,000	
	Total					$3,185,000
	SUBTOTAL					**$3,185,000**
2	**C-Line Pipeline**					
	21-inch Steel Pipeline - 0.25-inch Thickness	15400	LF	$500	$7,700,000	
	21-inch Steel Pipeline - 0.5-in thickness	15300	LF	$600	$9,180,000	
	21-inch Steel Pipeline - 0.75-in thickness	32800	LF	$850	$27,880,000	
	Misc. Mechanical Equipment (transition, valves, fitings)	1	LS	$2,000,000	$2,000,000	
	Total					$39,060,000
	SUBTOTAL					**$39,060,000**
3	**Allowances**					
	Power Generation Site Allowance (Mechanical, site, piping, EIC)	35	%		$1,115,000	
	Pipeline Allowance (permitting, traffic control, easements)	35	%		$13,670,000	
	Total					$14,785,000
	SUBTOTAL					**$57,030,000**
	Estimating Contingency	30	%			$17,109,000
	SUBTOTAL					**$74,139,000**
	Sales Tax on 50% of Direct Costs	7	%			$1,996,000
	SUBTOTAL					**$76,135,000**
	General Conditions, Contractor Overhead, & Profit	25	%			$18,535,000
	CONSTRUCTION COST SUBTOTAL					**$94,670,000**
	Engineering, Const. Mgmt., Eng. Support During Const.	30	%			$28,401,000
	PROJECT COST					**$123,071,000**

ATTACHMENT 3B1B

OPTION B – PATS ALONG ALIGNMENT COST ESTIMATE

carollo
Engineers...Working Wonders With Water®

TASK :	1	LOCATION FACTOR :	1
JOB # :	200689	20 CITY AVERAGE ENR DECEMBER 2018:	
LOCATION :	STPUD	ESTIMATE PREPARATION DATE :	6/24/2024
PROCESS:	Custom Francis Turbine	PREPARED BY :	NLO
CAPACITY:	152 kW multiple sites (up to 6) 5.4 MGD at 130 psig to total 0.91 MW	REVIEWED BY :	

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	SUBTOTAL	TOTAL
1	Generator System					
	205 kW Custom Francis turbine generator CanyonHydro	6	EA	$475,000	$2,850,000	
	Misc. Mechanical Equipment	6	LS	$80,000	$480,000	
	Misc. pumps, valves, piping	6	LS	$80,000	$480,000	
	Ancillery Facilities (building, site development)	6	EA	$2,000,000	$12,000,000	
	Total					$15,810,000
	SUBTOTAL					**$15,810,000**
2	C-Line Pipeline					
	21-inch Ductile Iron Pipeline	8240	LF	$850	$7,004,000	
	Misc. Mechanical Equipment (transition, valves, fitings)	1	LS	$350,200	$350,200	
	Total					$7,354,000
	SUBTOTAL					**$7,354,000**
3	Allowances					
	Power Generation Sites Allowance	35	%		$5,534,000	
	Pipeline Allowance	35	%		$2,574,000	
	Total					$8,108,000
	SUBTOTAL					**$23,918,000**
	Estimating Contingency	30	%			$7,175,000
	SUBTOTAL					**$31,093,000**
	Sales Tax on 50% of Direct Costs	7	%			$837,000
	SUBTOTAL					**$31,930,000**
	General Conditions, Contractor Overhead, & Profit	25	%			$7,983,000
	CONSTRUCTION COST SUBTOTAL					**$39,913,000**
	Engineering, Const. Mgmt., Eng. Support During Const.	30	%			$11,974,000
	PROJECT COST					**$51,887,000**

Attachment 3B2

ALTERNATIVE 7A POWER GENERATION CONCEPTUAL OPTIONS

SOUTH TAHOE PUD

Alternative 7A Power Generation Conceptual Options

Project No.: 200689

Date: 8/19/24

Prepared By: Nicolas Lozano Ordonez and Josh Viray

Reviewed By: Darren Baune and Elisa Garvey

Subject: Alternative 7A Power Generation Conceptual Review

Purpose

The purpose of this technical memorandum (TM) is to perform a conceptual review of implementing hydroelectric power generation on a proposed export pipeline co-owned by the South Tahoe Public Utility District (District) and the Douglas County Lake Tahoe Sewer Authority (DCLTSA). The proposed export pipeline is referenced as Alternative 7A – Treated Effluent Conveyances to DCLTSA with Reuse in Nevada (Alternative 7A) in Carollo's Technical Memorandum 3 – Alternatives Evaluation (TM3) for the District's Recycled Water Strategic Plan.

This TM evaluates installing a single hydroelectric generator near the crossing of State Route 206 using the Pelton wheel power generation technology or using up to four (4) hydroelectric generators in series along the proposed effluent export pipeline using the Pumps-as-Turbines (PATs) power generation technology. This TM summarizes key considerations for each alternative and provides recommended next steps.

Background

The District's WWTP generates an annual average of 3.9 million gallons per day (mgd) of recycled water. The future annual average recycled water flows are estimated at 5.4 mgd.

One of the alternatives identified in TM3 is Alternative 7A which would pump treated effluent from the District's WWTP over Kingsbury Pass and tie-in to DCLTSA's existing effluent export pipeline. DCLTSA's existing export pipeline conveys between 1.6 and 1.9 mgd (depending on the season) of recycled water from DCLTSA's WWTP over Kingsbury Grade and into Carson Valley. The recycled water from DCLTSA is stored in the Buckeye Creek Effluent Storage Facility and used for irrigation. The DCLTSA effluent pipeline has segments of 10-inch, 12-inch, and 14-inch diameter ductile iron pipe.

The analysis of Alternative 7A in TM3 determined that the existing DCLTSA effluent pipeline has insufficient capacity to convey the District's future effluent flow. As such, this effluent pipeline would need to be replaced with approximately 3.6 miles (19,030 linear feet) of new 20-inch pipe for this to be a practical alternative.

In May 2009, DCLTSA commissioned an Energy Recovery Report done by R.O. Anderson which evaluated the possibility of adding power generators along the existing effluent pipeline at average flows of 1.62 mgd. This study investigated having a single power generator at the bottom of the existing effluent pipeline as well as four generators along the alignment. Among the findings of this study, it was determined that a single generator at Buckeye Creek Reservoir could recover a total of 290kW while four power generators in series along the existing pipeline would recover at total of about 242 kW.

Pelton Wheel Station along State Route 206

Pelton Wheel Power Generation Technology

Pelton wheels are a hydroelectric power generating technology where pressurized flow in the pipe is routed through one or more nozzles and directed at a wheel with cups on the perimeter. The impulse of the water causes a wheel to spin and turn a generator. A key advantage and disadvantage of this technology in general are:

- Pelton wheel nozzles are adjustable with an electrical control system. This means Pelton wheels can operate over a wide range of flows.
- Pelton wheels must discharge at zero pressure and, therefore, can only be located in the system where a zero-pressure discharge is possible which limits the placement of the power-generator.

The Pelton wheel station will require the following components:

- A transition structure along the pipeline to convert the flows from a gravity system to a pressurized system.
- A building or structure to house the Pelton wheel, as well as mechanical and electrical equipment.
- A bypass line to take the turbine out of service.
- Pressure relief valves and possibly surge tanks to ensure that the system is not over pressurized.
- A step-up transformer.
- Transmission lines to take the electrical energy either back to the plant or to an acceptable location.
- A telemetry monitoring system may also be useful. This system is particularly important if the turbine is located where winter access is difficult.

Option A Description

Option A includes installing a Pelton wheel at the bottom of the new effluent export pipeline near the State Route 206 crossing. This option is based on the following assumptions:

- The transition structure will be placed near the top of Kingsbury Grade Pass where the District's proposed pressurized effluent line connects with the DCLTSA's effluent pipeline. The elevation of this transition structure has been assumed to be 7,380 ft.
- The hydroelectric generator will be placed near the State Route 206 crossing at an elevation of 5,250 feet.
- Based on the of the transition structure and power generator elevations, the total static head would be 2,130 feet.
- Friction and minor headlosses are approximately 5 percent of the static head for a total of 110 feet.
- The total dynamic head at the Pelton wheel would be approximately 2,020 feet (875 pounds per square inch [psi]).

- The existing DCLTSA effluent pipe will be abandoned in place. A new alignment would be used for the proposed effluent pipe. It has been assumed the new alignment would parallel the existing effluent pipe.

Based on a net pressure of 900 psi and a design flow of 7 mgd, the expected system production is 1.4 megawatts (MW) with an estimated equipment package cost of $880,000 for a Custom Canyon Pelton turbine wheel.

As referenced in TM3 and this TM, the existing DCLTSA's effluent gravity line sizes vary between 10-,12-, and 14-inch diameter. Due to the existing size, and unknown condition, this option proposes replacing approximately 3.6 miles of the existing effluent pipeline with new 20-inch pipe. The implications of designing and constructing a single power generation station at the State Route 206 crossing are as follows:

- A steel pipeline with varying thicknesses would be installed for the entire DCLTSA effluent pipeline alignment. The lengths and thickness of the steel pipe would be as follows:
  - ~11,180 linear feet of 20-in pipe at 0.25-inch thickness.
  - ~4,700 linear feet of 20-inch pipe at 0.5-inch thickness.
  - ~3,150 linear feet of 20-inch pipe at 0.75-inch thickness or greater.
- Additional easements will likely be needed along the proposed pipeline alignment and land acquisition may be necessary for the hydroelectric power generation station.
- Surge pressure analysis of the entire line will be required.
- Special fittings and appurtenance that can meet the high-pressure demands are required.
- Bypass lines with series of pressure reducing valves will be required to break head for cases when the Pelton wheel is out of service.

The total project cost of this option as shown in Attachment A is $45M. Planning level cost estimates can range from -30 percent to +50 percent. In this case, the total project cost range is $32 million to $68 million.

If the District decides to pursue this option further, it is highly recommended to conduct a detailed feasibility analysis. This detailed analysis should at a minimum review:

- Potential pipeline alignments, environmental impacts, land acquisition, and right-of-way easements.
- Evaluation of potential power generation turbine technologies and site design.
- Detailed surge analysis throughout the pipeline.
- Bypass options for when system is out of power.
- Operation and maintenance required to maintain a power generation station.
- Options to distribute the hydroelectric power generated. Options for the District and DCLTSA could include:
  - Selling power back to a utility owner (NV Energy).
  - Routing electricity back to DCLTSA's WWTP
- Cash flow analysis with timeline for a return on investment.

Option B: PATs along Pipeline Alignment

Pumps-as-Turbines (PATs) Power Generation Technology

PATs are a hydroelectric power generating technology where a centrifugal pump is used with curved vanes running backwards. As the pressurized water enters the center of impeller and flows radially, the water flows against the curved impeller vanes causing the impeller to spin and turn the generator. Some advantages and disadvantages of this technology in general are:

- PATs do not require a zero-pressure discharge and, therefore, the location on the pipeline is not as critical as the location of Pelton wheels.
- PATs are designed for a specific flow and pressure and do not operate outside of that range. If the flows are less than the design flow, no energy would be recovered by the system. If flows exceed that of the design, the additional flow would be bypassed, and no energy would be recovered from that additional flow.

The PAT stations will require the same components as the Pelton wheel station. These components include:

- A single transition structure along the pipeline to convert the flows from a gravity system to a pressurized system.
- A building or structure to house at each station to house the PAT, and mechanical and electrical equipment.
- A bypass line at each station to take the turbine out of service.
- Pressure relief valves and possibly surge tanks at each station to ensure that the system is not over pressurized.
- A step-up transformer at each station.
- Transmission lines to take the electrical energy either back to the plant or to an acceptable location.
- A telemetry monitoring system may also be useful. This system is particularly important if the turbine is located where winter access is difficult.

Option B Description

Option B includes installing four (4) power generation stations along the pipe alignment. Each power generation station will be equipped with PATs. This option is based on the following assumptions:

- The four power generation stations would be spread out so that the static pressure in the pipeline does not exceed 250 psi. This gives the District the option of procuring and installing standard 20- inch Class 250 ductile iron pipe.
- The transition structure will be placed near the top of Kingsbury Grade Pass where the District's proposed pressurized effluent line connects with the DCLTSA's effluent pipeline. The elevation of this transition structure has been assumed to be 7,380 ft.
- The hydroelectric generators will be placed every 530 vertical feet with the first generator being located at an elevation of 6,850 feet and the last generator being located at the State Route 206 crossing at an elevation of 5,250.
- The existing DCLTSA effluent pipe will be abandoned in place. A new alignment would be used for the proposed effluent pipe. It has been assumed the new alignment would parallel the existing effluent pipe.

Based on a net pressure of 250 psi a design flow of 7 mgd, the expected system production for each station would be 260kW for a total recovery of 1.04MW. The estimated equipment package cost of each station is $520,000 for a Custom Canyon inline Francis turbine.

The key considerations of designing and constructing the four power generators along the alignment are as follows:

- An 20-inch ductile iron pipe (Class 250) would be installed along the entire alignment for a total of 19,030 linear feet.
- A transient surge pressure analysis of the pipeline and system is required. Each station would likely have pressure reducing valves that reduce the pressure in the pipeline when the turbines are out of service.
- The existing DCLTSA effluent pipeline follows an alignment along a dirt service road. It was assumed that each power generation station would be evenly located every 530 vertical feet. A detailed analysis of the siting for each power generation station will be necessary to look at the feasibility of constructing along a narrow and vertical service road. This could alter the location of the power generation stations and subsequently the pressure rating of the pipeline.
- Land acquisition will be needed for the four different power generation sites. Additional easements will be necessary to install the new pipeline as well.
- Operation and maintenance strategies will be critical as the four sites would be located along a mountainous service road. Snow removal and wintertime operations will be necessary.

The total project cost of this option as shown in Attachment B is $40 M. The total project cost range is $28 million to $60 million (based on planning level cost accuracy range of -30 percent to +50 percent).

If the District decides to pursue this option further, it is highly recommended to conduct a detailed feasibility analysis. This detailed analysis should, at a minimum, review the following:

- Potential pipeline alignments, environmental impacts, land acquisition, and right-of-way easements.
- Review of potential power generation siting options and any subsequent impacts on the assumed pressure rating of the pipeline. environmental impacts, and land acquisition or right-of-way easements necessary.
- Detailed transient pressure surge analysis of the pipeline.
- Bypass options for when system is out of power.
- Study of power generation turbine technologies.
- Operation and maintenance strategies to maintain a power generation station along an unpaved mountain service road.
- Options for the hydroelectric power generated. Options for the District could include:
  - Selling power back to a utility owner (NV Energy).
  - Routing electricity back to DCLTSA's WWTP (costs to furnish and install a power transmission line were not included as part of this cost estimate).
- Cash flow analysis with timeline for a return on investment.

Summary

This memorandum evaluates the feasibility of installing energy recovery systems along the proposed effluent pipeline identified in Alternative 7A in TM3. The energy recovery systems include a single hydroelectric generator at the State Route 206 crossing or using up to four (4) hydroelectric generators in series along the effluent pipeline alignment.

Option A is estimated to provide a total energy recovery of 1.4 MW and a total project cost of $45M (with an accuracy range from $32 million to $68 million). This cost includes:

- Installation of a single Pelton wheel turbine at the State Route 206 crossing.
- Replacement of the entire DCLTSA effluent pipeline (19,030 linear feet) with a new 20-inch steel pipeline of varying thicknesses.
- Additional allowances and contingencies for the project.

Option B is estimated to provide a total energy recovery of 1.04MW and a total project cost of $40M (with an accuracy range from $28 million to $60 million). This cost includes:

- Installation of four (4) PAT stations along the effluent pipe alignment.
- Replacement of the entire DCLTSA effluent pipeline (19,030 linear feet) with a new 20-inch Class 250 ductile iron pipe.
- Additional allowances and contingencies for the project.

ATTACHMENT 3B2A

OPTION A – PELTON WHEEL STATION COST ESTIMATE

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TASK :	1	**LOCATION FACTOR :**	1
JOB # :	200689	**20 CITY AVERAGE ENR DECEMBER 2018:**	
LOCATION :	STPUD & DCLTSA	**ESTIMATE PREPARATION DATE :**	8/16/2024
PROCESS:	Pelton Turbine	**PREPARED BY :**	NLO
CAPACITY:	1.4 MW at 7 MGD and 250 psig	**REVIEWED BY :**	

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	SUBTOTAL	TOTAL
1	**Power Generator System**					
	1.4 MW Pelton turbine Power Generation CanyonHydro	1	EA	$880,000	$880,000	
	Misc. Mechanical Equipment	1	LS	$220,000	$220,000	
	Misc. pumps, valves, piping	1	LS	$200,000	$200,000	
	Ancillery Facilities (building, site development)	1	LS	$2,000,000	$2,000,000	
	Total					$3,300,000
	SUBTOTAL					**$3,300,000**
2	**DCTLSA Steel Pipeline**					
	20-inch Steel Pipeline - 0.25-inch Thickness	11180	LF	$500	$5,590,000	
	20-inch Steel Pipeline - 0.5-in thickness	4700	LF	$600	$2,820,000	
	20-inch Steel Pipeline - 0.75-in thickness	3150	LF	$850	$2,677,500	
	Misc. Mechanical Equipment (transition, valves, fitings)	1	LS	$1,000,000	$1,000,000	
	Total					$12,088,000
	SUBTOTAL					**$12,088,000**
3	**Allowances**					
	Power Generation Site Allowance (Mechanical, site, piping, EIC)	35	%		$1,155,000	
	Pipeline Allowance (permitting, traffic control, easements)	35	%		$4,230,000	
	Total					$5,385,000
	SUBTOTAL					**$20,773,000**
	Estimating Contingency	30	%			$6,232,000
	SUBTOTAL					**$27,005,000**
	Sales Tax on 50% of Direct Costs	7	%			$727,000
	SUBTOTAL					**$27,732,000**
	General Conditions, Contractor Overhead, & Profit	25	%			$6,751,000
	CONSTRUCTION COST SUBTOTAL					**$34,483,000**
	Engineering, Const. Mgmt., Eng. Support During Const.	30	%			$10,345,000
	PROJECT COST					**$44,828,000**

ATTACHMENT 3B2B

OPTION B – PATS ALONG ALIGNMENT COST ESTIMATE

TASK : 1
JOB # : 200689
LOCATION : STPUD & DCTLSA
PROCESS: Custom Francis Turbine
CAPACITY: 260kW multiple sites (up to 4) 8 MGD at 250 psig to total 1.04 MW

LOCATION FACTOR : 1
20 CITY AVERAGE ENR DECEMBER 2018:
ESTIMATE PREPARATION DATE : 8/16/2024
PREPARED BY : NLO
REVIEWED BY :

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	SUBTOTAL	TOTAL
1	**Generator System**					
	260 kW Custom Francis turbine generator CanyonHydro	4	EA	$520,000	$2,080,000	
	Misc. Mechanical Equipment	4	LS	$80,000	$320,000	
	Misc. pumps, valves, piping	4	LS	$80,000	$320,000	
	Ancillery Facilities (building, site development)	4	EA	$2,000,000	$8,000,000	
	Total					$10,720,000
	SUBTOTAL					**$10,720,000**
2	**DCLTSA Pipeline**					
	20-inch Ductile Iron Pipeline	19030	LF	$550	$10,466,500	
	Misc. Mechanical Equipment (transition, valves, fitings)	1	LS	$750,000	$750,000	
	Total					$11,217,000
	SUBTOTAL					**$11,217,000**
3	**Allowances**					
	Power Generation Sites Allowance	35	%		$3,752,000	
	Pipeline Allowance	35	%		$3,926,000	
	Total					$7,678,000
	SUBTOTAL					**$18,398,000**
	Estimating Contingency	30	%			$5,519,000
	SUBTOTAL					**$23,917,000**
	Sales Tax on 50% of Direct Costs	7	%			$644,000
	SUBTOTAL					**$24,561,000**
	General Conditions, Contractor Overhead, & Profit	25	%			$6,140,000
	CONSTRUCTION COST SUBTOTAL					**$30,701,000**
	Engineering, Const. Mgmt., Eng. Support During Const.	30	%			$9,211,000
	PROJECT COST					**$39,912,000**

Appendix 3C

MULTI-CRITERIA DECISION ANALYSIS

South Tahoe Public Utility District
Recycled Water Strategic Plan

Appendix 3C
MULTI-CRITERIA DECISION ANALYSIS

FINAL DRAFT | August 2024

South Tahoe Public Utility District
Recycled Water Strategic Plan

Appendix 3C
MULTI-CRITERIA DECISION ANALYSIS

FINAL DRAFT | August 2024

Contents

Abbreviations

$M	million dollars
AFY	acre-ft per year
CO_2e	carbon dioxide equivalent
DCLTSA	Douglas County Lake Tahoe Sewer Authority
DVR	Diamond Valley Ranch
gal	gallon
GHG	greenhouse gas
GRGID	Gardnerville Ranchos General Improvement District
kg	kilogram
mgd	million gallons per day
NV	Nevada
O&M	operations and maintenance
RW	recycled water
UV	ultraviolet
WWTP	wastewater treatment plant
yr	year

Appendix 3C

MULTI-CRITERIA DECISION ANALYSIS

This appendix contains information about the multi-criteria decision analysis method utilized as part of the Recycled Water Strategic Plan.

3C.1 Scoring Metrics

Each of the sub-criteria can be scored from 0 to 10, with 0 being the lowest score and 10 being the highest score. A detailed explanation for the scoring range for each of the sub-criteria is provided below.

Where applicable, additional information related to how these sub-criteria were scored during the July 15, 2024 workshop is noted.

The **Economics / Cost** Criterion is composed of three sub-criteria: Capital, Operations and Maintenance (O&M), and District Revenue Potential.

3C.1.1 Capital

The description of 0 End of Range is the "highest million dollars ($M)". The description of 10 End of Range is "lowest $M". This sub-criterion is quantitative.

- Capital costs associated with the alternatives in TM3 were utilized to score these alternatives, as shown in the "Cheat Sheet" page at the end of this appendix.

3C.1.2 O&M

The description of 0 End of Range is the "highest $M/year". The description of 10 End of Range is "lowest $M/year". This sub-criterion is quantitative.

- O&M costs associated with the alternatives in TM3 were utilized to score these alternatives, as shown in the "Cheat Sheet" page at the end of this appendix.

3C.1.3 District Revenue Potential

The description of 0 End of Range is the "least District potential revenue through sale of recycled water." The description of 10 End of Range is "most District potential revenue through sale of recycled water." Note that the sale of water rights is not an opportunity for the District, as no new water rights are essentially created with these alternatives. Therefore, the revenue is limited to the sale of recycled water for use. This sub-criterion is qualitative.

- Ranges of revenue potential for the alternatives in TM3 include:
  - Very low potential (delivery of secondary 23 effluent in Alpine County).
  - Low potential (delivery of recycled water to higher levels of reuse).
  - Moderate potential (delivery of recycled water to users in Nevada [NV]).
  - High potential (delivery of secondary effluent for supply to potable reuse facility).

- Notes for context:
  - Douglas County Lake Tahoe Sewer Authority (DCLTSA) receives $0.01 to $0.02 per 1,000 gallons (gal). At this rate, the annual revenue for 5.4 million gallons per day (mgd) would be $39,000.
  - Truckee Meadows Water Authority (TMWA) charges $1.77 per 1,000 gal for large volume resale service. At this rate, the annual revenue for 5.4 mgd would be $4.1 million.

The **Technical** Criterion is composed of two sub-criteria: Treatment Level and Infrastructure.

3C.1.4 Treatment Level

The description of 0 End of Range is the "highest treatment complexity and degree of implementation in the industry". The description of 10 End of Range is "lowest treatment complexity and degree of implementation in the industry". Treatment complexity refers to the level of instrumentation, operator level, and monitoring/attention needed to maintain performance. This sub-criterion is qualitative.

- The range of treatment complexity (low to high) includes:
  - Existing - Secondary 23.
  - Disinfected tertiary.
  - Nutrient removal.
  - Advanced nutrient removal with ultraviolet (UV) disinfection.
  - Indirect Potable Reuse (IPR).

3C.1.5 Infrastructure

The description of 0 End of Range is the "highest complexity of conveyance infrastructure". The description of 10 End of Range is "lowest complexity of conveyance infrastructure". The existing system would be considered to have the lowest complexity of conveyance infrastructure, since the associated infrastructure is all existing and no new infrastructure is proposed. This sub-criterion is qualitative.

- The range of Infrastructure complexity (low to high) includes:
  - Additional water in existing ditches.
  - Recycled water distribution system to end users.
  - Conveyance from Diamond Valley Ranch (DVR) Loop to Indian Creek.
  - Conveyance to West Fork Carson River.
  - Conveyance to Mud Lake.
  - Conveyance to Gardnerville Ranchos General Improvement District (GRGID).
  - Conveyance to DCLTSA.

The **Capacity & Demands** Criterion is composed of two sub-criteria: Total Capacity and Demand Interest.

3C.1.6 Total Capacity

The description of 0 End of Range is the "least amount of new end use capacity for recycled water (RW)". The description of 10 End of Range is "most amount of new end use capacity for RW". This sub-criterion is quantitative.

- The range is from 0 to the projected flow of 5.4 mgd (6,050 acre-feet per year [AFY]). While some alternatives would rely on some of the existing system recycled water capacity, the scoring should be based on the RW capacity provided specifically by the alternative.
- The capacity of Alternatives 4, 6A, and 6B is highly dependent on regulatory approvals. One approach would be to assume 5.4 mgd (6,050 AFY) capacity but put the demand interest "0" and consider ranking these alternatives on the lower end of permitting feasibility.

3C.1.7 Demand Interest

The description of 0 End of Range is the "least amount of demand interest". The description of 10 End of Range is "most amount of demand interest". This sub-criterion is qualitative.

- The range (low to high) includes:
  - Conceptual (IPR or downstream use after surface water discharge).
  - Some details on potential users and known drivers or interest in RW.
  - Some site-specific users and known drivers or interest in RW.

The **Regulatory & Permitting** Criterion is composed of two sub-criteria: Permitting Feasibility and Permitting Timeline.

3C.1.8 Permitting Feasibility

The description of 0 End of Range is the "lowest amount of feasibility". The description of 10 End of Range is "highest amount of feasibility". This sub-criterion is qualitative.

3C.1.9 Permitting Timeline

The description of 0 End of Range is the "longest / most uncertain permitting timeline". The description of 10 End of Range is "shortest / most certain permitting timeline". This sub-criterion is quantitative.

The **Environmental & Sustainability** Criterion is composed of two sub-criteria: Value of RW Beneficial Use (hydrologic system) and Energy Usage and Greenhouse Gas (GHG) Emissions.

3C.1.10 Value of RW Beneficial Use (hydrologic system)

The description of 0 End of Range is the "lowest value". The description of 10 End of Range is "highest value". Recycled water beneficial use should be considered in the context of the hydrologic system conditions. This sub-criterion is qualitative.

3C.1.11 Energy Usage and GHG Emissions

The description of 0 End of Range is the "highest energy usage / GHG emissions". The description of 10 End of Range is "lowest energy usage / GHG emissions". GHG emissions are in kilograms (kg) or CO_2 equivalents per year (CO_2e/yr).

Significant energy demands would be associated with additional pumping and treatment processes including aeration, ozone generation, and UV disinfection. GHG emissions would be associated with energy demands and methanol (required for nutrient removal treatment processes). This sub-criterion is quantitative.

The **Local Agency & Public Perception** Criterion is composed of two sub-criteria: Interagency Participation and Public Acceptance of Recycled Water End Use (at the point of use).

3C.1.12 Interagency Participation

The description of 0 End of Range is the "highest interagency participation". The description of 10 End of Range is "lowest interagency participation". Interagency participation is related to the need for agreements and coordination with other agencies (this does not include permitting, as permitting is covered in a separate sub-criterion). This sub-criterion is qualitative.

3C.1.13 Public Acceptance of Recycled Water End Use (at the point of use)

The description of 0 End of Range is the "lowest public acceptance of recycled water end use". The description of 10 End of Range is "highest public acceptance of recycled water end use". Public acceptance is based on the concept that some recycled water end uses are going to be more divisive among the community of end users (or the community in the region of end use). It is assumed that public acceptance will be more challenging if the proposed end use is more controversial. This sub-criterion is qualitative.

3C.2 July 2024 Specific Scoring Notes

On July 15, 2024, a workshop was held with District staff to utilize the multi-criteria decision analysis tool. During this workshop, the alternatives in TM3 were scored as described above. Detailed spreadsheets showing these calculations are in the subsequent pages.

Criteria	Sub-Criteria	Weights for Criteria	Weights for Sub Criteria	Total Weight for Sub Criteria (check)	1	2	3(Split)	3	4	6A	6B	6C	6D	7A	1	2	3(Split)	3	4	6A	6B	6C	6D	7A
					Scores	Scores	Scores	Scores	Scores	Scores	Scores	Scores	Scores	Scores	Weighted Scores	Weighted Scores	Weighted Scores	Weighted Scores	Weighted Scores	Weighted Scores	Weighted Scores	Weighted Scores	Weighted Scores	Weighted Scores
Economics / Cost		25%		100%											**2.05**	**1.95**	**1.95**	**1.75**	**0.70**	**0.90**	**0.90**	**0.50**	**1.45**	**1.00**
	Capital		40%		10	9	9	7	2	2	1	0	6	2										
	O&M		40%		10	10	9	9	5	5	5	0	8	6										
	District Revenue Potential		20%		1	1	3	3	0	4	6	10	1	4										
Technical		25%		100%											**2.50**	**2.35**	**2.00**	**2.00**	**1.08**	**1.23**	**1.00**	**0.23**	**1.73**	**1.05**
	Treatment Level		70%		10	10	8	8	4	4	4	0	6	6										
	Infrastructure		30%		10	8	8	8	5	7	4	3	9	0										
Capacity & Demands		25%		100%											**1.13**	**2.13**	**0.63**	**0.63**	**1.25**	**1.75**	**1.75**	**1.38**	**2.13**	**2.13**
	Total Capacity		50%		0	7	1	1	10	10	10	10	10	10										
	Demand Interest		50%		9	10	4	4	0	4	4	1	7	7										
Regulatory & Permitting		8.33%		100%											**0.83**	**0.67**	**0.58**	**0.58**	**0.21**	**0.29**	**0.25**	**0.00**	**0.46**	**0.21**
	Permitting Feasibility		50%		10	8	7	7	1	2	2	0	6	3										
	Permitting Timeline		50%		10	8	7	7	4	5	4	0	5	2										
Environmental & Sustainability		8.33%		100%											**0.83**	**0.83**	**0.62**	**0.62**	**0.40**	**0.47**	**0.47**	**0.20**	**0.67**	**0.60**
	Value of RW Beneficial Use (hydrologic system)		40%		10	10	5	5	0	2	2	6	8	6										
	Energy Usage and GHG Emissions (GHGs kg CO2e/yr)		60%		10	10	9	9	8	8	8	0	8	8										
Local Agency & Public Perception		8.33%		100%											**0.83**	**0.75**	**0.67**	**0.67**	**0.42**	**0.21**	**0.42**	**0.04**	**0.63**	**0.50**
	Interagency Participation		50%		10	8	8	8	6	3	4	0	5	2										
	Public acceptance of recycled water end use (at the point of use)		50%		10	10	8	8	4	2	6	1	10	10										

Instructions

Enter scores from 0 to 10 in the light green cells. Scores in darker green cells reference the "Cheat Sheet" Tab.

Use the "Scoring Metrics" tab to help determine scores for each alternative.
Adjust weights of criteria and sub criteria in the yellow cells. Use the check cells to confirm a 100% total on the weights.

Total Weight for Criteria
100.00%

	1	2	3(Split)	3	4	6A	6B	6C	6D	7A
Total	**8.18**	**8.68**	**6.44**	**6.24**	**4.05**	**4.84**	**4.78**	**2.34**	**7.05**	**5.48**
Rank	**2**	**1**	**4**	**5**	**9**	**7**	**8**	**10**	**3**	**6**

		Scoring Metrics (Scale of 1-10)													
Criteria	**Sub-Criteria**	**Description of 0 End of Range**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Description of 10 End of Range**	**Notes**
Economics / Cost															
	Capital	Highest $M	320	288	256	224	192	160	128	96	64	32	0	Lowest $M	
	O&M	Highest $M/year	7.52	6.77	6.02	5.27	4.52	3.77	3.02	2.27	1.51	0.76	0.01	Lowest $M/year	
	District Revenue Potential	Least District potential revenue through sale of recycled water. Note - the sale of water rights is not an opportunity for the District, as no new water rights are essentially created with these alternatives. Therefore, the revenue is limited to the sale of recycled water for use.												Most District potential revenue through sale of recycled water.	Ranges of revenue potential incudes: - Very Low Potential (delivery of secondary 23 effluent in Alpine County) - Low Potential (delivery of recycled water to higher levels of reuse) - Moderate Potential (delivery of recycled water to users in NV) - High Potential (delivery of secondary effluent for supply to potable reuse facility) Notes for context: DCLTSA receives $0.01 to $0.02 per 1,000 gal. At this rate, the annual revenue for 5.4 mgd would be $39K. TMWA charges $1.77 per 1,000 gal for large volume resale service. At this rate, the annual revenue for 5.4 mgd would be $4.1M.
Technical															
	Treatment Level	Highest treatment complexity (level of instrumentation, operator level, monitoring/attention needed to maintain performance), and degree of implementation in the industry.												Lowest treatment complexity (level of instrumentation, operator level, monitoring/attention needed to maintain performance), and degree of implementation in the industry.	The range of treatment complexity (low to high) includes: - Existing - Secondary 23 - Disinfected Tertiary - Nutrient removal - Advanced nutrient removal with UV disinfection - IPR
	Infrastructure	Highest complexity of conveyance infrastructure												Lowest complexity of conveyance infrastructure (existing system)	The range of Infrastructure complexity (low to high) includes: - additional water in existing ditches - recycled water distribution system to end users - conveyance from DVR Loop to Indian Creek - conveyance to West Fork Carson River - conveyance to Mud Lake - conveyance to Gardnerville Ranchos GID - conveyance to DCLTSA
Capacity & Demands															
	Total Capacity	Least amount of new end use capacity for RW	0	605	1210	1815	2420	3025	3630	4235	4840	5445	6050	Most amount of new end use capacity for RW	The range is from 0 to the projected flow of 5.4 mgd (6,050 AFY). While some alternatives would rely on some of the existing system recycled water capacity, the scoring should be based on the RW capacity provided specifically by the alternative. Capacity of alternatives 4, 6A and 6B is highly dependent on regulatory approvals. One approach would be to assume 5.4 mgd (6,050 AFY) capacity but put the demand interest "0", and consider ranking these alternatives on the lower end of permitting feasibility.
	Demand Interest	Least amount of demand interest												Most amount of demand interest	The range (low to high) includes: - conceptual (IPR or downstream use after surface water discharge) - some details on potential users and known drivers or interest in RW - some site specific users and known drivers or interest in RW
Regulatory & Permitting															
	Permitting Feasibility	Lowest amount of feasibility												Highest amount of feasibility	
	Permitting Timeline	Longest / most uncertain permitting timeline												Shortest / most certain permitting timeline	

Environmental & Sustainability															
	Value of RW Beneficial Use (hydrologic system)	Lowest Value												Highest Value	Recycled water beneficial use should be considered in the context of the hydrologic system conditions.
	Energy Usage and GHG Emissions (GHGs kg CO2e/yr)	Highest energy usage / GHG emissions	7322	6590	5858	5125	4393	3661	2929	2197	1464	732	0	Lowest energy usage / GHG emissions	Significant energy demands would be associated with additional pumping, and treatment processes including aeration, ozone generation, and UV disinfection. GHG emissions would be associated with energy demands and methanol (nutrient removal).
Local Agency & Public Perception															
	Interagency Participation	Highest interagency participation												Lowest interagency participation	Related to the need for agreements and coordination with other agencies (not permitting).
	Public acceptance of recycled water end use (at the point of use)	Lowest public acceptance of recycled water end use												Highest public acceptance of recycled water end use	This is based on the concept that some recycled water end uses are going to be more divisive among the community of end users (or the community in the region of end use). It is assumed that public acceptance will be more challenging if the proposed end use is more controversial.

July 2024 "Cheat Sheet" with Quantitative Alternatives Information

Alternative	Total Capital Costs ($M)[1]	Total Capital Costs Score	Total O&M Costs ($M /yr)[2]	Total O&M Costs Score	Total Capacity (AFY)	Total Capacity (AFY) Score	GHGs kg CO2e/year	GHGs kg CO2e/year Score
Alt 1 – Existing System "No Project"	$0	10	$0	10	0	0	0	10
Alt 2 – Expanded Disinfected Secondary-23 Delivery in Alpine County	$18	9	$0	10	3797	7	0	10
Alt 3 – Expanded Disinfected Tertiary Reuse in Alpine County (split treatment at DVR)	$15	9	0.07	9	79	1	10	9
Alt 3 – Expanded Disinfected Tertiary Reuse in Alpine County (treatment at WWTP)	$88	7	0.75	9	79	1	202	9
Alt 4 – Discharge to West Fork Carson River and Use in NV	$245	2	$3.08	5	6050	10	1028	8
Alt 6A – Expanded Class A or B Reuse in NV via Discharge to Indian Creek	$227	2	$3.08	5	6050	10	1028	8
Alt 6B – Expanded Class A or B Reuse in NV via Discharge to Mud Lake	$262	1	$3.08	5	6050	10	1028	8
Alt 6C – IPR in NV	$320	0	$7.52	0	6050	10	7322	0
Alt 6D – Expanded Reuse in Nevada via Direct Delivery	$120	6	$1.21	8	6050	10	766	8
Alt 7A – Treated Effluent Conveyance to DCLTSA with Reuse in NV	$248	2	$2.94	6	6050	10	1450	8

Instructions

Values in blue are based on engineering estimates. If these values change then update number in blue cells and use as reference.

Values in green are scores. The "Criteria and Subcriteria" Tab references these cells. Change scores, as needed, based on values in blue. Use the "Scoring Metrics" tab to help determine scores for each alternative.

Appendix D:

Meeting Materials and Minutes

Appendix D:

February 8, 2022 Meeting Materials

SOUTH TAHOE PUBLIC UTILITY DISTRICT

RECYCLED WATER STRATEGIC PLAN

Public Information Meeting

February 8, 2022

SOUTH TAHOE Sewer · 1950 · Water PUBLIC UTILITY DISTRICT

carollo Engineers...Working Wonders With Water®

Meeting Outline

// Meeting Outline

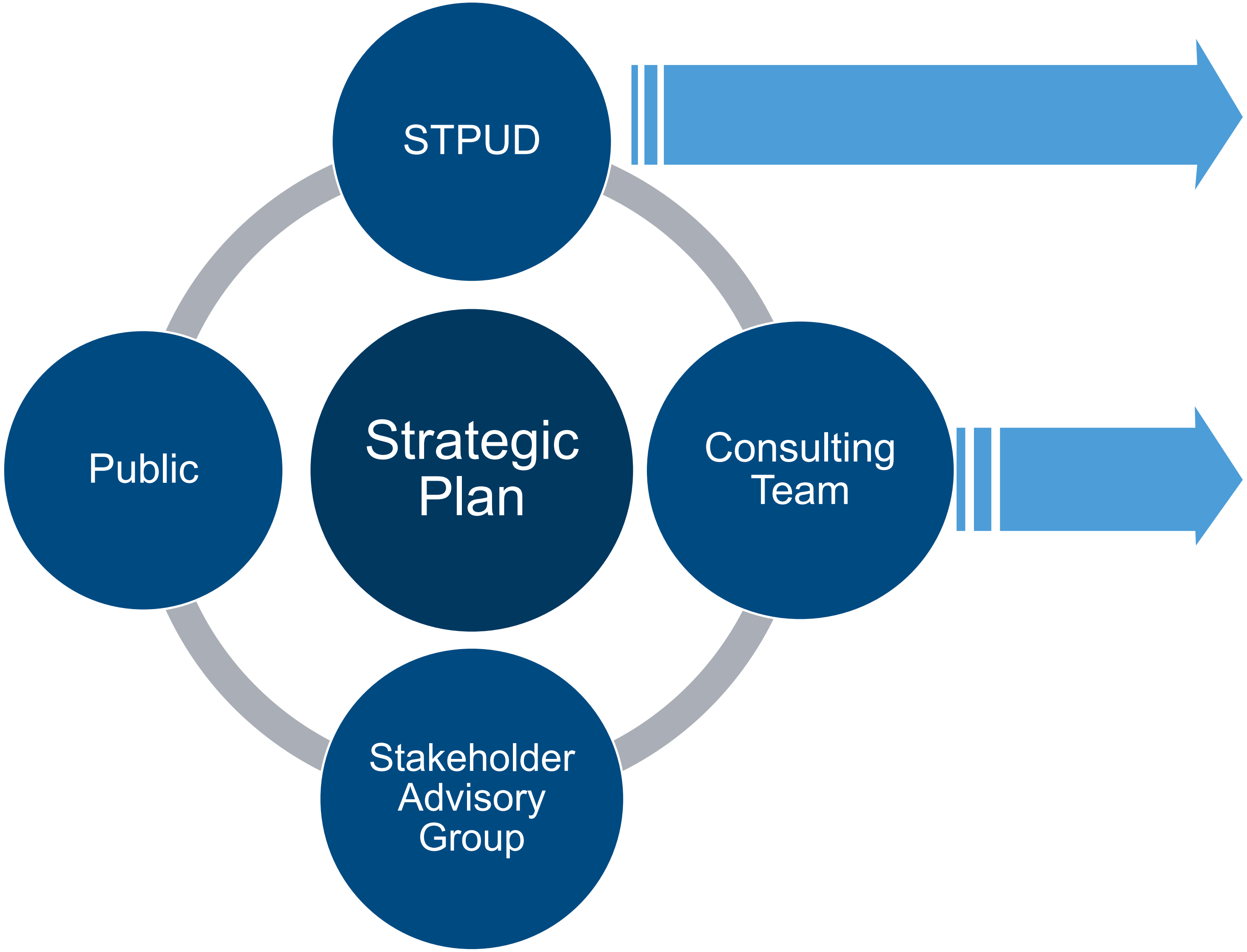
- Introduction
- Overview of STPUD's Existing System
- Description of the Recycled Water Strategic Plan
- Public Engagement
- Question & Answer Session
- Closing

Introduction to the Plan and Project Team

// Why are we here today?

- ✓ To explain why the STPUD is embarking on the Recycled Water Strategic Plan
- ✓ Understand the strategic plan development process
- ✓ Understand how you can stay involved

// Who will you hear from today?




John Thiel


Steve Caswell


Shelly Thomsen


Elisa Garvey

// Brief History of Existing System

- STPUD established in 1950
- The District began exporting recycled water to Alpine County in 1968
- Porter Cologne Act (1969) required export of treated wastewater out of Tahoe Basin by 1972
- STPUD history of innovation / achievement
  - First tertiary treatment plant in the U.S.
  - USEPA #1 Plant of the Year in 1994 and 2001
  - 100% of treated effluent is reused
  - 100% of biosolids recycled as fertilizer
  - Electricity produced off the Export System
    - 380 MWh saves 100 tons of GHG per year
    - Equivalent to about 50 homes

// Why is STPUD embarking on a Recycled Water Strategic Plan?

In the past
50
YEARS

Technological advancements in wastewater treatment

Acceptance of water reuse in California

STPUD is taking a proactive approach in planning for the future. The plan will analyze and identify options to determine the most cost-effective, innovative, and environmentally conscious way to manage recycled water in the future.

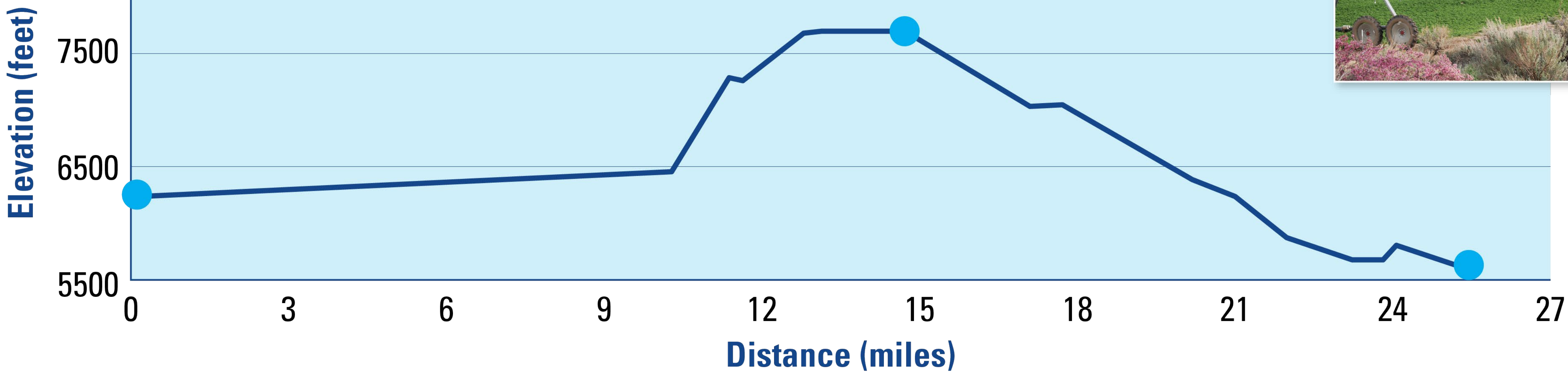
Overview of STPUD’s Existing System

// STPUD's Recycled Water System

WWTP

Export Pipeline

Reuse in Alpine County



// California Reuse Options

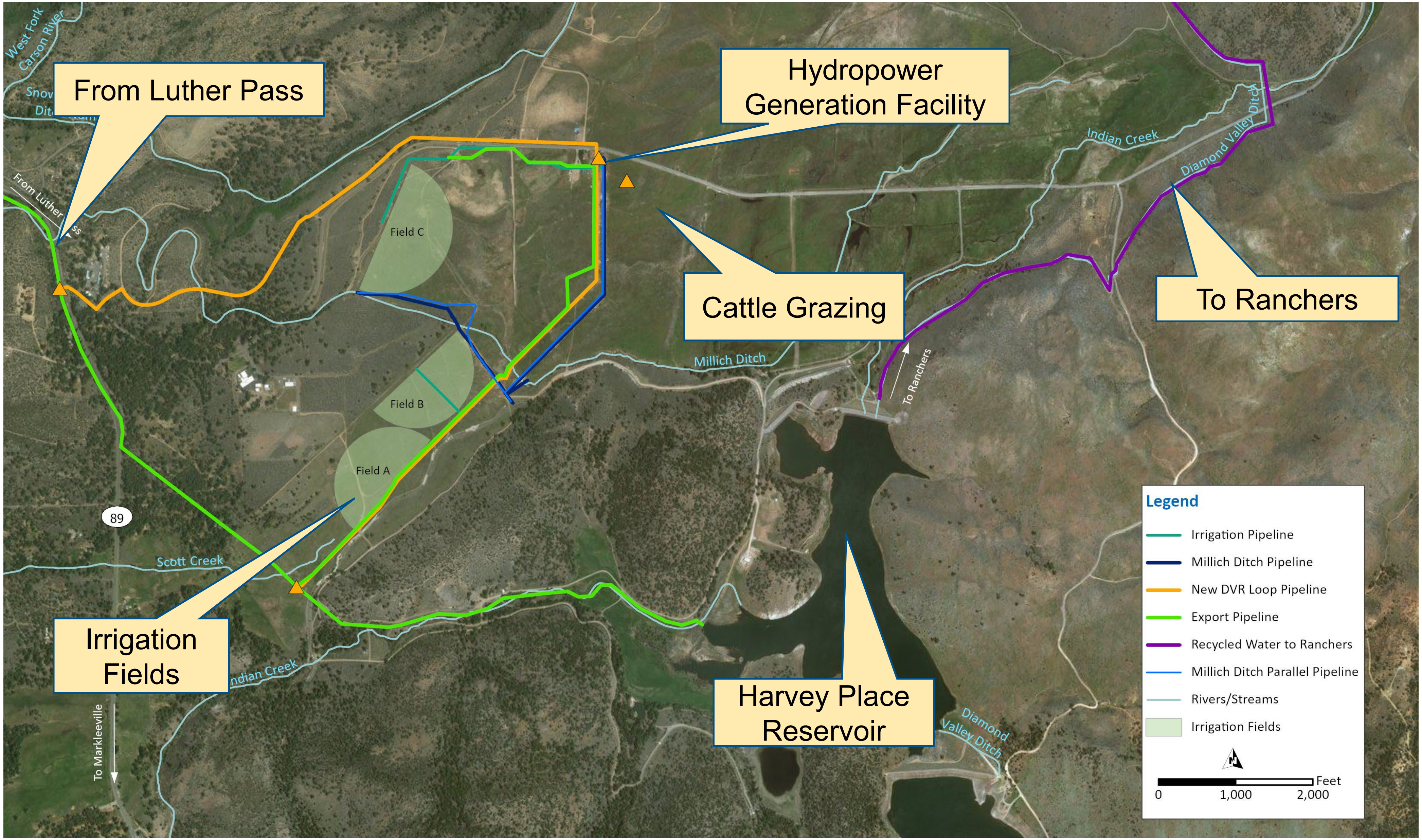
STPUD Recycled Water System

Treatment Level	Approved Uses
Disinfected Secondary – 23 Recycled Water	▪ Pasture for Milking Animals ▪ Landscape Irrigation (restricted) ▪ Landscape Impoundment
Undisinfected Secondary Recycled Water	▪ Surface Irrigation of Orchards and Vineyards (limited harvesting) ▪ Fodder, Fiber and Seed Crops

Additional Recycled Water Options

Treatment Level	Approved Uses
Indirect Potable Reuse	▪ Drinking Water
Disinfected Tertiary Recycled Water	▪ Spray Irrigation of Food Crops ▪ Landscape Irrigation ▪ Nonrestricted Recreational Impoundment
Disinfected Secondary – 2.2 Recycled Water	▪ Surface Irrigation of Food Crops ▪ Restricted Recreational Impoundment

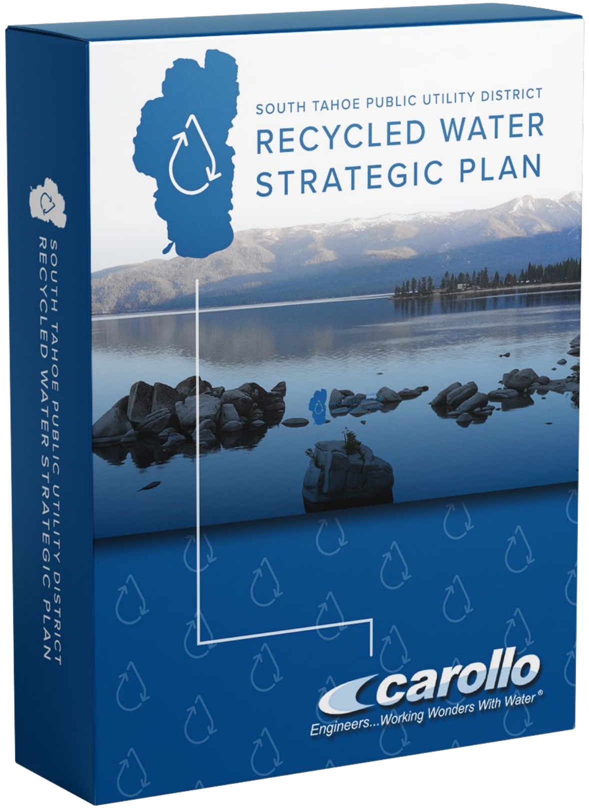
// Recycled Water System in Alpine County



Recycled Water Strategic Plan

SOUTH TAHOE PUBLIC UTILITY DISTRICT
RECYCLED WATER
STRATEGIC PLAN

// Outcome of the Recycled Water Strategic Plan



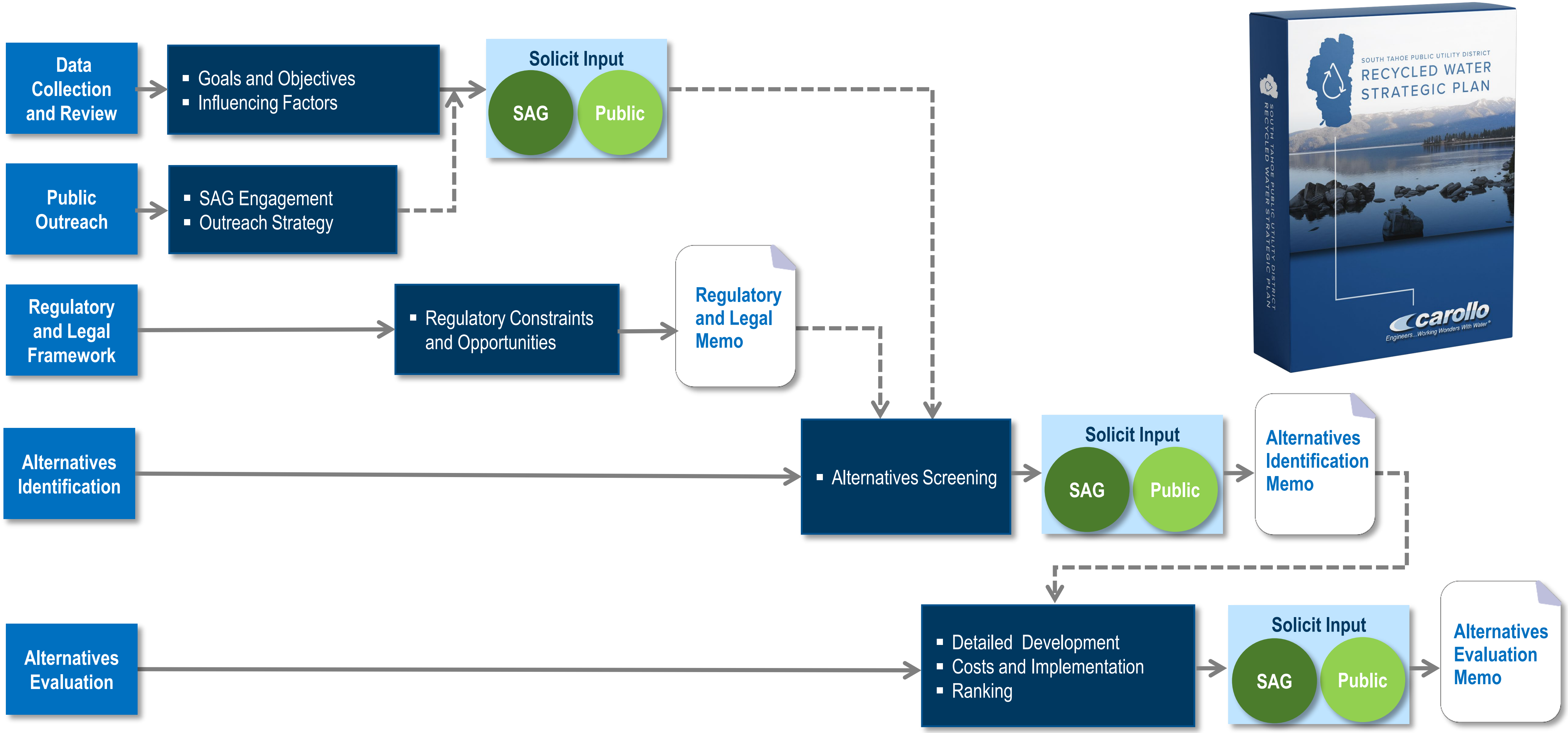
- Overall direction for recycled water system
- Factors that may trigger change and associated alternative pathways

VS.

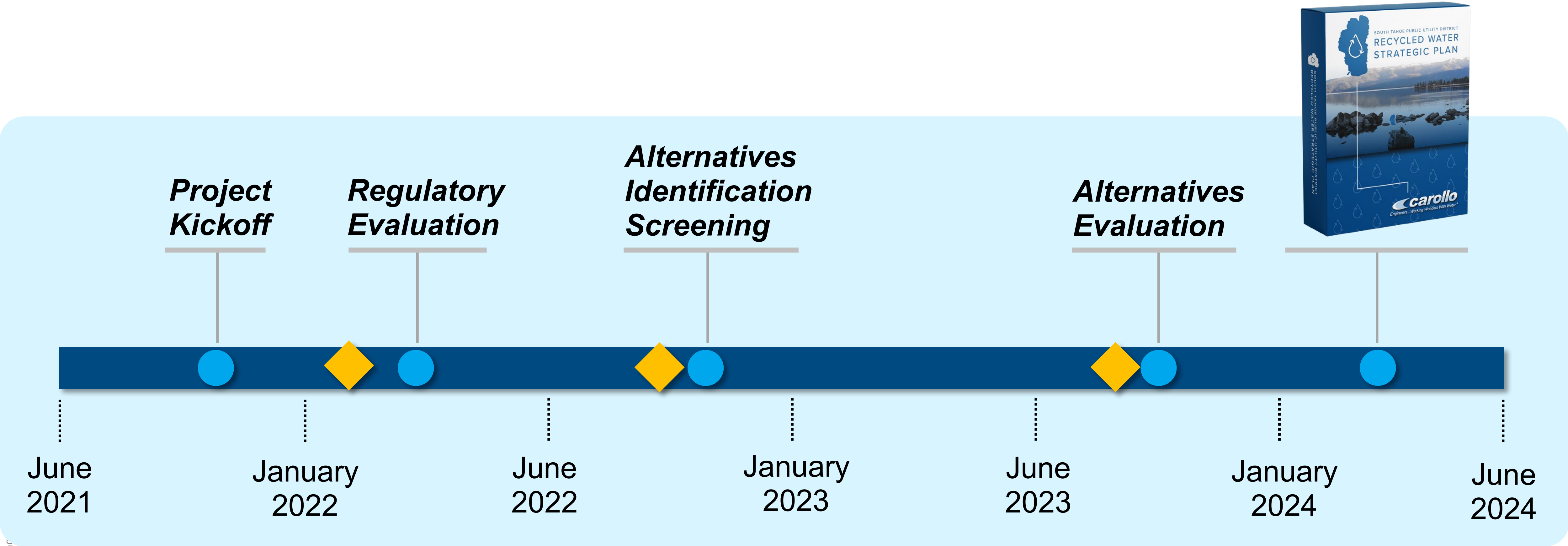
Master Plan

- Specific objective
- Alternatives evaluation
- Selection of preferred alternative or "project"
- Project CIP

// Recycled Water Strategic Plan Development



// Recycled Water Strategic Plan Schedule



Milestones

SAG and Public Workshops

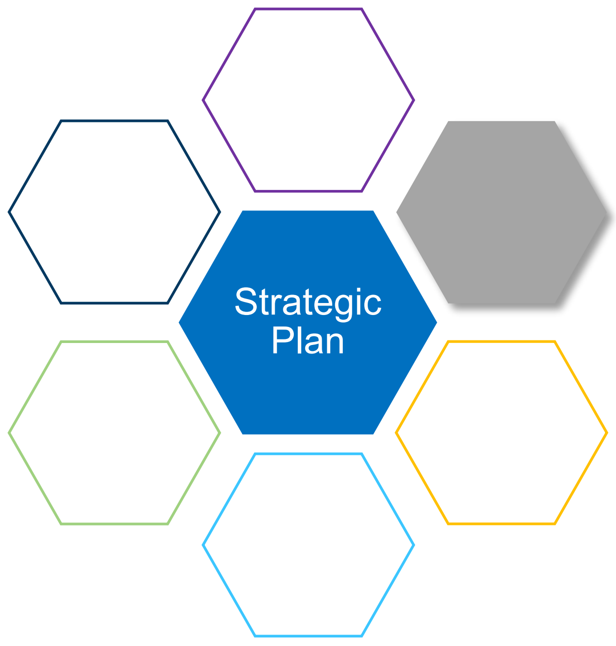
// What might influence change in the way recycled water is treated and used?

// What might influence change in the way recycled water is treated and used?

Regulations

- More stringent requirements on land application of recycled water
- Regulatory frameworks for other types of recycled water

// What might influence change in the way recycled water is treated and used?



Legal

- Unfavorable future contracts
- Revisiting Porter-Cologne Act

// What might influence change in the way recycled water is treated and used?

Economics

- Energy optimization and/or recovery
- Revenue opportunities for recycled water

// What might influence change in the way recycled water is treated and used?

Community

- Acceptance of water reuse
- Ideas for improvements

// What might influence change in the way recycled water is treated and used?

Sustainability

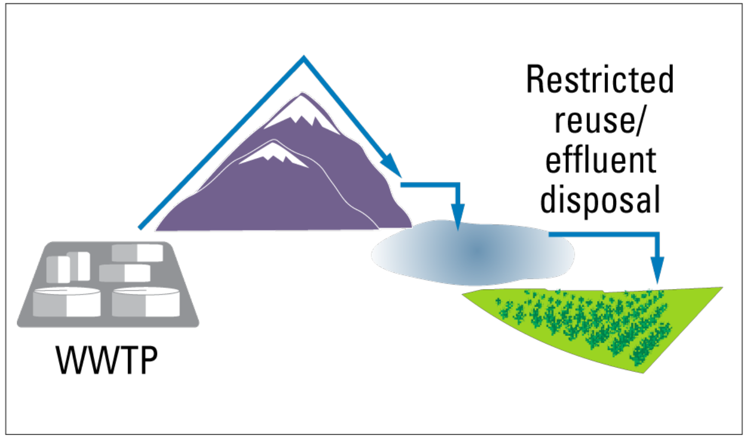
- Climate change
- Enhanced beneficial uses of recycled water

// What might influence change in the way recycled water is treated and used?

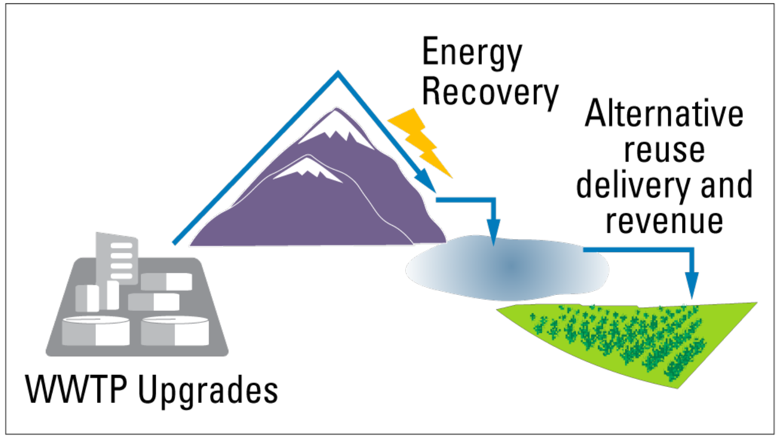
Technology

- Advanced treatment processes for wastewater purification
- Technology related to energy recovery

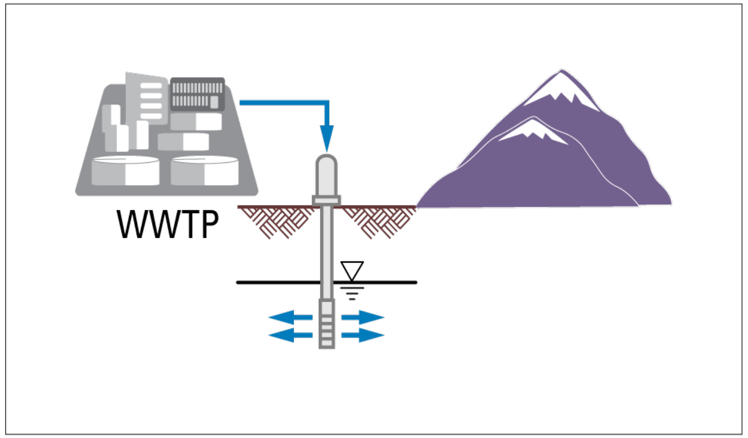
// What categories of alternatives may be considered?



Existing System – Maintain Functionality



Existing System – Optimize Functionality



New System – Different Functionality

Public Engagement

SOUTH TAHOE PUBLIC UTILITY DISTRICT
RECYCLED WATER
STRATEGIC PLAN

// Public Participation - Attend. Learn. Engage.

- Project webpage: https://stpud.us/recycled-water-strategic-plan/
- E-blast updates/public meeting notices/questions:
  - Email your name to recycledwater@stpud.us
- Phone: (530) 544-6474 x 6202
- Social media sites:

Instagram: www.instagram.com/southtahoepud/

Facebook: www.facebook.com/SouthTahoePUD

Twitter: @SouthTahoePUD

Questions & Answers

SOUTH TAHOE PUBLIC UTILITY DISTRICT
RECYCLED WATER
STRATEGIC PLAN

// How to ask questions

- Computer participants:
  - Ask question in the chat box of GoToMeeting
  - Un-mute to speak
- Mobile participants
  - Press “*6” on phone (for land lines)
  - Un-mute to speak

Closing

SOUTH TAHOE PUBLIC UTILITY DISTRICT
RECYCLED WATER
STRATEGIC PLAN

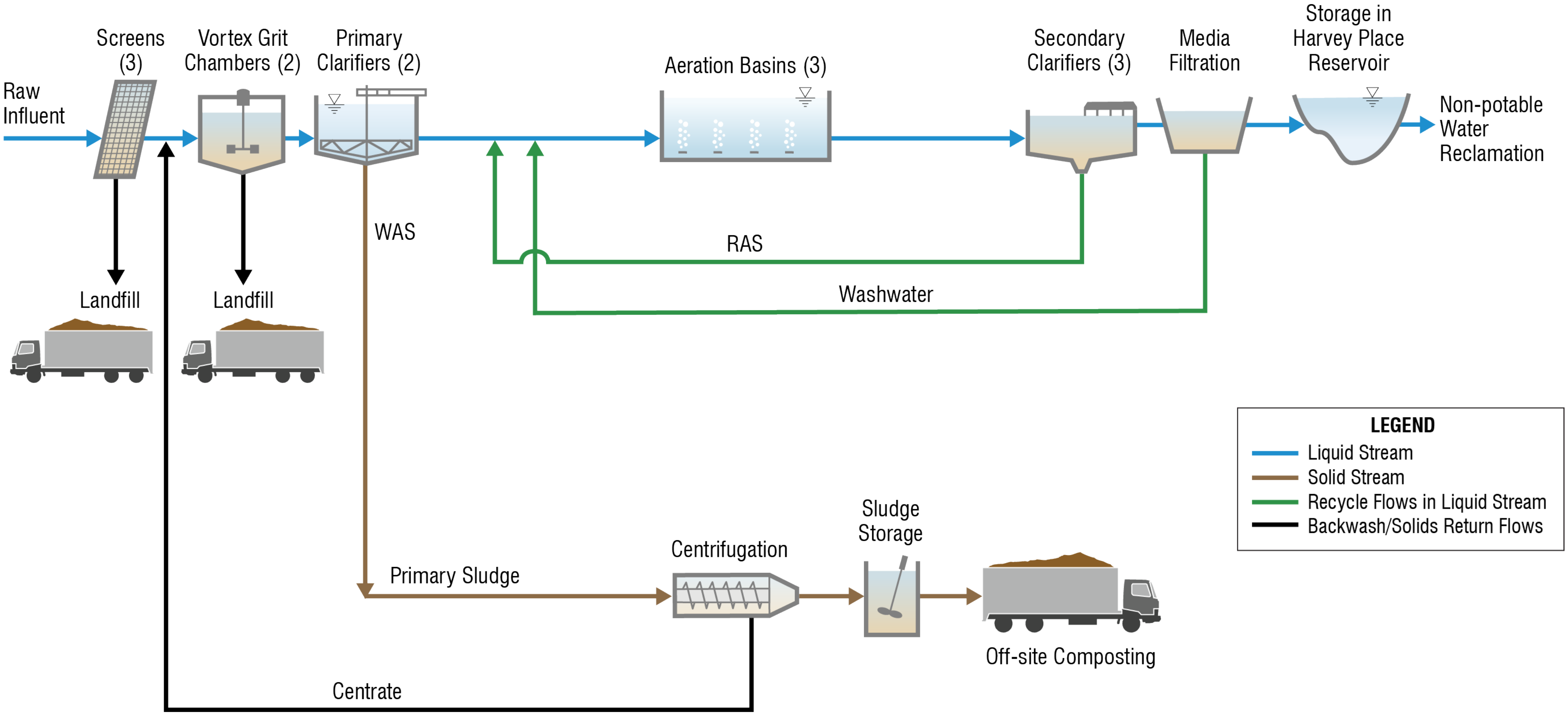
// Closing

- Thank you for being here!

- Project webpage: https://stpud.us/recycled-water-strategic-plan/

SOUTH TAHOE PUBLIC UTILITY DISTRICT
RECYCLED WATER
STRATEGIC PLAN

// STPUD's WWTP



Raw Influent
Screens (3)
Vortex Grit Chambers (2)
Primary Clarifiers (2)
Aeration Basins (3)
Secondary Clarifiers (3)
Media Filtration
Storage in Harvey Place Reservoir
Non-potable Water Reclamation
Landfill
Landfill
WAS
RAS
Washwater
Primary Sludge
Centrifugation
Sludge Storage
Off-site Composting
Centrate
LEGEND
Liquid Stream
Solid Stream
Recycle Flows in Liquid Stream
Backwash/Solids Return Flows

// STPUD Strategic Goals

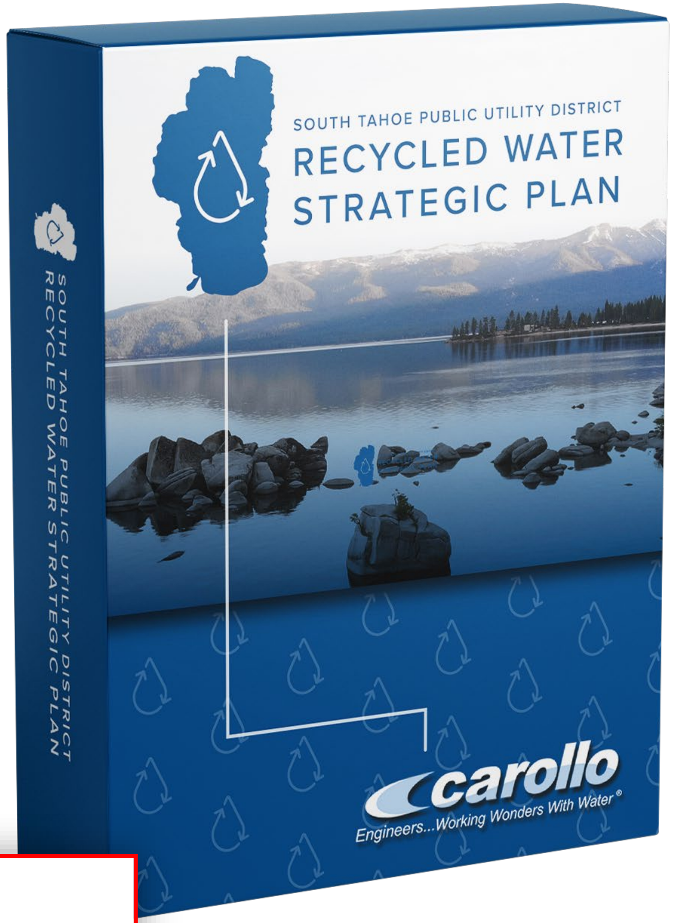
- Provide reliable and safe water, wastewater, and recycled systems
- Foster a culture of efficient water use in our community
- Promote public awareness of all District activities and the value of District services
- Continue to be outstanding financial stewards
- Maximize technology to improve operational efficiency and prioritize asset replacement

- Protect and Improve Water Quality
- Protect the Community Water Supply and Treatment/Delivery System
- Manage Groundwater Sustainable Yield
- Contribute to Ecosystem Restoration
- Implement Integrated Watershed Management in Region

- Economics
- Environment
- Sustainability
- Public Acceptance
- Technical Feasibility (design/construction/operation)
- Regulatory Compliance
- Legal Compliance

// Goals and Objectives – Recycled Water Strategic Plan

- Comprehensive
- Technically Sound
- Path Forward
- Incorporate Points of Flexibility
- Accepted by District Board and Community



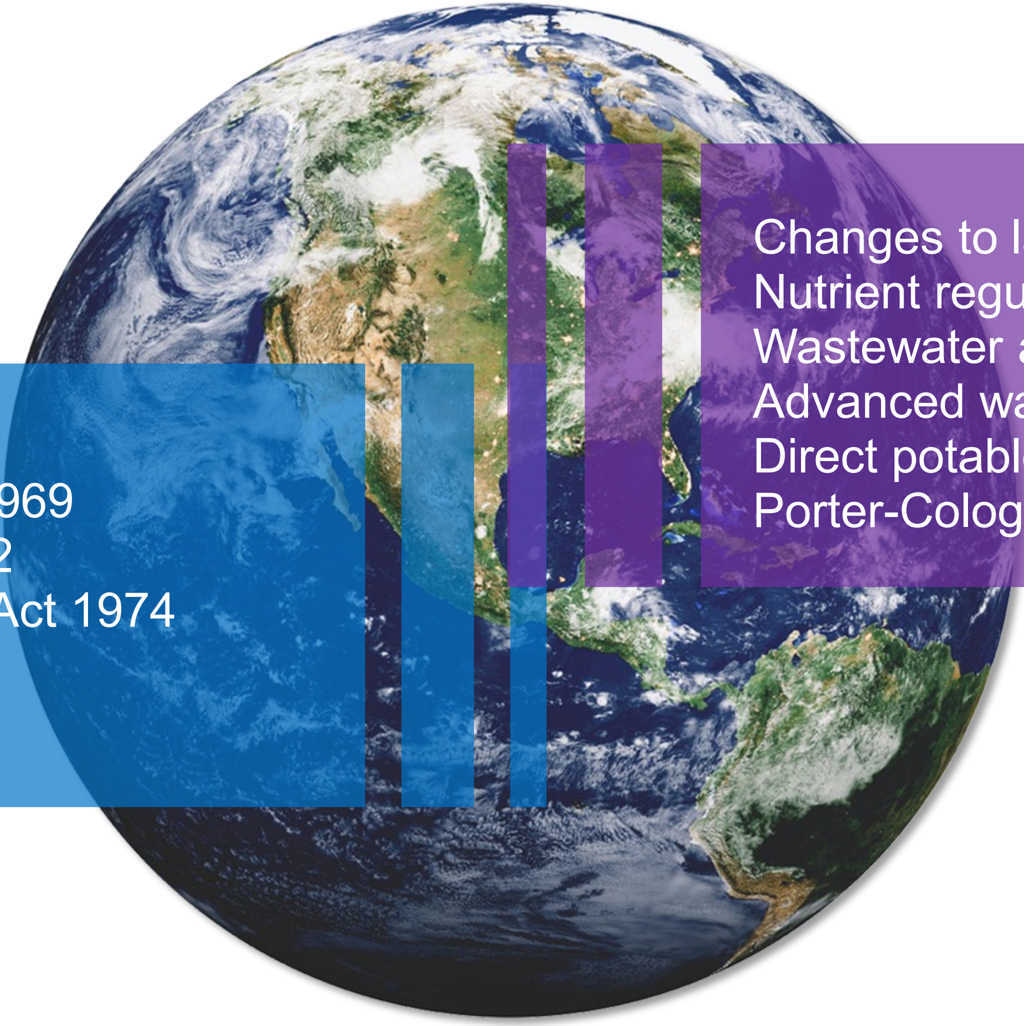
Our Vision

Maintain a dynamic organization that can quickly and proactively meet an ever increasing environment of regulations and scarce resources.

Our Mission

Furnish our customers with reliable water and wastewater services, and provide those services safely, efficiently, and cost effectively.

// Why now?



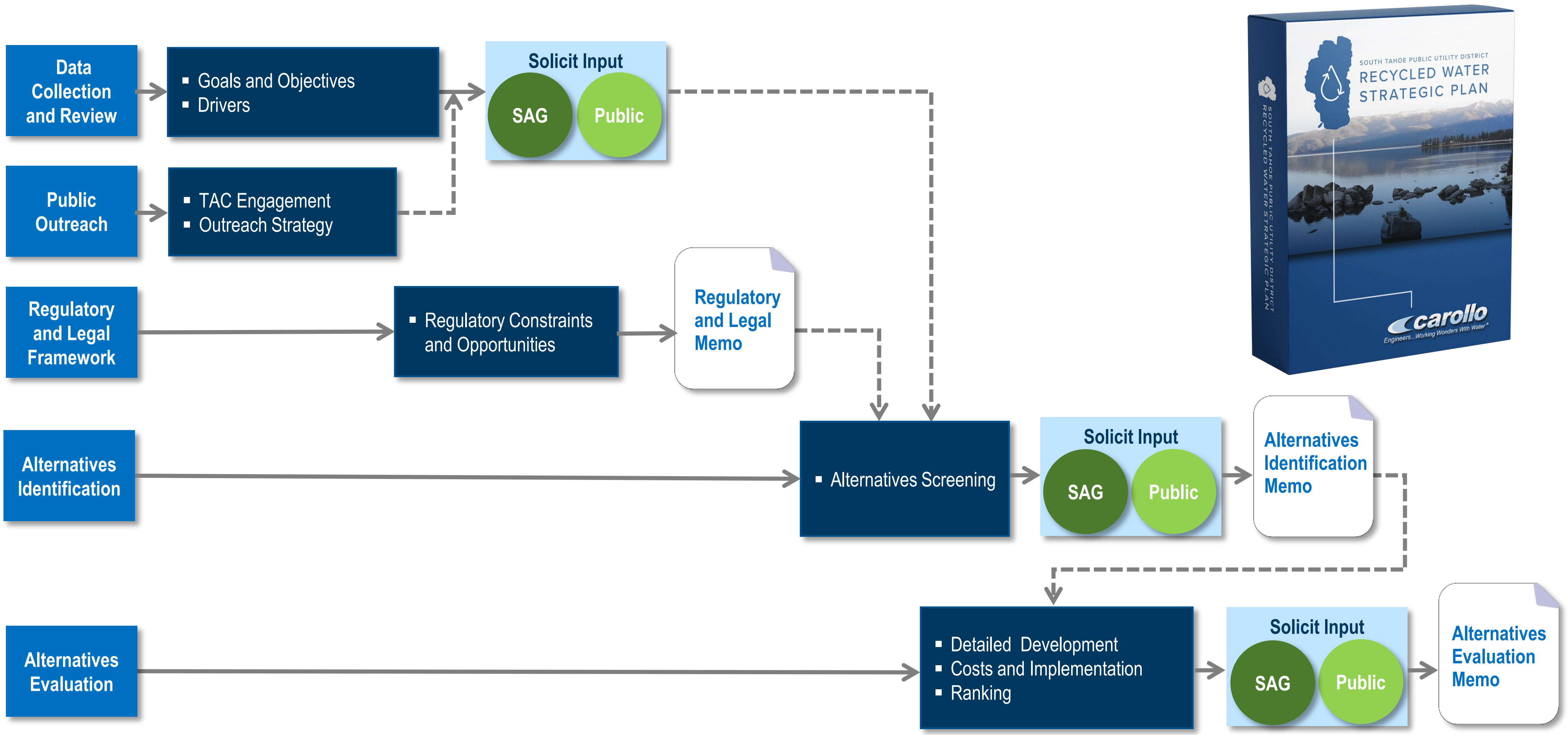
2071

Changes to landowner agreements?
Nutrient regulations?
Wastewater as resource/climate change?
Advanced wastewater treatment processes?
Direct potable reuse regulations?
Porter-Cologne modifications?

1971

Porter-Cologne Act 1969
Clean Water Act 1972
Safe Drinking Water Act 1974
Secondary treatment

// Recycled Water Strategic Plan Development



// California Reuse Options

Treatment Level	Approved Uses
Indirect Potable Reuse	
Disinfected Tertiary Recycled Water	▪ Spray Irrigation of Food Crops ▪ Landscape Irrigation ▪ Nonrestricted Recreational Impoundment
Disinfected Secondary – 2.2 Recycled Water	▪ Surface Irrigation of Food Crops ▪ Restricted Recreational Impoundment
Disinfected Secondary – 23 Recycled Water	▪ Pasture for Milking Animals ▪ Landscape Irrigation (restricted) ▪ Landscape Impoundment
Undisinfected Secondary Recycled Water	▪ Surface Irrigation of Orchards and Vineyards (limited harvesting) ▪ Fodder, Fiber and Seed Crops

// Brief History of Existing System

- STPUD established in 1950
- The District began exporting recycled water to Alpine County in 1968
- Porter Cologne Act (1969) required export of treated wastewater out of Tahoe Basin by 1972
- STPUD history of innovation / achievement
  - First tertiary treatment plant in the U.S.
  - USEPA #1 Plant of the Year in 1994 and 2001
  - 100% of treated effluent is reused
  - 100% of biosolids recycled as fertilizer
  - Electricity produced off the Export System
    - 380 MWh saves 100 tons of GHG per year
    - Equivalent to about 50 homes

Appendix D:

February 8, 2022 Meeting Minutes

MEETING MINUTES

RECYCLED WATER STRATEGIC PLAN

South Tahoe Public Utility District

Issue Date:	March 31, 2022
Project No.:	200689

Purpose:	Recycled Water Strategic Plan - Public Meeting		
Meeting Date:	February 8, 2022, 4:00 – 5:00 pm PST		
Meeting Location:	Virtual (GoToMeeting)		
Prepared By:	Carollo Team		
Attendees:	**Client:**	**Carollo:**	**General Public**
	John Thiel	Elisa Garvey	52 people total
	Steve Caswell	Coral Taylor	(list from Steve Caswell)
	Shelly Thomsen	Ricky Gutierrez	Bob Baer (previous STPUD GM)
		Beverly Hann	Dave Petersen (STPUD Board member)
		Margaret Skillicorn (ESI)	Shane Romsos (STPUD Board member)
		Nanette Hansel (Ascent Environmental)	
Distribution:	STPUD & Carollo team members		

Discussion:

The following is our understanding of the subject matter covered in this conference. If this differs from your understanding, please notify us.

Meeting Agenda

- Introduction
- Overview of STPUD's Existing System
- Description of the Recycled Water Strategic Plan
- Public Engagement
- Question & Answer Session
- Closing

Public Meeting Notes

Introduction (John Thiel)

- Welcomed the public and the stakeholder advisory group noting that this was the public meeting to introduce the Recycled Water Strategic Plan (RWSP) process, team, etc.
- The PowerPoint complemented the verbal aspect of the presentation.
- Offered a brief history of the wastewater/recycled water system and shared accomplishments and innovations that the District had earned/completed in the past. He emphasized how proactive they've been for numerous years and how they've been forward thinking.
- Gave an explanation as to why this is the right time to create the RWSP, and the role both the public and the SAG will play moving forward during the process.

Overview of STPUD's Existing System (Steve Caswell)

- Gave an overview of the existing STPUD wastewater/recycled water system.
- Discussed reuse options in California, both what STPUD is currently doing as well as additional options.
- Provided an overview of STPUD's existing recycled water system in Alpine County.

Description of the Recycled Water Strategic Plan (Elisa Garvey)

- Explained what the Recycled Water Strategic Plan will include. Began by noting the difference between a strategic plan and a project as well as the difference between a strategic plan and a master plan.
- Provided an overview of the various RWSP steps, as well as public and SAG input opportunities.
- Provided an overview of the RWSP timeline.
- Described some of the areas of influence that the RWSP will be looking at (regulations, legal, economics, community, sustainability, and technology).
- Provided a broad overview of how alternatives will be categorized.

Public Engagement (Shelly Thomsen)

- Described how the public will be engaged throughout the RWSP process and various opportunities for the public to interact.

Question & Answer Session (Steve Caswell)

- Wrapped up the above sections and lead the meeting into the Q&A session.
- Steve fielded questions and directed them to various Team members as needed.
- The Team answered various questions from the public, SAG members, and other agency partners and employee such as:
    - Will recycled water go through my pipeline?
    - Will there be public outreach to Alpine County?
    - Are you looking into just upgrading the existing system?
    - Is the plan subject to CEQA?
    - What entities are participating in the SAG?
    - What are the limits to the strategic analysis of alternatives?
    - Does the engineering team have experience working with Outstanding National Resource Water (ONRWs)?
    - What is entailed by "revisiting" the Porter Cologne Act?

Closing (Steve Caswell)

- Closed the meeting, thanked attendees for their time, and reminded people to sign up for RWSP updates if they haven't already.

Take-Aways

Overall

- Speakers spoke clearly, slowly, and stayed on message.
- The speakers did a good job emphasizing STPUD's innovations and past achievements – that was very impressive… "the most advanced treatment in 1969 when export began."
- PowerPoint was visually on target and easy to read and follow.
- <u>From Kathy (ESI), after watching the Public Meeting (not live):</u>
    - STPUD, Carollo, and ESI could benefit from conducting a poll to better understand sentiments of their constituents. There appears to be a need to better understand the public and its perception of STPUD.

    - Recommend that the Porter-Cologne Act be described as well as its implications to the RWSP.

Suggestions for Next Meeting

- At the start, have Shelly welcome the public and then introduce the first speaker.
- Spell out and say the words for all acronyms; WWTP – Wastewater Treatment Plan, CIP – Capital Improvement Program
- Have each speaker have a standard background image. This is possible with Zoom and Teams Meet. Consider a different virtual meeting platform?
- On the PowerPoint – use more map images; list the Stakeholder Advisory Group – agencies and individuals.
- Ask each public speaker to say his/her name and affiliation prior to speaking.
- Ask attendees to register in advance for the meeting (this allows us to get their email address).
- Ask attendees to put their names and affiliations in the chat at beginning of meeting.
- During Q&A, ask speakers to state their name and affiliation before speaking.
- If the purpose of these workshops is to solicit input, a recommendation is that the Team provide meaningful meeting materials and an Agenda on the topics for discussion, prior to the workshop to registered attendees.
- Add the SAG members and description to the RWSP website.

Appendix D:

September 28, 2022 Meeting Materials

District Recycled Water Strategic Plan

Alternatives Screening Review
Stakeholder Advisory Group Meeting #2

carollo®

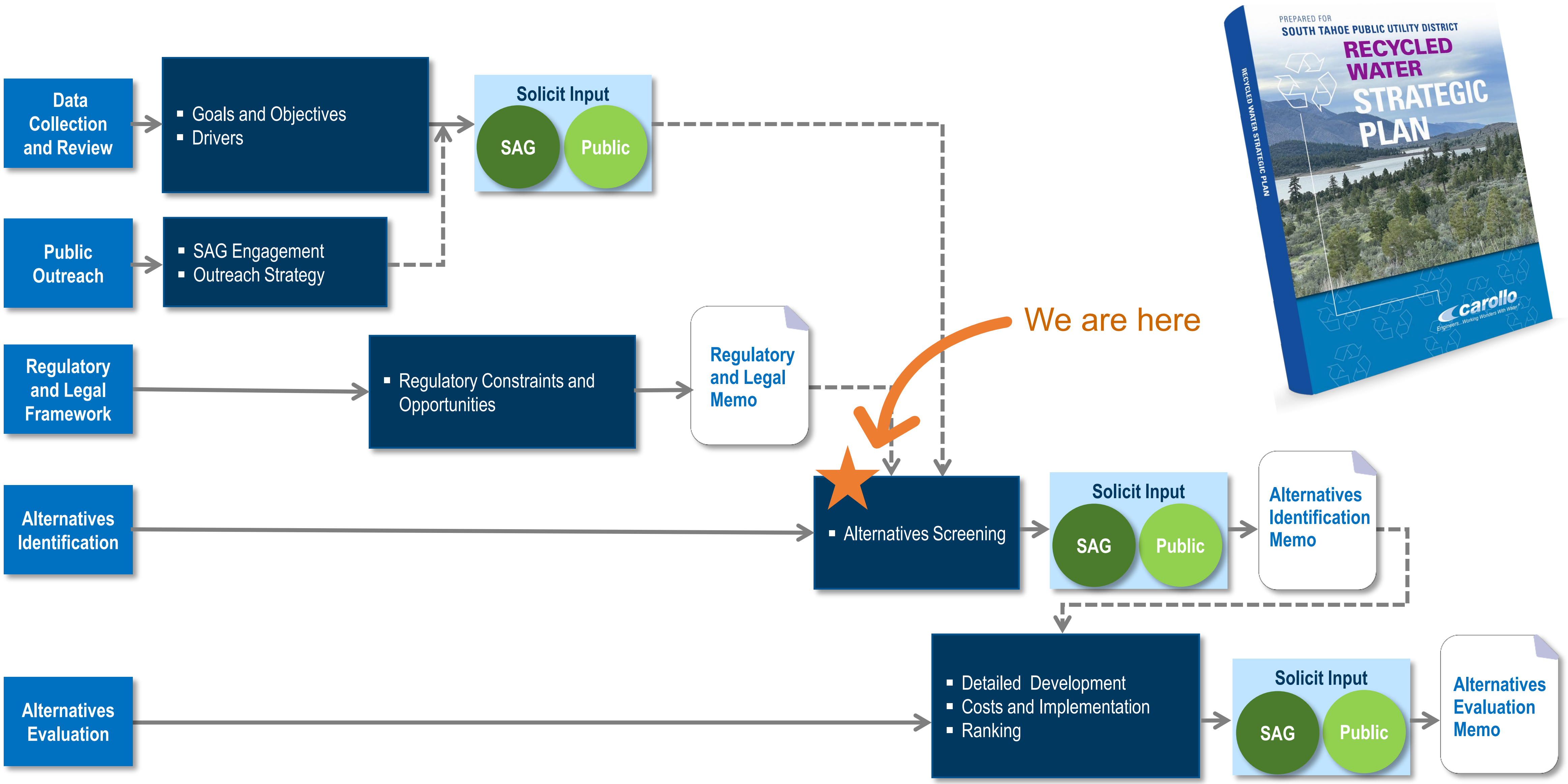
District and VIRTUAL // September 28, 2022

// Agenda

- Objectives for Today
- Recycled Water Strategic Plan Objectives
- Alternatives Identification
- Alternatives Screening
- Summary
- Next Steps

Objectives for Today

// Recycled Water Strategic Plan Development



SAG = Stakeholder Advisory Group

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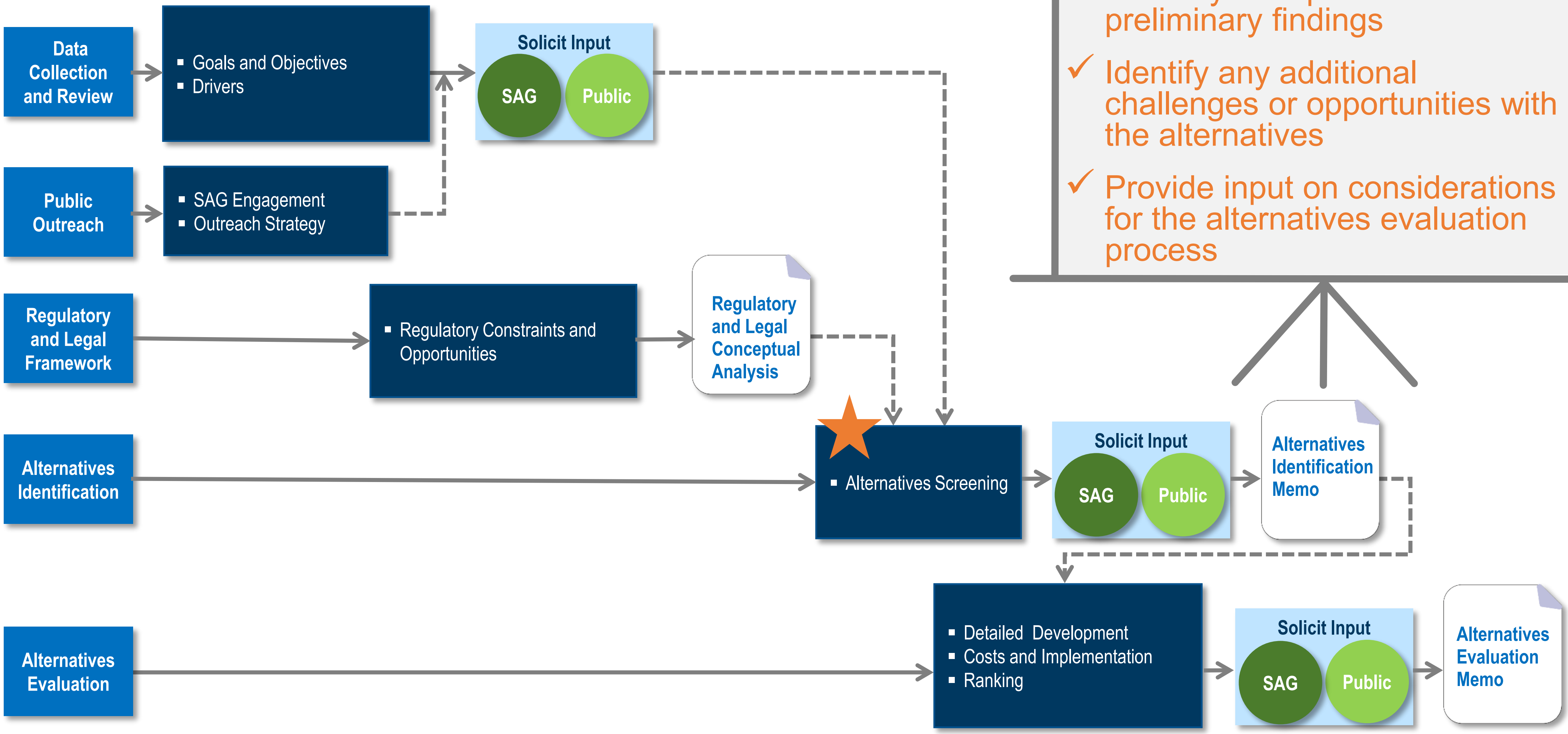
// Objectives for Today

Objectives

- ✓ Obtain your input on the preliminary findings
- ✓ Identify any additional challenges or opportunities with the alternatives
- ✓ Provide input on considerations for the alternatives evaluation process



SAG = Stakeholder Advisory Group

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Stakeholder Advisory Group

Name	Affiliation
Jason Burke	City of South Lake Tahoe
Andrea Buxton	Tahoe Resource Conservation District
Scott Cecchi	California Tahoe Conservancy
Madonna Dunbar	Tahoe Water Suppliers Association
Brian Garrett	United States Forest Service
Jenny Hatch	Sierra Nevada Alliance
Mollie Hurt	Tahoe Resource Conservation District
Rhiana Jones	Washoe Tribe
Rachel Kieffer	Alpine Watershed Group
Jen Lukins	Lukins Brothers (also representing Tahoe Keys Water)
Patricia Maloney	Tahoe Environmental Research Center
Kimra McAfee	Alpine Watershed Group
Shay Navarro	Tahoe Regional Planning Agency
Kate Nelson	Incline Village General Improvement District
Nikolai Nikolov	Douglas County Lake Tahoe Sewer Authority
Laura Patten	League to Save Lake Tahoe
Tiffany Racz	Lahontan Regional Water Quality Control Board
Matt Ricci	Lukins Brothers (also representing Tahoe Keys Water)
Russ Wigart	El Dorado County

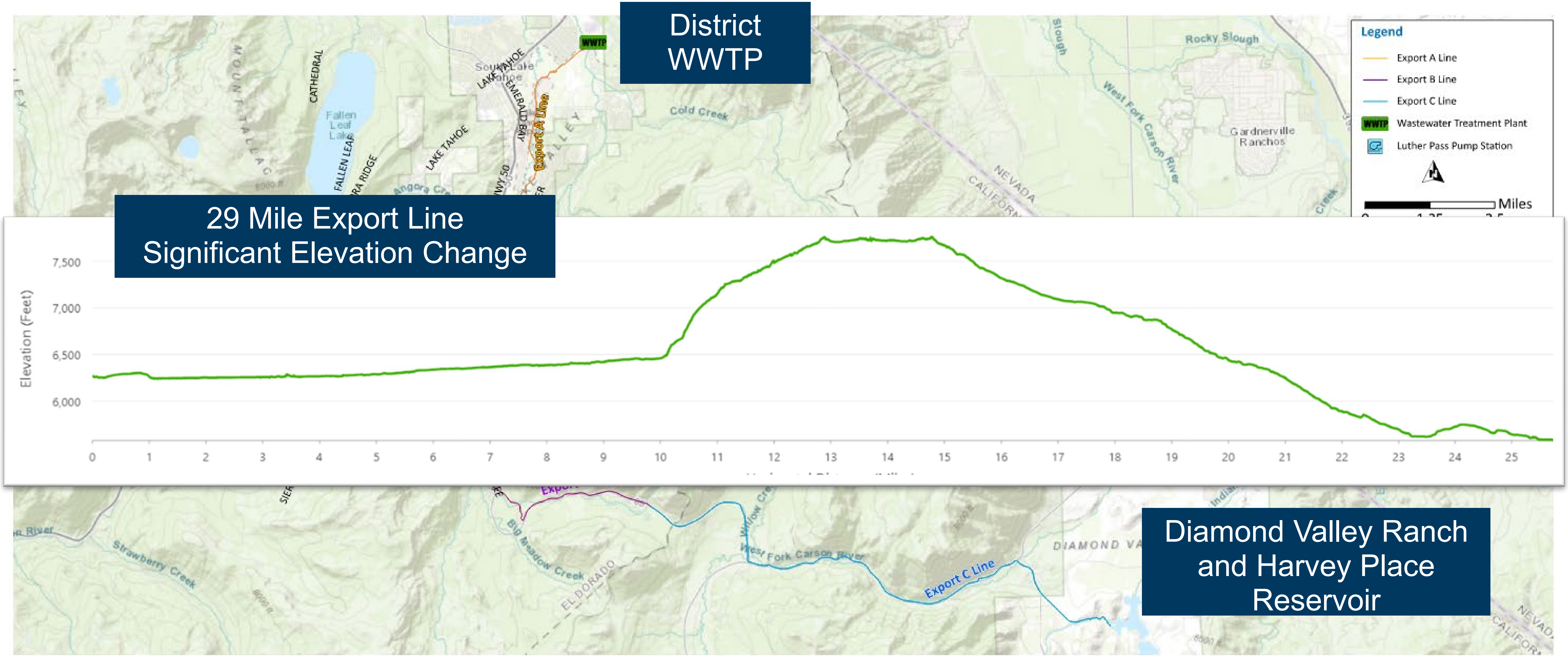
How to provide feedback today

Pause at the end of each section

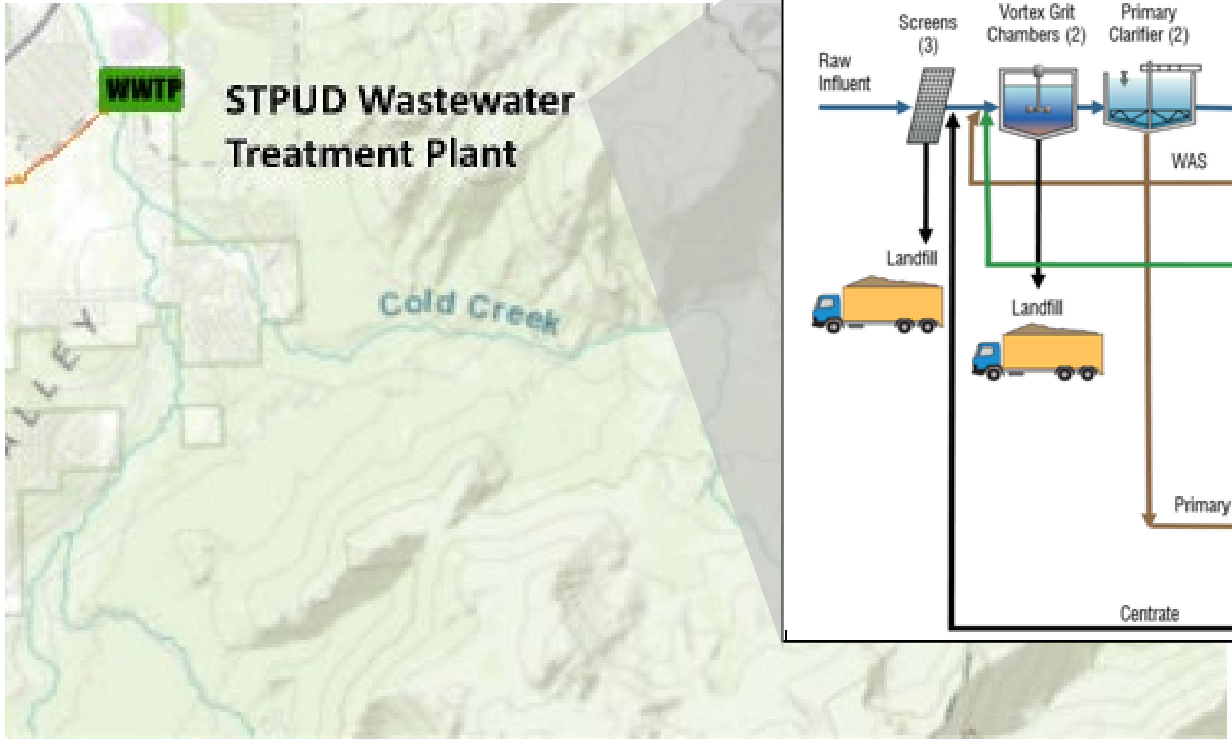
Virtual chat and discussion

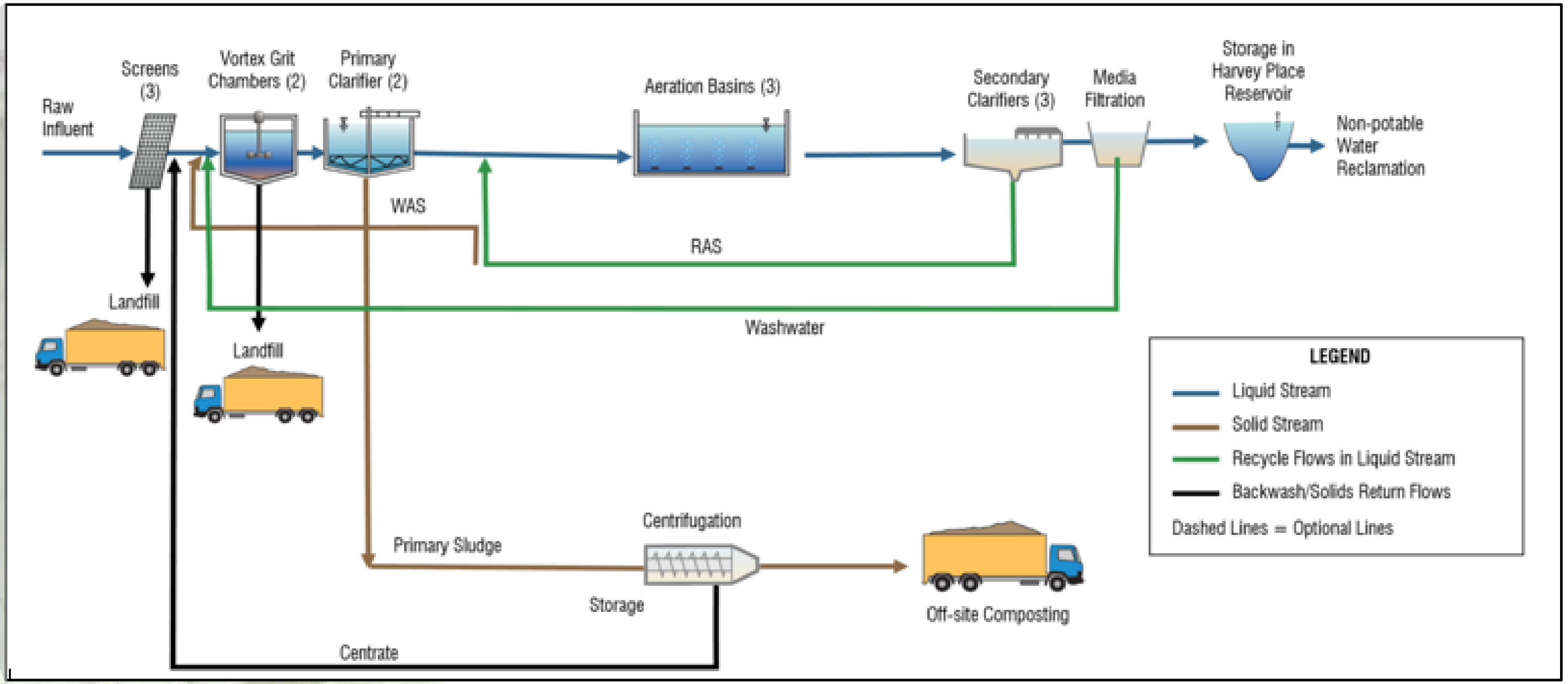
Recycled Water Strategic Plan Objectives

// District Existing System



// District – Advanced Secondary Treatment

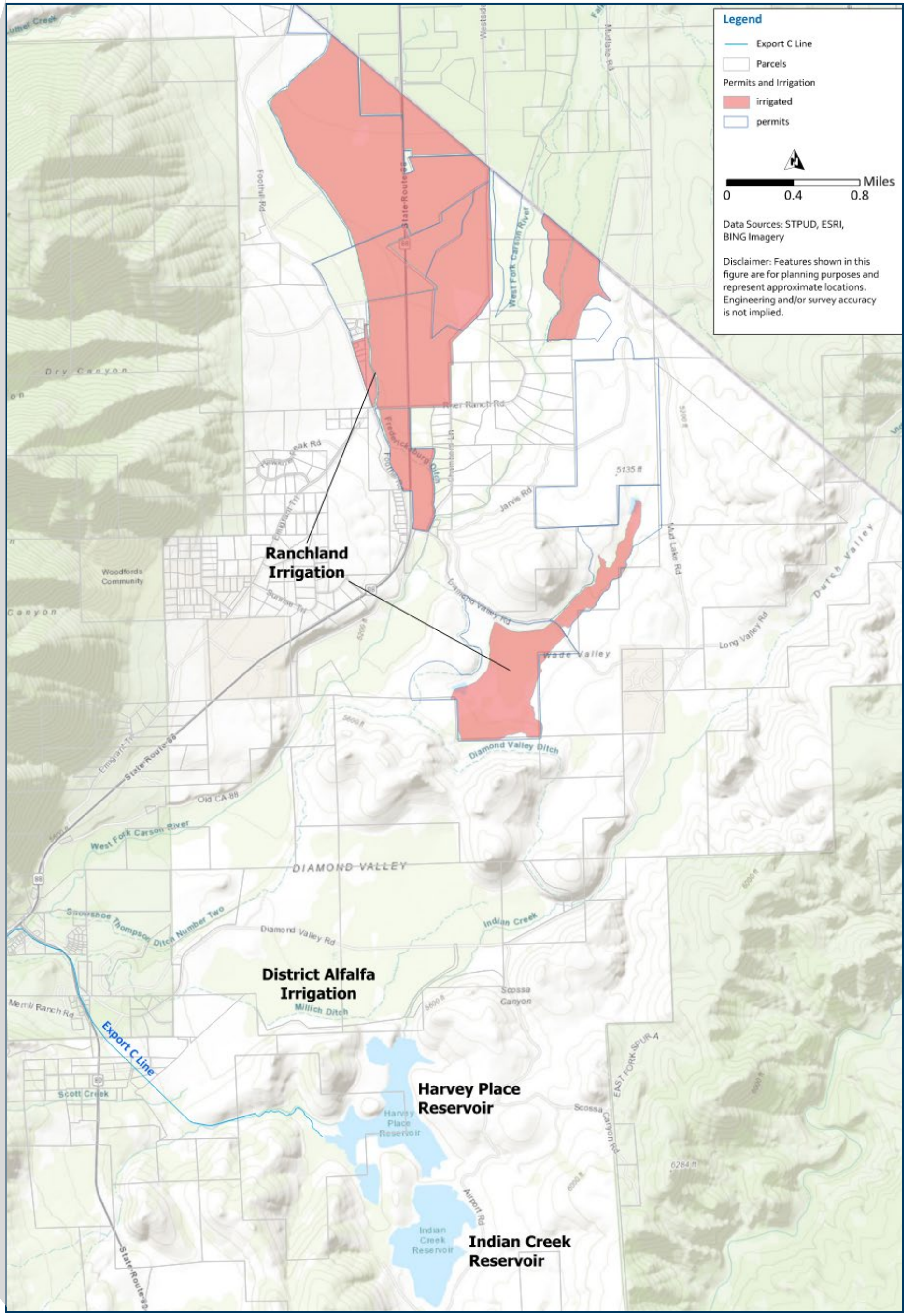




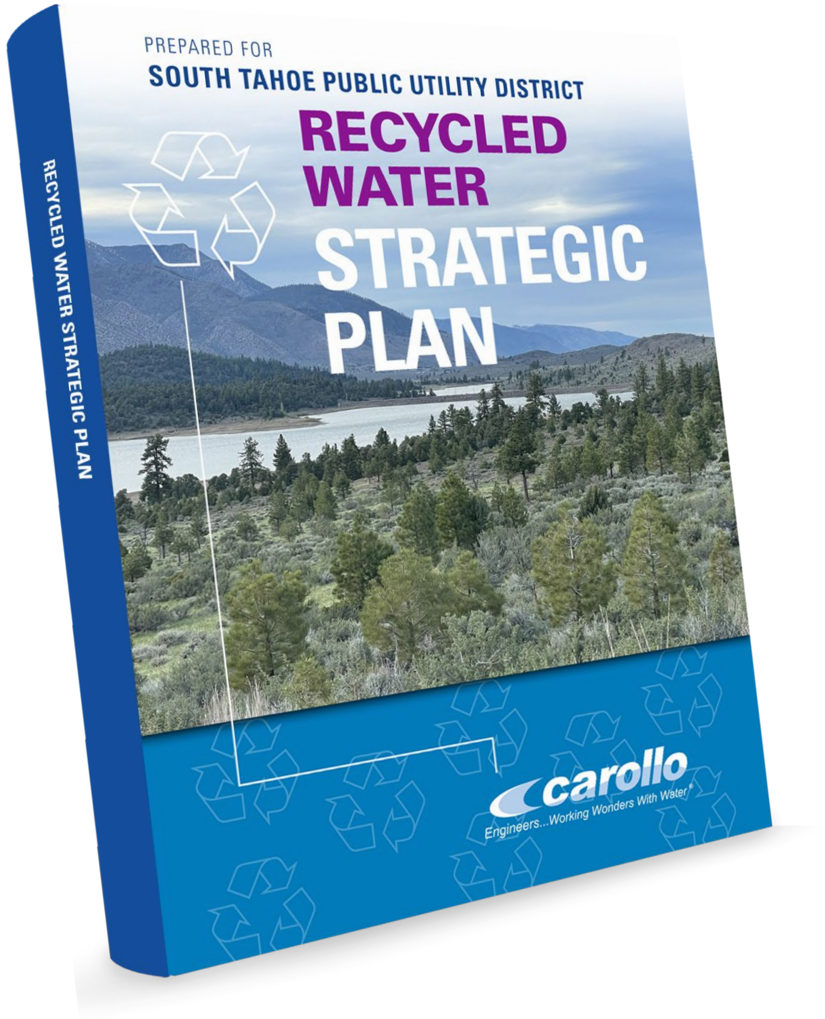
District Average Annual Effluent Flow		
Existing	3.8 mgd	4300 AFY
Future	5.4 mgd	6000 AFY

AFY = acre feet per year
mgd = million gallons per day

// District - Restricted Reuse



// District Recycled Water Strategic Plan Objective



50 Year Planning Horizon

Develop a long-term strategy for District wastewater effluent disposal/reuse that incorporates viable alternatives to the existing system.

These alternatives would be triggered for implementation by existing or future drivers and/or constraints.

// Considerations

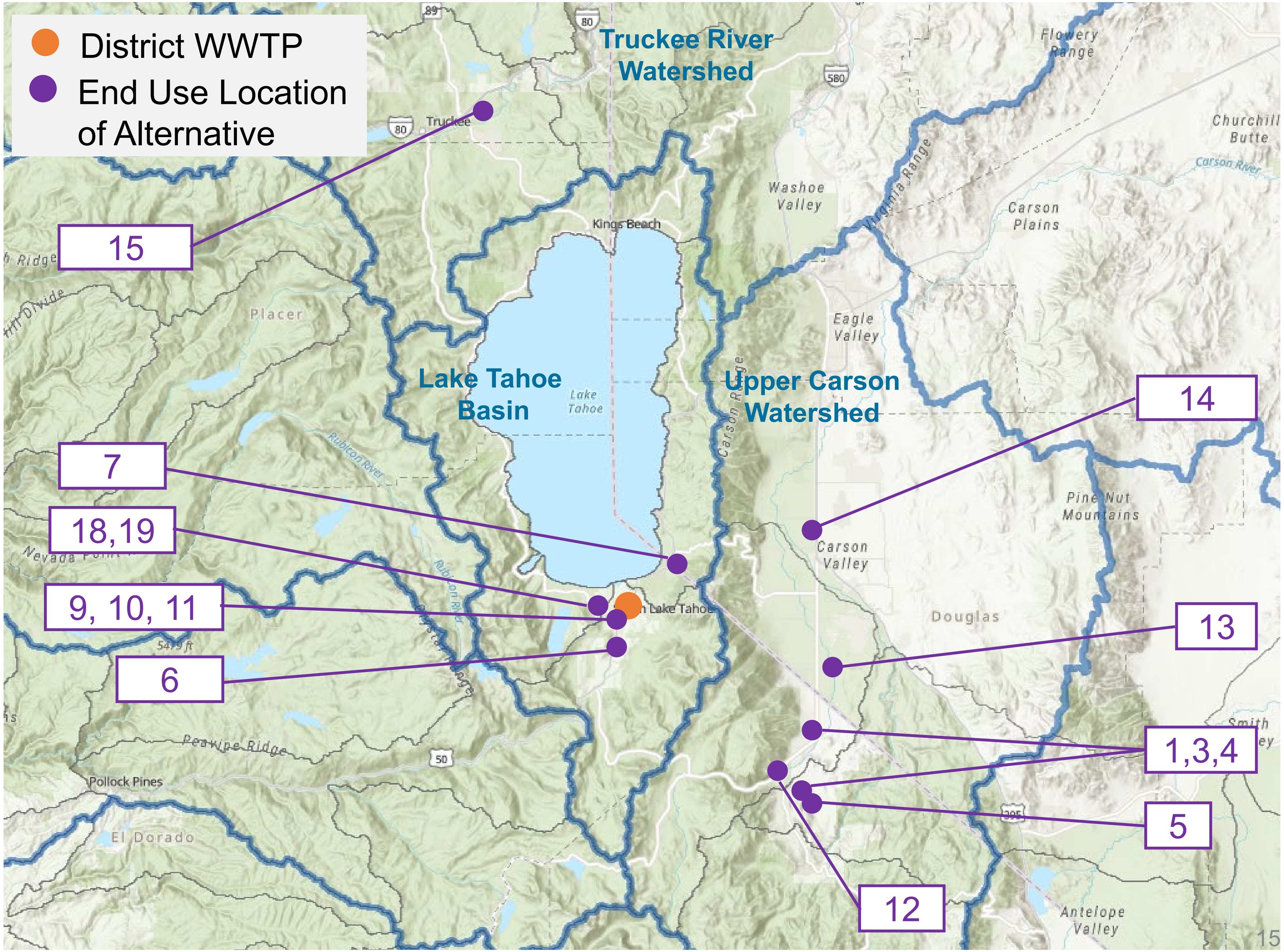
Economic	Regulatory	Technical	Institutional	Environmental and Sustainability	Public
Energy for export	New permit requirements	Aging infrastructure	Rancher contracts	Energy	Cost of service
Continued investment in system	New regulations for recycled water	Capacity Limitations	Collaboration with stakeholders	Beneficial use	Energy
Revenue – sell recycled water	Other regulatory constraints / opportunities	Innovative concepts	New partnerships	Higher beneficial use	Changing perspectives
Revenue – water rights		New technologies		Regional water supply	Better ideas
				Climate change	

Alternatives Identification

// Alternatives Identification

Project Team

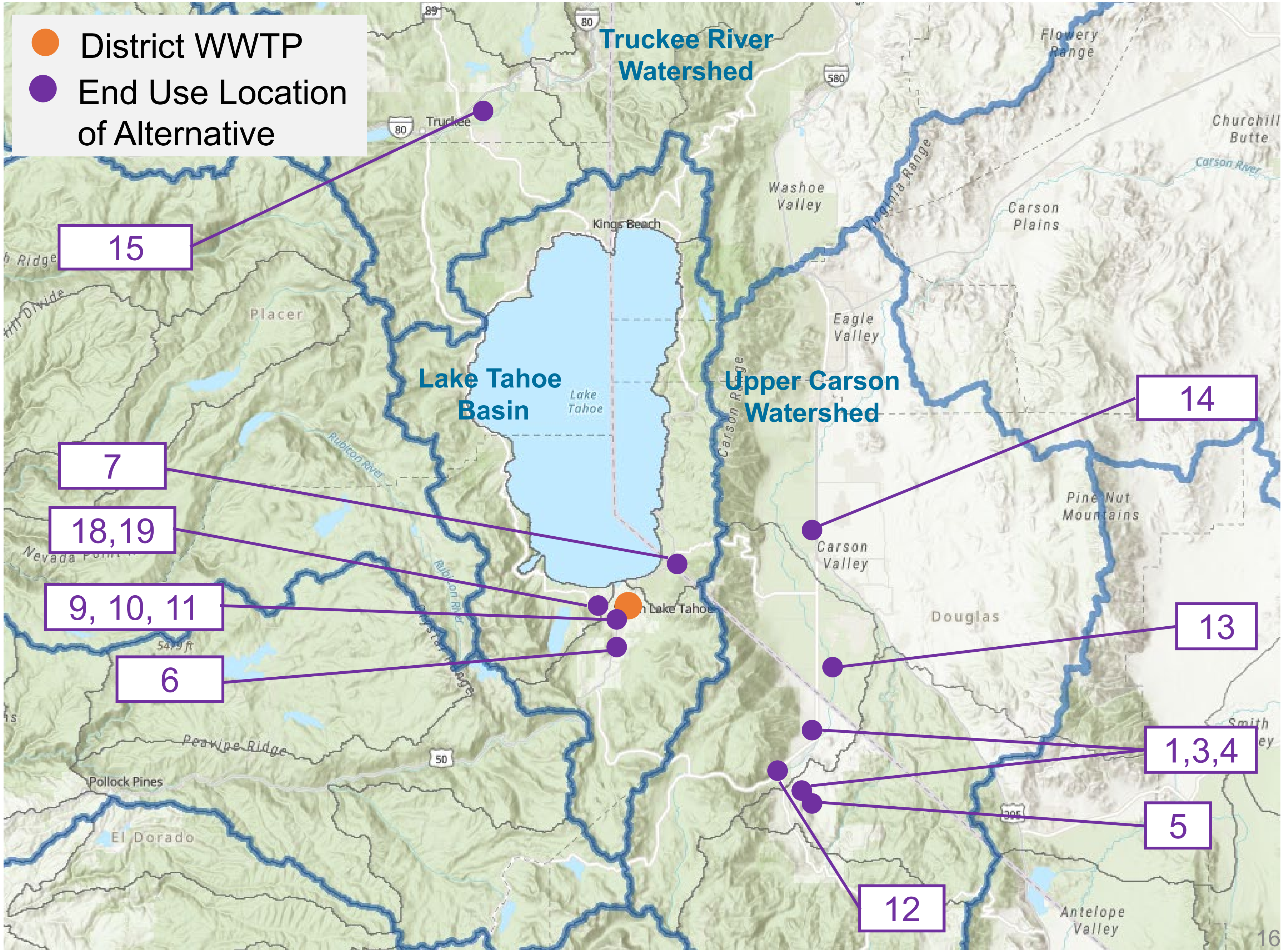
- Brainstorming exercise
- Wide net of potential options
- Varying challenges and potential benefits



WWTP = wastewater treatment plant

// Alternatives Screening Considerations

- Regulatory / Legal / Institutional
- Treatment and Infrastructure
- Environmental / Sustainability
- Public
- Economic



WWTP = wastewater treatment plant

// Alternatives Screening Objectives

- High level screening of alternatives based on comparative assessment of challenges and opportunities

Low Potential	Uncertain Potential	High Potential

Alternatives Screening – High Level

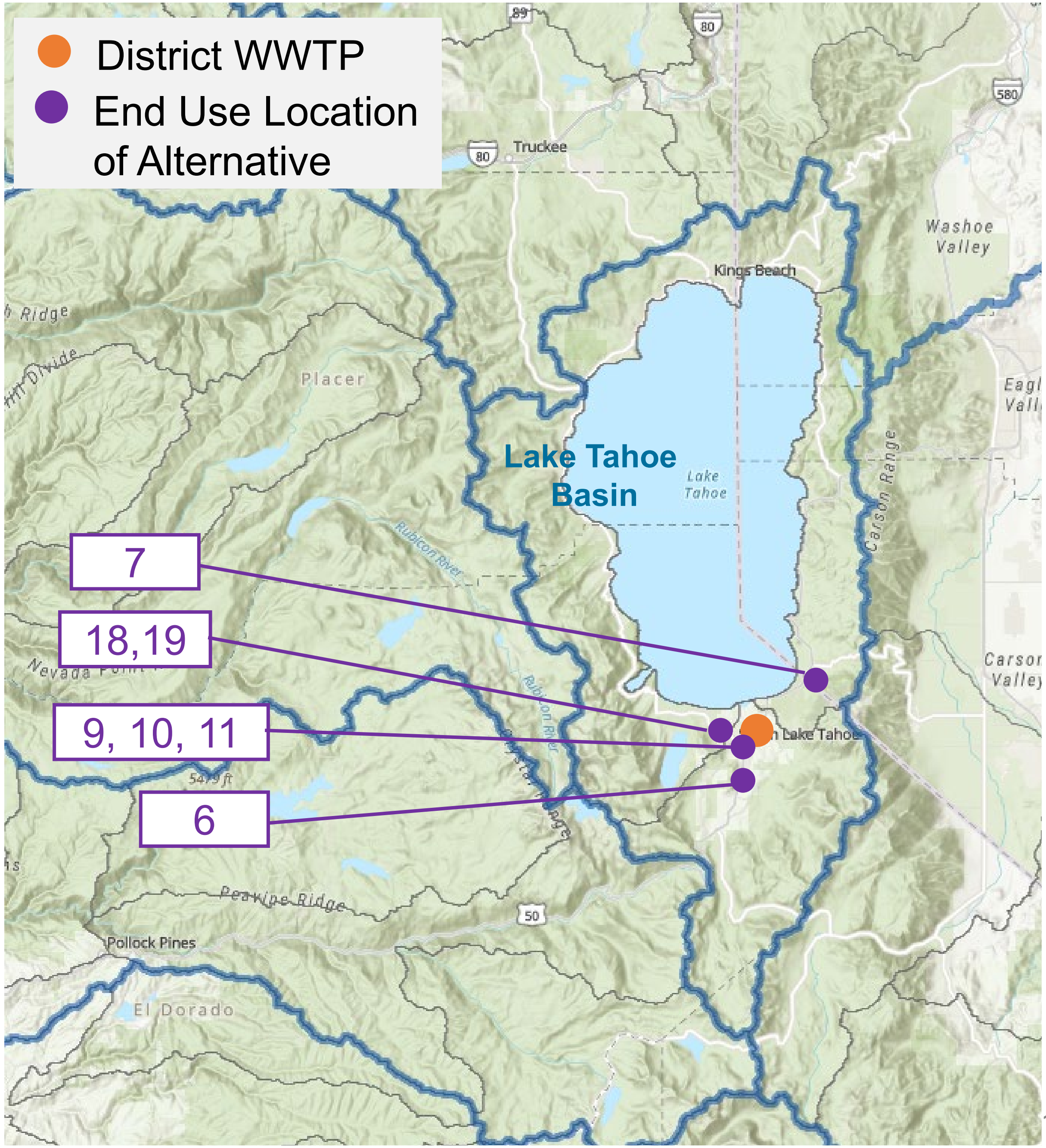
// Screening of Lake Tahoe Basin Alternatives

Challenges

- **Regulatory / Legal / Institutional**
- Treatment and Infrastructure
- Environmental / Sustainability
- Public
- Economic

Potential Benefits

- Water maintained in Lake Tahoe Basin
- Water supply in Lake Tahoe Basin and/or Truckee River Watershed



WWTP = wastewater treatment plant

Alternatives List – Lake Tahoe Basin

End Use Watershed	Alternative	
Lake Tahoe Basin	6	Urban Landscape Irrigation
	7	Snowmaking
	9	Discharge to Heavenly Valley Creek
	10	Discharge to Trout Creek
	11	Discharge to Upper Truckee River
	18	Indirect Potable Reuse – District Water Supply
	19	Direct Potable Reuse – District Water Supply

Major Regulations

Porter Cologne Act

Regulation
Export of wastewater out of Tahoe Basin

Implementation
LRWQCB
Tahoe Regional Planning Agency

Modification
CA Legislature

- Lake Tahoe - Outstanding National Resource Waters (ONRW)
  - No permanent waste streams can be discharged to an ONRW
- Lahontan Regional Water Quality Control Board (LRWQCB) – Basin Plan
  - Prohibits discharge of wastes to surface waters in the Take Tahoe hydrologic unit
  - Prohibits further degradation of water quality in surface waters or groundwaters
- California Environmental Quality Act (CEQA) and Permitting
  - Federal, State and Local Environmental Review and Permitting

Screening

Low Potential	Uncertain Potential	High Potential
Alt 6 – Urban Landscape Irrigation		
Alt 7 – Snowmaking in Basin		
Alt 9,10,11 – Discharge to Tributaries		
Alt 18 – Indirect Potable Reuse		
Alt 19 – Direct Potable Reuse		

Discussion Topics

- Do you agree with the "low potential" screening result for these alternatives?
  - Are there other constraints or limitations associated with these alternatives?

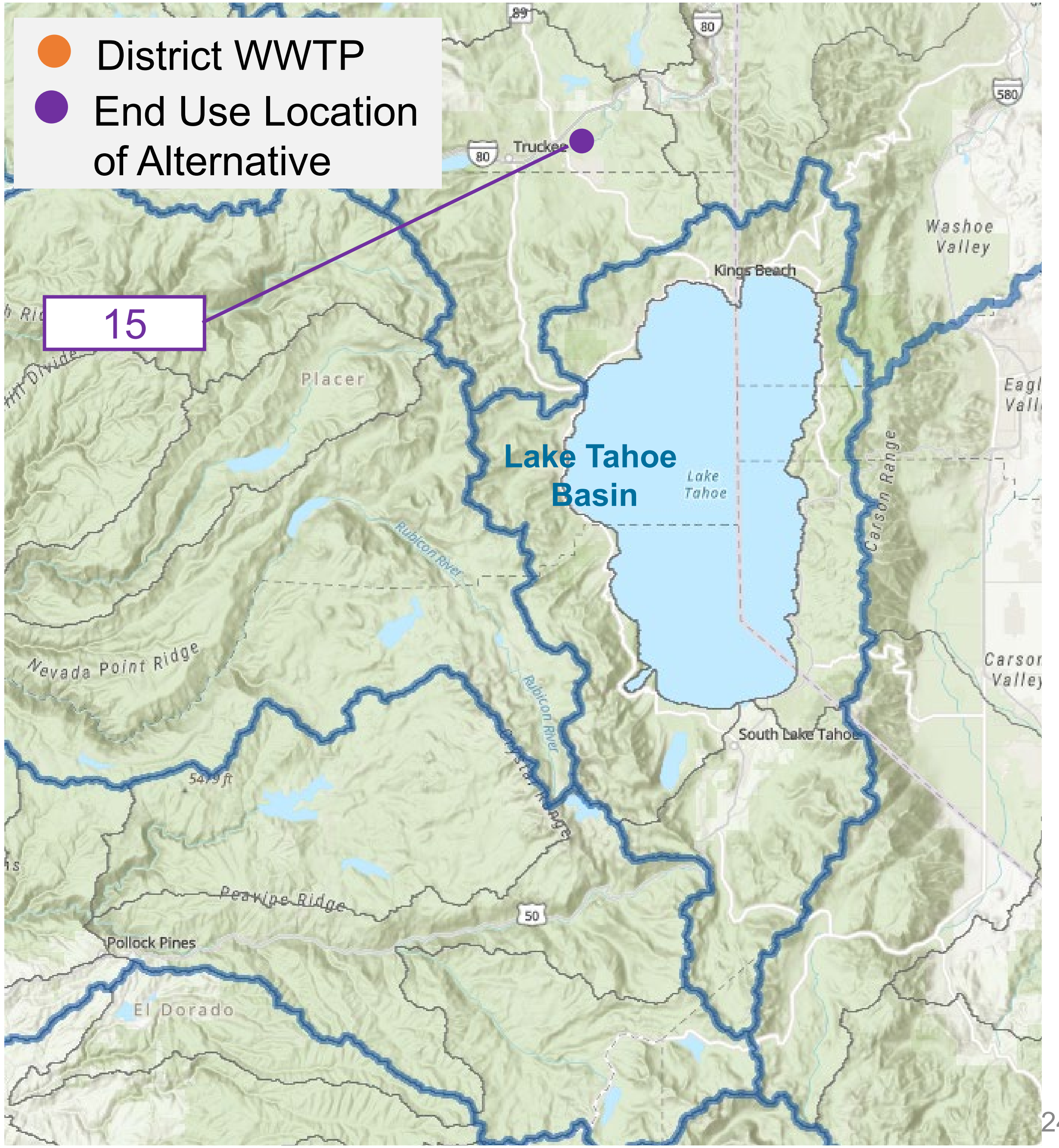
// Screening of Truckee River Watershed Alternatives

Challenges

- **Regulatory / Legal / Institutional**
- **Treatment and Infrastructure**
- Environmental / Sustainability
- Public
- Economic

Potential Benefits

- Water supply in Truckee River Watershed



WWTP = wastewater treatment plant

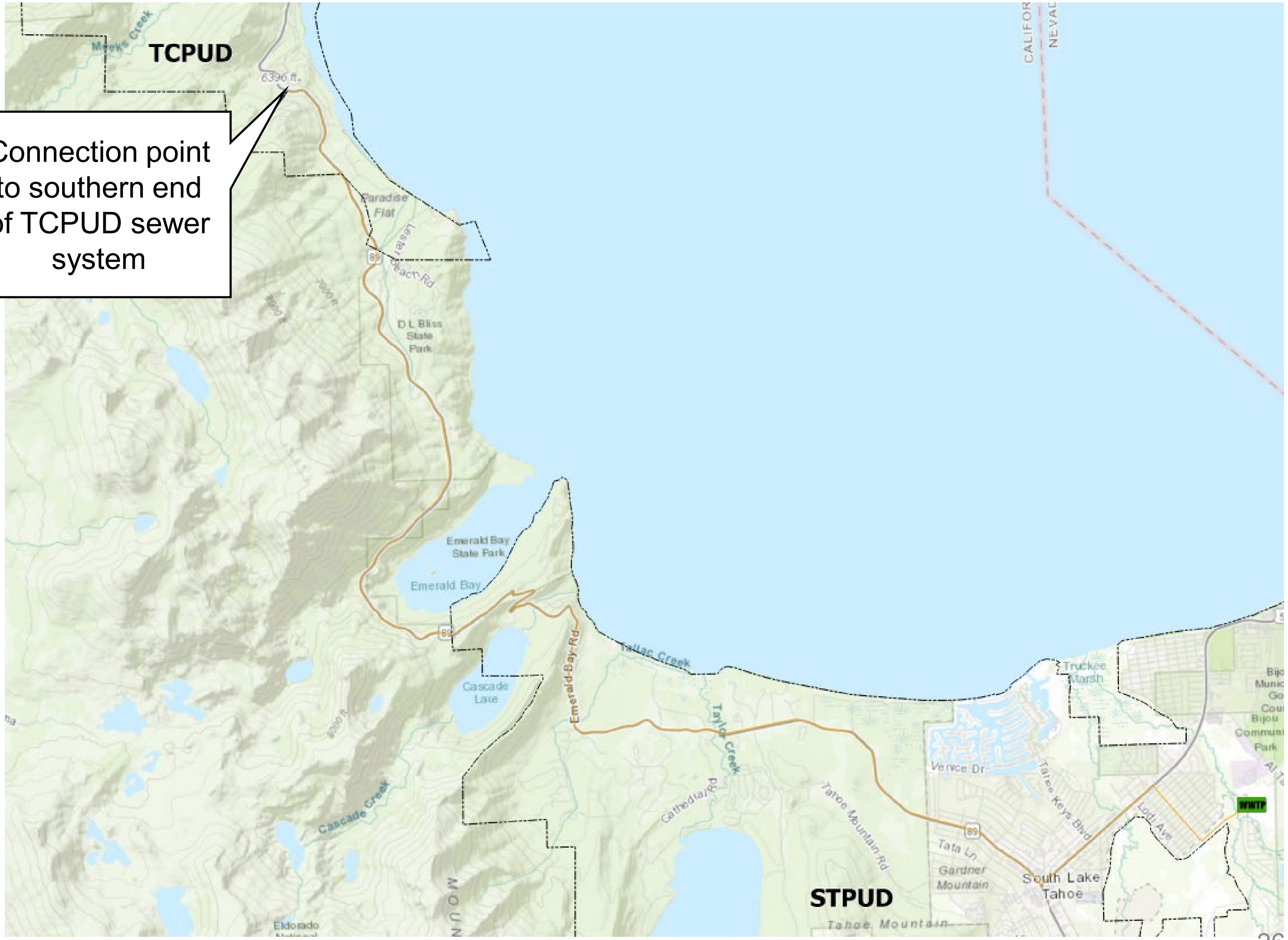
Alternatives List

End Use Watershed	Alternative	
Truckee River Watershed	15	Conveyance to Tahoe City PUD wastewater collection system, then conveyance to T-TSA and discharge to the Truckee River 15A – Treated Effluent to T-TSA 15B – Raw or Partially Treated Effluent to T-TSA

PUD = Public Utility District
T-TSA = Tahoe-Truckee Sanitation Agency

// Treatment and Infrastructure Challenges

- Infrastructure Analysis
  - Extremely challenging pipeline design and construction
  - Capacity limitations of existing pipelines for new flow
- Treatment
  - Capacity limitations for new flow



TCPUD = Tahoe City Public Utility District

Major Regulations

Waste Discharge Requirements

Regulation
Discharge requirements for T-TSA effluent

- CEQA and Permitting
  - Federal, State and Local Environmental Review and Permitting

CEQA = California Environmental Quality Act
T-TSA = Tahoe-Truckee Sanitation Agency

Screening

Low Potential

Alt 15A – Conveyance to T-TSA for Discharge to the Truckee River

Alt 15B – Conveyance to T-TSA for Treatment and Discharge to the Truckee River

Uncertain Potential

High Potential

T-TSA = Tahoe-Truckee Sanitation Agency

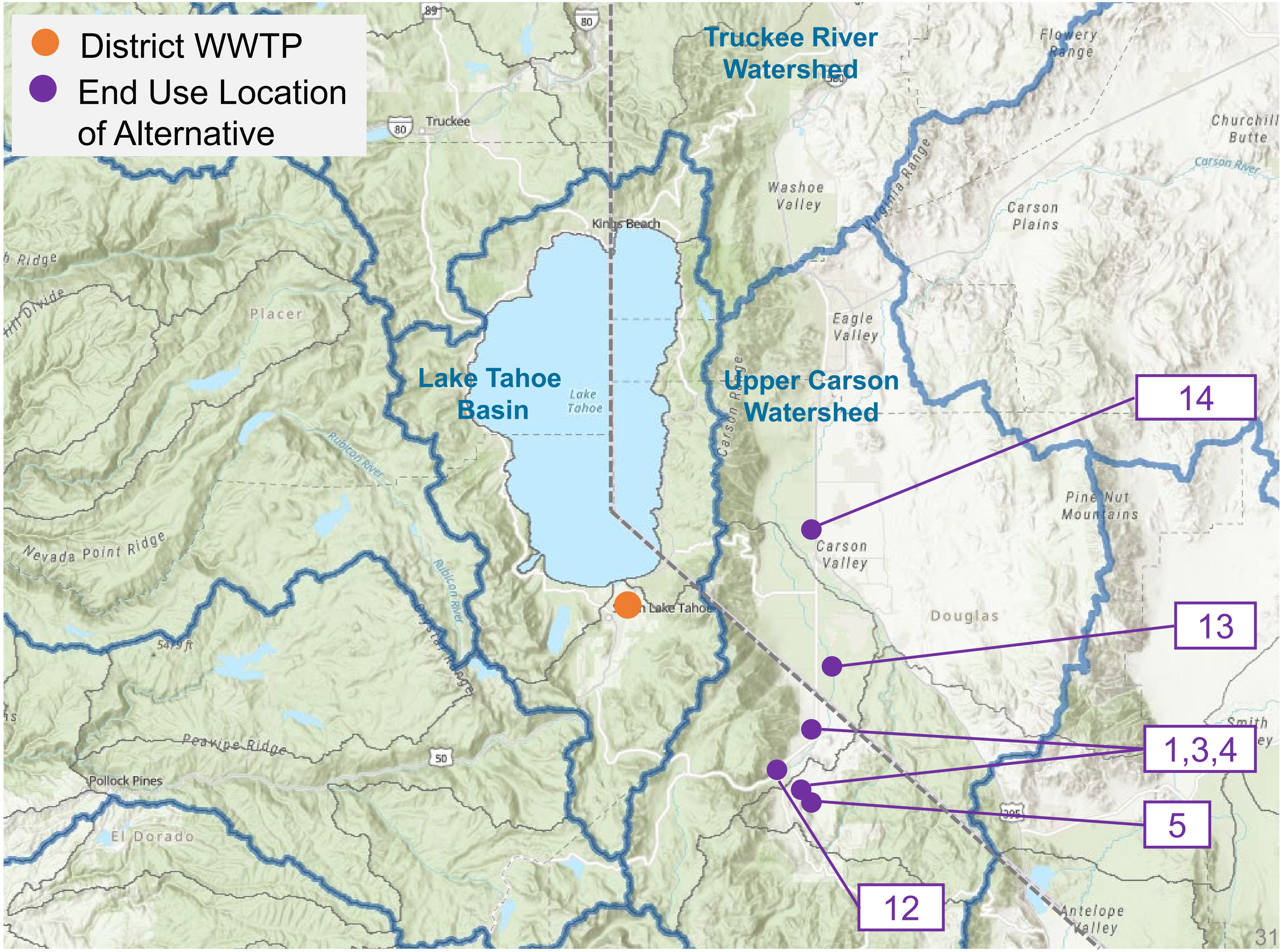
Discussion Topics

- Do you agree with the “low potential” screening result for these alternatives?
  - Are there other constraints or limitations associated with these alternatives?

Alternatives Screening – Detailed

// Remaining Alternatives

- All involve export out of Lake Tahoe Basin
- Some end uses
  - California
  - Nevada



WWTP = wastewater treatment plant

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Alternatives List

End Use Watershed	Alternative	
Upper Carson Watershed	1	Existing System
	3	Expanded Secondary 23 Reuse in Alpine County
	4	Expanded Reuse in Alpine County with Disinfected Tertiary
	13	Expanded Reuse in Nevada 13A – Conveyance via Indian Creek 13B – Conveyance via New Infrastructure
	12	Discharge into West Fork Carson River
	5	Groundwater injection for disposal in Alpine County
	14	Conveyance to Douglas County Lake Tahoe Sewer Authority (DCLTSA) with Reuse in Nevada 14A – Treated Effluent to DCLTSA 14B – Raw or Partially Treated Effluent to DCLTSA

Regulatory and Legal Considerations

- District
  - Waste Discharge Requirements (WDRs)
  - Recycled water permit
- Sustainable Groundwater Management Act (SGMA)
- Salt and Nutrient Management Plan
- Nevada Division of Environmental Protection (NDEP)
  - Recycled water regulations
  - Discharge permit
- Water Rights
- Environmental Review and Permitting

Alternatives Screening

#1 Existing System

Existing System

Components

- Existing Treatment
- Existing Export

Rationale

- No additional treatment or infrastructure capital projects are necessary
- Requires investment in system to maintain a useful life, and/or to address any future capacity limits

Screening

Low Potential

Uncertain Potential

High Potential

Alt 1 – Existing System

Challenges

- Renewal/extension of rancher contracts
- Recycled water revenue
- **Energy associated with export**
- **Repair/replacement/upsizing and maintenance of export infrastructure**

Alternatives Screening

#3 Expanded Secondary 23 Recycled Water Delivery in Alpine County

Expanded Secondary 23 Reuse

Components

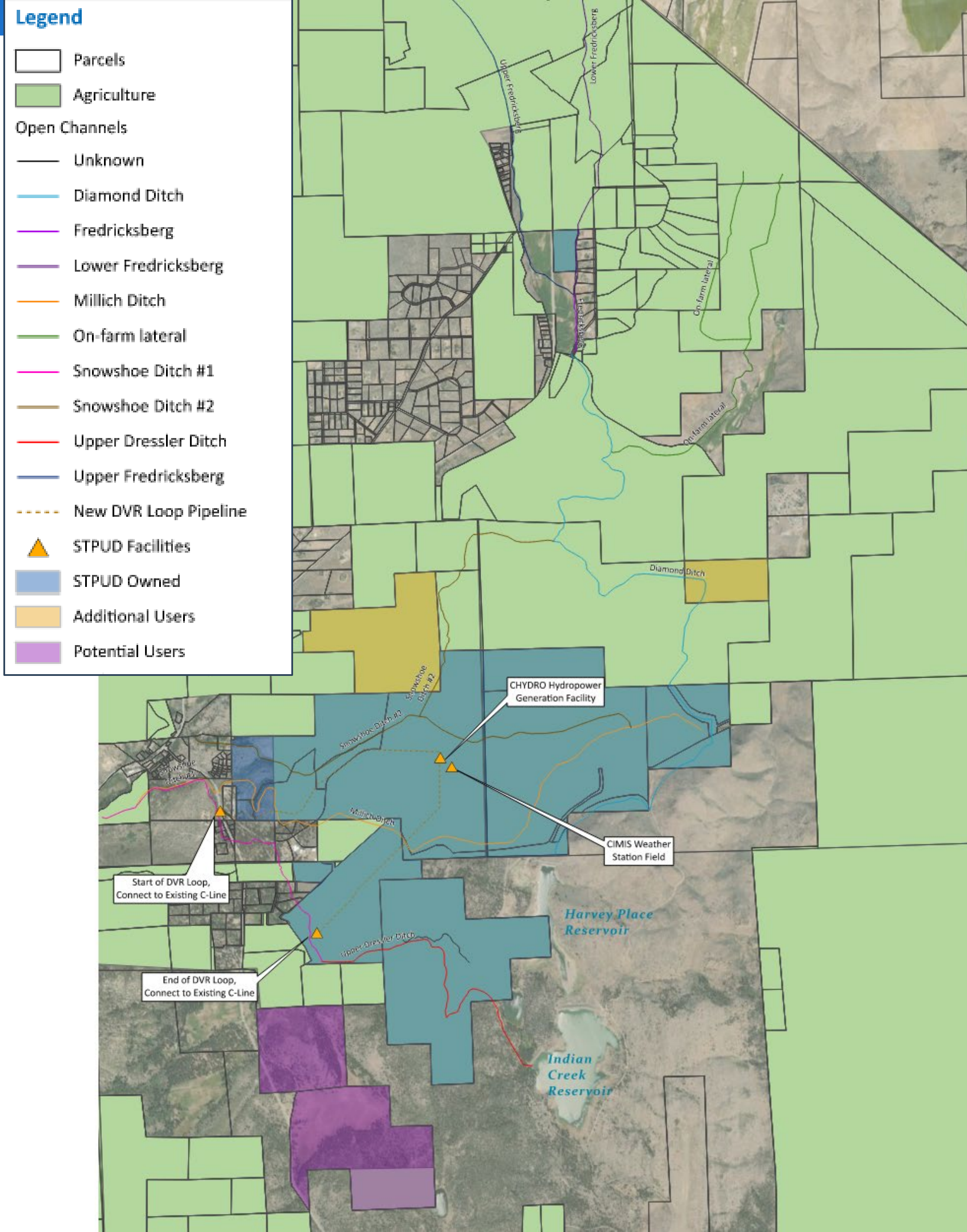
- Existing Treatment
- Existing Export
- Expanded Recycled Water Use on District Property
- Expanded Recycled Water Use on Other Properties
- Possible Infrastructure Modifications/Expansion

Rationale

- New users of Secondary 23 could be in addition to existing contracts
- Direct delivery to existing or new users may provide recycled water revenue

Expanded Secondary 23 Reuse

- Expanded District Irrigation Operations
  - Additional fodder crop irrigation areas
  - Wetlands on property may limit expansion potential
- New Users
  - Few parcels identified to date
- Direct delivery (infrastructure improvements)
  - Existing customers
  - New customers
  - Recycled water distribution system to provide reliable supply to users



Screening

Low Potential

Uncertain Potential

Alt 2B – Expanded Secondary 23 – New Users

High Potential

Alt 2A – Expanded Secondary 23 – District Property

Alt 2C – Expanded Secondary 23 – Direct Delivery (existing & new)

Challenges

- Limited expansion potential
- Renewal/extension of rancher contracts
- Contracts for new users
- Updated WDRs and recycled water permit
- Requires infrastructure to provide direct delivery

WDRs = Waste Discharge Requirements

Discussion Topics

- Do you agree with the “high potential” screening result for expanding Secondary 23 recycled water use on District property?
  - Are there other constraints or limitations associated with this alternative?
- Do you agree with the “high potential” screening result for direct delivery of Secondary 23 recycled to users?
  - Are there other constraints or limitations associated with this alternative?
- Do you agree with the “uncertain potential” screening result for expanding Secondary 23 recycled water use on new properties?
  - Are there other constraints or limitations associated with this alternative?

Alternatives Screening

#4 Expanded Disinfected Tertiary Reuse in Alpine County

Disinfected Tertiary Reuse in Alpine County

Components

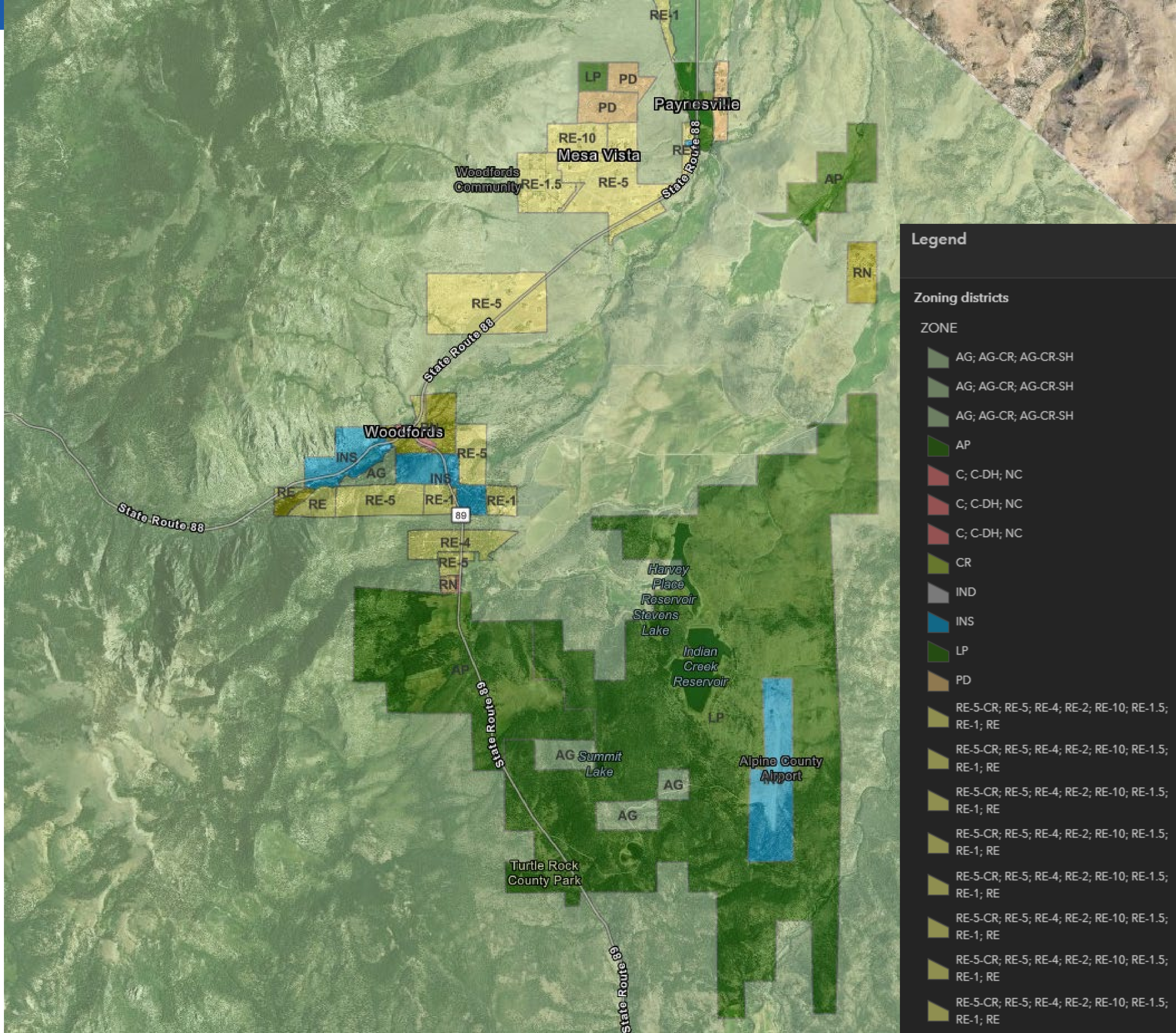
- Existing Export
- Disinfected Tertiary Treatment
- Infrastructure for delivery of recycled water

Rationale

- Disinfected tertiary recycled water may provide a greater demand for recycled water due to increased end use types (e.g., landscape and food crop irrigation)
- May provide potential for the District to generate revenue through sale of recycled water

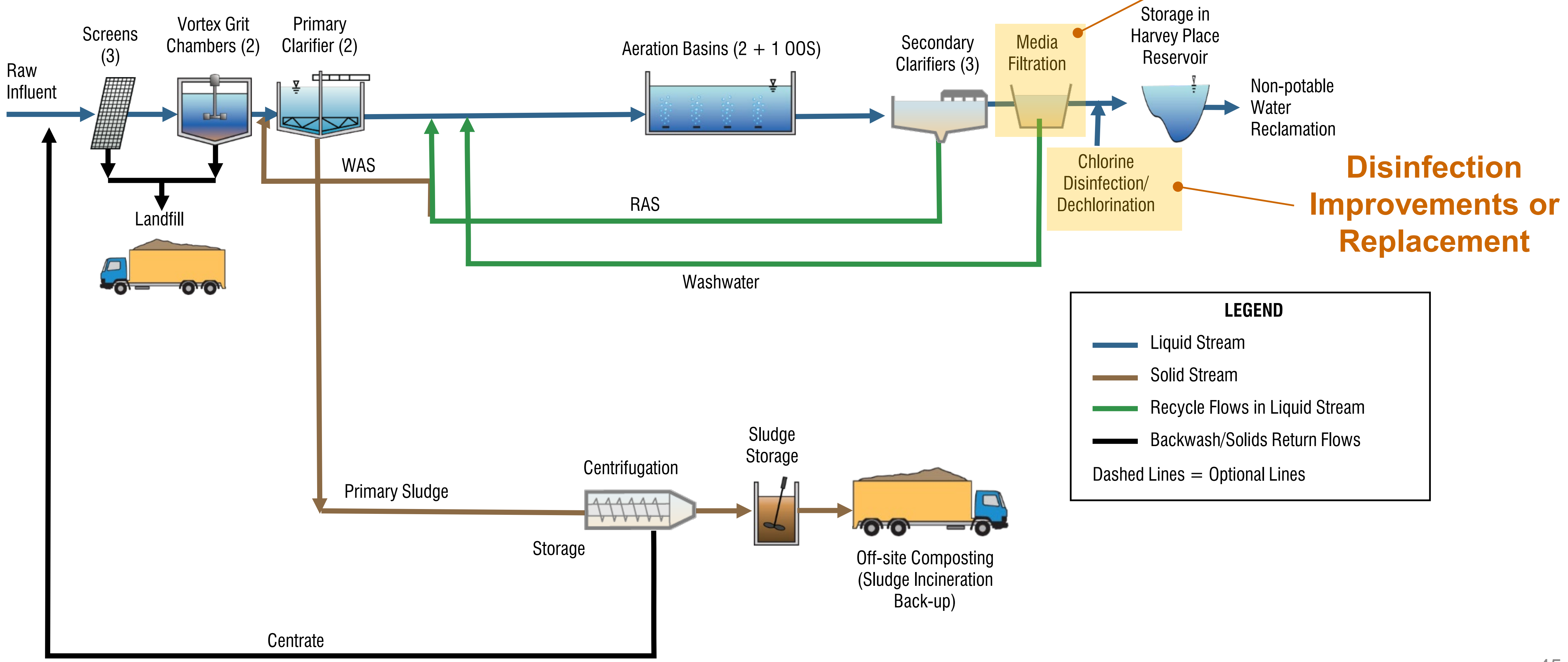
Disinfected Tertiary Reuse in Alpine County

- Region is dominated by Ag and open space
- Ag areas not used for food crops due to climate – limits potential demand
- Limited demand for urban landscape irrigation (parks, golf courses, etc.)



Disinfected Tertiary Reuse in Alpine County

Filter Replacement



Screening

Low Potential

Alt 4 – Expanded Reuse Disinfected Tertiary

Uncertain Potential

High Potential

Challenges

- Limited expansion potential even with higher level of treatment
- Requires treatment upgrades
- Renewal/extension of rancher contracts
- Contracts required for any new users
- Updated WDRs and recycled water permit
- May require additional infrastructure to deliver to customers

WDRs = Waste Discharge Requirements

Could this alternative be considered in the future?

Screened as "Low Potential"

Alt 4 - Expanded Reuse Disinfected Tertiary

IF

- Development patterns change in vicinity of DVR such that there is a significant demand for disinfected tertiary effluent
- Regulatory drivers that require changes in existing recycled water quality

Future Consideration in 50-Year Strategy

Alt 4- Expanded Reuse Disinfected Tertiary

DVR = Diamond Valley Ranch

Discussion Topics

- Do you agree with the “low potential” screening result for Disinfected Tertiary Reuse in Alpine County?
  - Are there other constraints or limitations associated with this alternative?

Alternatives Screening

#13 Expanded Class A or B Reuse in Nevada

Class A or B Reuse in Nevada

Components

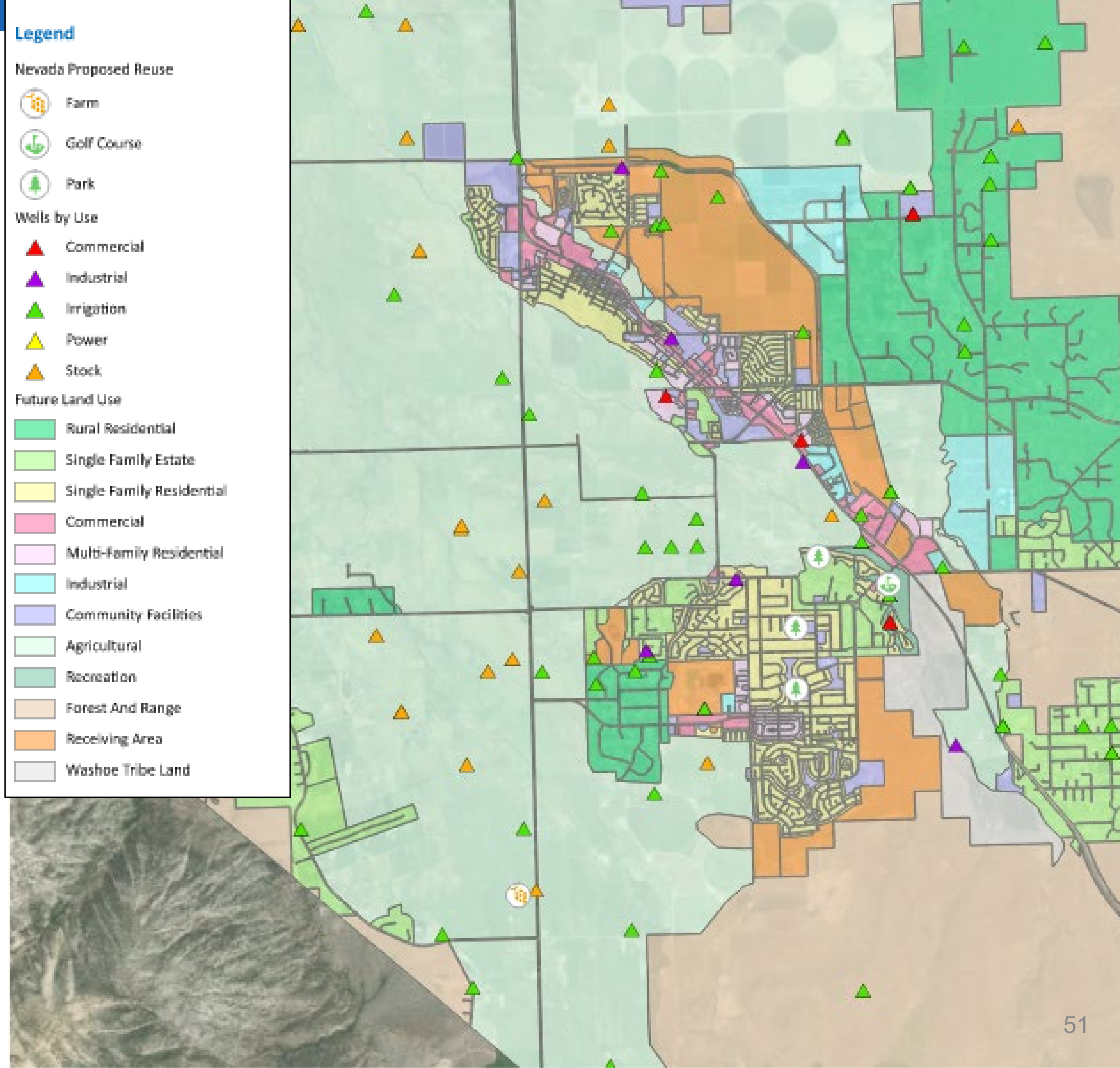
- Existing Export
- Potential Treatment Upgrades
- Infrastructure for delivery of recycled water OR approval for alternative conveyance

Rationale

- May provide potential for sale of recycled water to users in Nevada

Class A or B Reuse in Nevada

- Agricultural Areas
  - Cattle ranching/farming
  - Hay farming
  - Other animal production – bees, goats, sheep, hogs
- Current Ag Water Sources
  - East Fork Carson River
  - Wells
- Golf Courses, Parks, Schools
  - Urban irrigation



Class A or B Reuse in Nevada

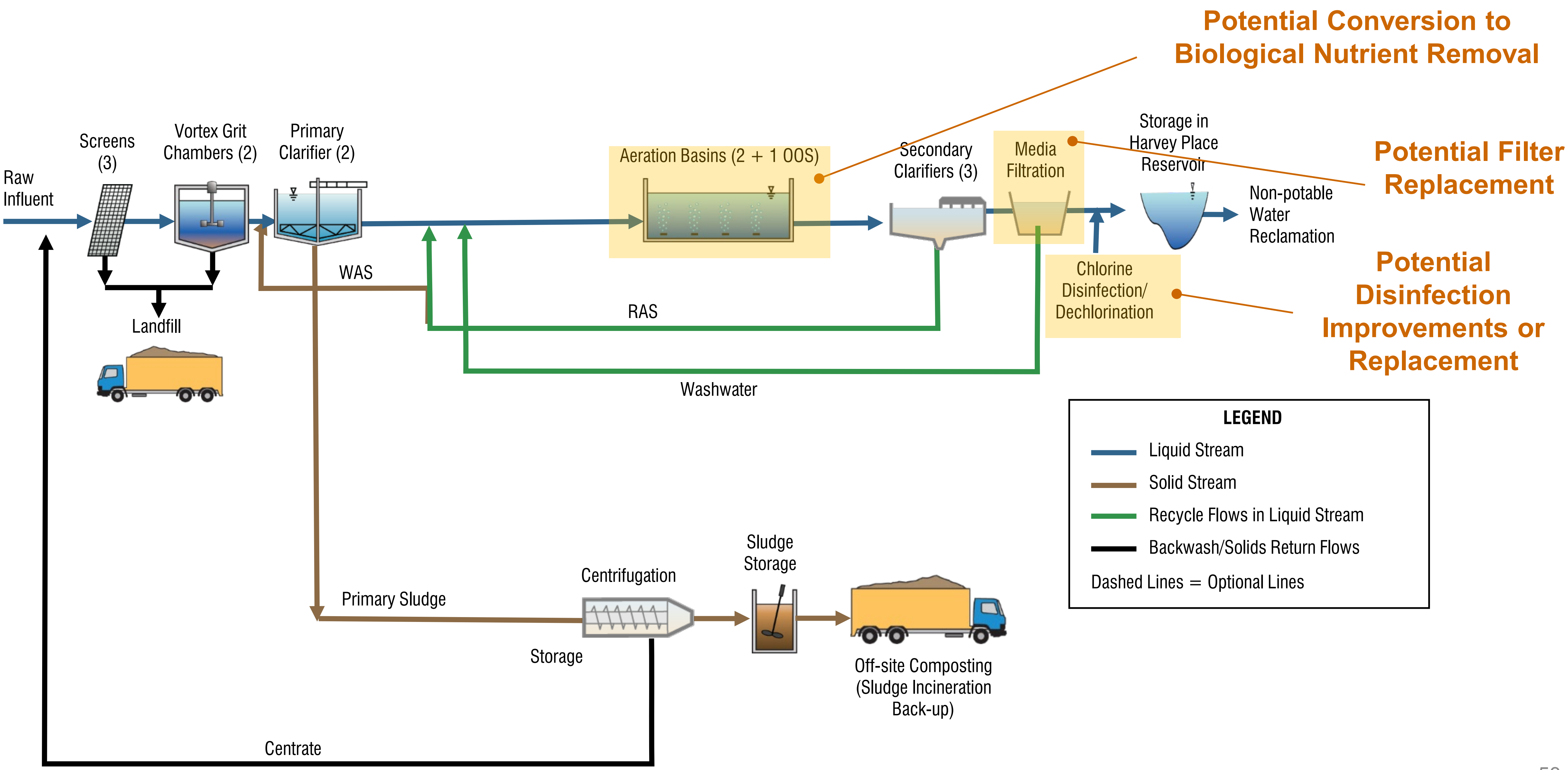
Category of Reuse	Allowable Uses for Reclaimed Water
A+	• Indirect potable reuse through groundwater augmentation and other allowed uses
A	• Spray irrigation of food crops, cemetery, commercial lawn, golf course, greenbelts and parks • Impoundment and outdoor decorative water features • Snowmaking (may require additional treatment) • Commercial toilet and urinal flushing • Commercial window washing or pressure cleaning • Any activity approved for reuse category B, C, D or E
B	• Spray irrigation of cemetery, commercial lawn, golf course, greenbelts and parks • Cooling water for industrial processes • Firefighting in urban areas • Commercial chemical mixing • Street sweeping • Any activity approved for reuse category C, D or E
C	• Spray irrigation of cemeteries, nurseries, commercial lawns, golf courses, green belts and parks with 100-foot buffer • Establishment, restoration or maintenance of wetlands – with buffer zone • Firefighting of forest or wildland fires • Any activity approved for reuse category D or E
D	• Spray irrigation for agriculture with 400-foot buffer • Dust control • Flushing sewer lines or impoundment (with conditions) • Any activity approved for reuse category E
E	• Spray irrigation of agriculture with 800-foot buffer

Class A and Class B Comparison

- Class A includes food crops
- Class A includes snowmaking

- CA and NV Reuse Regulations
  - Similarities for some levels of reuse
  - Type of reuse may require treatment plant upgrades

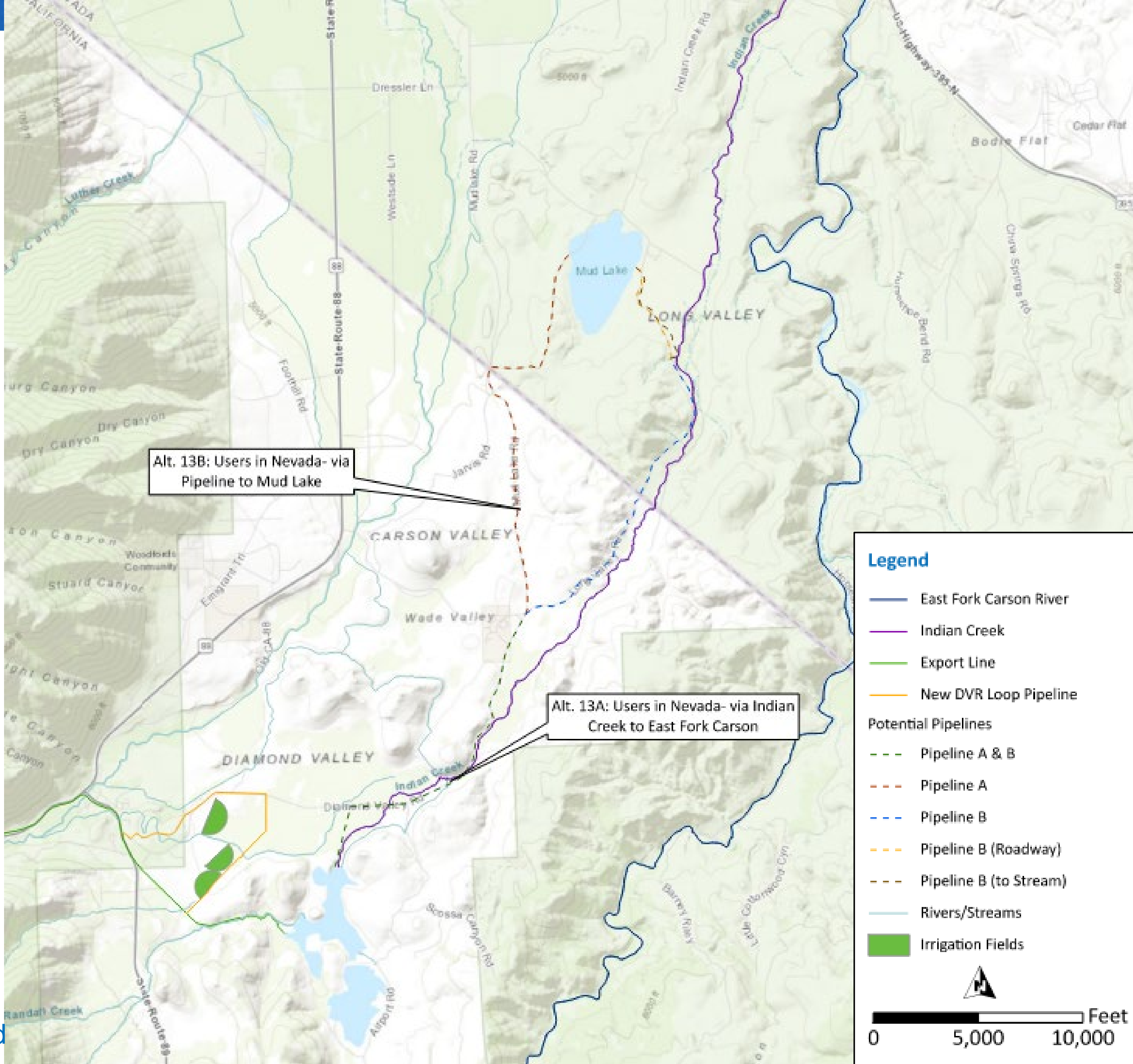
Treatment Improvements – Dependent on Class A or B



Conveyance Options

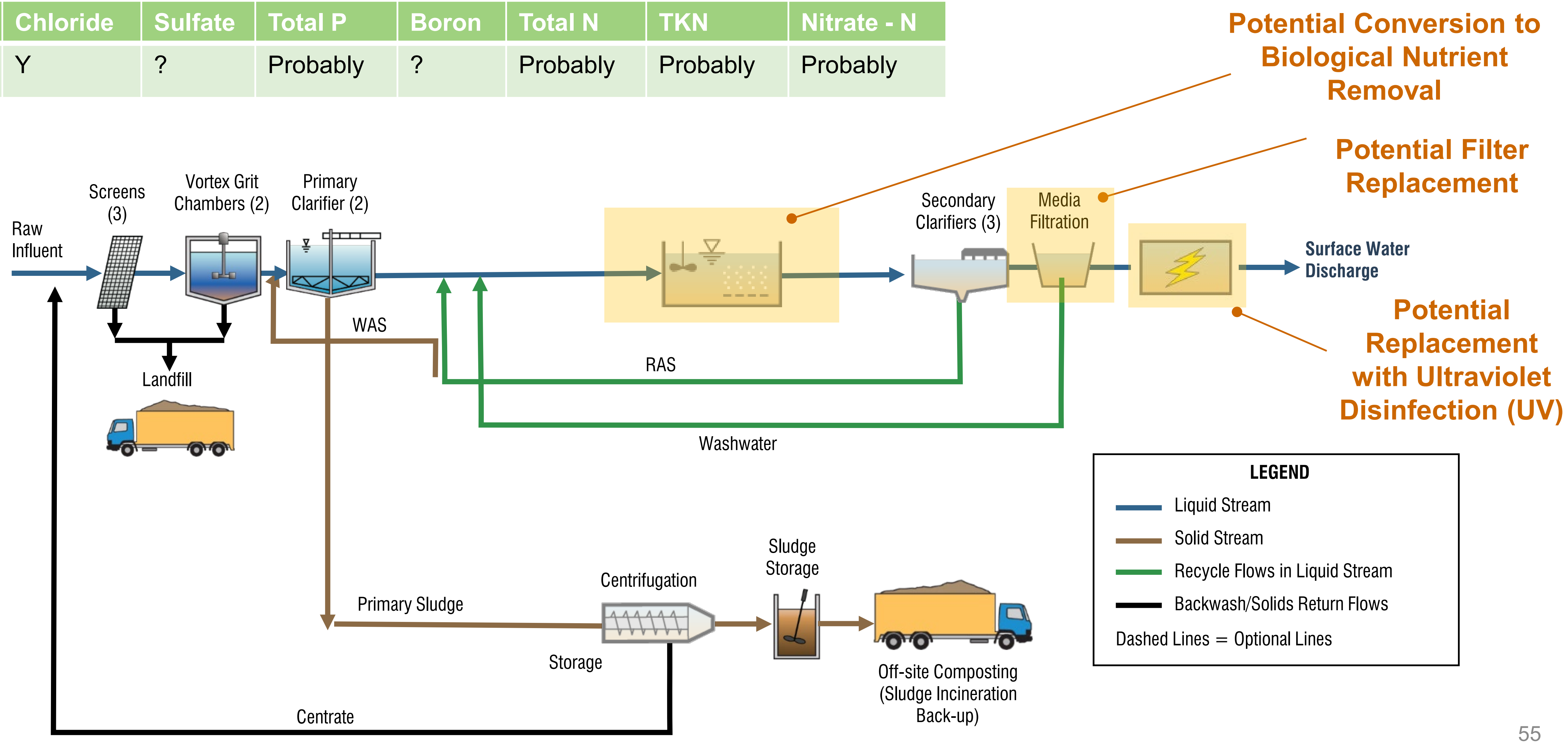
- Potential downstream use from Mud Lake
  - New pipeline to Mud Lake
  - NDEP – Discharge to Mud Lake
- Potential conveyance via Indian Creek to East Fork Carson
  - Regulatory approval LRWQCB and NDEP

NDEP = Nevada Division of Environmental Protection
LRWQCB = Lahontan Regional Water Quality Control Board



Treatment Improvements – Indian Creek Conveyance

TDS	Chloride	Sulfate	Total P	Boron	Total N	TKN	Nitrate - N
N	Y	?	Probably	?	Probably	Probably	Probably



Screening

Low Potential

Uncertain Potential

Alt 13A – Discharge to Indian Creek with Downstream Use

High Potential

Challenges/Uncertainties

- Either conveyance approach
  - Treatment upgrades
  - Potential demand and revenue opportunities
- Conveyance by Indian Creek
  - Confirmation on applicable water quality standards
  - Requirements for additional treatment
  - Surface water discharge permit
- CA and NV regulations

Screening

Low Potential

Uncertain Potential

Alt 13B – Conveyance to Mud Lake with Downstream Use

High Potential

Challenges/Uncertainties

- Either conveyance approach
  - Treatment upgrades
  - Potential demand and revenue opportunities
- Conveyance by pipeline to Mud Lake
  - Use of Mud Lake as source for recycled water users
  - Confirmation on applicable water quality standards for Mud Lake
  - Pipeline alignment assessment
  - Surface water discharge permit
- CA and NV regulations

Discussion Topics

- Do you agree with the “uncertain potential” screening result for Class A or B Reuse in Nevada via Indian Creek?
  - Are there other constraints or limitations associated with this alternative?
- Do you agree with the “uncertain potential” screening result for Class A or B Reuse in Nevada via a new conveyance pipeline to Mud Lake?
  - Are there other constraints or limitations associated with this alternative?

Alternatives Screening

#14 Conveyance to Douglas County Lake Tahoe Sewer Authority (DCLTSA) with Reuse in NV

Conveyance to DCLTSA with Class D (or higher) Reuse in Nevada

Components

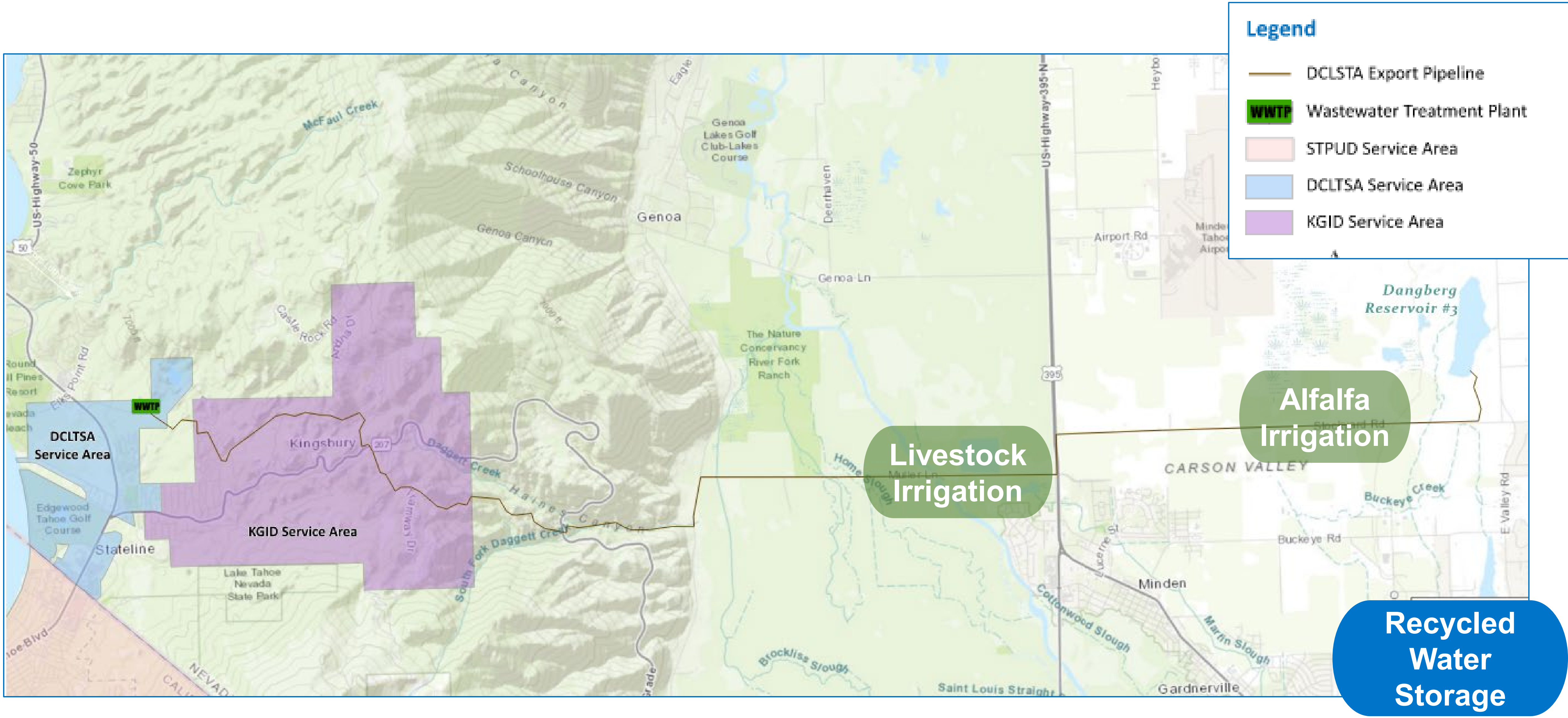
- Conveyance Pipeline to DCLTSA
- Treatment Options – District or DCLTSA
- Potential Treatment Upgrades at District
- Potential infrastructure for delivery of recycled water (new users in NV)

Rationale

- Combined export with DCLTSA would potentially eliminate the need for the District's existing export system
- Potential for revenue from sale of recycled water to users in NV

DCLTSA = Douglas County Lake Tahoe Sewer Authority

DCLTSA Export Pipeline and Recycled Water Use



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DCLTSA Treatment Process

- Partial or Full treatment at DCLTSA
  - District existing effluent flows ≅ rated capacity

DCLTSA Treatment Facility

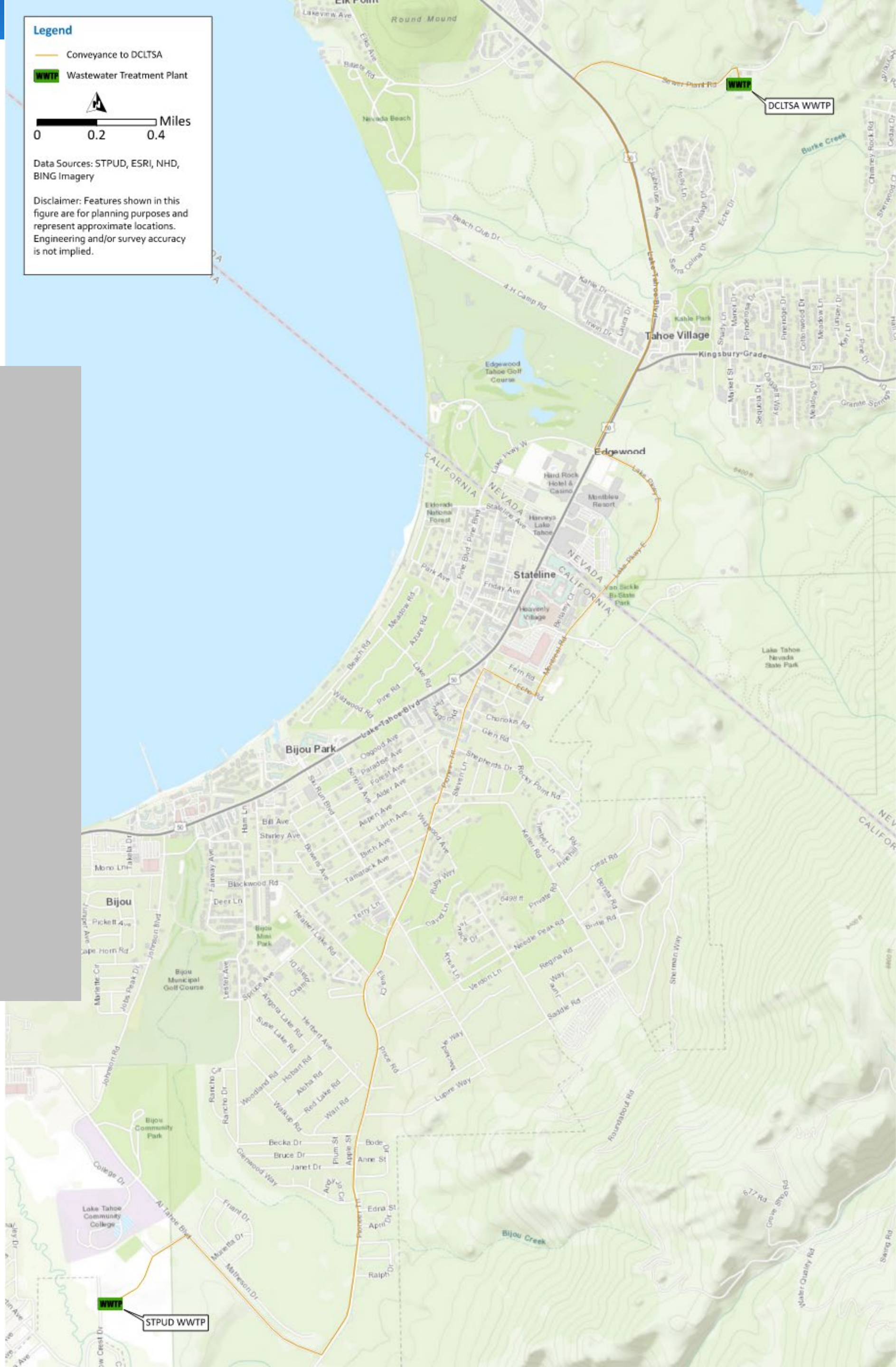
Parameter	Value
Rated Capacity	3.75 mgd
Max Day Flow	4.2 mgd

- Full Treatment at District
  - Meet DCLTSA treated effluent quality requirements
  - Treatment upgrades – Nutrient removal

DCLTSA = Douglas County Lake Tahoe Sewer Authority
mgd = million gallons per day

Conveyance to DCLTSA

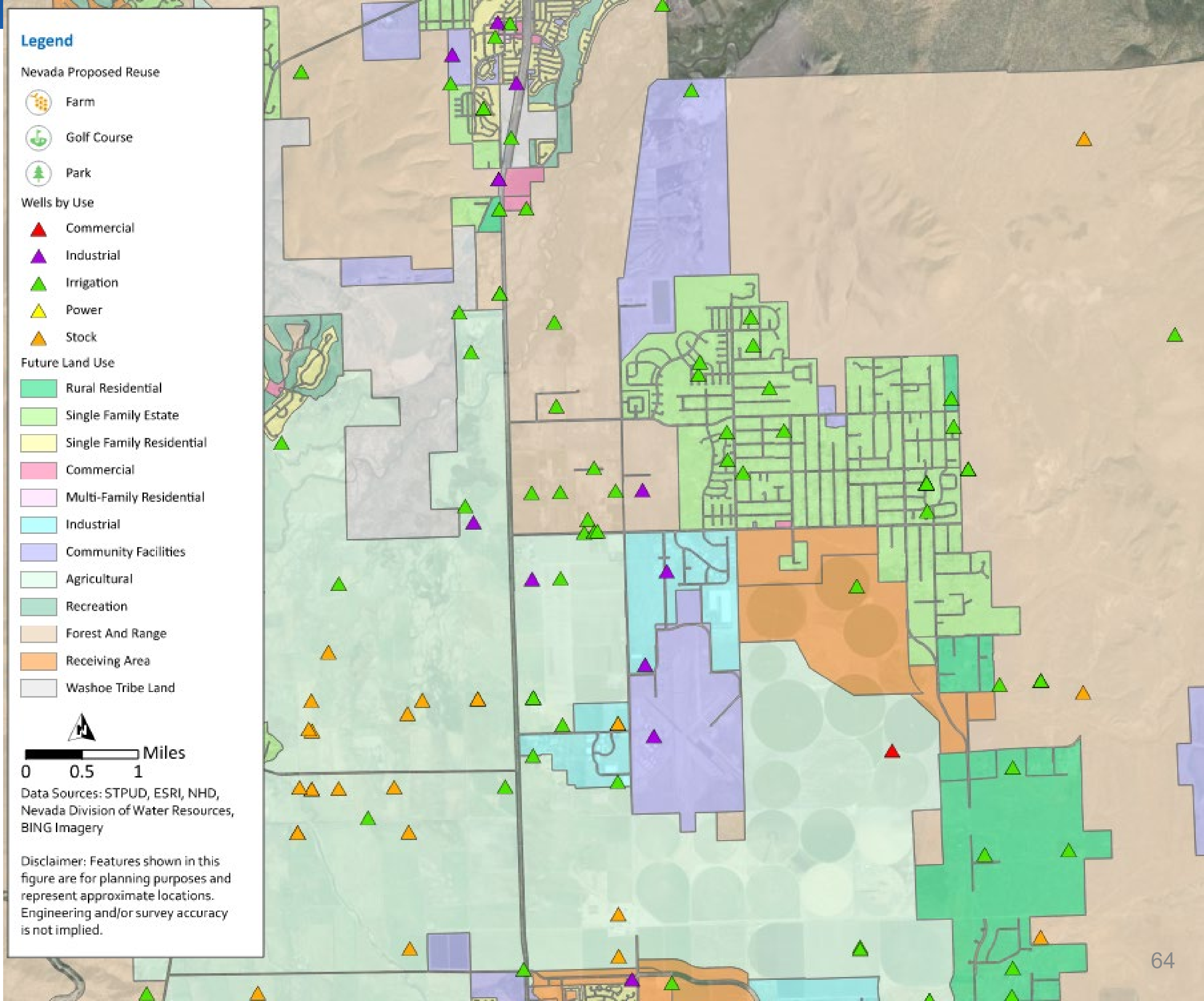
- Pipeline to DCLTSA
  - ~6.3 miles 24/30-inch force main
  - Short construction window
  - Creek crossings
  - Business impacts
- Connection point may require additional infrastructure or infrastructure capacity improvements



DCLTSA = Douglas County Lake Tahoe Sewer Authority

Demands in Vicinity

- Existing Demands
  - Livestock
  - Fodder Crop
- Potential New Demand
  - Ranches / Livestock
  - Urban Irrigation – Golf Courses
  - Snowmaking – NV side of Heavenly Ski Resort
- Conveyance to new users



Screening

Low Potential

Alt 14B – Conveyance to DCLTSA for Treatment, Export, and Reuse

Uncertain Potential

Alt 14A – Conveyance to DCLTSA for Export and Reuse

High Potential

Challenges/Uncertainties

- DCLTSA export system capacity
- Connection point to export line
- Demand and market for recycled water
- DCLTSA conditions/requirements for taking recycled water
- Conveyance pipeline alignment

DCLTSA = Douglas County Lake Tahoe Sewer Authority

Discussion Topics

- Do you agree with the “low potential” screening result for conveyance to DCLTSA, treatment at DCLTSA, export to and reuse in NV?
  - Are there other constraints or limitations associated with this alternative?
- Do you agree with the “uncertain potential” screening result for treatment at South Tahoe Public Utility District, conveyance to DCLTSA, export to and reuse in NV?
  - Are there other constraints or limitations associated with this alternative?

DCLTSA = Douglas County Lake Tahoe Sewer Authority

Alternatives Screening

#12 Discharge to West Fork Carson and use in Nevada

Discharge to West Fork Carson River

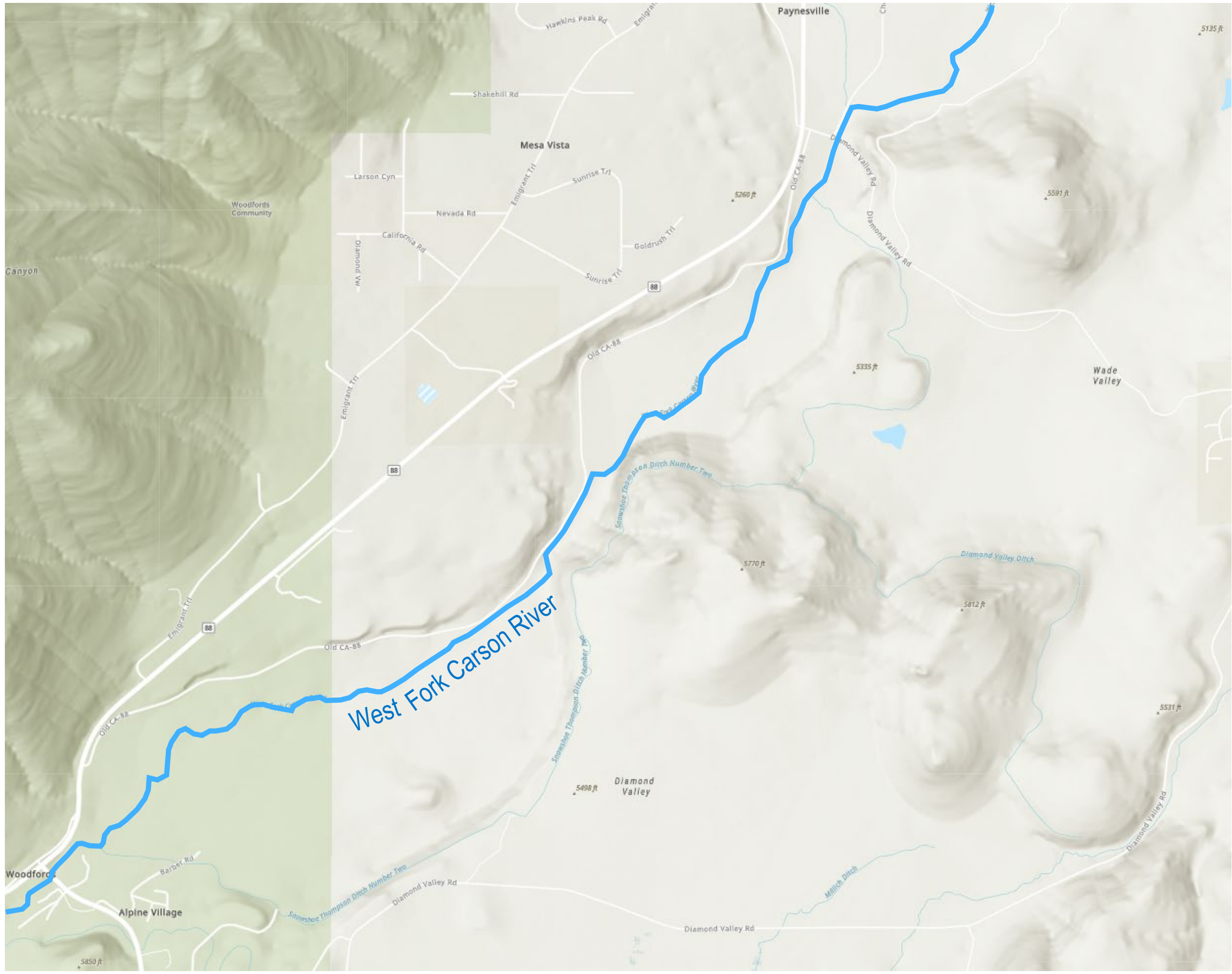
Components

- Existing Export
- New Surface Water Discharge
- Potential Treatment Upgrades

Rationale

- Potentially reduce some Alpine County recycled water operations
- Potential opportunity for revenue

Discharge to West Fork Carson River

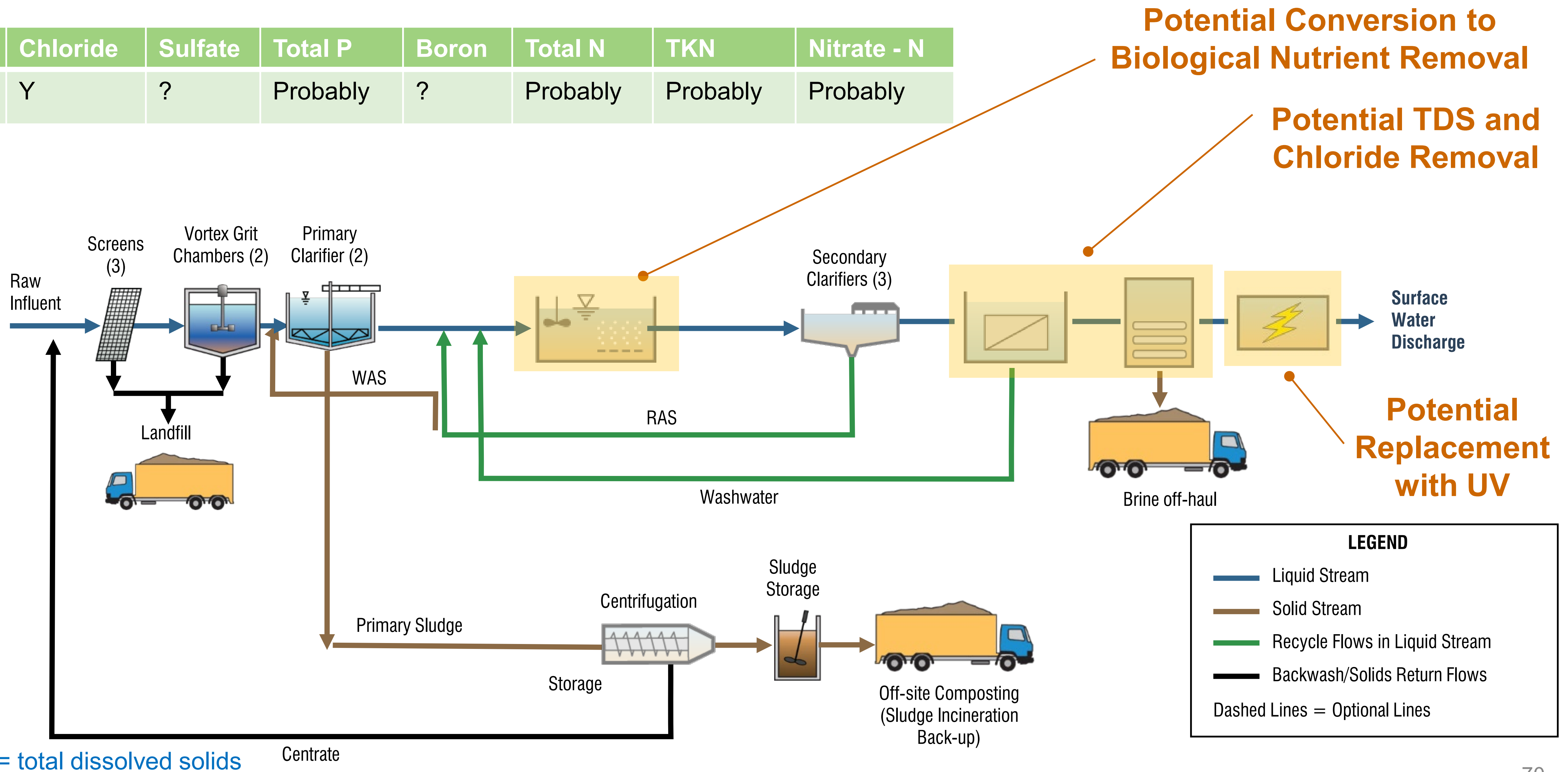


- LRWQCB
  - New discharge permit
  - Potential treatment requirements
- Water Rights
  - Analysis of water rights and adjudication

LRWQCB = Lahontan Regional Water Quality Control Board

Regulatory Analysis - Reasonable Potential

TDS	Chloride	Sulfate	Total P	Boron	Total N	TKN	Nitrate - N
Y	Y	?	Probably	?	Probably	Probably	Probably



TDS = total dissolved solids
UV = ultraviolet

TDS and Chloride Removal

Industry Standard Treatment

Reverse Osmosis

20% Concentrate Production
- Existing = 0.8 mgd
- Future = 1.1 mgd

Industry Standard Concentrate Disposal

Transport - Landfill

Brine Line

Thermal Concentration and Crystallization

Evaporation Ponds

Combinations

- Current Technologies
  - Not applicable
  - Very $$$
- Future technologies
  - RO Membranes
    - Reduction in concentrate production
  - Alternatives to RO
    - New technologies
    - Combinations of existing technologies

mgd = million gallons per day
RO = reverse osmosis

Screening

Low Potential

Alt 12 – Discharge to West Fork Carson

Uncertain Potential

High Potential

Challenges/Uncertainties

- Feasibility of selling recycled water in adjudicated West Fork Carson
- Surface water discharge permit
- Likely requires nutrient removal and possibly TDS and chloride removal
- Existing technologies for TDS and chloride removal present issues with concentrate stream

TDS = total dissolved solids

Alternatives that may be considered in the future

Screened as "Low Potential"

Alt 14 - Discharge to West Fork Carson River

IF

- Increased pressure on water supplies in West Fork Carson River, such that there is a significant demand, market, and revenue mechanism for recycled water
- Non-RO based technology for TDS and chloride removal
- Surface water discharge permit

Future Consideration in 50-Year Strategy

Alt 14 - Discharge to West Fork Carson River

RO = reverse osmosis

Discussion Topics

- Do you agree with the “low potential” screening results for Discharge to West Fork Carson River?
  - Are there other constraints or limitations associated with this alternative?

Alternatives Screening

#5 Groundwater Injection for Disposal in Alpine County

Groundwater Injection for Disposal

Components

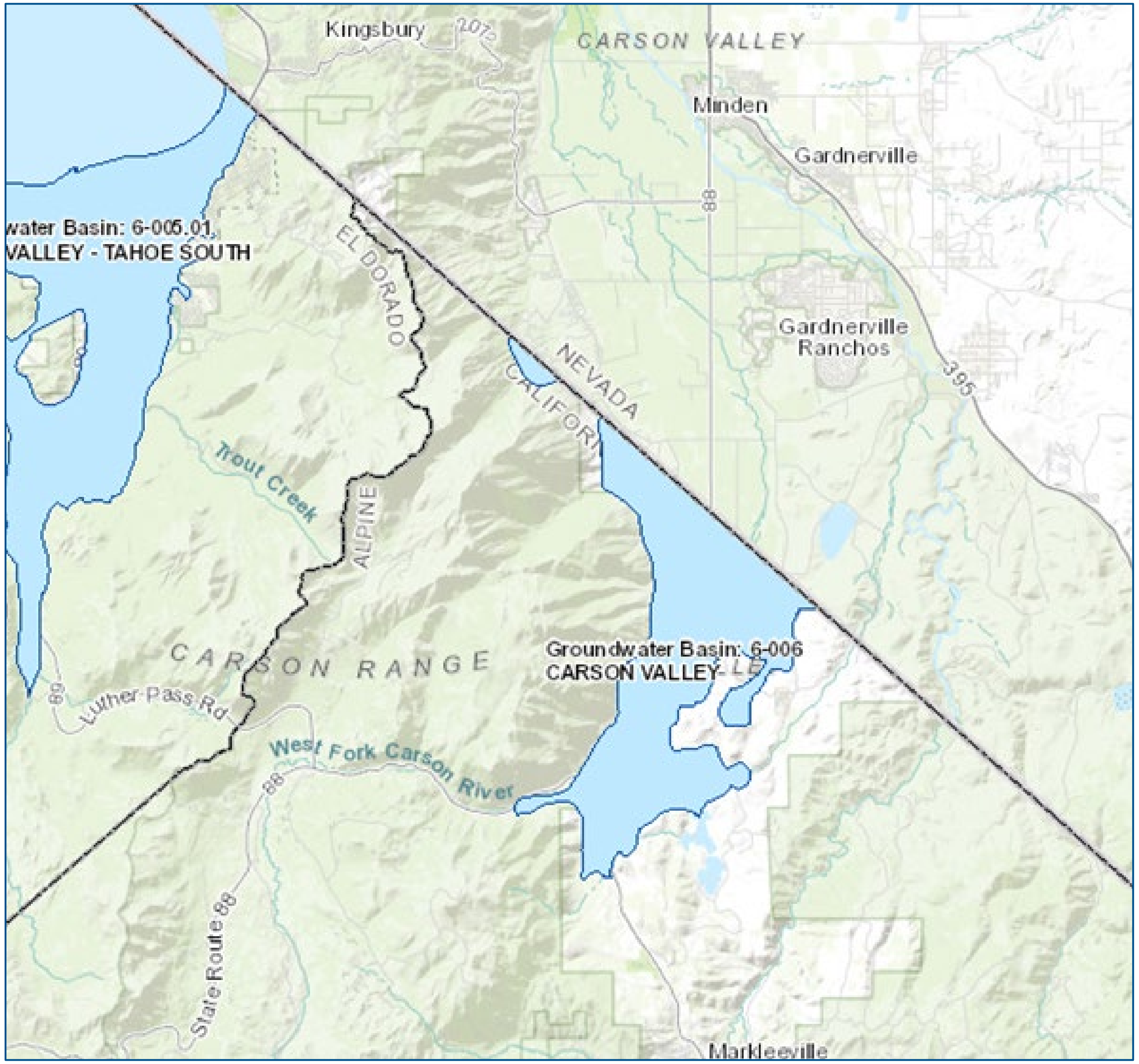
Existing Export

New Injection Wells for Groundwater Discharge

Rationale

- Potentially reduce some Alpine County recycled water operations

Groundwater Injection for Disposal



- Carson Valley Basin MUN Designation
  - Municipal and Domestic Wells
  - Low TDS and chloride concentrations
    - TDS = 94 mg/L
    - Chloride = 9 mg/L
- LRWQCB permit
- Disposal
  - No beneficial use

LRWQCB = Lahontan Regional Water Quality Control Board
MUN = municipal and domestic supply

TDS = total dissolved solids

Screening

Low Potential

Alt 5 – Groundwater Recharge for Disposal

Uncertain Potential

High Potential

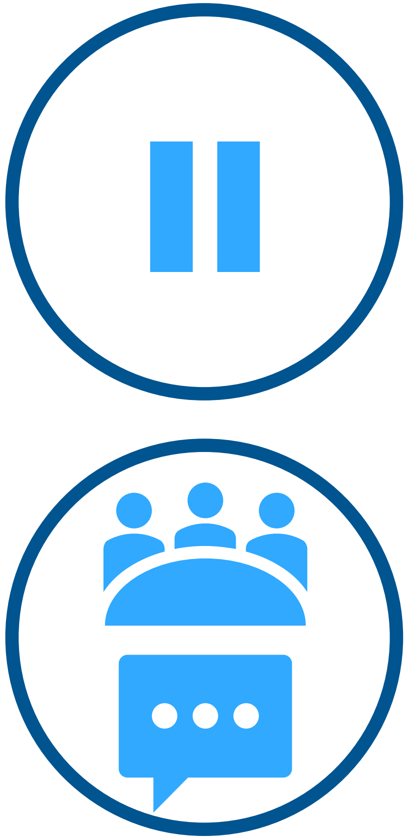
Challenges/Uncertainties

- MUN designation of basin presents limits permitting of effluent disposal in basin
- No beneficial use of recycled water

MUN = municipal and domestic supply

Discussion Topics

- Do you agree with the “low potential” screening results for groundwater injection for disposal in Alpine County?
  - Are there other constraints or limitations associated with this alternative?



Summary

Summary

Uncertain Potential

- Alt 2B – Expanded Secondary 23 – New Users
- Alt 13A – Discharge to Indian Creek with Downstream Use
- Alt 13B – Conveyance to Mud Lake with Downstream Use
- Alt 14B – DCLTSA for Conveyance and Reuse

High Potential

- Alt 1 - Existing
- Alt 2A – Expanded Secondary 23 – District Property
- Alt 2C – Expanded Secondary 23 – Direct Delivery (existing & new)

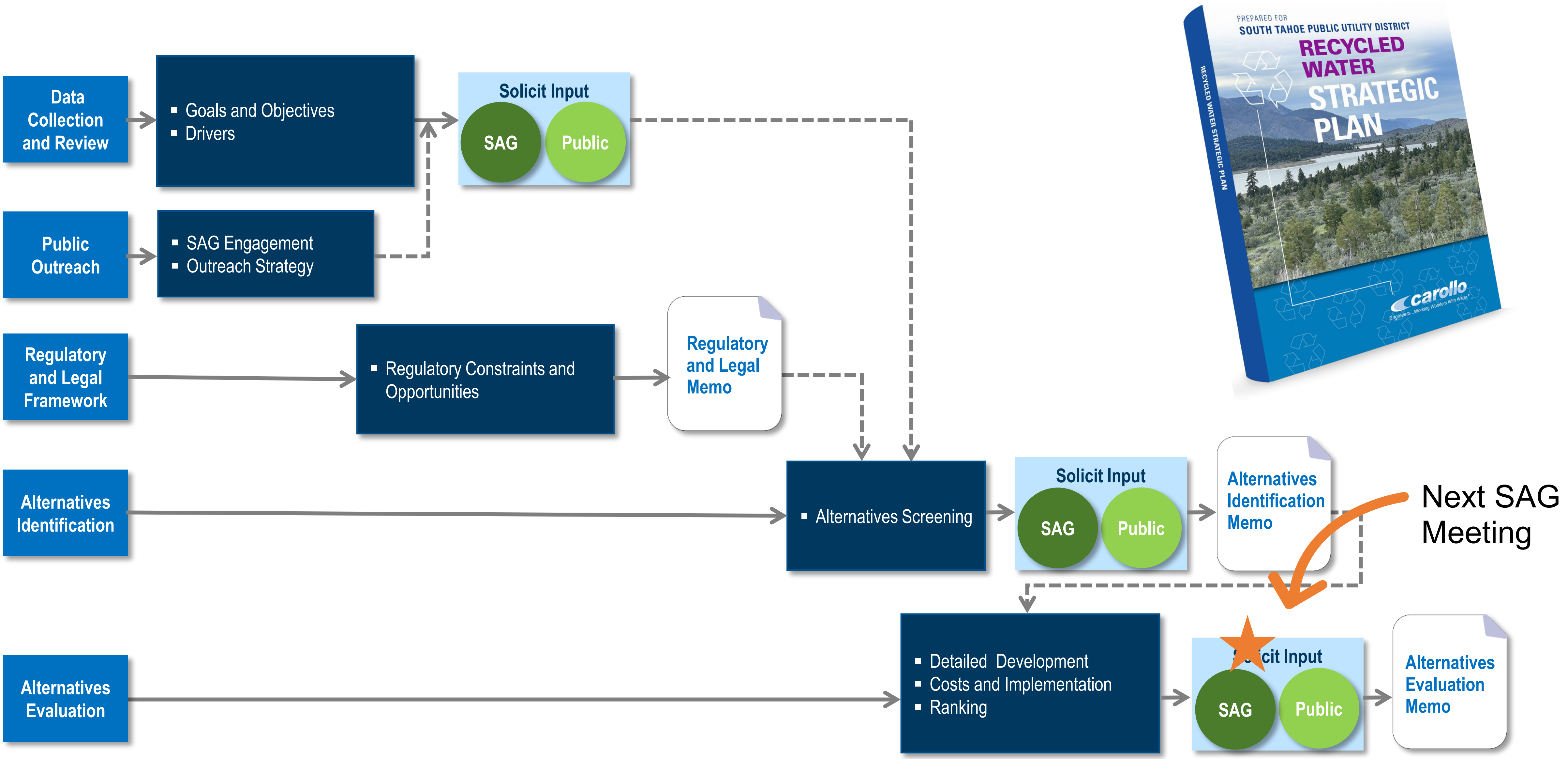
DCLTSA = Douglas County Lake Tahoe Sewer Authority

Additional Concepts – Further investigation required

Concept		
Enhanced Energy Recovery	Increase energy recovery from export conveyance system. • May be combined with any alternative using the existing District or other export systems	✓
South Tahoe Urban Boundary Fire Protection	Recycled water infrastructure to provide water source for firefighting • May be combined with any alternative where treated effluent is generated at District site	?
Conveyance Tunnel (Tunnel Portion)	Replacement of export pipeline (or portion of export pipeline) with tunnel (or tunnel section) to reduce elevation change in export system • May be combined with any alternative using the existing District or other export systems	X

Next Steps

// Recycled Water Strategic Plan Development



SAG = Stakeholder Advisory Group

// Next Steps

- SAG Feedback
  - Feedback from today
  - Additional feedback by October 7
- Additional Analysis
  - Incorporating SAG feedback
  - Gathering additional information
- Determination of High Potential Alternatives for Further Evaluation
- Public Outreach – Alternatives
- Conduct Detailed Evaluation of High Potential Alternatives
- SAG Meeting – Alternatives Evaluation

SAG = Stakeholder Advisory Group

End

Class A or B Reuse in Nevada

Reuse Water Categories

NAC 445A.276

	Total Coliform	Fecal Coliform			
	c.f.u. or mpn/100 mL	c.f.u. or mpn/100 mL			
Reuse Category	A	B	C	D	E
Max. 30-day geometric mean	2.2	2.2	23	200	No Limit
Maximum daily number	23	23	240	400	No Limit

- NV Class A is similar to CA Disinfected Tertiary
  - CA has turbidity requirements
  - CA has shorter averaging period

- NV Class C is similar to CA Disinfected Secondary 23
  - CA total coliform basis
  - CA has shorter averaging period

Appendix D:

September 28, 2022 Meeting Minutes

MEETING MINUTES

RECYCLED WATER STRATEGIC PLAN

South Tahoe Public Utility District

Issue Date: October 17, 2022

Project No.: 200689

Purpose:	Alternatives Screening Review – Stakeholder Advisory Group (SAG) Meeting #2
Meeting Date:	September 28, 2022
Meeting Location:	District Board Room and Virtual (MS Teams)
Prepared By:	Carollo Team

Attendees:

Client:
Steve Caswell
Julie Ryan
Shelly Thomsen
Gary Kvistad (legal)

Carollo:
Elisa Garvey
Ricky Gutierrez
Bev Hann
Maddi Rasmus
Margaret Skillicorn (Paragon PR)
Coral Taylor

SAG
See table below.

Distribution: STPUD

Discussion:

The following is our understanding of the subject matter covered in this conference. If this differs from your understanding, please notify us.

Objectives for Today

The meeting's objectives were communicated, and introductions were made.

SAG invitees and attendees are listed in the table below:

Name	Affiliation
Jason Burke	City of South Lake Tahoe
Andrea Buxton	Tahoe Resource Conservation District
Scott Cecchi	California Tahoe Conservancy
Madonna Dunbar	Tahoe Water Suppliers Association
Brian Garrett	United States Forest Service
Jenny Hatch	Sierra Nevada Alliance
Mollie Hurt	Tahoe Resource Conservation District

Rhiana Jones	Washoe Tribe
Rachel Kieffer	Alpine Watershed Group
Jen Lukins	Lukins Brothers (also representing Tahoe Keys Water)
Patricia Maloney	Tahoe Environmental Research Center
Kimra McAfee	Alpine Watershed Group
Shay Navarro	Tahoe Regional Planning Agency
Kate Nelson	Incline Village General Improvement District
Nikolai Nikolov	Douglas County Lake Tahoe Sewer Authority
Laura Patten	League to Save Lake Tahoe
Tiffany Racz	Lahontan Regional Water Quality Control Board
Matt Ricci	Lukins Brothers (also representing Tahoe Keys Water)
Russ Wigart	El Dorado County

Steve Caswell (SC) noted that we will follow up with SAG members for any other thoughts over the next week.

Recycled Water Strategic Plan Objectives

An overview of the District's existing system as well as the Recycled Water Strategic Plan objectives were presented. There was a discussion on where we'll be in 50 years with technology/water treatment, etc. So, there could be some IF…THEN scenarios.

- Russ Wigart (RW) asked: When does the 50-year planning horizon start?
    - Answer: Assumed 50-years as of today. Will extend to approximately 2072.

Alternatives Identification

A high-level overview of the alternatives identification process was presented. All in basin alternatives landed in the low potential group.

- RW asked: Is there a document to review? If not, when will a document be available to review?
    - Answer: After the alternatives screening is complete, the alternatives identification memo will be complete. STPUD will review internally before passing onto SAG group to review. Additionally, the draft Recycled Water Strategic Plan will be circulated for review before finalizing.
- Jason Burke (JB) asked: From a climate perspective, have greenhouse gas (GHG) emissions been considered when evaluating alternatives? i.e., is one goal to focus on the energy use and GHG footprint of the existing export system?
    - Answer: GHG was not considered as part of the high level screening work done to date, however, this will be included as part of the detailed evaluation for those alternatives that are evaluated in further detail. Likely that STPUD will need to continue to export out of the Basin. JB agreed with this approach.

Alternatives Screening – High Level

Alternatives within the Lake Tahoe Basin were presented at a high level. These are all subject to regulatory constraints, notably the Porter-Cologne Act. However, Outstanding National Resource Waters (ONRW), the Lahontan Basin Plan, and CEQA also need to be taken into consideration.

- Shay Navarro (SN): Noted that another regulatory consideration is TRPA's Regional Plan Water Quality Sub-element. Policy's 2.1 and 2.2 prohibit discharge of "wastewater" and "sewage". Pg 2-39 in RPU https://www.trpa.gov/wp-content/uploads/Adopted-Regional-Plan.pdf
- It was noted that the Lahontan Regional Water Quality Control Board sees recycled wastewater, even if it's treated to drinkable water levels, as wastewater.
- Ricky Gutierrez (RG): Noted that someday Porter Cologne Act will need to be updated.

Lake Tahoe Basin Alternatives

- **Question for SAG: Do you agree with the "low potential" result for these alternatives?**
    - RW: Without knowledge of water quality (WQ) data, it is hard to say. Thinking some of these alternatives could move from low- to mid-potential if WQ is good. At what point in time is it worth keeping the water within the basin? If the recycled water meets drinking water standards, what is the problem discharging it? Does that make it worthwhile to go to the legislature for approval? In a dire climate situation, it may be worthwhile to keep water in basin. WQ should be the driver there.
        - Answer: There are a few regulatory exceedances that will require implementation of advanced treatment. TDS and chloride removal will require a reverse osmosis (RO) process to remove. This will lead to a concentrated waste stream that is difficult to dispose of for inland agencies. However, technology may evolve within the planning period to make this easier to implement.
        - SC noted: In discussions with Lahontan, even if recycled water is treated to drinking water standards, it is still considered a waste product as it originated as a waste so still discussions that would have to occur before heading down that path. Also, the current technological challenges associated with getting to that level of treatment are very challenging.
        - Elisa Garvey (EG) noted: We have to meet WQ objectives for the point of discharge, ~ 50 mg/L TDS for many of these (e.g., discharge to tributaries), if trying to meet this objective, it would require RO process. Disposal of RO waste product (brine) in an inland area is particularly challenging. On the potable reuse end, we currently don't have regulations in CA for direct potable reuse. For indirect potable reuse, the configuration would be a groundwater injection and extraction, which requires an RO based process unless you can demonstrate equivalency with an alternative treatment train.
    - RW noted that South Lake Tahoe is in a very unique situation compared to the rest of the state in terms of water availability, groundwater table, etc. So, demand drivers here for recycled water aren't as strong as in other areas of the state.
        - EG noted: While current secondary effluent meets TDS drinking water standards, the underlying groundwater in South Lake Tahoe has lower TDS and will require removal of TDS before recycled water could be injected into the groundwater.
    - Laura Patten (LP): The assumption is that recycled water used in an urban landscape still needs to meet same WQ objectives even though it's not a point discharge. The League to Save Lake Tahoe will always be concerned with WQ. It would be a shame to screen out certain alternatives due to regulatory constraints that may be possible in the future. She

also wanted clarification that some alternatives won't be entirely screened out because of today's regulations, as regulations may/will change, etc.
        - SC: It is conceivable that as technology and regulations change over the next 50 years, these alternatives may become more viable. The idea is to have a roadmap, and that if things change, the District can start to consider such alternatives more in depth in the future.
    - Julie Ryan (JR): Asked what the physical capacity or demand of the recycled water is for each of these alternatives. She noted that there is also limited demand within the basin that would allow for full use of water through many of these alternatives. A lot of these could not be a standalone solution for the District. For example, no landscape irrigation in the winter.
        - EG: Agreed with JR and that alternatives like landscape irrigation and snowmaking would have to be paired with other alternatives to allow for year-round recycled water demand.

- **Are there other constraints or limitations associated with these alternatives?**
    - Porter-Cologne Act and technology development are currently considered very significant limitations to some alternatives.
        - Porter-Cologne considers wastewater as a "waste" no matter the extent that it is treated.
- Most alternatives seem like there is a limitation to offset the entirety of STPUD's discharge. Has any analysis been put into this?
    - Yes, in some cases, there will not be a demand/capacity that will accommodate all of the water. Many of these are not standalone solutions.

Truckee River Watershed Alternatives

The Truckee River Watershed Alternatives were presented, which had many regulatory and infrastructure considerations as the recycled water would be conveyed to T-TSA.

- **Do you agree with the "low potential" result for these alternatives?**
    - General agreement on the low potential result.
- **Are there other constraints or limitations associated with these alternatives?**
    - Capacity limitations show that upsizing of existing T-TSA conveyance infrastructure would be required.
- JR: Asked if peak flows were looked at?
    - EG: At this high-level screening, only average flows from STPUD were looked at as part of the high-level screening. That being said, even under average flow conditions, there is insufficient existing capacity.

Remaining Alternatives

- Remaining alternatives encompass those in the Upper Carson Watershed. Various end uses of water in both California and Nevada. These alternatives will be presented in more detail as they do not have the same technological or regulatory constraints as the previous alternatives do.

Alternatives Screening – Detailed

Alternative #1 – Existing System

- While pumping over Luther Pass is energy intensive, note that there is a small hydroelectric facility in Douglas County that does generate some hydropower, potential to expand this. Although the existing system is considered a "high potential" alternative, it still has challenges.
    - RW: Agreed that it makes sense to keep the existing system in the plan.

Alternative #3 – Expanded Secondary 23 Recycled Water Delivery in Alpine County

- Some specific identified users (purple on the map) versus some general potential users. Maps will be available in the alternatives memo. Demand from new users have uncertain potential, will dig into further. Other subalternatives (District Property and Direct Delivery) have high potential.

- Tiffany Racz (TR): Would this alternative change the existing treatment?
    - Response: Treatment for this alternative would remain the same as existing.
- LP: What would happen with the revenue generated from requiring users in Alpine County to pay for recycled water? Would this generate revenue to offset some of the export costs and also GHG emissions? She also noted that many alternatives are very "high energy" and have associated GHG emissions.
    - SC: Not sure at this time, but doubtful that it would be a lot of money, revenue seems like it would be pretty low, although we haven't dug into the details of it yet. Any revenue would probably be used to partially offset the costs of treatment and export, but it's unlikely that it would offset the full costs of treatment and export.
    - EG: As a general rule, non-potable reuse does not typically pencil out and revenue is not typically the driver for doing it.
- TR: Noted that STPUD's permit does allow for emergency storage in Fields 1 and 2, so the District should consider emergency storage expansion. Not required but allowed.

Alternative #4 – Expanded Disinfected Tertiary Reuse in Alpine County

- Treatment plant was constructed over 50-years ago. Region dominated by ag and open space but not food crops, livestock, grazing and fodder crop type of demand. Not much urban development, limited demand for urban landscape. Low potential due to treatment upgrade requirement without demand that would drive it.
    - RW: Noted that it makes sense to keep in plan for 50 years

- JR: Are there any regulatory changes that you could see triggering this kind of change?
    - EG: One potential change is if there are nutrient removal requirements that could trigger treatment upgrades.
- RW: Is there a social issue with implementing this? "Toilet to tap" for communities outside of the basin?
    - Response: This alternative wouldn't take it all the way to the tap. Would be used for crop irrigation so do not anticipate negative social perceptions.
        - This concept of social constraints which directly relate to public perception should be kept in mind as we move forward with Strategic Plan.
    - TR: Noted that a consideration may be for the native tribes, since they exist outside of CA's regulatory constraints. As far as social constraints, maybe people on native lands (such as Genoa) would be open to using this water and they should be engaged in this process.

Alternative #13 – Expanded Class A or B Reuse in Nevada

- Both sub alternatives landed in the "uncertain potential" screening.
    - 13A - Discharge to Indian Creek - Uncertain Potential
    - 13B - Conveyance to Mud Lake - Uncertain Potential, need to investigate further demands and costs.
    - General agreement with the "uncertain potential" screening result for Class A/B reuse in Nevada via Indian Creek.
- RW: Agreed with screening result. Asked if Indian creek is ephemeral or perennial drainage?

    - Response: Unsure, would need to look into. If not flowing most of the time, then could be easier for use for conveying. Have not been able to find much flow data for Indian Creek.
- TR: Asked if Harvey Place would still be used?
    - SC: It depends, could still use Harvey Place for storage during the winter, similar as is done now.
- TR: Noted that there are WQ issues in East Fork Carson River, so this recycled water could actually help with WQ goals. One strategy that has been discussed is dilution, since the existing waters are impaired, could offset impaired WQ with the District's water that is better in terms of WQ. That could be a strategy. Currently discussing with the Vision Project, talking about East Fork, located downstream of Indian Creek. Both East Fork and West Fork of the Carson are impaired waterways at this point, so there is potential that STPUD effluent could improve WQ and align with broader regional goals. Have just put Vision Project for Bishop Creek through recently, and could use this the Bishop Creek Vision Project as a point of reference for better understanding of the vision project concept (see LRWQCB September 2022 board meeting)
    - This potential benefit may shift this alternative to higher potential. Consider WQ improvement in impaired waters as an "additional benefit".
- RW: asked for clarity on existing configuration.
    - SC clarified that recycled water goes into Diamond Ditch and from there it goes to the ranchers where needed, flows to end of Diamond Ditch and there are some tailwater rights beyond that. There is an agreement with Nevada Division of Environmental Protection (NDEP) that some of the tailwater can end up in NV.
        - Follow up: potentially invite NDEP to future SAG meetings.

Alternative #14 – Conveyance to DCLTSA with Reuse in Nevada

- Conveyance to DCLTSA - 14B (Treatment at DCLTSA) screened as Low Potential, 14A (Treatment at STPUD) screened as uncertain potential.
- Need to further assess capacity limitations for these users to take all of the STPUD water.
    - Action Item: We need to get feedback from Nikolai with Douglas County to add to these notes, and that input would assist us to when planning for a public meeting/workshop.
- JR asked if users from previous alternative 13 overlap.
    - SC: Not necessarily, could but this area shown is a bit further to the north. Potential end users for Alternative 14 are in a different location than Alternative 13, could also implement both alternatives. End use goals are similar.
- JR: Noted maybe a driver if STPUD has to significantly rehab or replace the export pipeline, then this could be another alternative.
    - EG: Another driver could be demands, market for RW.
    - SC: Per conversation with DCLTSA, if you send your water to agricultural use in NV, you get a discounted rate on your power, so energy costs could be another driver.
- RW: Asked if all STPUD's recycled water would go there.
    - SC: Yes, that is the alternative as we are currently looking at it.

Alternative #12 – Discharge to West Fork Carson and use in Nevada

- WQ standards are more stringent for West Fork Carson than for Indian Creek Reservoir. Thus, this alternative may require more extensive treatment (for TDS removal).
- Was in low potential group, due to potential requirement for significant treatment upgrade and surface waste discharge permit.
    - TR: Add to discussion, there is the Bishop Creek Vision Project with may provide insight into the Vision Project approach. In the West Fork Vision Project, improvement in water quality of the West Fork will be an objective. This provide potential opportunity for recycled water alternatives that improve water quality of the West Fork.

        - Response: Discussion today supports putting this into future consideration if there are other drivers such as improved WQ in the impaired West Fork Carson River.
    - JR: Are WQ objectives for discharge to West Fork higher than for Indian Creek?
        - EG: There are WQ objectives for Indian Creek. Would need to circle back with NDEP for anything imposed from the NV side. But currently TDS and chloride limits for West Fork of Carson are higher than for discharge to Indian Creek reservoir.
    - TR noted this alternative would require a basin plan amendment which is challenging. Would be same person at LRWQCB that is in charge of the Vision Project.

Alternative #5 – Groundwater Injection for Disposal in Alpine County

- This groundwater basin is designated as MUN and has low TDS and chloride concentrations.
    - Recycled water would need to be permitted as disposal which would be challenging given the MUN designation of the basin. Aiming to get permitted for disposal instead of indirect potable reuse (IPR) to avoid high level of treatment that would be needed.
- This alternative landed in low potential because of MUN designation. Also, there is no beneficial reuse considered given disposal designation.
    - RW: Assuming that cost is part of the decision factor. Could be the driver for one alternative over the other.
        - Response: Correct that cost is one part of this.
        - This is a good point to keep in mind how would we answer this question for the general public as it relates to Green House Gas Emissions, etc.

Summary and Next Steps

Remaining Questions/Comments

- JR: Was there a pre-screening to carve off consideration of disposal west of Lake Tahoe? I.e., what about the other watersheds in the area?
    - SC: The District submitted an application to El Dorado County for discharge to the American River watershed. Response to that application was that STPUD can't discharge anything upstream of Placerville, per the American River Agreement and the Central Valley RWQCB, which killed that option. Plus, it is more challenging to pipe out of the basin over Echo Pass as well.
    - JR: Noted is it worth taking a closer look at the American River watershed, and that this alternative should at least be considered even if it gets screened out, have it documented in the Alternatives Identification Memo. Given it is 50-year plan this alternative could be an option.
    - RG: Some of the districts in the American River watershed have supply challenges, so may be the recycled water would be of interest.
    - RW: Noted that the recycled WQ is better than American River WQ.

- LP: It seems like none of the alternatives are focusing on conservation and WQ potential. A lot of the alternatives focus on water leaving the Tahoe Basin. She thought it would be useful to look at the Truckee and Carson watersheds as a whole and think about a way to use this water for a whole system benefit. She also mentioned that there is some in-stream potential and opportunities to swap water with senior appropriators in Carson; the Nevada constitution also for in-stream benefit.
    - EG: The regional use of water was part of what we had originally considered as a benefit to going to that watershed but the WQ objectives present challenges.
    - Coral Taylor (CT): Carollo team members will be meeting with Ed James from the Carson Water Subconservancy District.

- Comments will be solicited from the SAG group after the alternatives memo is distributed.
- SC noted that the next Public Outreach meeting will likely be in December 2022.

Overall Thoughts

- RW with El Dorado County had a lot of good insights and input.
- Margaret Skillicorn would like to get input from SAG members who didn't attend to compare their insights and feedback prior to planning for the next steps for public outreach.
- We should continue to emphasize that this is a 50-year plan and how we'll plan for technological advancements, continue being forward thinking.
- Feedback from SAG was positive.

Decisions, Actions, Next Steps

Action Items are listed below.

- Include American river watershed alternative
- Highlight energy and GHG as driver for considering alternatives that do not include conveyance out of the basin. Note that "energy demand" has been a consideration, but we potentially need to highlight this a bit better and also present GHG.
    - Consider GHG as part of the detailed evaluation for those alternatives that are evaluated in further detail.
- Incorporate discussion of improvements to water quality in West Fork Carson, as a potential benefit/driver for this alternative. To provide a water quality benefit, this alternative would potentially (likely) this would require nutrient removal and TDS removal, otherwise it is not diluting with respect to water quality.
    - This potential benefit/driver may also apply to the East Fork of the Carson. May be a consideration in the discharge to Indian Creek option.
- Convene a future meeting with NDEP (not specifically identified in the meeting) to discuss recycled water in Nevada. There are a number of specific questions including, governing water quality for Indian Creek, discharge to Mud Lake and subsequent RW use, potential future nutrient removal requirements by NDEP (note this was a driver for DCLTSA to upgrade treatment processes, as it related to storage of recycled water in an unlined impoundment), among other questions.
- There are water rights questions that need to be addressed. Future discussion with Gary Kvistad is needed. Is there potential for NDEP to be helpful on water rights?
- Additional follow-up by SC with DCLTSA. However, SC has made several attempts. Do we need to somehow elevate this request?
- Additional regulations that should be documented and considered:
    - Another regulatory consideration is TRPA's Regional Plan Water Quality Sub-element. Policy's 2.1 and 2.2 prohibit discharge of "wastewater" and "sewage". Pg 2-39 in RPU https://www.trpa.gov/wp-content/uploads/Adopted-Regional-Plan.pdf
    - Note that STPUD's permit allows for emergency storage in Fields 1 and 2, so the District should consider emergency storage expansion for options that use the existing RW system. Not required but allowed.
- Consider social constraints/perceptions as we move forward with Strategic Plan, specifically related to communities outside the basin using recycled water from inside the basin.

Appendix D:

May 23, 2023 Meeting Materials

SOUTH TAHOE PUBLIC UTILITY DISTRICT
RECYCLED WATER
STRATEGIC PLAN

Stakeholder Advisory Group / Public Information Meeting

May 23, 2023

SOUTH TAHOE PUBLIC UTILITY DISTRICT Sewer · 1950 · Water

carollo
Engineers...Working Wonders With Water®

Meeting Agenda

Tonight's Schedule

Topic	Timeframe (PST)
Presentation – same for in-person and virtual attendees	6:00 – 6:45 pm
Q&A Session – for in-person and virtual attendees	6:45 – 7:00 pm
-- Break --	7:00 – 7:10 pm
Open House Engagement – for in-person attendees only	7:10 – 8:00 pm
-- Meeting Adjourned --	8:00 pm

Presentation Outline

- Welcome
- Background
- Alternatives Identification & Screening
- Next Steps
- Question & Answer Session
- Closing

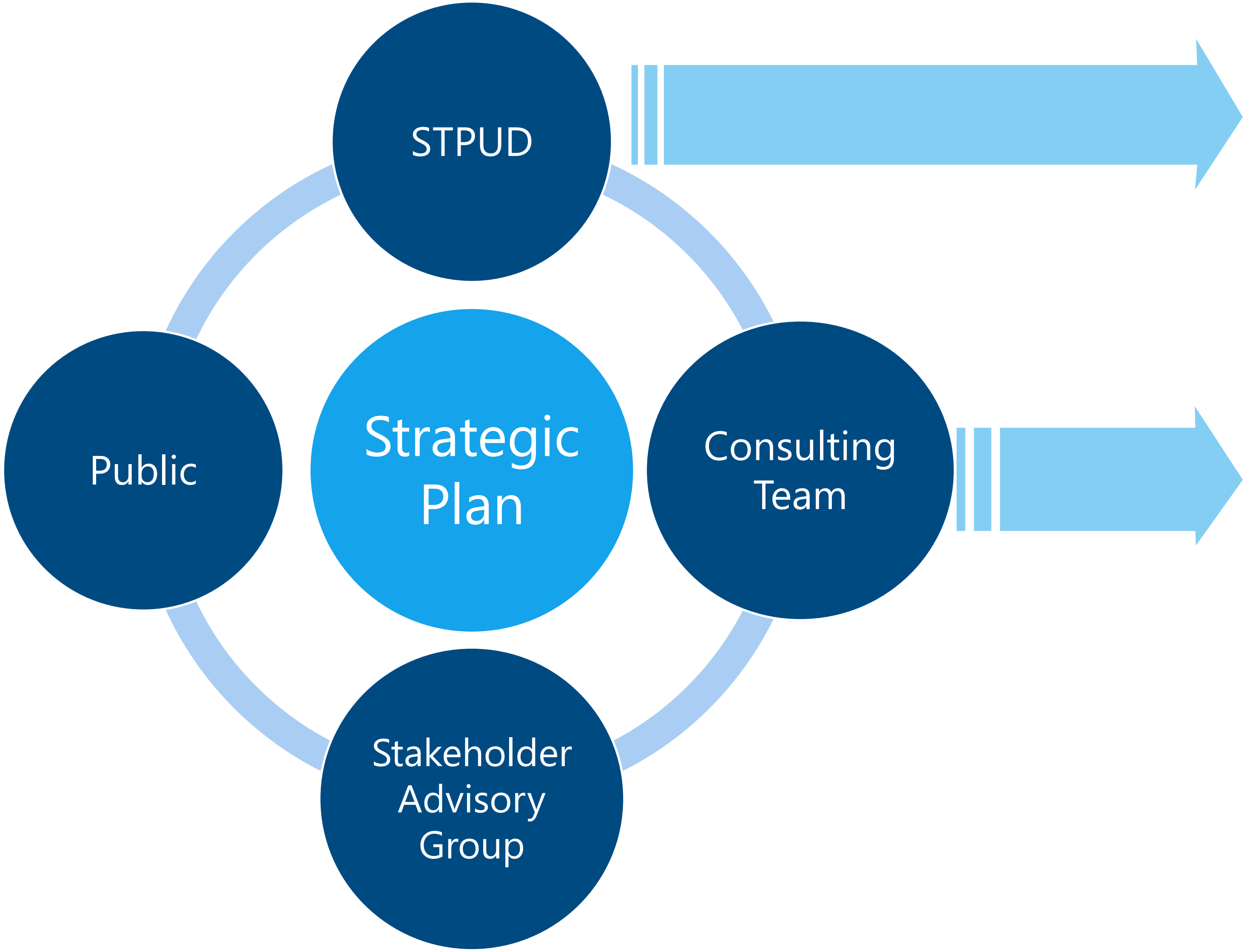
Welcome

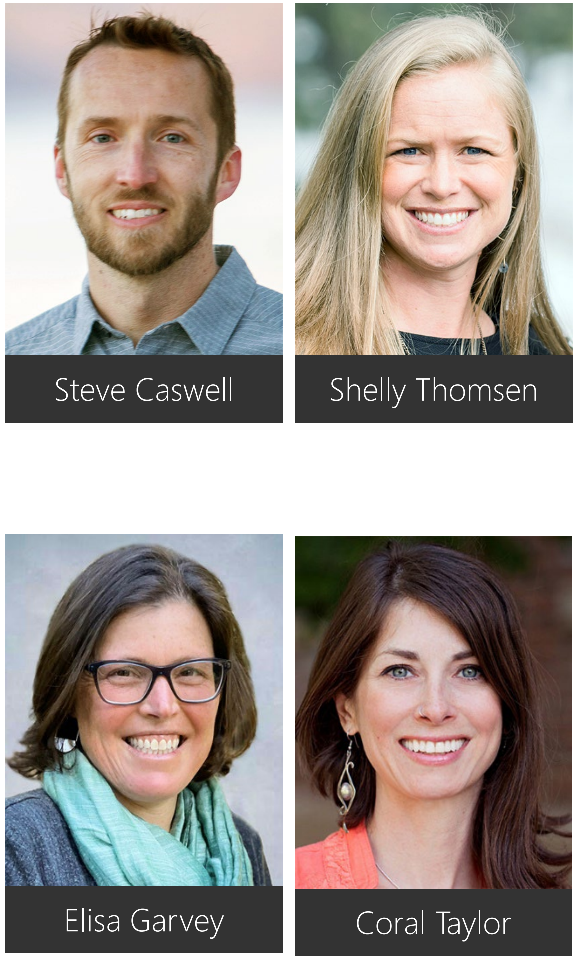
Why are we here today?

- To update the public and SAG on the Recycled Water Strategic Plan
- To obtain feedback and input from the public and SAG
- To remind or inform you on how to stay involved in the strategic plan development process

SAG = Stakeholder Advisory Group

// Who will you hear from today?



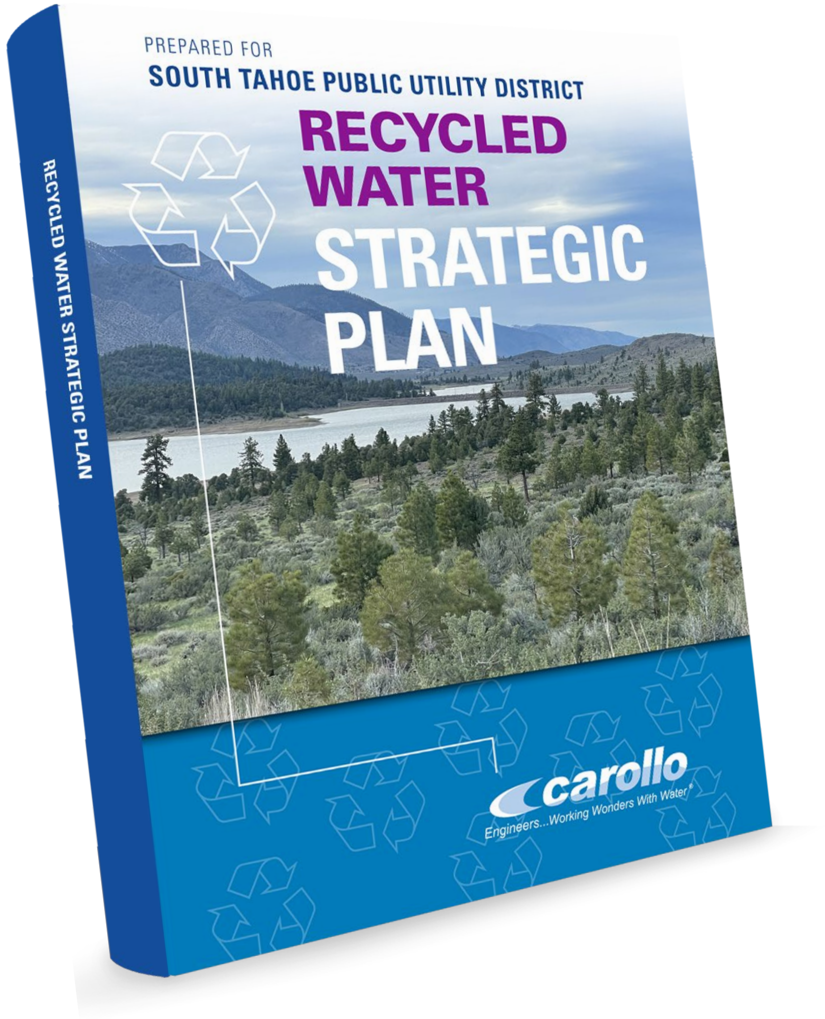


Background

Brief History of Existing System

- STPUD established in 1950
- The District began exporting recycled water to Alpine County in 1968
- Porter Cologne Act (1969) required export of treated wastewater out of Tahoe Basin by 1972
- STPUD history of innovation / achievement
  - 100% of treated effluent is reused
  - 100% of biosolids recycled as fertilizer
  - Electricity produced off the export system

District Recycled Water Strategic Plan Objectives

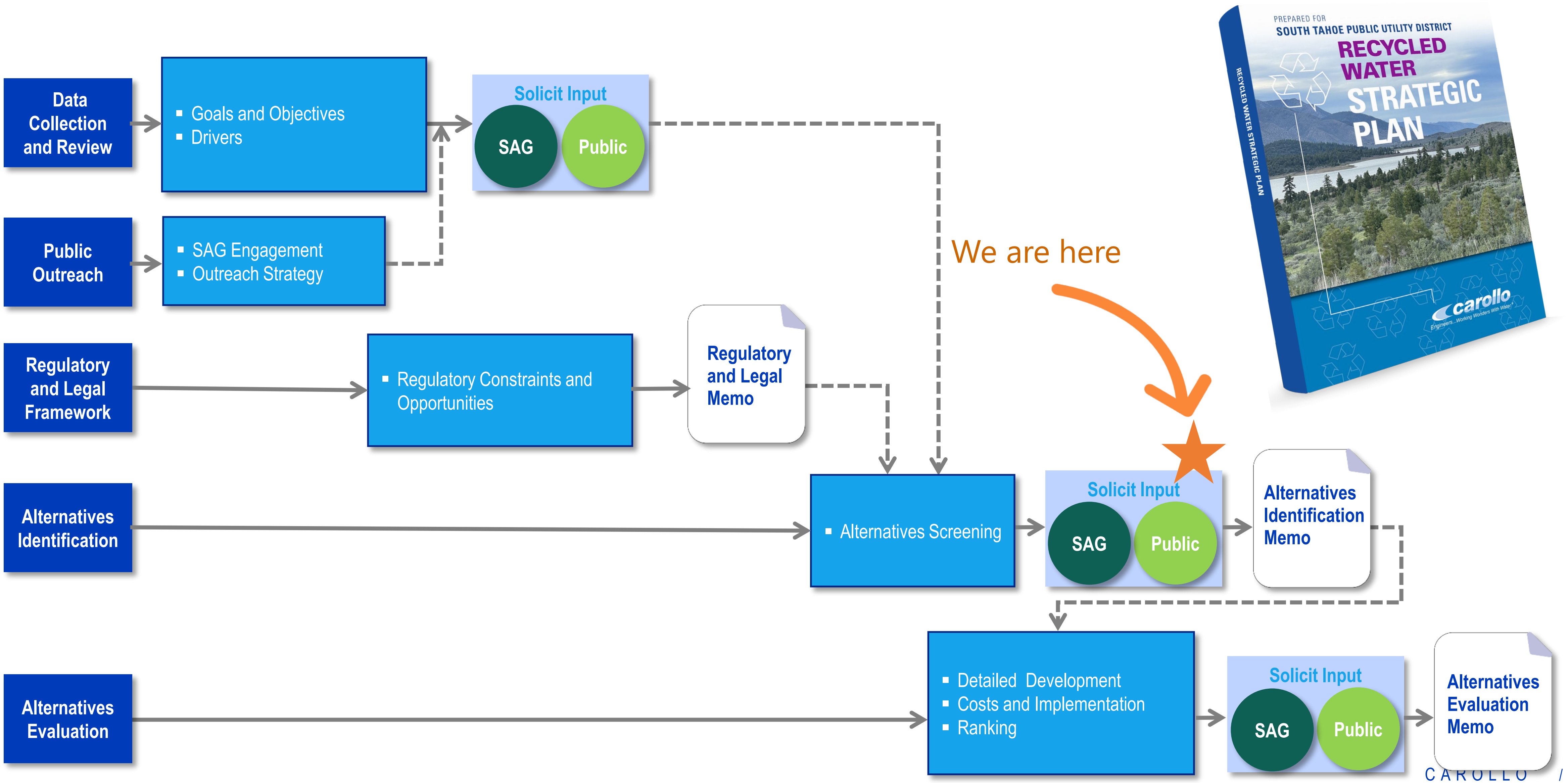


50 Year Planning Horizon

Develop a long-term strategy for District wastewater effluent disposal/reuse that incorporates viable alternatives to the existing system.

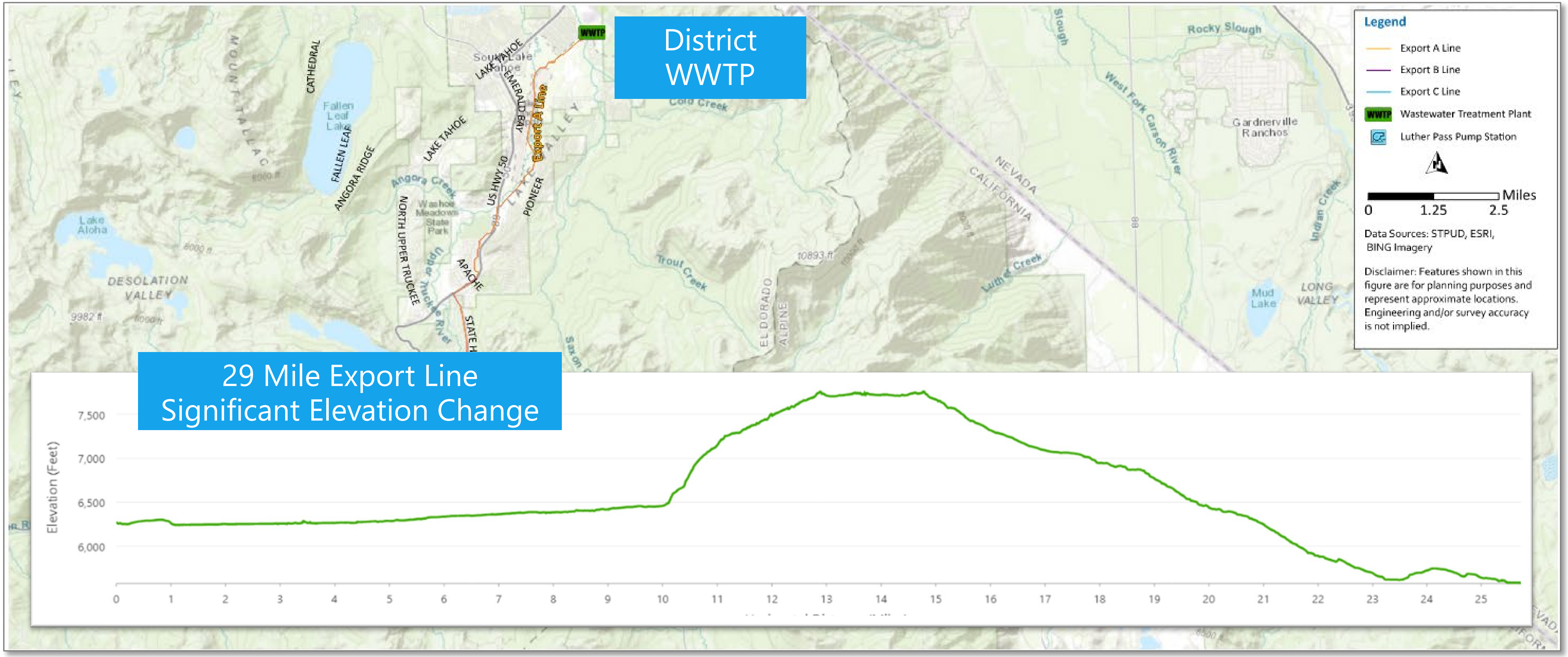
These alternatives would be triggered for implementation by existing or future drivers and/or constraints.

Recycled Water Strategic Plan Development Process



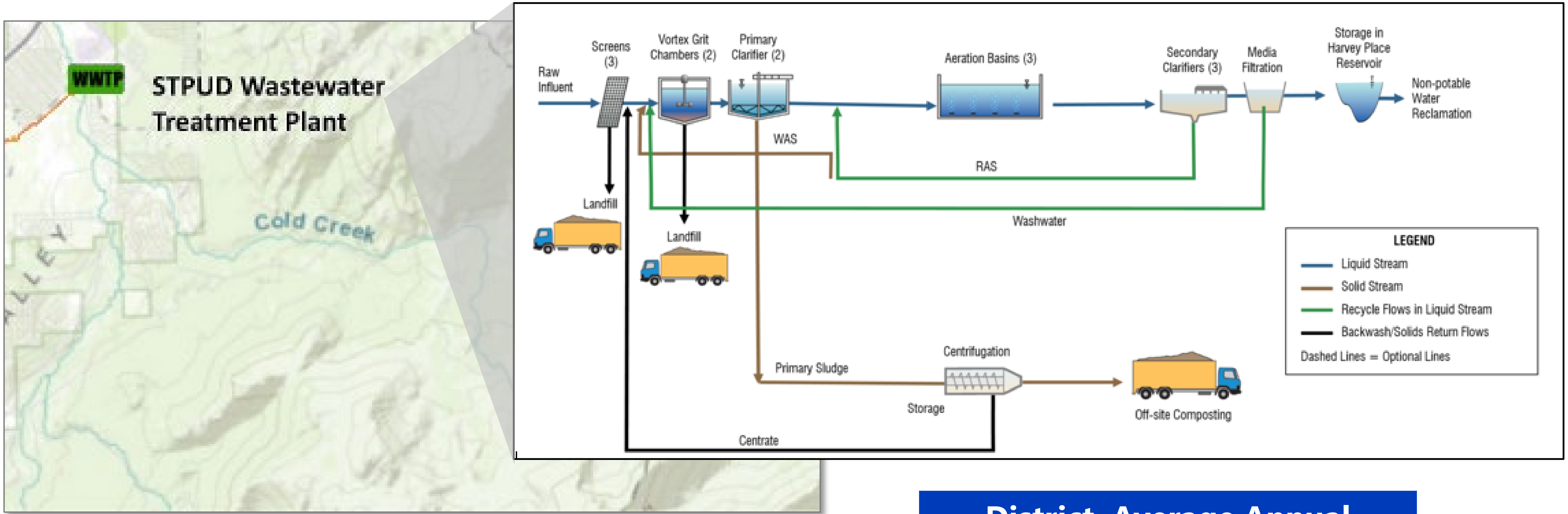
SAG = Stakeholder Advisory Group

District Existing System – Alternative 1



WWTP = wastewater treatment plant

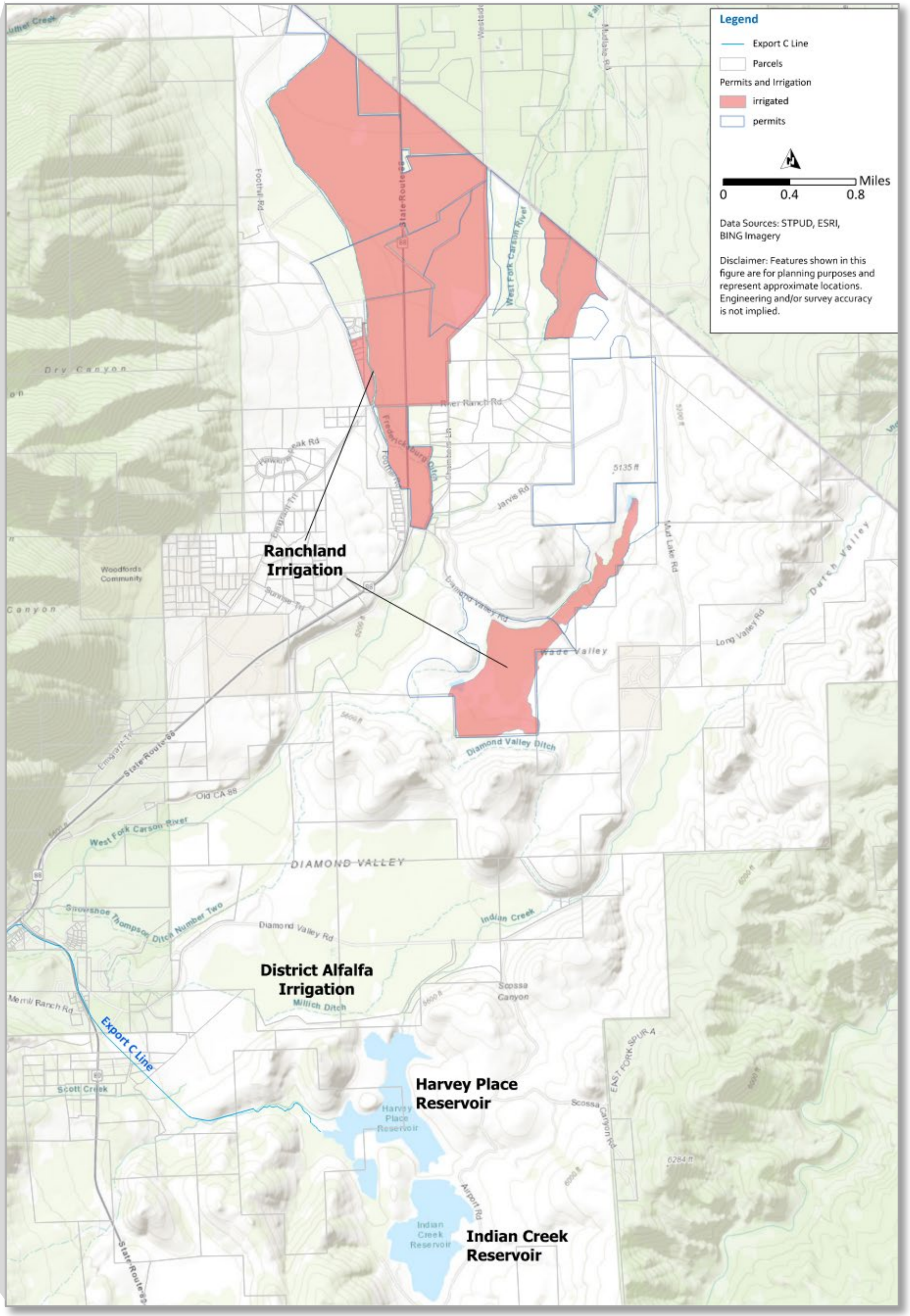
District – Advanced Secondary Treatment



District Average Annual Effluent Flow		
Existing	3.8 mgd	4300 AFY
Future	5.4 mgd	6000 AFY

mgd = million gallons per day
AFY = acre feet per year

District – Restricted Reuse



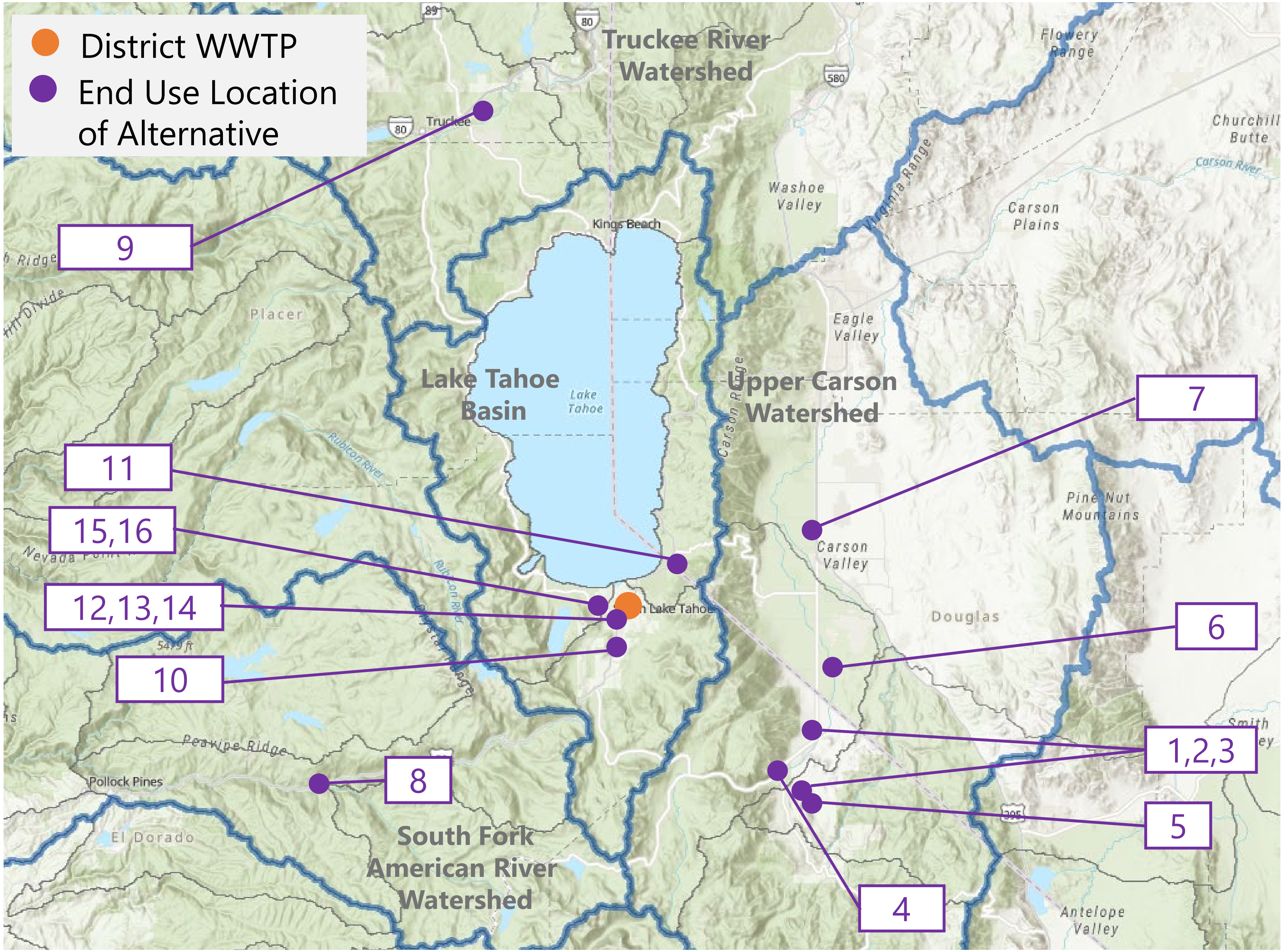
Existing System Challenges

Economic	• Operation and Maintenance cost for the system is ~$6M per year. Cost for export system energy is ~$1.2M per year. • Limited or no revenue from alfalfa and recycled water.
Regulatory	• Any permit changes may trigger Salt and Nutrient Management Plan (SNMP) requirements.
Technical	• Current operations require continued investment to maintain District established level of service.
Institutional	• Litigation between the District and Alpine County. • Rancher agreements will expire in 2028.
Environmental and Sustainability	• Energy consumption and production of greenhouse gas emissions
Public	• General concern with the cost of service to treat and export effluent.

Alternatives Identification and Screening

Alternatives Identification and Screening

- Brainstorming exercise – 16 alternatives
- Wide net of potential options
- Identify most viable options for detailed evaluation



WWTP = wastewater treatment plant

Alternatives Identification and Screening

Truckee River Watershed

Truckee River Watershed Alternative

- Conveyance to TTSA for subsurface discharge to Truckee River

TTSA = Tahoe Truckee Sanitation Agency
WWTP = wastewater treatment plant

Not Considered for Further Evaluation

Key Challenges – Truckee River Watershed Alternative 9

Regulatory	Institutional	Technical	Environmental
• LRWQCB – New wastewater discharge permit • US Congress Settlement Act – potential litigation	• Tahoe Truckee Sanitation Agency – Ordinance Modifications • Tahoe City Public Utility District - Ordinance Modifications	• 15-mile pipeline to connect to TCPUD infrastructure • Challenging construction • Requires increased pipeline capacity (TCPUD & TTSA) and treatment facility capacity (TTSA)	• Potential environmental impacts of pipeline construction

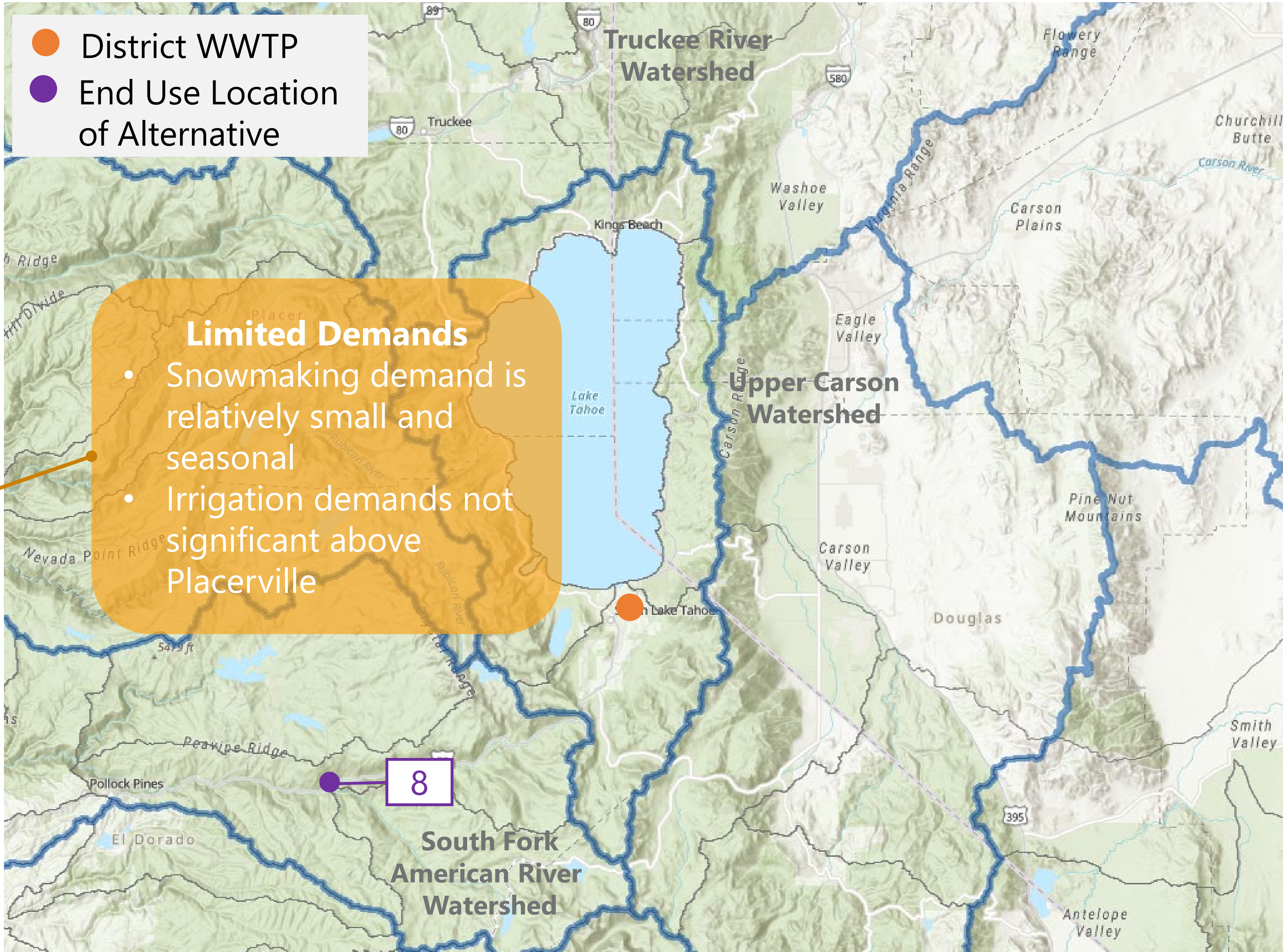
LRWQCB = Lahontan Regional Water Quality Control Board; TCPUD = Tahoe City Public Utility District; TTSA = Tahoe Truckee Sanitation Agency

Alternatives Identification and Screening

South Fork American River Watershed

South Fork American River Watershed Alternative

- Non-potable recycled water use in American River Watershed
  - » Snowmaking
  - » Irrigation
- Discharge to the American River



WWTP = wastewater treatment plant

Not Considered for Further Evaluation

Key Challenges – South Fork American River Watershed Alternative 8

Regulatory	Technical	Environmental
• CVRWQCB – New wastewater discharge permit • CVRWQCB 1977 Decision – Discharge of District Effluent to location near Kyburz • US Congress Settlement Act – potential litigation	• 28-mile pipeline to Kyburz, CA • Challenging pipeline construction • Treatment upgrades to meet American River Water Quality Objectives	• Potential environmental impacts of pipeline construction

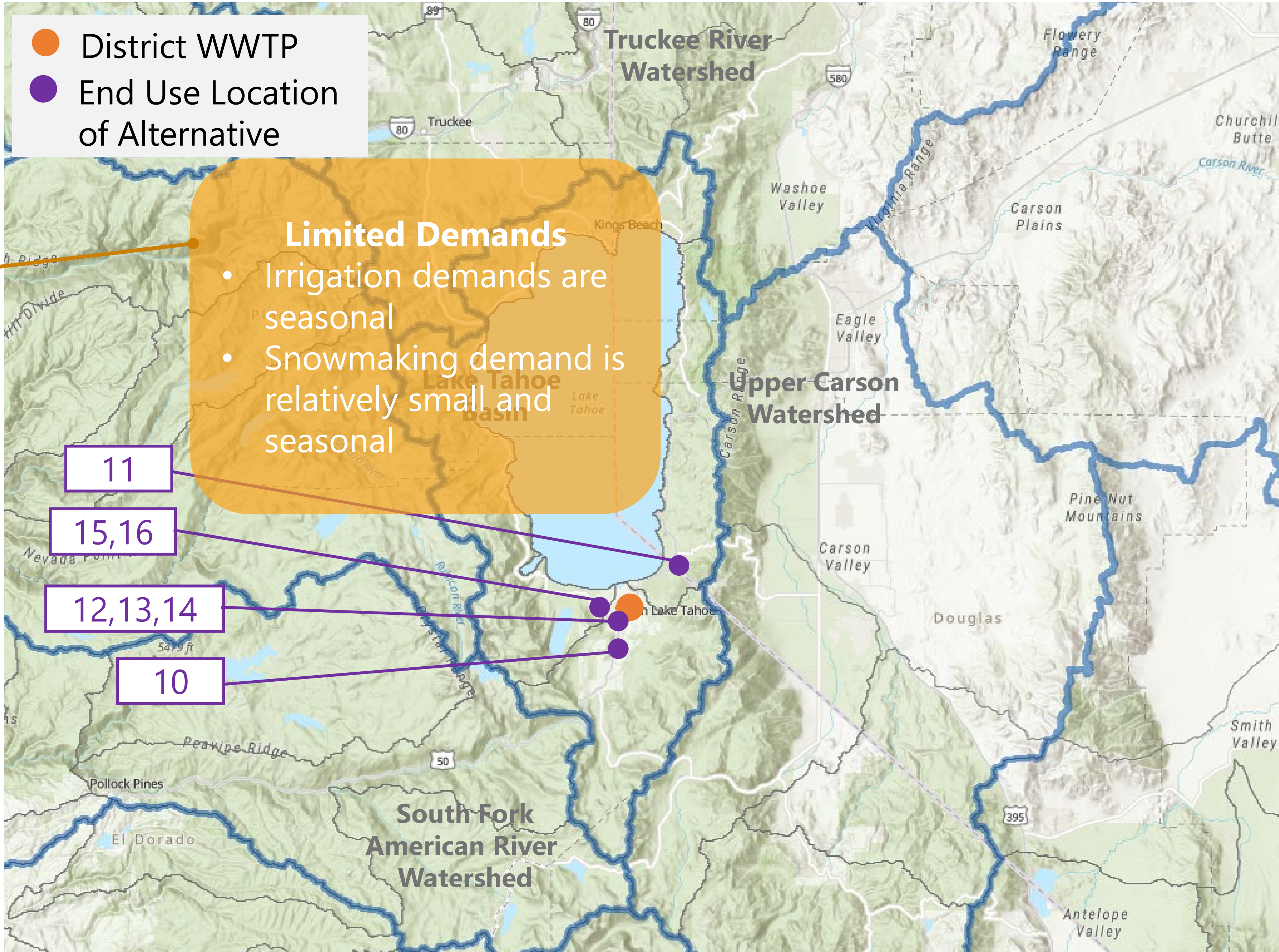
CVRWQCB = Central Valley Regional Water Quality Control Board

Alternatives Identification and Screening

Lake Tahoe Basin

Lake Tahoe Basin Alternatives

- Land Application
- Discharge to waterways
- Potable Reuse
  - » Indirect Potable Reuse
  - » Direct Potable Reuse



WWTP = wastewater treatment plant

Key Challenges – Regulatory

Authority	Regulation/ Agreement/ Policy/ Permit	Description	Challenge
State of California	Porter-Cologne Act	Requires export	• Porter-Cologne Act modification • Approval by CA Legislature
LRWQCB	Basin Plan	Designates Lake Tahoe as an Outstanding National Resource Waters (ONRW)	• De-designation of Lake Tahoe ONRW • Or meet water quality objectives at discharge
TRPA	Code or Ordinances	Prohibits municipal wastewater discharge to Tahoe region	• Requires modification of TRPA code
US Congress	Settlement Act	Stipulates the allocation of Carson River water between CA/NV	• Requires modification • Potential litigation
State of California	SGMA	Annual reporting on water supply and demands	• Ample water available
State of California	Title 22	Defines approved uses of recycled water	• Treatment requirements for various types of reuse • Not enough demand

LRWQCB = Lahontan Regional Water Quality Control Board; ONRW = Outstanding National Resource Waters; TRPA = Tahoe Regional Planning Agency; SGMA = Sustainable Groundwater Management Act

Lake Tahoe Basin Alternatives

Alternatives 12, 13, 14

Discharge to creeks or streams which are tributary to Lake Tahoe

Alternatives 10, 11

Recycled water for landscape irrigation
Recycled water for snowmaking

Stringent Water Quality Objectives

- Nutrients
- Salts
- Trace organics

Advanced Treatment Train

Nutrient Removal + Microfiltration + Reverse Osmosis + Advanced Oxidation

- ✓ Complex
- ✓ Energy Intensive
- ✓ High Capital and O&M Costs
- ✓ Generates RO concentrate waste product

O&M = operations and maintenance; RO = reverse osmosis

Lake Tahoe Basin Alternatives

Alternative 15

Indirect Potable Reuse – Treat to Drinking Water Standards and Inject into Groundwater Aquifer

Alternative 16

Direct Potable Reuse – Treat to Drinking Water Standards and Inject into Potable Water Distribution System

Title 22 Recycled Water Regulations

- Pathogens
- Trace organics
- Drinking Water Standards

Regulations under development

Advanced Treatment Train

Microfiltration + Reverse Osmosis + Advanced Oxidation

- ✓ Complex
- ✓ Energy Intensive
- ✓ High Capital and O&M Costs
- ✓ Generates RO concentrate waste product

O&M = operations and maintenance, RO = reverse osmosis

Key Challenges – Lake Tahoe Basin Alternatives 10, 11, 12, 13, 14, 15, 16

Not Considered for Further Evaluation

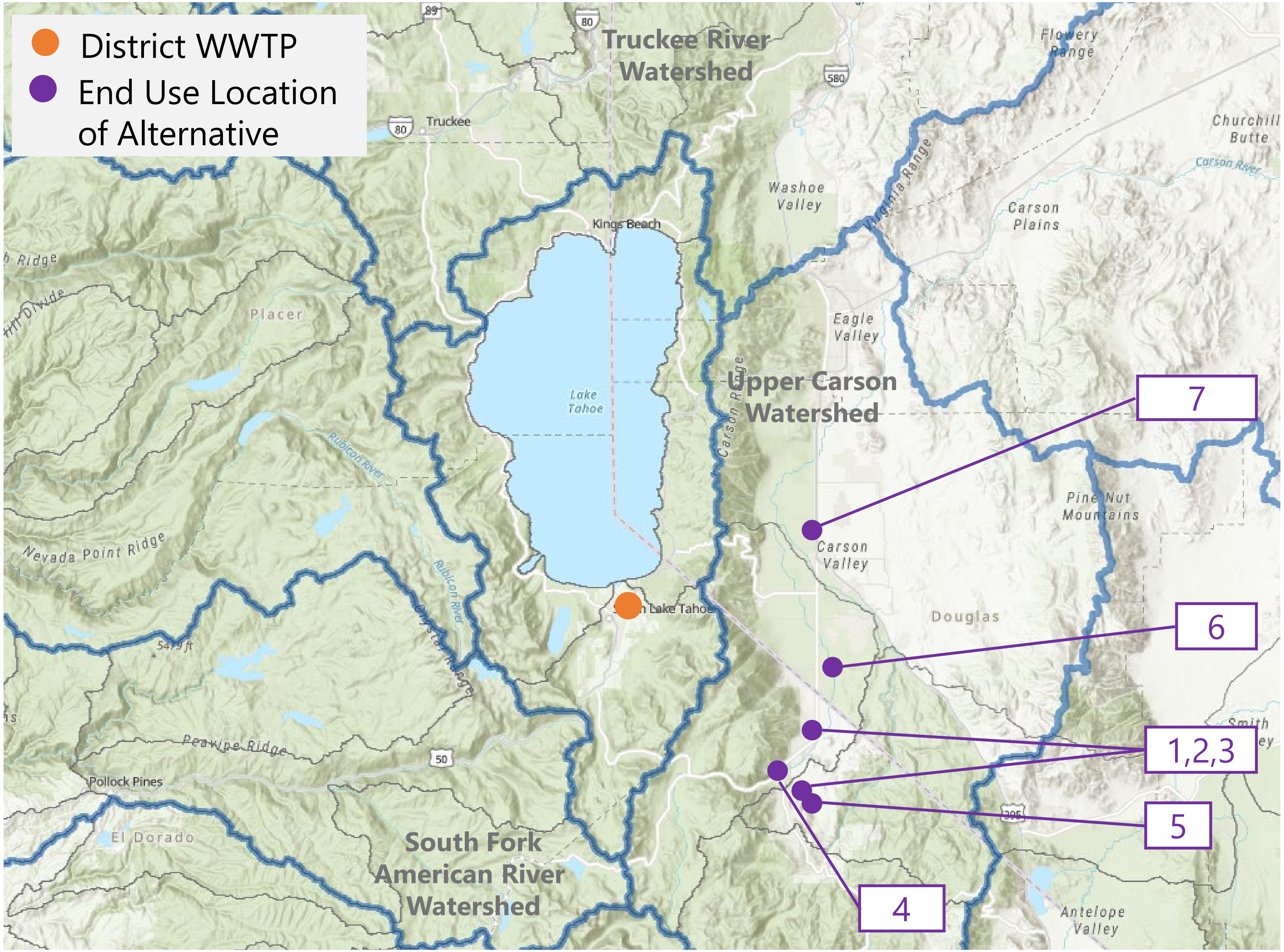
Regulatory	Technical	Environmental	Public
• Porter Cologne Act (among many)	• Advanced treatment to achieve standards and or Title 22 Regulations for potable reuse • Limited demand/need for additional water supply	• Reverse osmosis waste product • Energy intensive treatment processes	• Acceptance of recycled water use in the Tahoe Basin • Acceptance of potable reuse

Alternatives Identification and Screening

Carson River Watershed

Carson River Watershed Alternatives

- Existing System
- Non-potable reuse in CA and NV

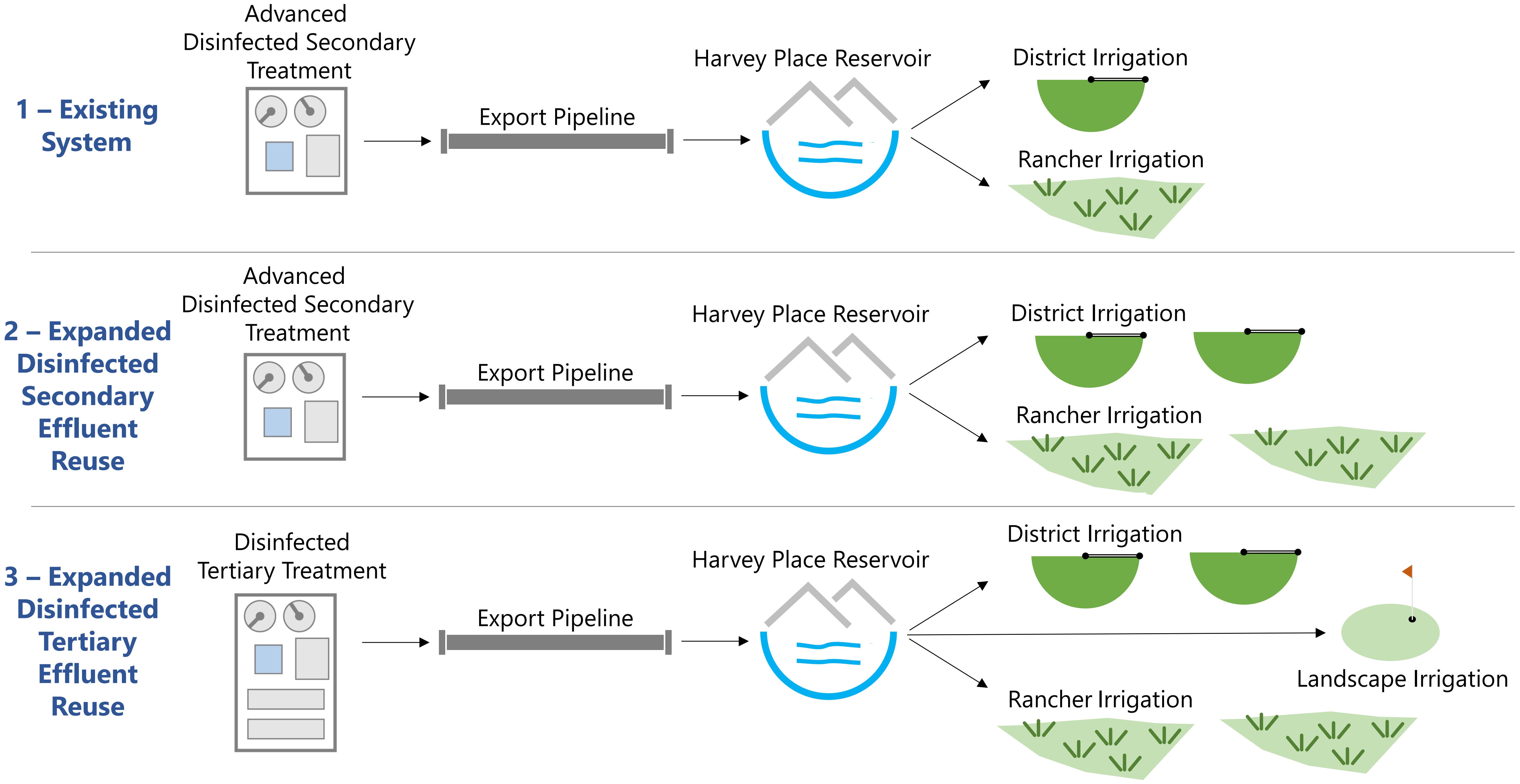


WWTP = wastewater treatment plant

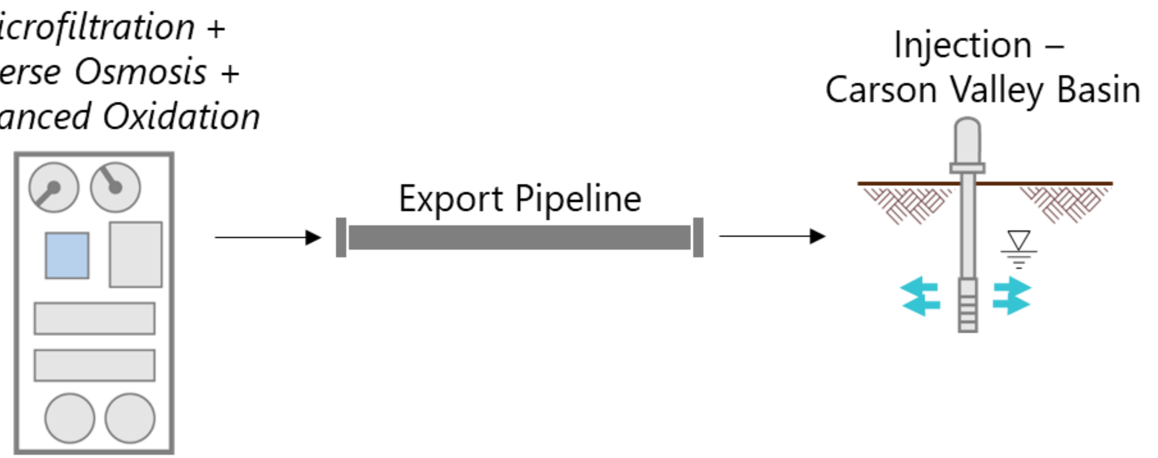
Key Regulatory Challenges

Authority	Regulation/ Agreement/ Policy/ Permit	Description	Challenge
State of California	Title 22	Defines approved uses of recycled water	• Limited options
LRWQCB	Basin Plan	Water quality objectives Surface water discharge permit	• Attainment of objectives
NDEP	Discharge Regulations	Water quality objectives Surface water discharge permit	• Attainment of objectives
State of Nevada	Reuse Regs	Defines approved uses of recycled water – Class A and Class B	• Class A may require treatment upgrades • Crossing State lines
NDEP	DCLTSA Permit	Recycled water permit	• Modifications to accommodate additional flow from the District
DCLTSA	DCLTSA Ordinance	Agreement needed between the two entities	• Negotiating agreement

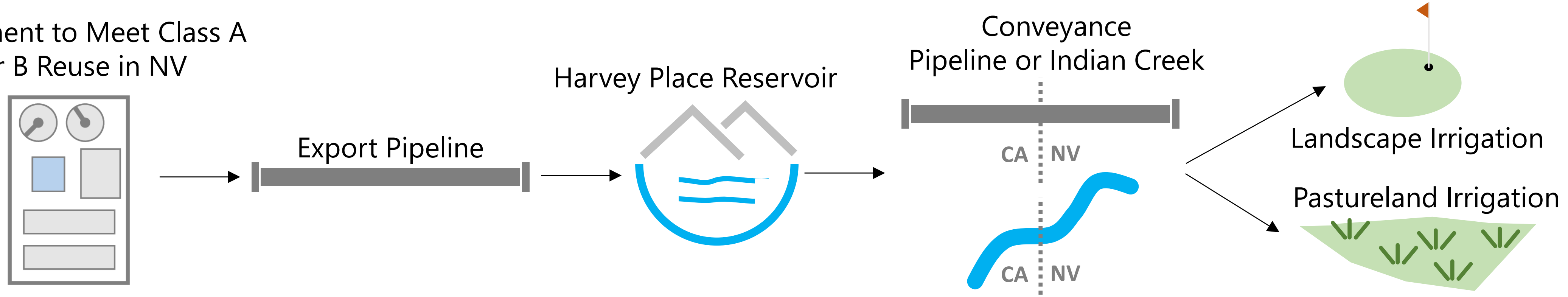
LRWQCB = Lahontan Regional Water Quality Control Board; NDEP = Nevada Division of Environmental Protection;
DCLTSA = Douglas County Lake Tahoe Sewer Authority


1 – Existing System
Advanced Disinfected Secondary Treatment
Export Pipeline
Harvey Place Reservoir
District Irrigation
Rancher Irrigation
2 – Expanded Disinfected Secondary Effluent Reuse
Advanced Disinfected Secondary Treatment
Export Pipeline
Harvey Place Reservoir
District Irrigation
Rancher Irrigation
3 – Expanded Disinfected Tertiary Effluent Reuse
Disinfected Tertiary Treatment
Export Pipeline
Harvey Place Reservoir
District Irrigation
Landscape Irrigation
Rancher Irrigation

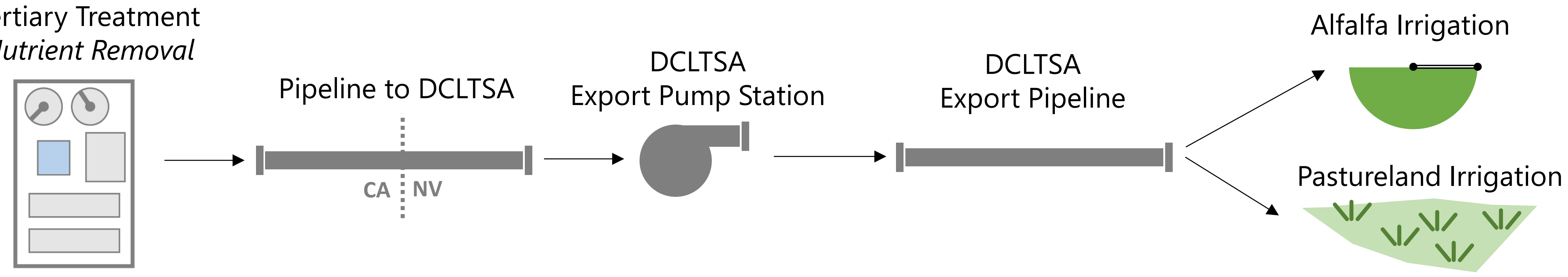
5 – Groundwater Injection For Disposal in Alpine County



6 – Expanded Class A or B Reuse in NV

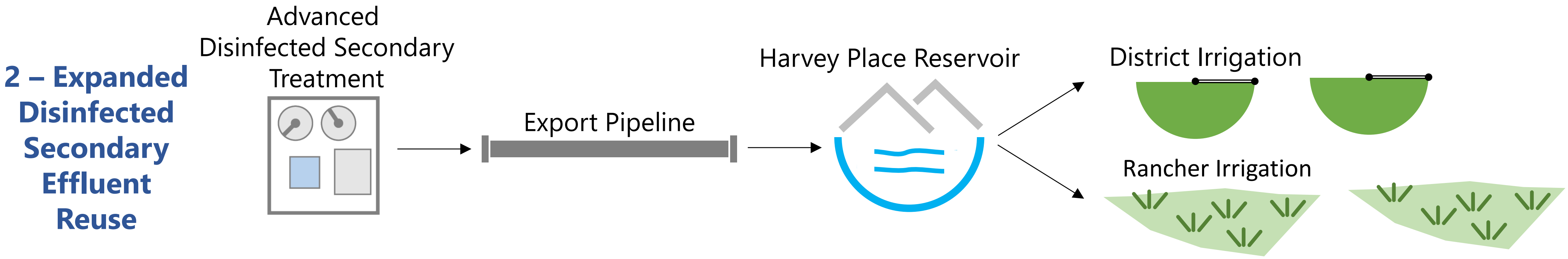


7 – Conveyance to DCLTSA



DCLTSA = Douglas County Lake Tahoe Sewer Authority

Alternative 2 – Expanded Reuse with Advanced Secondary Recycled Water

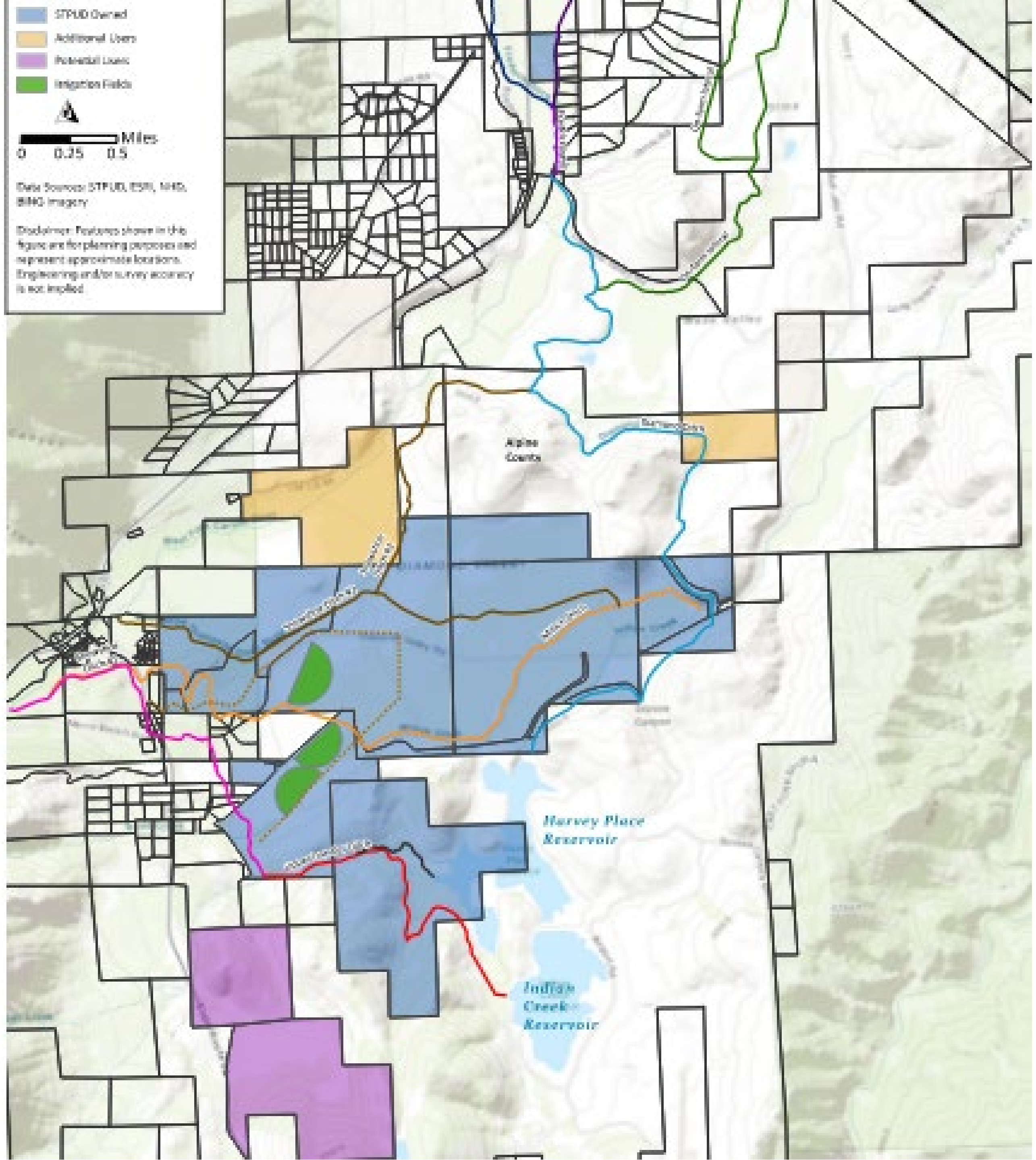


Components

- Existing Treatment
- Existing Export
- Expanded Recycled Water Use on District Property
- Expanded Recycled Water Use on Other Properties
- Possible Infrastructure Modifications/Expansion

Potential Recycled Water Demands

- Expanded District Irrigation Operations
  - » Additional fodder crop irrigation areas
  - » Wetlands on property may limit expansion potential
- New Users
  - » Few parcels identified to date



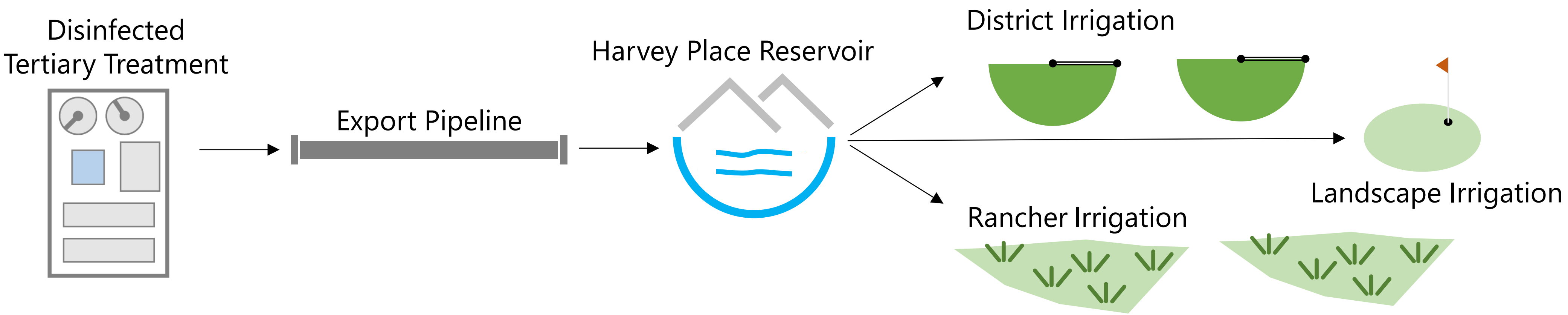
Considered for Further Evaluation

Key Challenges – Expanded Advanced Secondary Reuse in Alpine County Alternative 2

Regulatory	Technical	Environmental	Institutional
• Updated Recycled Water Permit • Salt and Nutrient Management Plan	• Limited new demands • Potential new recycled water delivery infrastructure	• Potential construction impacts of any new infrastructure	• Renewal/ extension of rancher contracts • New contracts with new users

Alternative 3 – Expanded Reuse with Disinfected Tertiary Recycled Water

3 – Expanded Disinfected Tertiary Effluent Reuse

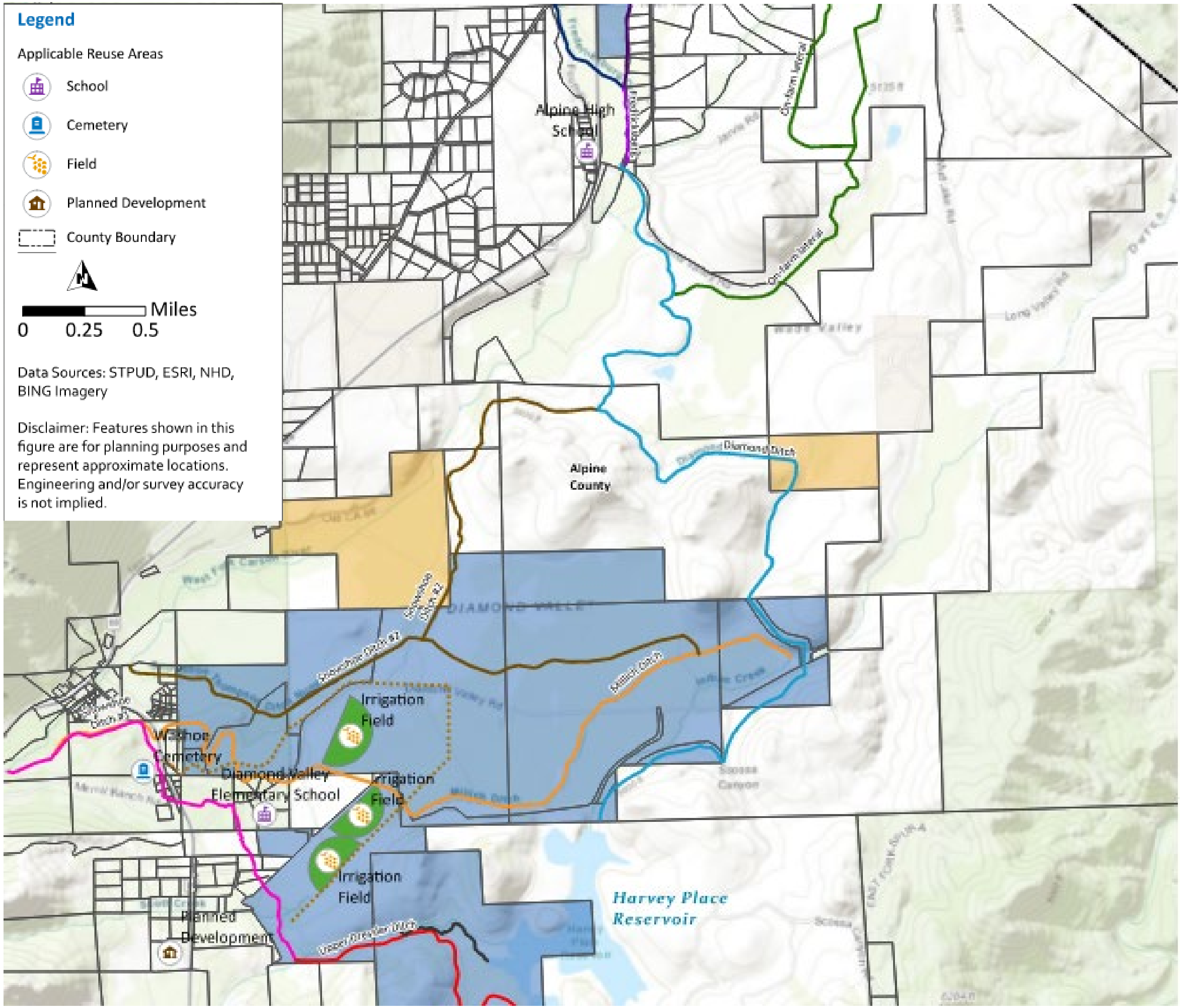


Components

- Existing Export
- Disinfected Tertiary Treatment
- Infrastructure for delivery of recycled water

Potential Recycled Water Demands

- Region is dominated by Ag and open space
- Ag areas not used for food crops due to climate
- Limited demand for urban landscape irrigation



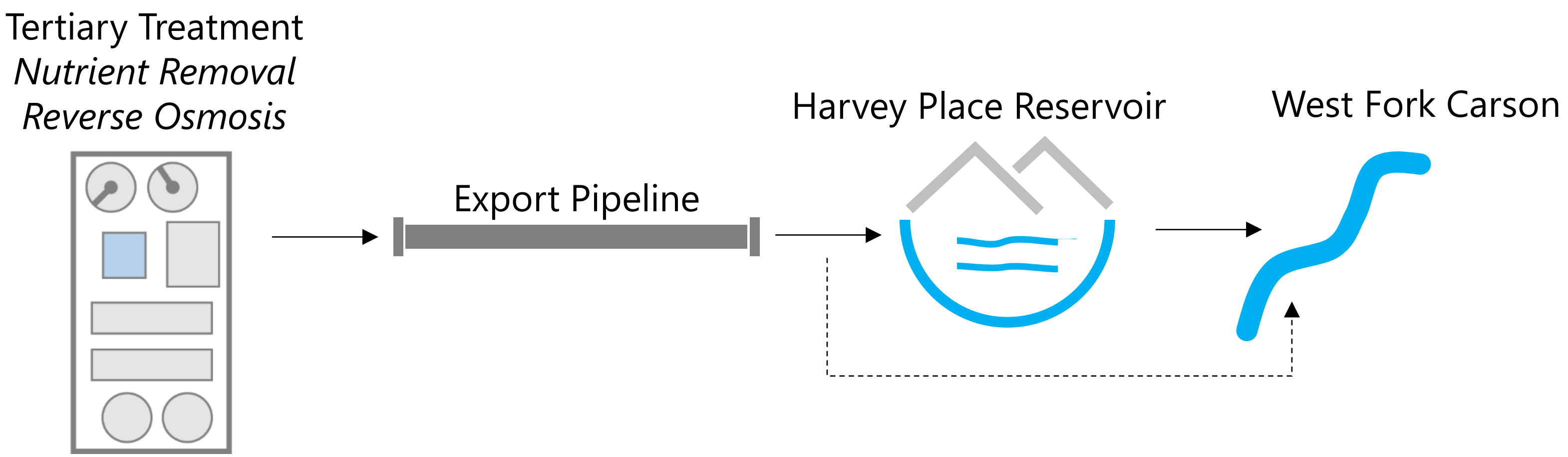
Key Challenges – Expanded Disinfected Tertiary Effluent Reuse Alternative 3

Considered for Further Evaluation

Regulatory	Technical	Environmental	Institutional
• Updated Recycled Water Permit • Salt and Nutrient Management Plan	• Limited new demands even with higher level of treatment • Potential new recycled water delivery infrastructure	• Potential construction impacts of any new infrastructure	• Renewal/ extension of rancher contracts • New contracts with new users

Alternative 4 – Discharge to West Fork Carson River

Discharge to West Fork Carson River



Components

Existing Export

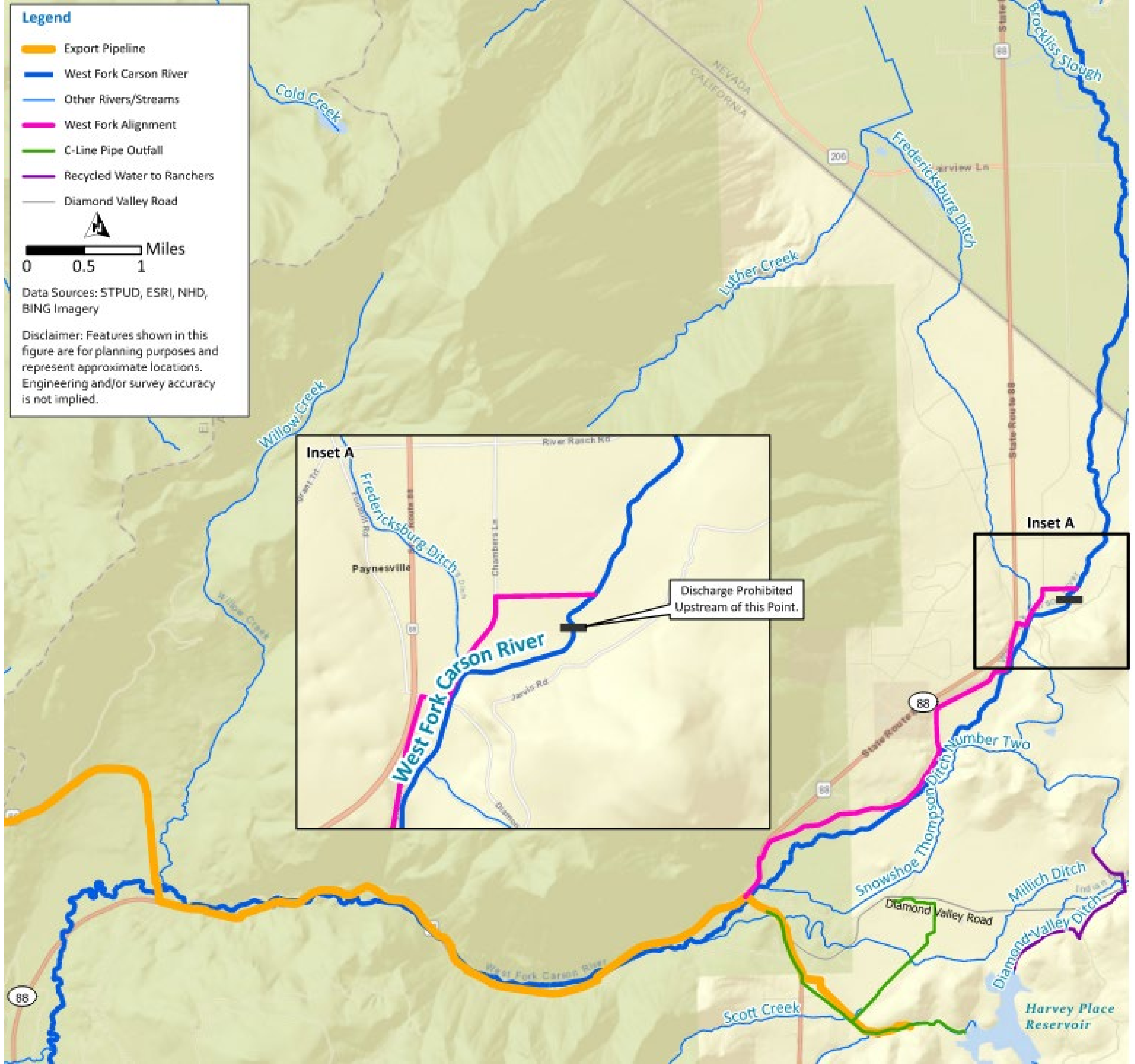
Potential Treatment Upgrades

Seasonal Discharge

New surface water discharge to West Fork Carson

Location of Potential West Fork Discharge

- Alpine County
  - 1965 Ordinance Regulating Recycled Water



LRWQCB = Lahontan Regional Water Quality Control Board

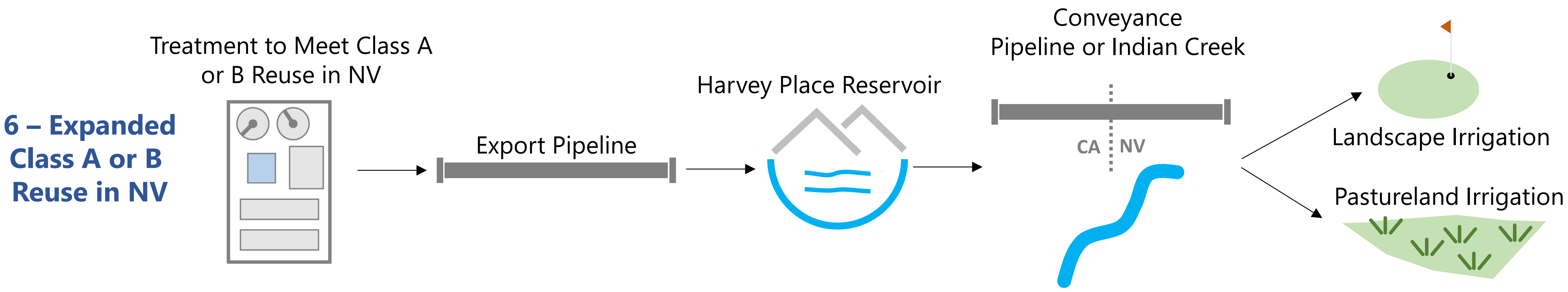
Considered for Further Evaluation

Key Challenges – Discharge to West Fork Carson River Alternative 4

Regulatory	Technical	Environmental	Institutional
• LRWQCB – Surface water discharge permit • LRWQCB – Basin Plan Amendment • NDEP approval • NDEP - Approval for conveyance into NV • Consistency with West Fork Vision Project	• Potential treatment upgrades – Nutrient removal, partial salt and chloride removal • Generation of RO concentrate	• Potential construction impacts of pipeline to discharge location	• Use of recycled water during time of discharge

LRWQCB = Lahontan Regional Water Quality Control Board; NDEP = Nevada Division of Environmental Protection; RO = reverse osmosis

Alternative 6 – Expanded Class A or B Reuse in Nevada

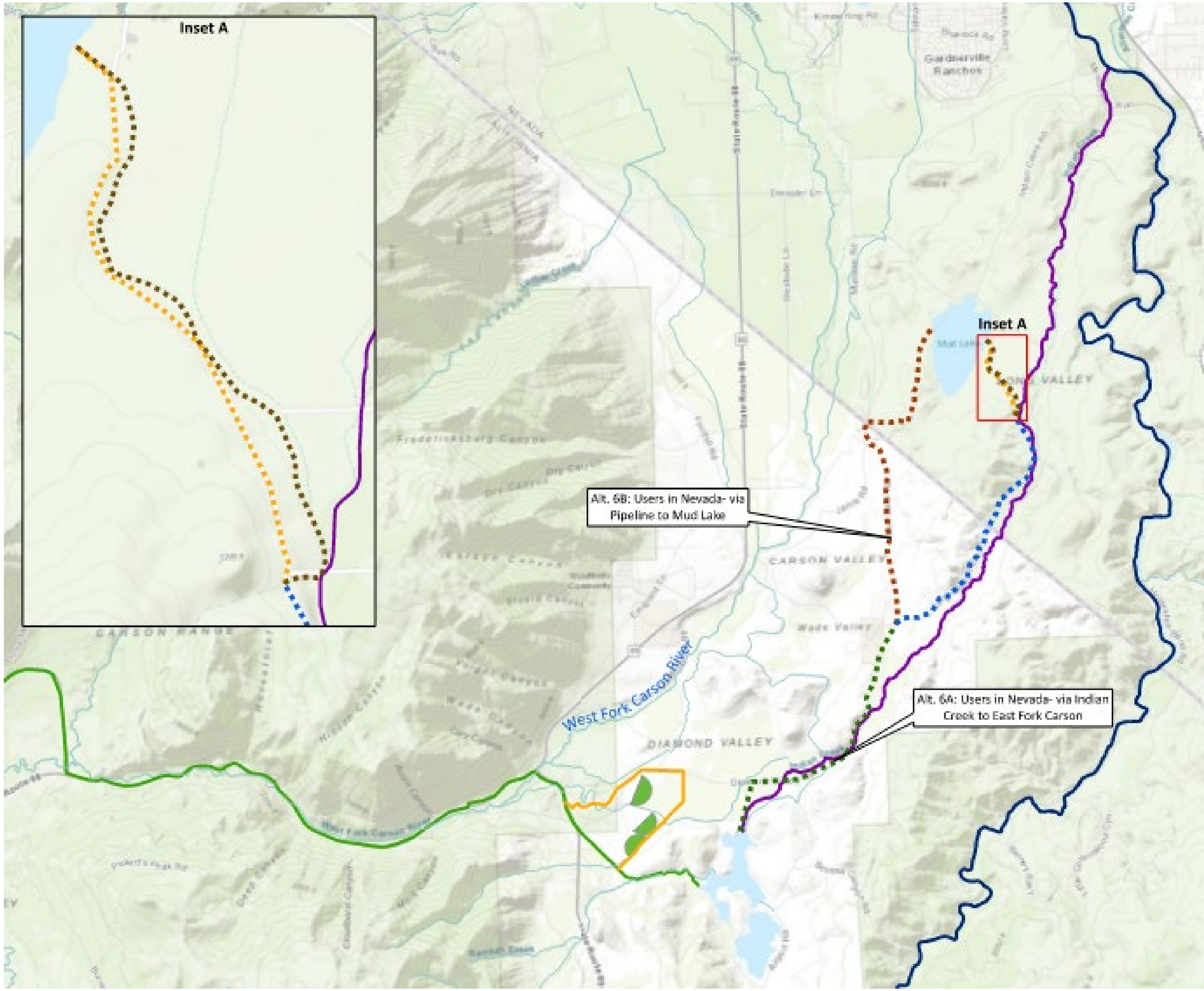


Components

- Existing Export
- Potential Treatment Upgrades
- Infrastructure for delivery of recycled water or approval for alternative conveyance

Conveyance Options

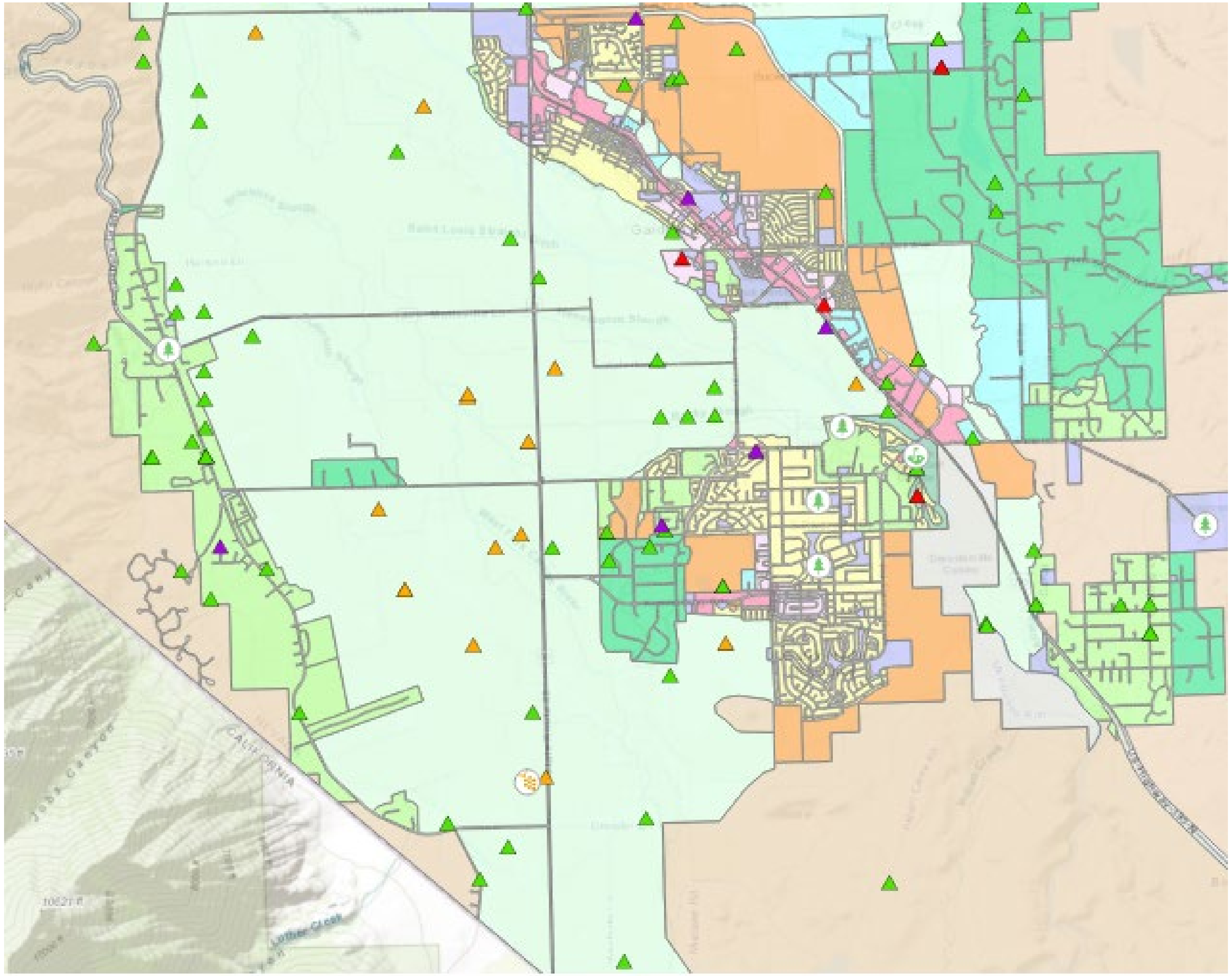
- Potential conveyance from Harvey Place Reservoir
  - » Pipeline
  - » Indian Creek



NDEP = Nevada Division of Environmental Protection
LRWQCB = Lahontan Regional Water Quality Control Board

Class A or B Reuse in Nevada

- Agricultural Areas
  - » Cattle ranching / farming
  - » Hay farming
  - » Other animal production – bees, goats, sheep, hogs
- Urban Irrigation
  - » Golf Courses
  - » Parks
  - » Schools



Considered for Further Evaluation

Key Challenges – Expanded Class A or B Reuse in Nevada Alternative 6

Conveyance pipeline to Mud Lake

Regulatory	Technical	Environmental	Institutional
• NDEP Discharge permit for Mud Lake • Approval for use by NDEP	• New conveyance pipeline • Potential treatment upgrades – depending on level of reuse	• Potential construction impacts of any new infrastructure	• New contracts with new users

NDEP = Nevada Division of Environmental Protection

Considered for Further Evaluation

Key Challenges – Expanded Class A or B Reuse in Nevada Alternative 6

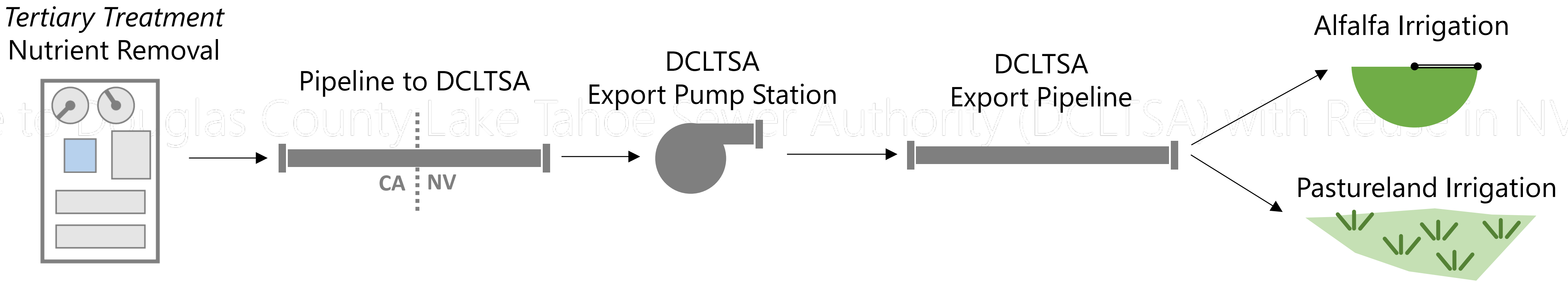
Conveyance via Indian Creek

Regulatory	Technical	Environmental	Institutional
• LRWQCB discharge permit • Approval for use by NDEP	• Potential treatment upgrades to meet water quality objectives	• Potential construction impacts of any new infrastructure	• New contracts with new users

LRWQCB = Lahontan Regional Water Quality Control Board; NDEP = Nevada Division of Environmental Protection

Alternative 7 – Conveyance to DCLTSA

7 – Conveyance to DCLTSA



Components

- Potential Treatment Upgrades
- Capacity Increase of DCLTSA Export Line (Partial)
- Conveyance Pipeline to DCLTSA
- Infrastructure for delivery of recycled water to new users

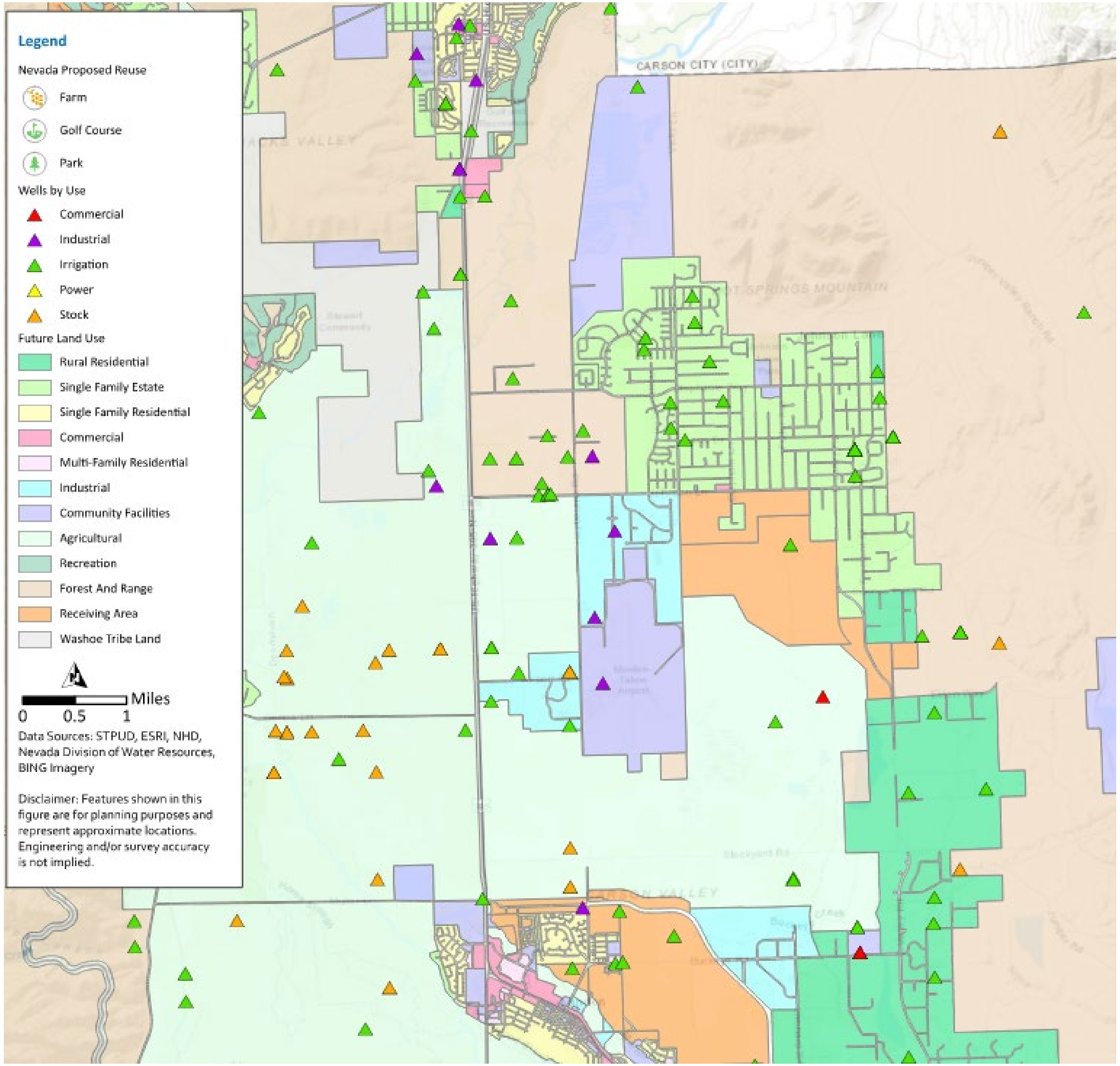
DCLTSA = Douglas County Lake Tahoe Sewer Authority

DCLTSA Export Pipeline and Recycled Water Use

DCLTSA = Douglas County Lake Tahoe Sewer Authority; KGID = Kingsbury General Improvement District

Demands in Vicinity

- Existing Demands
  - » Ranches / livestock
  - » Fodder crop
- Potential Demands
  - » Ranches / livestock
  - » Fodder crop
  - » Urban irrigation – Golf Courses
  - » Snowmaking – NV side of Heavenly Ski Resort
- Conveyance to New Users



Considered for Further Evaluation

Key Challenges – Conveyance to DCLTSA Alternative 7

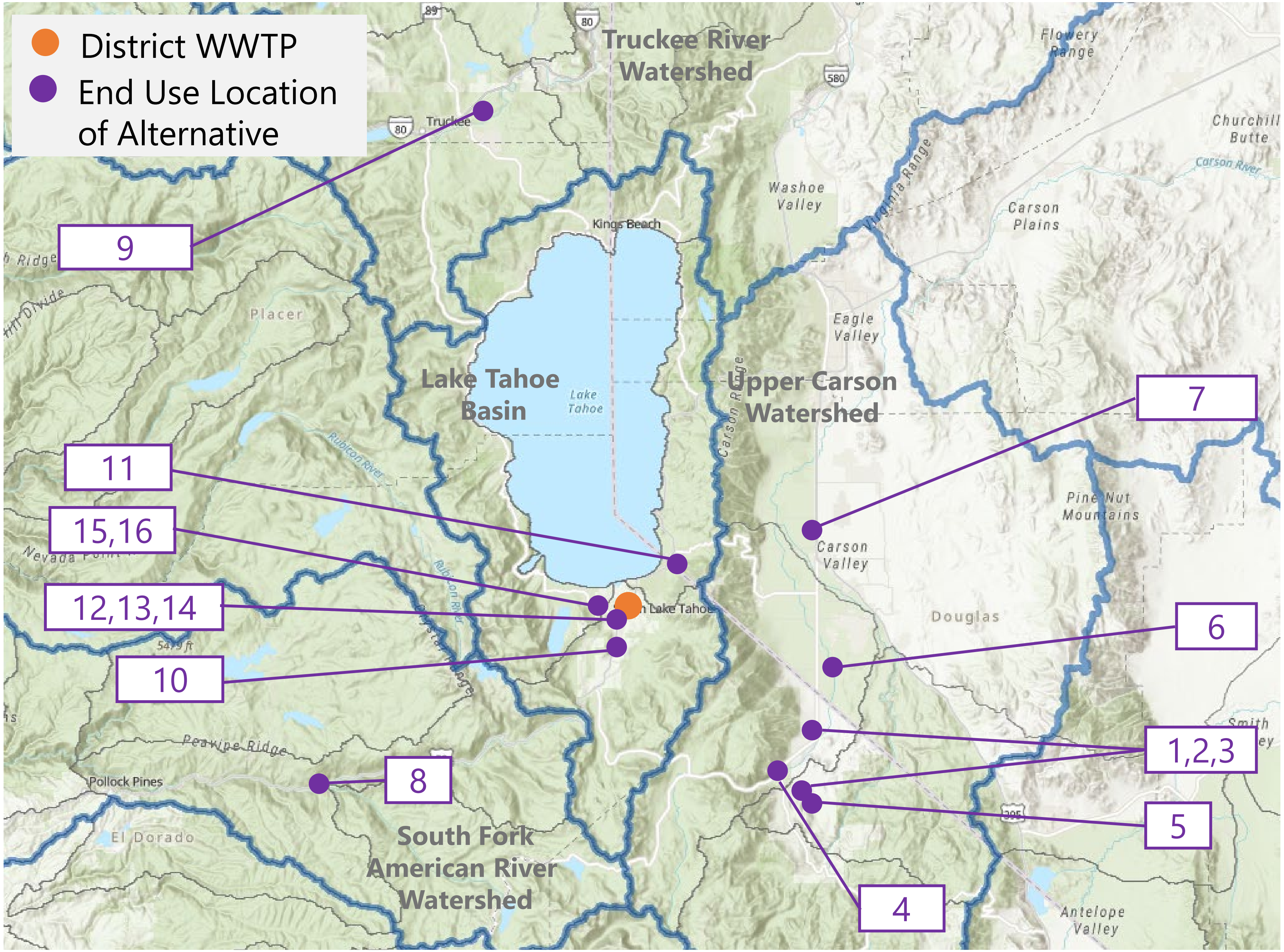
Regulatory	Technical	Environmental	Institutional
• Approval for use by NDEP • Approval/permit for connection to DCLTSA system	• Conveyance pipeline to DCLTSA • Capacity increase for pressurized section of DCLTSA export system	• Potential construction impacts of pipeline to DCLTSA	• Agreement with DCLTSA • Contracts with new users

NDEP = Nevada Division of Environmental Protection; DCLTSA = Douglas County Lake Tahoe Sewer Authority

Summary and Next Steps

Summary

16 Alternatives

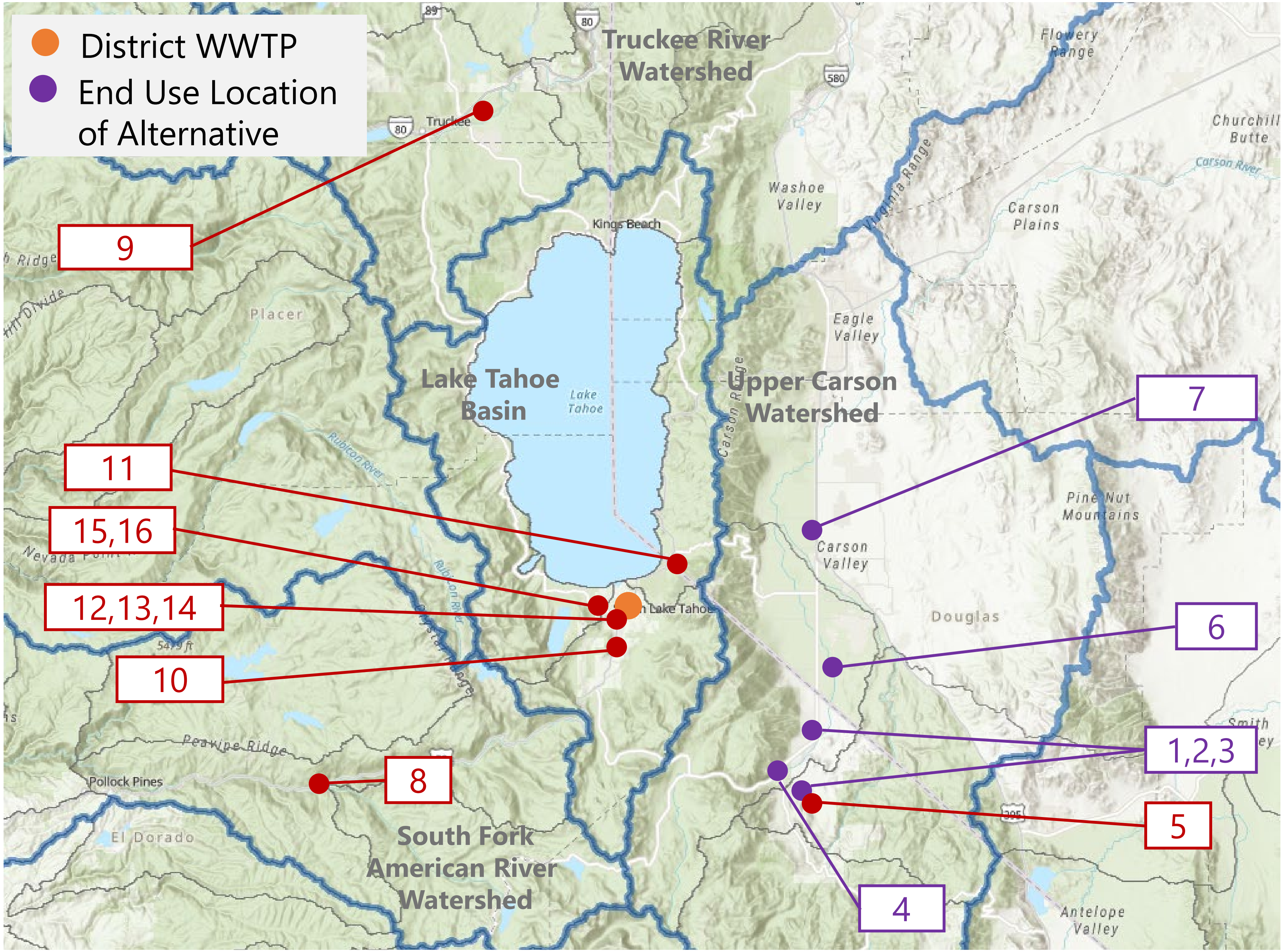


WWTP = wastewater treatment plant

Summary

16 Alternatives

10 Not Considered for Further Evaluation



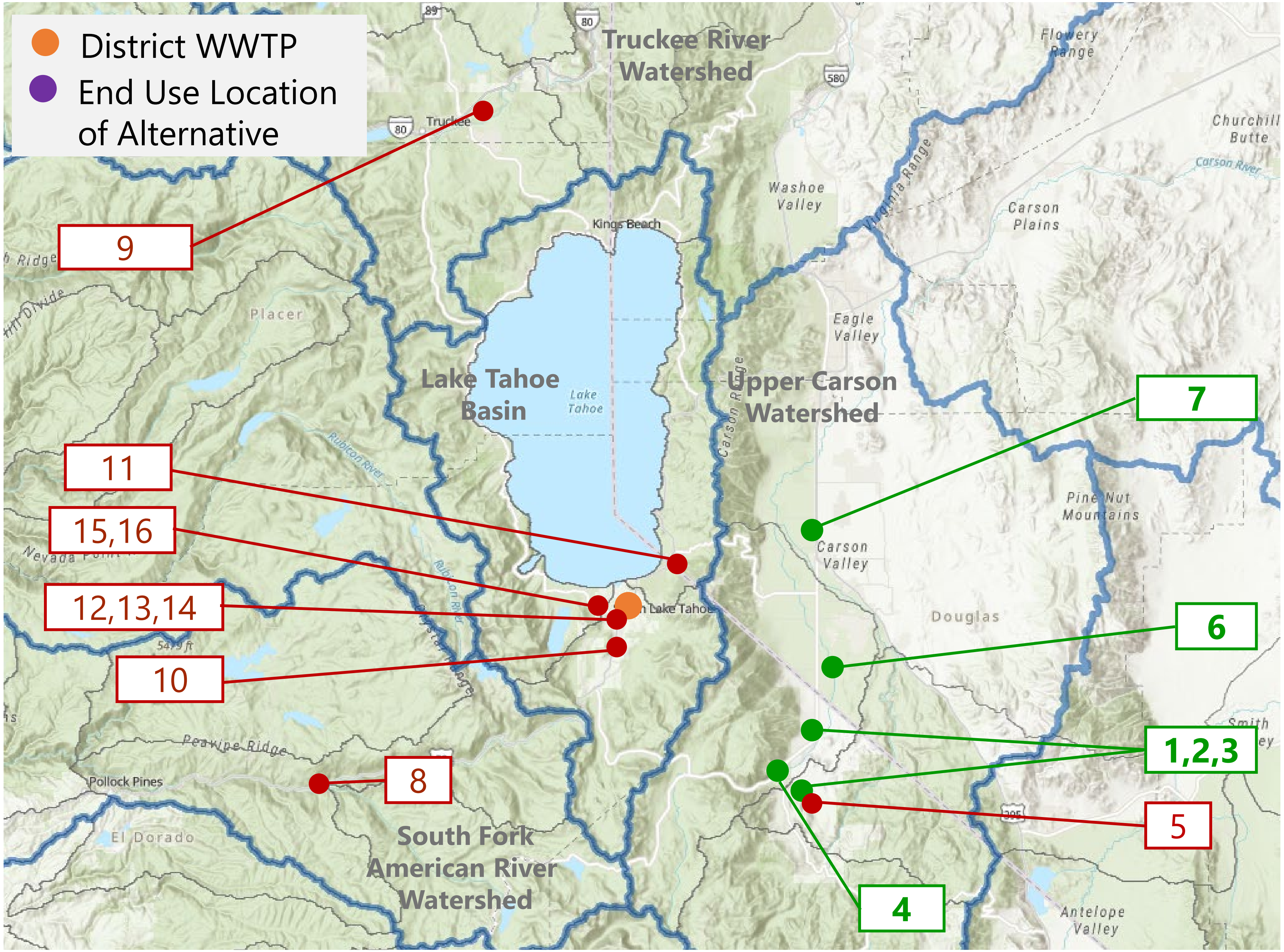
WWTP = wastewater treatment plant

Summary

16 Alternatives

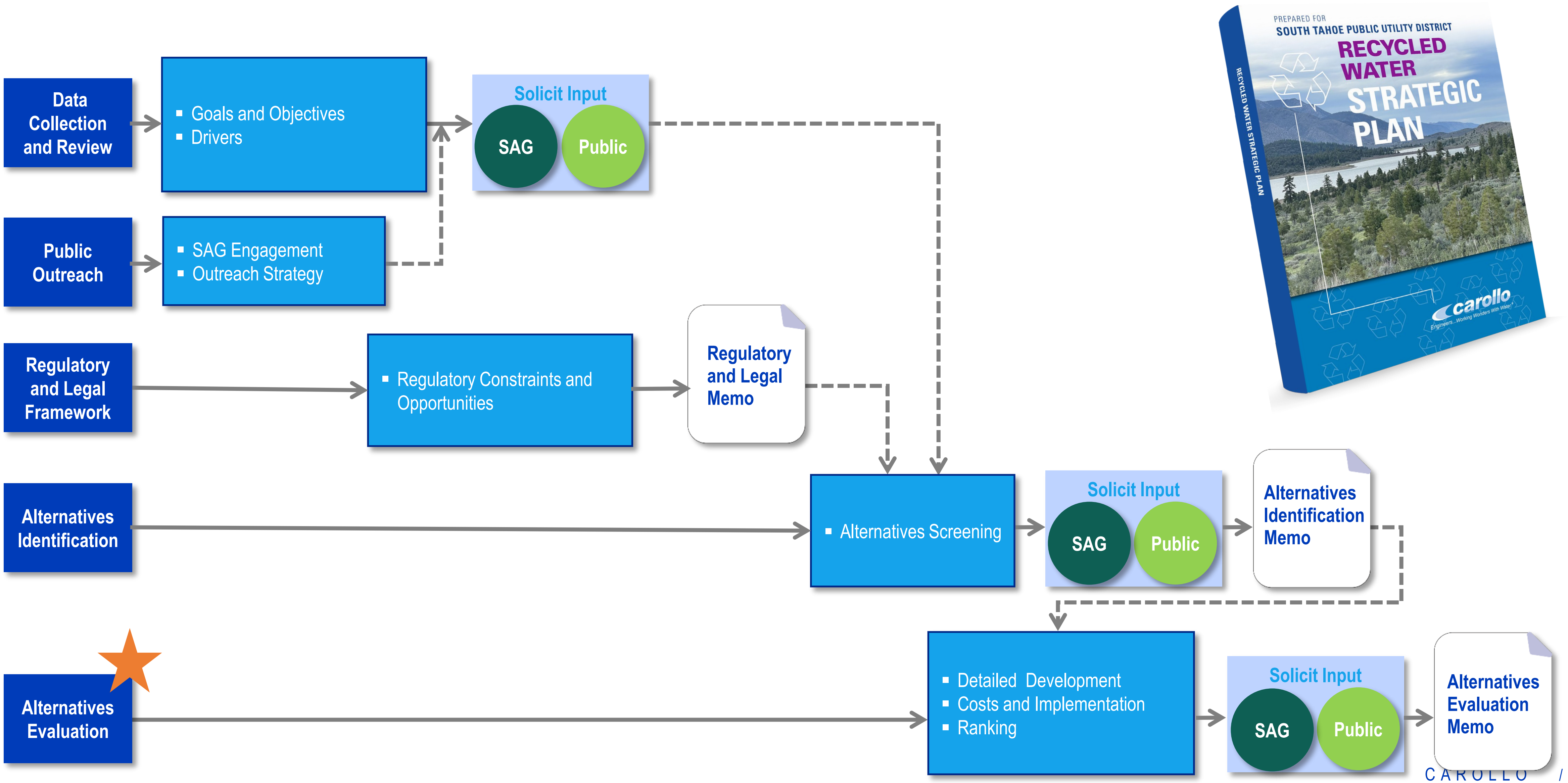
10 Not Considered for Further Evaluation

6 Considered for Further Evaluation



WWTP = wastewater treatment plant

Recycled Water Strategic Plan Process Next Steps



SAG = Stakeholder Advisory Group

Questions?

How to ask questions

- In-person participants:
  - » Raise hand
  - » Ask questions when called upon
    - – questions will be repeated for virtual participants
- Computer participants:
  - » Raise hand, ask question when called upon – un-mute to speak
  - » Ask question in the chat box
- Phone participants:
  - » Press “*6” to un-mute

Closing

- Thank you for being here!
  - » Comment cards
- Project webpage: https://stpud.us/recycled-water-strategic-plan/
- E-blast updates/public meeting notices/questions:
  - » Email your name to recycledwater@stpud.us
- Phone: (530) 544-6474 x 6202
- Social media sites:

Instagram: www.instagram.com/southtahoepud/

Facebook: www.facebook.com/SouthTahoePUD

Twitter: @SouthTahoePUD

End of Presentation

In-Person Interactions

- Open House Format until 8:00 pm
- Four boards set up
  - » Carson Watershed Alternatives schematics
  - » 3 maps
- Computers set up
  - » Various treatment schematics

- Feel free to wander around, learn more, ask questions, and provide feedback

Appendix D:

May 23, 2023 Meeting Minutes

MEETING MINUTES

RECYCLED WATER STRATEGIC PLAN

South Tahoe Public Utility District

Issue Date: July 10, 2023

Project No.: 200689

Purpose:	Alternatives Screening Update – Stakeholder Advisory Group (SAG) Meeting #3 & Public Outreach Meeting #2
Meeting Date:	May 23, 2023
Meeting Location:	District Board Room and Virtual (MS Teams)
Prepared By:	Carollo Team

Attendees:

Client:	Carollo:	SAG & Public
Steve Caswell	Elisa Garvey	See table below.
Shelly Thomsen	Margaret Skillicorn (Paragon PR)	
	Coral Taylor	

Distribution: STPUD and Carollo teams

Discussion:

The following is our understanding of the subject matter covered in this conference. If this differs from your understanding, please notify us.

Attendees

In-person attendees are shown in the table and images below:

Name	Email	Phone
Carl Ruschmeyer	rushky@charter.net	775-690-1437
Shane Romsos	sromsos@chartner.net	530-721-7508
Evan Mecak	eem247@yahoo.com	530-307-9933
Jason Glaze	jasonglaze78@yahoo.com	
Jim Feeney	jfeeney@sierraattahoe.com	530-314-1232; 530-543-3102
Bryan Hickman	bhickman@sierraattahoe.com	530-318-3245
Jason Burke	jburke@cityofslt.us	530-542-6038
Nick Exline	nick@exlineandcompany.com	775-240-1301
Charles McKee	charlesjmckee@gmail.com	831-595-7743
Matt Ricci	matt@lukinswater.com	530-318-1993
Shay Navarro	shay@trpa.gov	775-589-5282

Nichole Williamson	nicholehaas@hotmail.com	
Harold Singer		

SOUTH TAHOE PUBLIC UTILITY DISTRICT

RECYCLED WATER STRATEGIC PLAN

SAG / Public Information Meeting
Tuesday, May 23, 2023; 6 – 8 p.m.
South Tahoe Public Utility District Board Room

Name	Email and/or Mailing Address	Phone
Carl Ruschmeyer	rushky@charter.net	(775) 690-1437
SHANE ROMSOS	sromsos@charter.net	(530) 721 7508
EVAN MEAH	eem247@Yahoo.com	530-307-9933
JASON GLAZE	jasonglaze78@yahoo.com	
Jim Feeney	jfeeney6sierra at tahoe.com	530 314 1232
BRYAN HICKMAN	BHICKMAN@SIERRAATTAHOE.COM	530 318 3245
Jason Burke	jburke@cityofslt.us	530 542-6038
Nick Exline	Nick@exlineandcompany.com	775-240-138
Charles mckee	charlesjmckee@gmail.com	831-595-7743
MATT RICCI	MATT@LUKINSWATER.COM	530-318-1993

Please print legibly.

Note: Signing this list is voluntary. You will receive email updates on this project.

SOUTH TAHOE PUBLIC UTILITY DISTRICT
RECYCLED WATER STRATEGIC PLAN

SAG / Public Information Meeting
Tuesday, May 23, 2023; 6 – 8 p.m.
South Tahoe Public Utility District Board Room

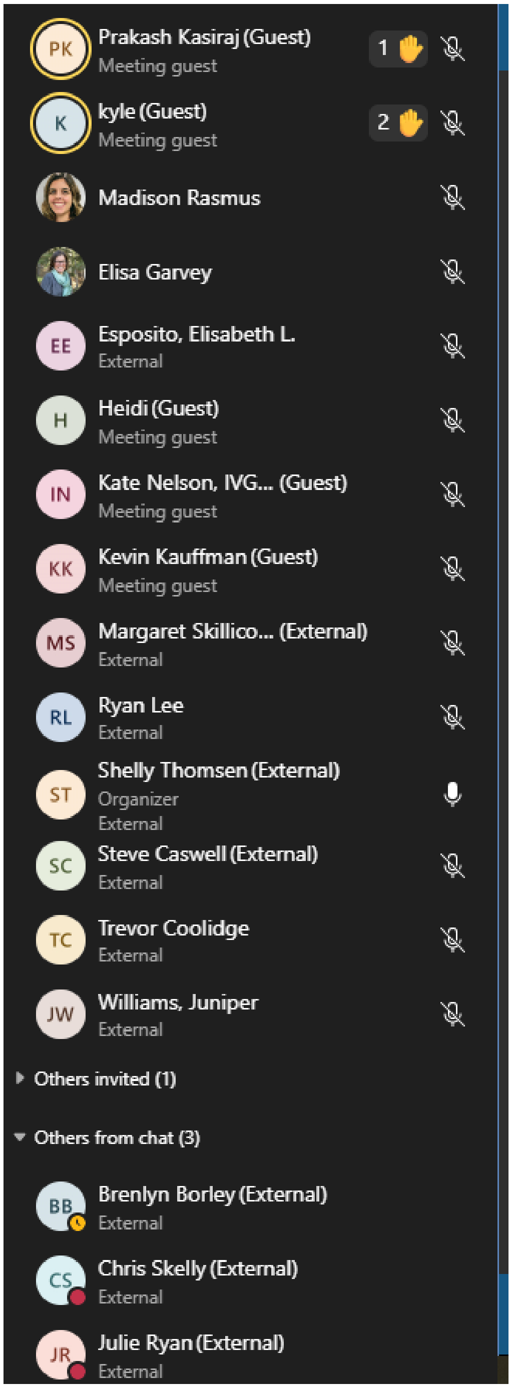
Name	Email and/or Mailing Address	Phone
Shay Navarro	snavarro@trpa.gov	775.589.5282
Nichole Williamson	nicholehaase@hotmail.com	

Please print legibly.

Note: Signing this list is voluntary. You will receive email updates on this project.

Virtual attendees are shown in the table and screenshot below:

Name	Email
Prakash Kasiraj	
Madison Rasmus	mrasmus@carollo.com
Elisabeth Esposito	EESPOSITO@bhfs.com
Ryan Lee	rlee@stpud.us
Trevor Coolidge	tcoolidge@stpud.us
Brenlyn Borley	
Chris Skelly	cskelly@stpud.us
Julie Ryan	jryan@stpud.us
Kate Nelson	
Juniper Williams	2582418@WASHOESCHOOLS.ORG
Kevin Kauffman	
Kyle	
Heidi	
Amy Mecak	amy@inka-solutions.com
15305446474	



Welcome & Background

Steve welcomed the attendees, shared the agenda, and introduced the project team. An overview of the District's existing system as well as the Recycled Water Strategic Plan objectives were presented. Challenges with the existing system were discussed as part of the "why" the District is doing a Strategic Plan.

Alternative #1 – Existing System

- While pumping over Luther Pass is energy intensive, note that there is a small hydroelectric facility in Douglas County that does generate some hydropower, potential to expand this. Although this is for the existing system, it still has challenges.
- This alternative is CONSIDERED FOR FURTHER EVALUATION.

Alternatives Identification and Screening

Steve presented a high-level overview of the alternatives identification process.

Alternatives Screening – Truckee River Watershed

Alternatives within the Truckee River Watershed were presented at a high level, which had many regulatory and infrastructure considerations as the recycled water would be conveyed to TTSA. The main challenge with this alternative is associated with the construction of the 15-mile conveyance pipeline from STPUD to TCPUD's export system.

- This alternative is NOT CONSIDERED FOR FURTHER EVALUATION.

Alternatives Screening – South Fork American River Watershed

Alternatives within the South Fork American River Watershed were presented at a high level, which had many regulatory and infrastructure considerations as the recycled water would be conveyed to the South Fork American River. Additionally, the high-level analysis showed that there is not a nearby demand in this watershed for recycled water.

- This alternative is NOT CONSIDERED FOR FURTHER EVALUATION.
- Deliver to Sierra at Tahoe ski resort can be added as a sub-alternative to the expanded tertiary treatment alternative

Alternatives Screening – Lake Tahoe Basin

Alternatives within the Lake Tahoe Basin were presented at a high level. These are all subject to regulatory constraints, notably the Porter-Cologne Act. However, Outstanding National Resource Waters (ONRW), the Lahontan Basin Plan, and CEQA also need to be taken into consideration.

- These alternatives are NOT CONSIDERED FOR FURTHER EVALUATION.

Alternatives Screening – Carson River Watershed

Alternatives within the Carson River Watershed were presented at a high level, and then the alternatives were described in further detail.

Alternative #2 – Expanded Reuse with Advanced Secondary Recycled Water

- Some specific identified users (purple on the map) versus some general potential users. Demand from new users have uncertain potential, will dig into further. Key challenges are needing a new Recycled Water Permit, maybe a Salt and Nutrient Management Plan, and there may be limited demands for increasing recycled water use in Alpine County.
- This alternative is CONSIDERED FOR FURTHER EVALUATION.

Alternative #3 – Expanded Reused with Disinfected Tertiary Recycled Water

- Region dominated by ag and open space but not food crops, livestock, grazing and fodder crop type of demand. Not much urban development, limited demand for urban landscape. Key challenges are needing a new Recycled Water Permit, maybe a Salt and Nutrient Management Plan, and there may be limited demands for increasing recycled water use in Alpine County, even with disinfected tertiary recycled water.
- This alternative is CONSIDERED FOR FURTHER EVALUATION.

Alternative #4 – Discharge to West Fork Carson River

- WQ standards are more stringent for West Fork Carson than for Indian Creek Reservoir. Thus, this alternative may require more extensive treatment (for TDS removal). However, this alternative could potentially reduced recycled water operations in Alpine County, and there is a potential opportunity for revenue. Discharge may have to be downstream of the 1965 Discharge Prohibition location, fairly close to CA/NV border. Key challenges would include getting a new surface water

discharge permit and a basin plan amendment approval from Lahontan, getting NDEP approval, treatment upgrades, and a new pipeline to the West Fork Carson.
- This alternative is CONSIDERED FOR FURTHER EVALUATION.

Alternative #5 – Groundwater Injection for Disposal in Alpine County

- This groundwater basin is designated as MUN and has low TDS and chloride concentrations. Recycled water would need to be permitted as disposal which would be challenging given the MUN designation of the basin. Recycled water would need a higher level of treatment (and associated higher costs), and there would be no beneficial use or foreseeable revenue associated with this alternative.
- This alternative is NOT CONSIDERED FOR FURTHER EVALUATION.

Alternative #6 – Expanded Class A or B Reuse in Nevada

- Conveyance to Mud Lake would either be via a pipeline or a discharge to Indian Creek. There are opportunities for Class A or B Reuse in Nevada for ag and urban irrigation.
    - Conveyance pipeline key challenges include NDEP discharge permit and approval, new pipeline, potential treatment upgrades, and new contracts with new users.
    - Indian Creek key challenges include Lahontan discharge permit, NDEP approval, potential treatment upgrades, and new contracts with new users.
- This alternative is CONSIDERED FOR FURTHER EVALUATION.

Alternative #7 – Conveyance to DCLTSA with Reuse in Nevada

- Conveyance to DCLTSA for use in North Carson Valley would involve potential treatment upgrades, an in-Basin conveyance pipeline from STPUD to DCLTSA, potential partial capacity increase of DCLTSA's export pipeline, and infrastructure for delivery of recycled water to new users. Existing demands from DCLTSA's customers include irrigation for ranches/livestock and fodder crop; potential demands also include urban irrigation and snowmaking at Heavenly. Key challenges are needing approval and a permit from NDEP, infrastructure improvements, and potential additional contracts with new users.
- This alternative is CONSIDERED FOR FURTHER EVALUATION.

Summary and Next Steps

Started with 16 alternatives; 10 are not being considered for further evaluation and 6 will be considered for further evaluation and moving onto next step.

In-Person Questions

- Can we get a copy of the presentation?
    - Yes, it will be posted on the project website.
- Some options had secondary treatment and others had tertiary, could you elaborate on which alternatives had which levels of treatment?
    - The existing system has secondary treatment. Alternative 2 would also use this level of treatment. All other alternatives moving forward for further evaluation would require treatment upgrades (at varying levels).
- Why would you need tertiary treatment for Alternative 7?
    - Differences in regulations between California and Nevada. Would need tertiary treatment for this type of irrigation in Nevada (not required for similar irrigation in California).
- Why are there no other environmental concerns listed aside from conveyance? Wouldn't there be concerns with effluent discharge? Why wouldn't we discharge the water in the Tahoe Basin if the water is being treated adequately?
    - The permitting process and added treatment would meet environmental concerns for the noted discharge points.

    - The Tahoe Basin alternatives would be met with significant regulatory hurdles (including Porter Cologne, Outstanding National Resource Water [ONRW]) that other watersheds are not subjected to.
    - Water quality objectives for each water body are established based on beneficial uses of each water way. Objectives are developed by the Lahontan Regional Water Quality Control Board and Nevada Department of Environmental Protection. These entities issue permits for discharge based on the set objectives.
    - Another environmental impact associated with any alternatives requiring treatment upgrades are the energy, chemicals, and vehicle trips associated with the treatment processes.
- If Alternative 7 is pursued, would the existing District infrastructure be decommissioned? What would happen to the ranchers without this water?
    - These will be addressed with the deeper evaluation. Cannot give any assurances at this point for the ranchers, each have their own water rights.
- What is the capacity of Harvey Place reservoir?
    - Approximately 4,000 AF.
- For Alternative 4, would there be secondary rights the District could file? What are the impacts to the Alpine Decree?
    - This will be looked at in the next phase.
- Are the water quality objectives for the West Fork Carson River similar to the South Fork American River? Why is a 28-mile pipeline necessary to transport water to the American River when the actual river is only 3-miles away?
    - The objectives are similar between the two rivers, not exactly the same.
    - There was a 1977 decision by the Central Valley Regional Water Quality Control Board that means that the water cannot be discharged into the American River until after the Silver Fork confluence (west of Kyburz, CA).
- (Harold Singer, former LRWQCB Executive Officer) Was a pipeline through the mountain evaluated to eliminate pumping costs? Is there grant funding available to offset the cost of this pipeline option based on saved energy and carbon sequestration?
    - Yes, this has been evaluated and it is extremely expensive to put a pipeline through a mountain. It would take many years to re-coup these costs in terms of energy offset.
    - District/Carollo team can do a high-level look at grant opportunities for a tunnel.
- Specific question on Alternative 4 and Alternative 6: Have you considered putting a new facility at Harvey Place that would treat the water to tertiary standards and create jobs and provide water to Alpine County?
    - District/Carollo team can look at this option in the next phase.
- Comment on energy and energy recovery
    - District/Carollo will investigate options for increasing energy recovery.

Virtual Questions

- Prakash Kasiraj: Has there been any work done on looking at energy extraction from the water (Alternative 1)?
    - The existing pipeline cannot be pressurized to have enough additional hydropower generation. Pipeline will likely be upgraded in the near-future and upgrades that allow an increase in energy recovery will be considered.
    - There are some limitations, not a lot of energy demand in Alpine County.
    - Energy recovery can be incorporated into any alternative that utilizes the existing export pipeline.

- Kyle: Would Alternative 1-6 utilize much of the existing Alpine County infrastructure?
    - Yes.
- Kyle: Can you discuss some of the anticipated impacts that Alternative 7 would have?
    - Each alternative has different iterations that could come forth as we go into the more detailed evaluation. For example, there may be limitations to how much water DCLTSA could take.
    - Although Alternative 7 would not use the District's existing Alpine Co infrastructure, there's a potential that the District would still have to maintain the existing infrastructure to keep as a backup or use it for partial export.

In-Person Open House

- Carl Ruschmeyer (Alpine Watershed Group, NDEP Board for Financing Water Projects Member, former Douglas County Director of Public Works):
    - Used to work in the Carson Valley and is very knowledgeable about this area, its water, as well as wastewater and recycled water.
        - Follow up: for next SAG meeting, send invite to Carl as well as others at Alpine Watershed Group.
    - He mentioned that Ed James from Carson Water Subconservancy District is very knowledgeable about the Carson Valley and wanted to get more water in Mud Lake.
        - Follow up: reach out to Ed James and meet with him to discuss the Recycled Water Strategic Plan, invite Carson Water Subconservancy District to next SAG meeting, discuss alternatives, specifically those associated with Mud Lake.
    - Potentially update maps to show: IVGID ponds/constructed wetlands, Douglas County sewer facilities, and Gardnerville sewer facilities.
- Shane Romsos was very interested in seeing nature-based (i.e., non-hardened infrastructure) treatment solutions, such as constructed wetlands, being considered in the next phase. Constructed wetlands might be able to be used for wetland banking, and they would have many potential co-benefits for nature. He also mentioned that perhaps the District could construct the ancillary ponds from the initial permit and use those for nature-based treatment.
- Sierra At Tahoe is interested in using recycled water for snowmaking and would like to see this option explored further.
- Bryan Hickman, one of the Sierra At Tahoe operations attendees used to work at Heavenly. He stated that Heavenly's existing snowmaking system is completely interconnected between the NV and CA sides of the mountain, so recycled water that went to a pond on the NV side would likely be used on both the CA and NV sides of the mountain. It would be challenging to separate the snowmaking systems between the smaller NV side and the larger CA side of the resort.
    - Follow up: update Alternatives Memo to reflect that the snowmaking system is interconnected, and recycled water put in on the NV side would not stay there and could end up on CA side. Or remove snowmaking from this alternative.

Comment Cards

Comment cards were distributed to the in-person attendees. Two comment cards were received, which are written out as well as shown in the scanned images below.

- Jim Feeney; jfeeney@sierraattahoe.com, 530-314-1232, 530-543-3102
    - *Q1:* Focus on solution that expand uses utilizing existing infrastructure. Also, consider snowmaking as one of those uses. Outdoor recreation would potentially *[?]* one of the highest economic values for recycled water use.

- *Other input:* Sierra At Tahoe is interested in exploring snowmaking as a potential end use to add to the mix of potential end uses. Please don't hesitate to contact us.

- Shay Navarro, snavarro@trpa.gov, 775-589-5282
  - *Q1:*
    - #7. [should be further evaluated]. What would costs be in terms of maintenance and energy if District sent water to Douglas County?
    - Alternatives to Alpine County and expansion to NV are good.
  - *Q2:*
    - Any using reverse osmosis given waste concentrate.

SOUTH TAHOE PUBLIC UTILITY DISTRICT

RECYCLED WATER STRATEGIC PLAN

Public Meeting, Tuesday, May 23, 6 – 8 p.m.

Full Name: Jim Feeney

Email: jfeeney6sierraattahoe.com

Phone: 530 314 1232

Of the alternatives explained and discussed this evening, which alternatives do you think should be further evaluated as part of the Recycled Water Strategic Plan? Please explain why.

focus on solutions that expand uses utilizing existing infrastructure, Also, consider snow making as one of those uses, Outdoor recreation would potentially have one of the highest economic values for recycled water use.

Of the alternatives explained and discussed this evening, which alternatives do you think should not be further evaluated as part of the Recycled Water Strategic Plan? Please explain why.

Please offer any other input and/or questions.

Sierra At Tahoe is interested in exploring snow making as a potential end use to add to the mix of potential end uses, Please, don't hesitate to contact us,

Jim Feeney 530 314 1232
530 543 3102

SOUTH TAHOE PUBLIC UTILITY DISTRICT

RECYCLED WATER STRATEGIC PLAN

Public Meeting, Tuesday, May 23, 6 – 8 p.m.

Full Name: Shay Navarro

Email: snavarro@trpa.gov

Phone: 775 589 5282

Of the alternatives explained and discussed this evening, which alternatives do you think should be further evaluated as part of the Recycled Water Strategic Plan? Please explain why.

#7
what would costs be in terms of maint + energy if District send water to Douglas county
Alternatives to Alpine county + expansion to NV are good.

Of the alternatives explained and discussed this evening, which alternatives do you think should not be further evaluated as part of the Recycled Water Strategic Plan? Please explain why.

Any using reverse osmosis given waste concentrate

Please offer any other input and/or questions.

Overall Thoughts

- General comment (Alpine County resident): Do not give up on Porter Cologne hurdles. Does not think that a law passed 60-years ago holds up to modern science related to water reuse. Constructing a tertiary facility in Alpine County could create jobs out there and mend fences with Alpine County residents.

Next time:

- Update sign-in sheet to include affiliation, if any.
  - Done. Updated for future use.
- Update comment card to include affiliation, if any.
  - Done. Updated for future use.
- Get name and affiliation of question askers when they ask questions.
- Share comment card in chat for virtual attendees.
- Get a sign-in from virtual attendees; name, contact info, affiliation.
- For RO brine – update graphic to show truck and amount of DAILY truck trips to dispose of it. (Brine is ~20% of flow amount = a lot of liquid to dispose of!).
  - Will update in future communications.

Decisions, Actions, Next Steps

Decisions, Action Items, and Next Steps are listed below.

- Website:
  - Add comment cards. (see updated version with affiliation added)
  - Add FAQ document.

Appendix D:

June 6, 2024 Meeting Materials

SOUTH TAHOE PUBLIC UTILITY DISTRICT

RECYCLED WATER STRATEGIC PLAN

SAG Workshop

June 6, 2024

Introduction and Meeting Structure

- Introductions
  - » STPUD
  - » Carollo
  - » SAG members – in person and online
- Logistics
  - » Location of restrooms and exits
- Meeting Structure
  - » Feedback requested after each alternative is shared
    - – State name and affiliation

STPUD = South Tahoe Public Utility District
SAG = stakeholder advisory group

Agenda and Objectives

Agenda

- Phase 2 – Overview
- Phase 2 – Alternatives Evaluation
  - 7 alternatives (plus existing system)
  - 5 system modifications
- Decision Diagram
- Next steps

Objectives for Today

- *Update SAG on the Phase 2 Alternatives and System Modifications*
- *Get Feedback and Input from SAG on Phase 2 Alternatives and System Modifications*

- What concerns or feedback are there regarding the alternatives and system modifications?
- Did we get the range of complexity correct for the regulations and permits?
- Are there other things we should be aware of that might impact this Plan?

01

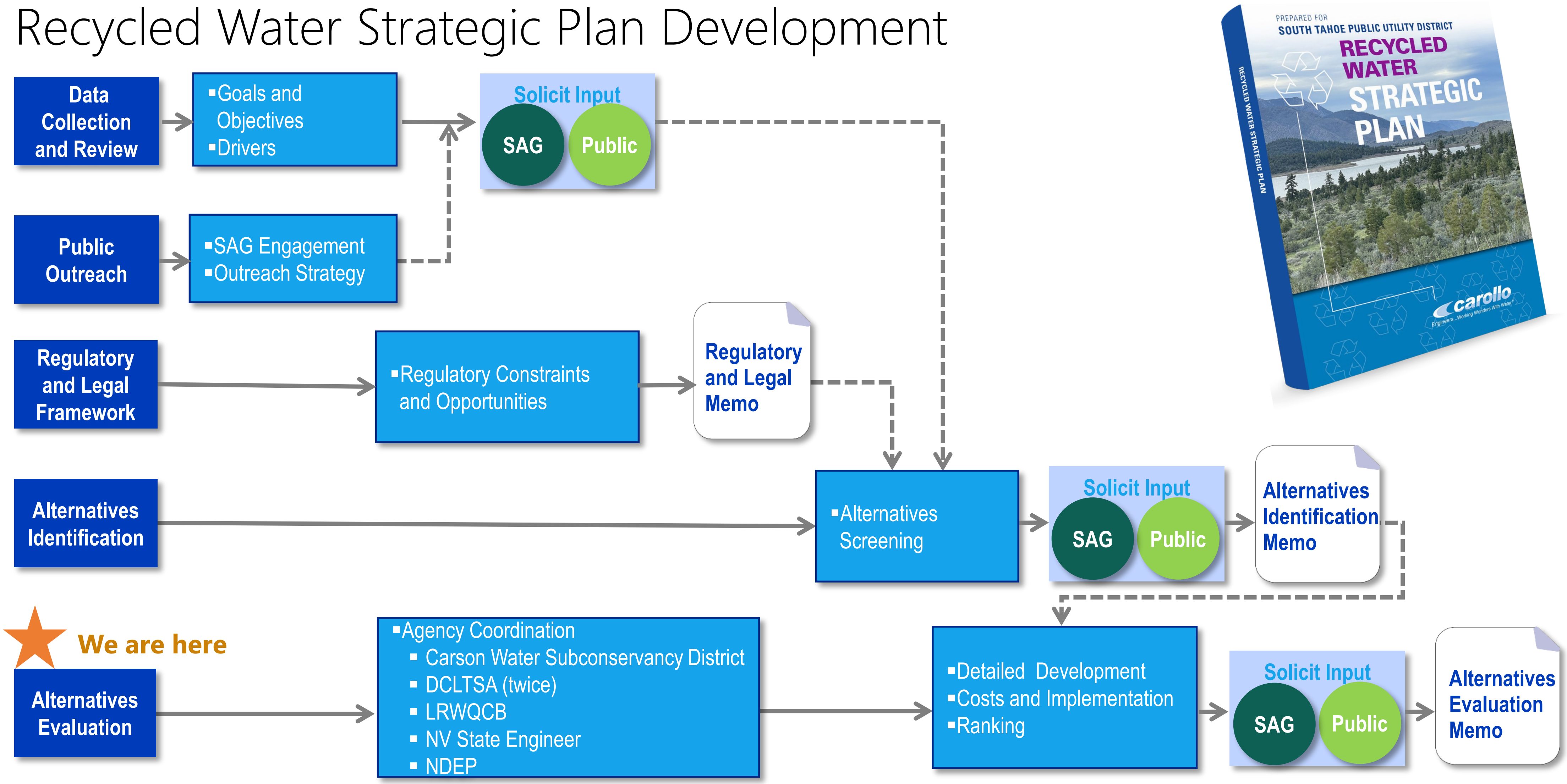
Phase 2 Overview

Drivers for the Recycled Water Strategic Plan

- 50-year Strategic Plan
  - » Future flows are projected to increase to 5.4 mgd (average)
  - » Future rancher contracts are uncertain
  - » Existing system requires capital investment to maintain reliable performance into the future
  - » Consideration of best use of the recycled water

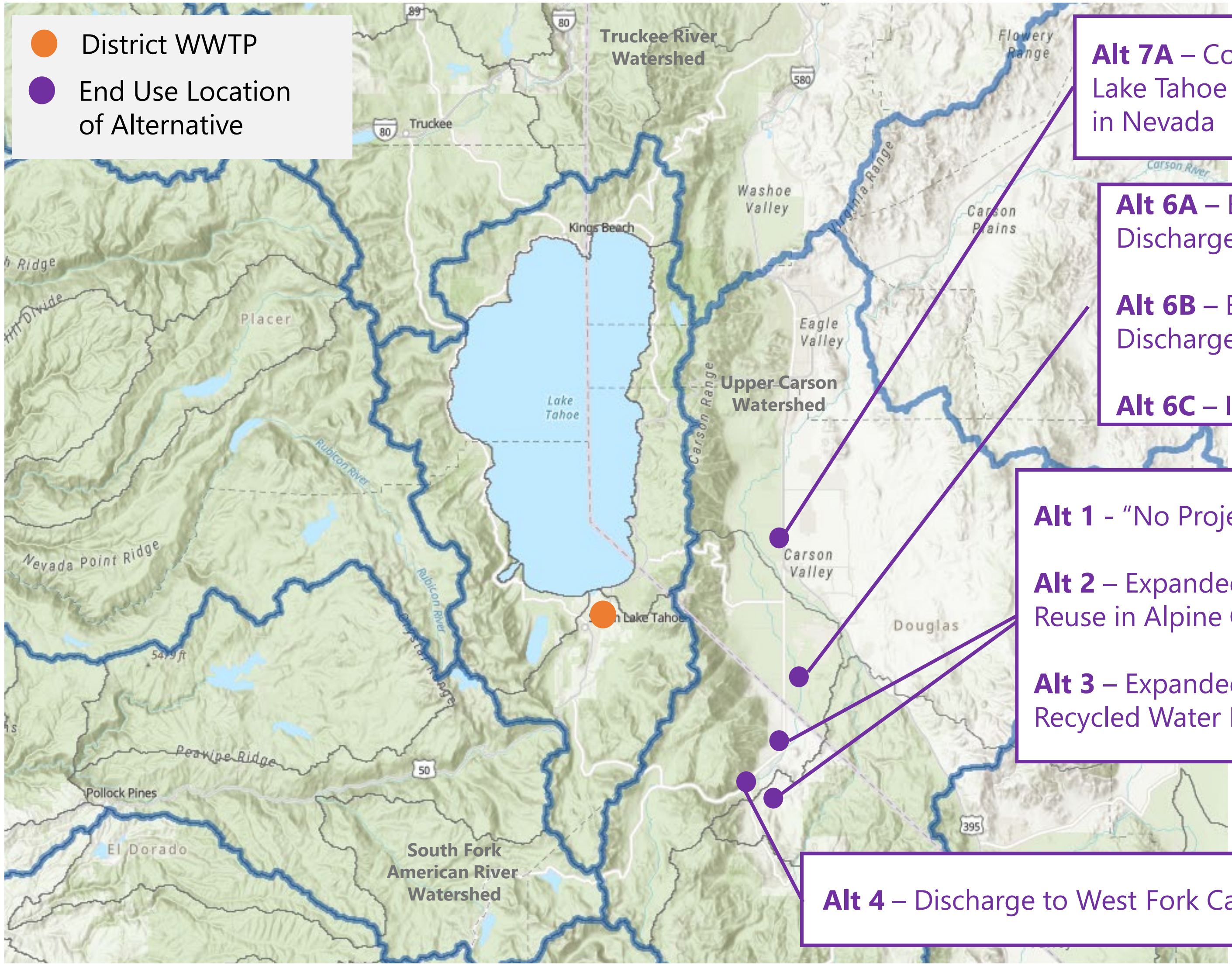
mgd = million gallons per day

Recycled Water Strategic Plan Development



DCLTSA = Douglas County Lake Tahoe Sewer Authority
LRWQCB = Lahontan Regional Water Quality Control Board
NV = Nevada
NDEP = Nevada Division of Environmental Protection

Alternatives Screening Results – 7 Alternatives plus Existing System



Alt 7A – Conveyance to Douglas County Lake Tahoe Sewer Authority and Reuse in Nevada

Alt 6A – Expanded Reuse in Nevada via Discharge to Indian Creek

Alt 6B – Expanded Reuse in Nevada via Discharge to Mud Lake

Alt 6C – Indirect Potable Reuse in Nevada

Alt 1 - "No Project" (Existing System)

Alt 2 – Expanded Secondary 23 Recycled Water Reuse in Alpine County

Alt 3 – Expanded Reuse via Disinfected Tertiary Recycled Water Reuse in Alpine County

Alt 4 – Discharge to West Fork Carson River

WWTP = wastewater treatment plant

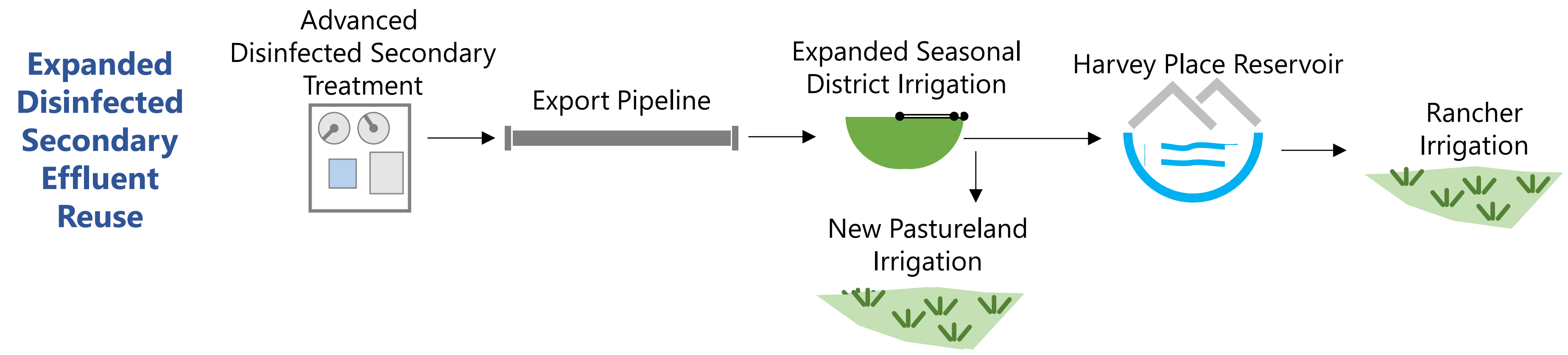
02

Phase 2 – Alternatives Evaluation

Alternative 2

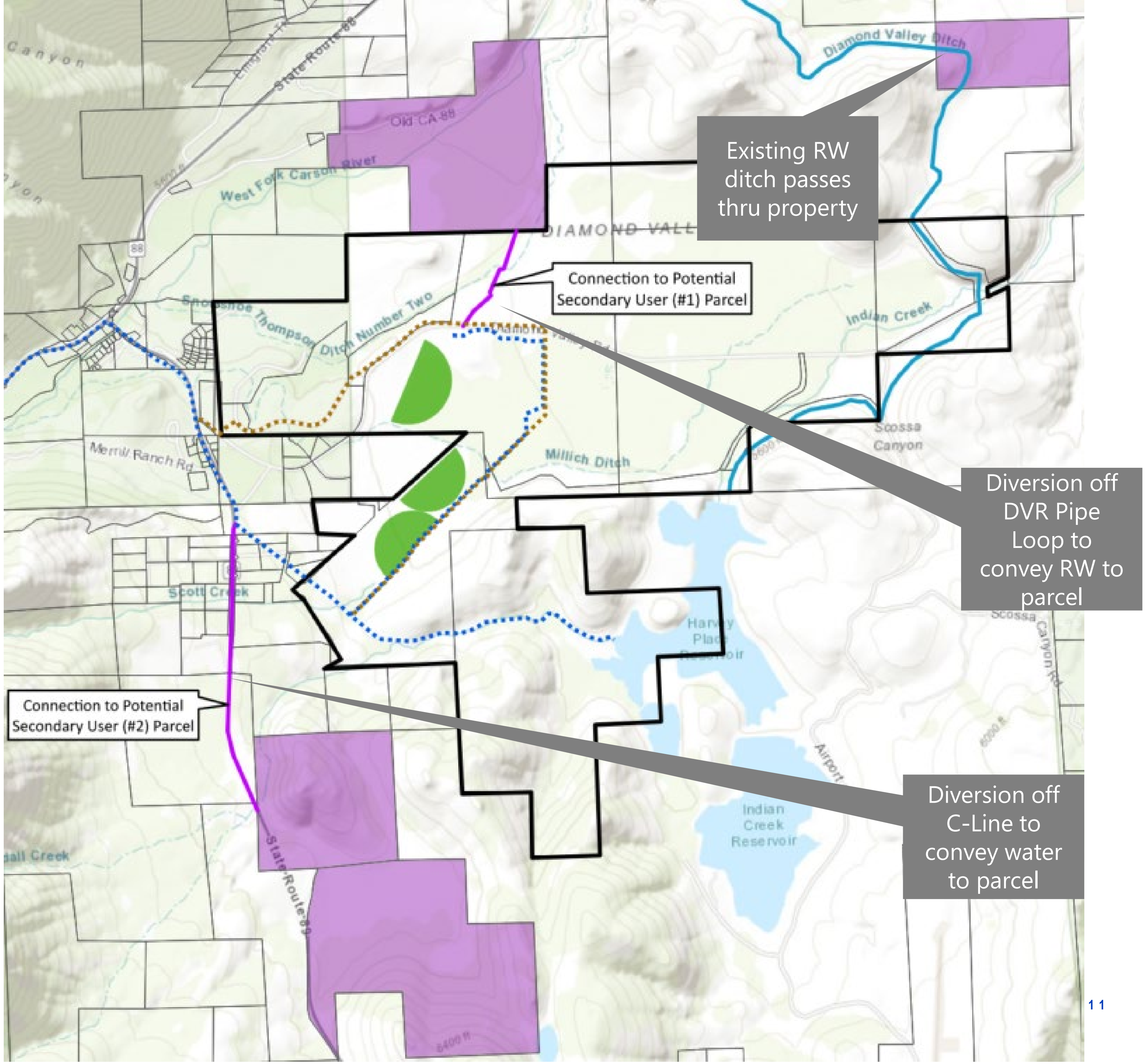
Expanded Disinfected Secondary-23 Delivery in Alpine County

Alternative 2 – Expanded Secondary 23 Recycled Water Reuse in Alpine County



Potential Users

- Conveyance alignments and cost estimates for 2 parcels
- Additional Secondary 23 Reuse on DVR Property
  - » Applied to areas identified in the 2013 MP Addendum
  - » The wetland delineation on DVR property was taken into account in development of the additional ~200 acres that could be used for RW irrigation



DVR = Diamond Valley Ranch
MP = Master Plan
RW = recycled water

Cost Estimates, Energy, and GHG Assessment

- Key Components/Assumptions
  - » No change in treatment
  - » Distribution pipelines to 2 parcels
- Energy Demands
  - » No significant increase as compared to existing system
  - » Energy demands associated with export to Alpine County
- GHG
  - » No significant increase as compared to existing system

Component	Value
Potential Additional Irrigation Areas	
- DVR	280 acres
- New Parcels	815 acres
Demands	3,893 AFY
Cost Estimate	
- Distribution pipelines	$ 1.7M
- TOTAL COSTS	**$ 1.7M**

GHG = greenhouse gas
AFY = acre-feet per year
M = million

Regulations and Permits – Range of Complexity

Low	Medium	High

Low

- Recycled Water Permits/Regulations
  - Amended District WDRs
    - RW irrigation on new properties
  - Property owners permits with LRWQCB
  - RW distribution pipelines
    - CA Construction General Permit
    - Alpine County building/grading permit

Medium

- Recycled Water Permits/Regulations
  - SNMP likely required with new / amended WDRs

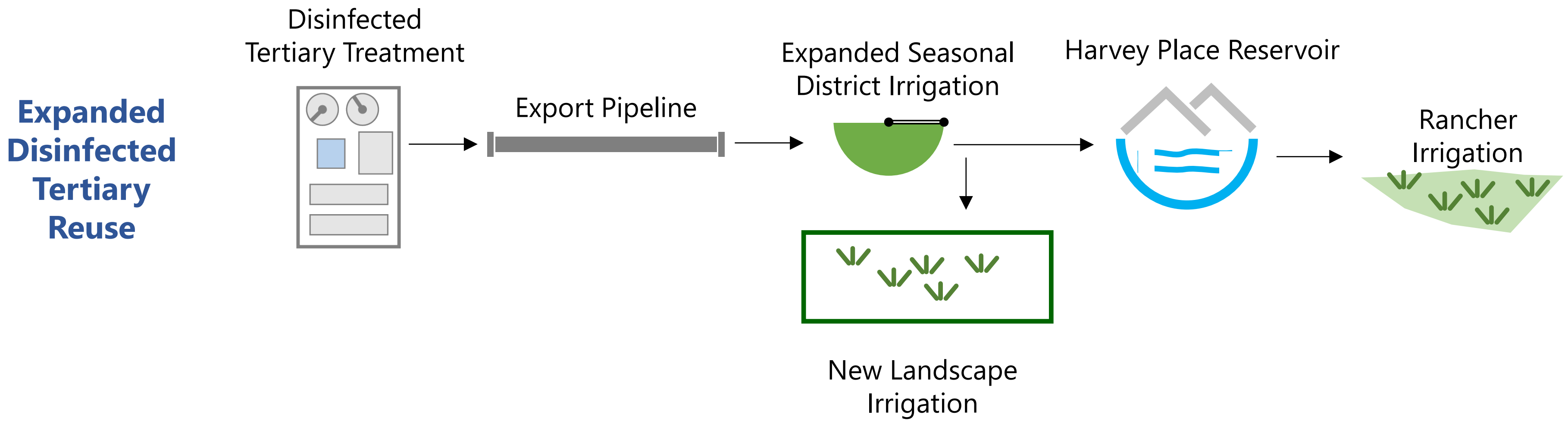
High

WDRs = waste discharge requirements
CA = California
SNMP = Salt and Nutrient Management Plan

Alternative 3

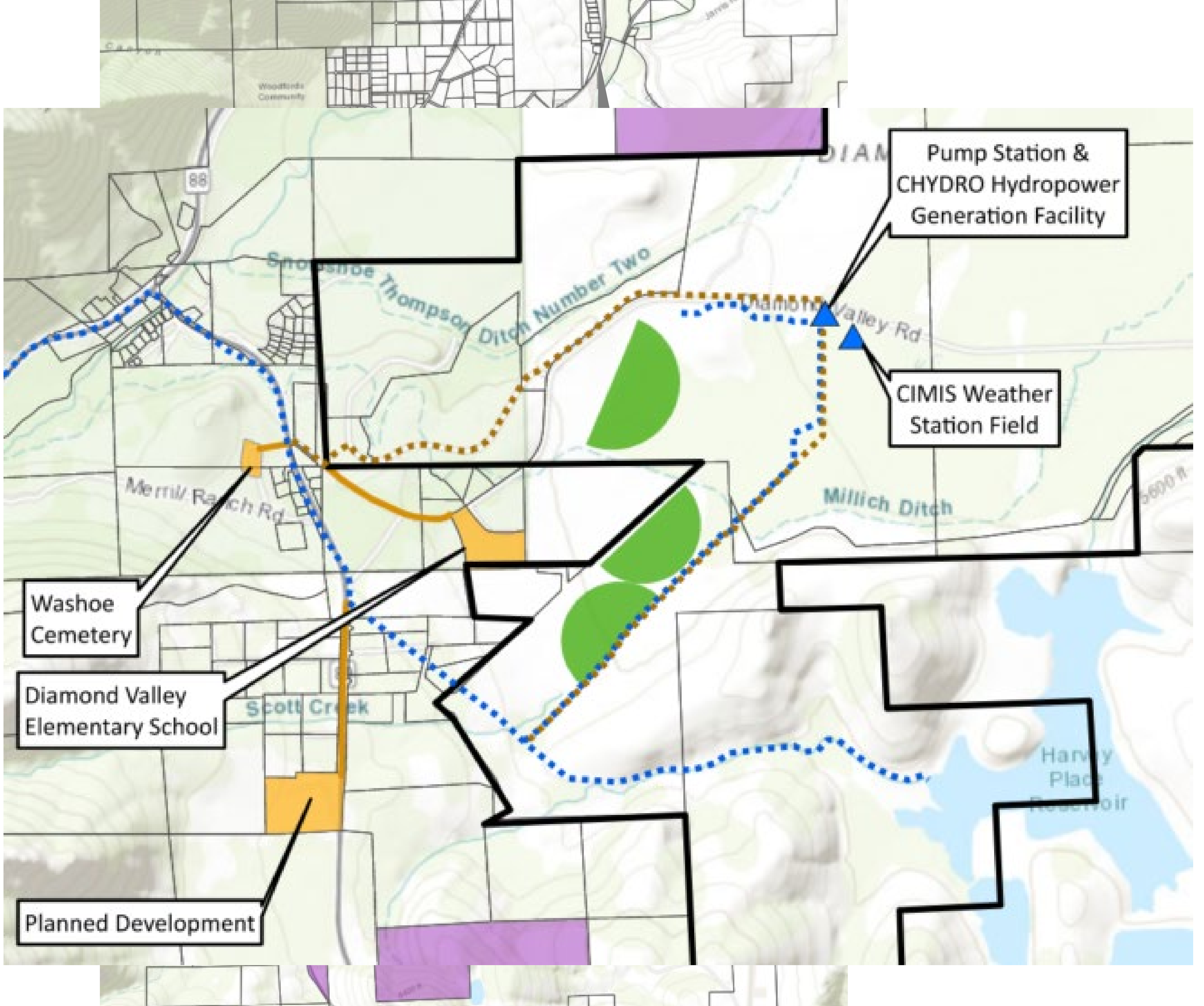
Expanded Disinfected Tertiary Reuse in Alpine County

Alternative 3 – Expanded Disinfected Tertiary Reuse in Alpine County

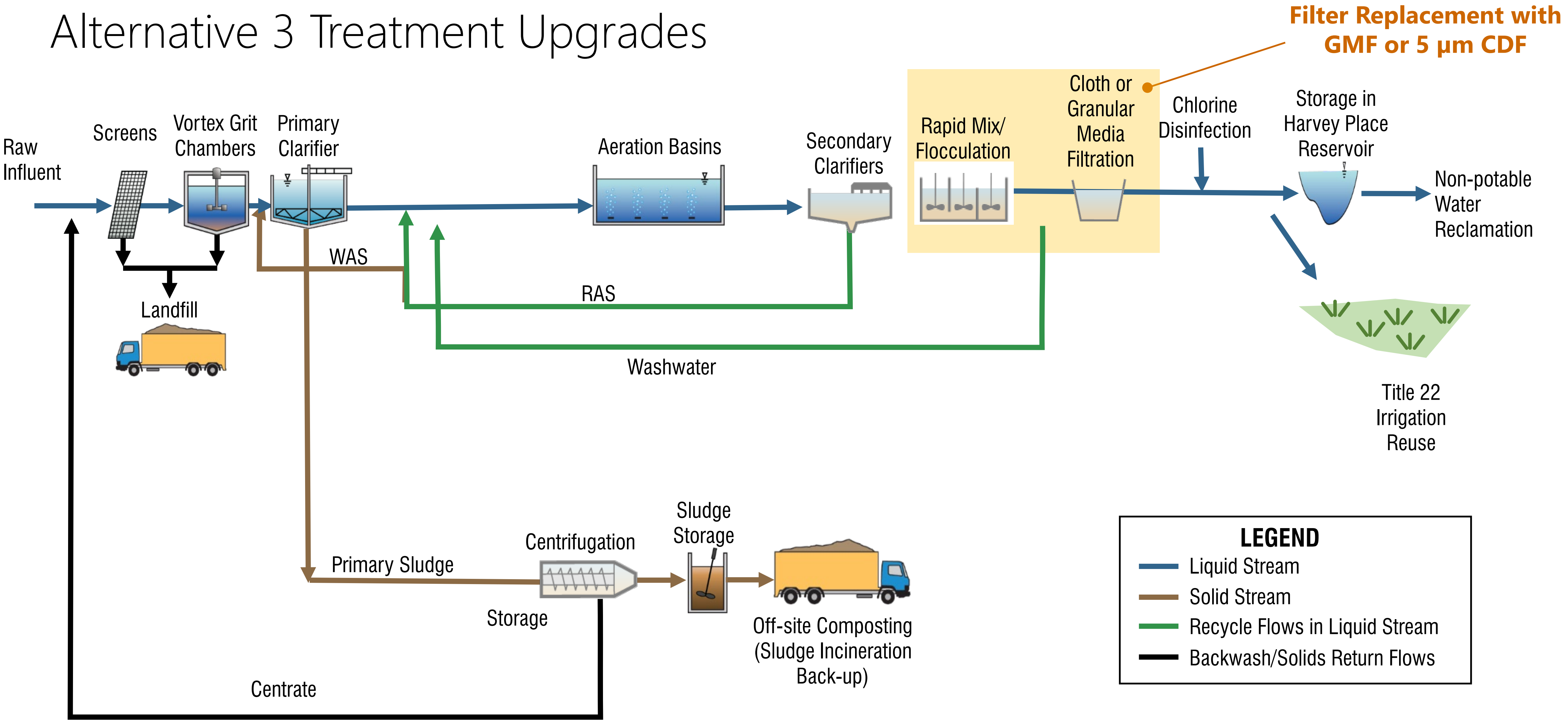


Potential Users

- Eliminated 1 parcel (from Phase 1)
  - » Could be considered if additional areas for landscape irrigation were identified
- Conveyance alignments and cost estimates for 3 parcels
  - » Future demands could allow for RW delivery to additional parcels



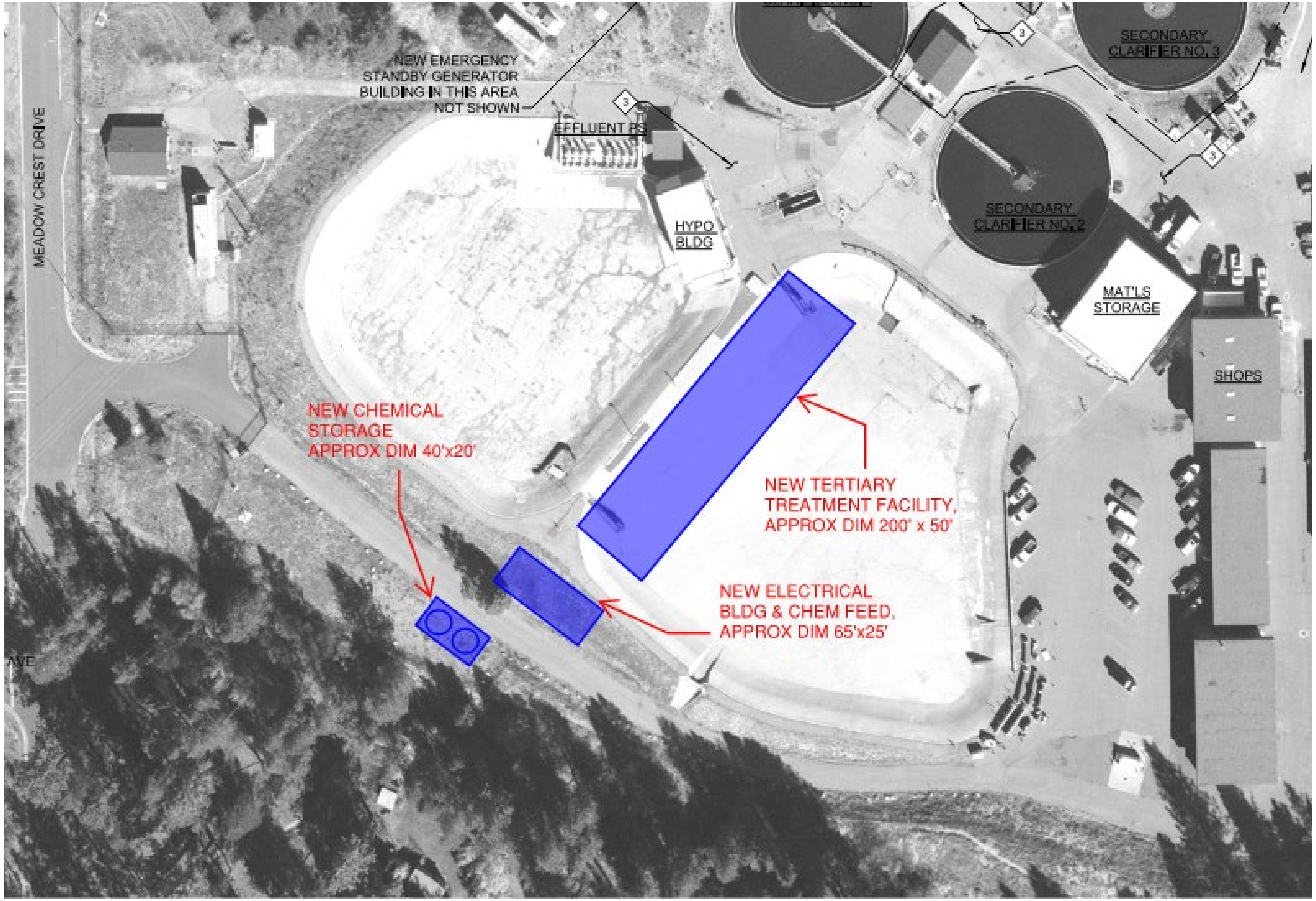
Alternative 3 Treatment Upgrades



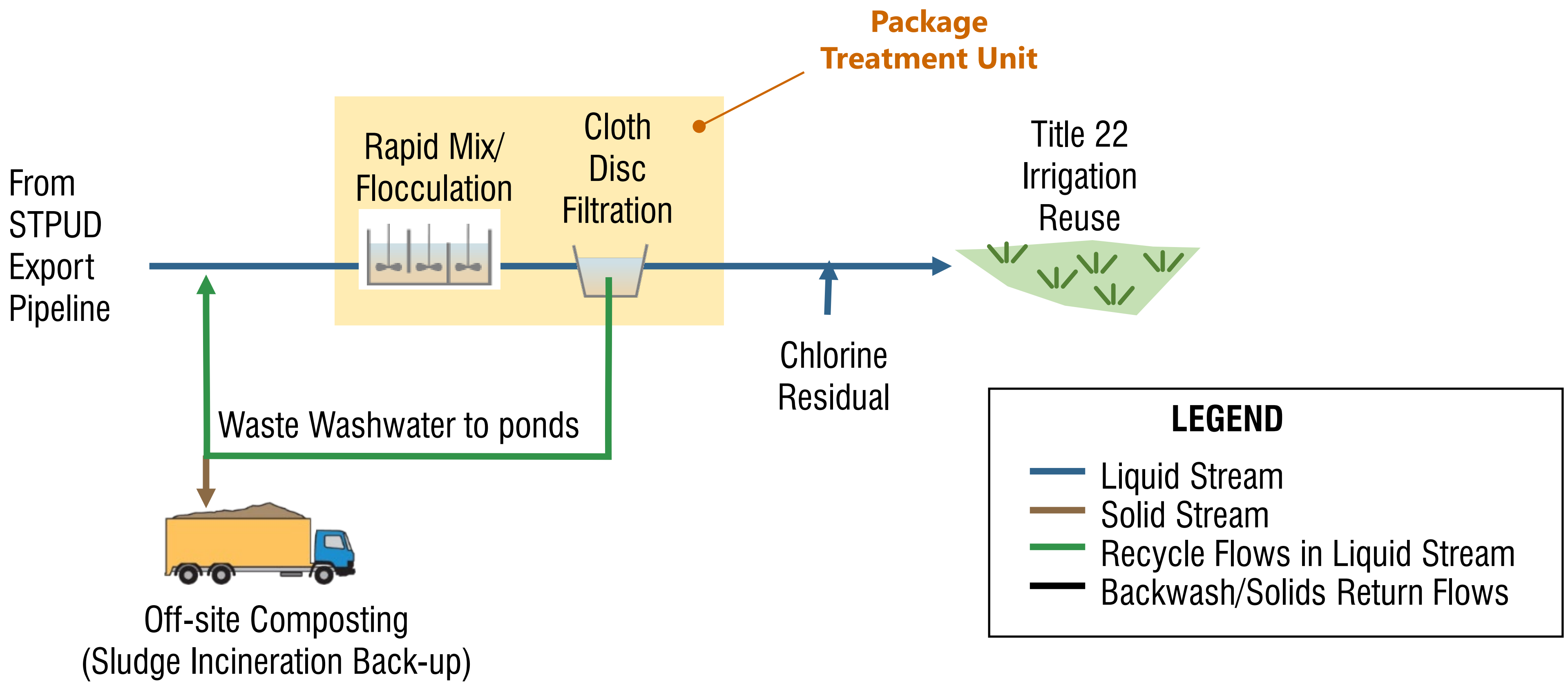
GMF = granular media filtration
CDF = cloth disk filtration
µm = micron

WAS = waste activated sludge
RAS = return activated sludge

Alt 3 Treatment Layout



Analysis – Alternative 3 – Assumed Split Treatment where Disinfection and Filtration are at DVR Site



Cost Estimates, Energy, and GHG Assessment

- Key Components/Assumptions
  - » Treatment plant upgrades
  - » Distribution pipelines to 3 parcels
- Energy Demands
  - » Energy demands associated with export to Alpine County
  - » Increased energy demands for treatment as compared to existing system
    - – Additional pumping in treatment process
- GHG
  - » Increase as compared to existing system related to increased energy for treatment

Component	Value
Potential Additional Irrigation Areas	
- 3 parcels	23 acres
Demands	79 AFY
Cost Estimate for treatment at WWTP	
- Treatment at WWTP	$ 86M
- Distribution pipelines	$ 0.4M
- TOTAL COSTS	**$ 86.4M**
Cost Estimate for Split Treatment	
- Split Treatment	$ 13M
- Distribution pipelines	$ 0.4M
- TOTAL COSTS	**$ 13.4M**

Regulations and Permits – Range of Complexity

Low	Medium	High

Low

- Recycled Water Permits/Regulations
  - » Amended District WDRs
    - – RW irrigation on new properties
  - » Engineers report for Title 22 unrestricted reuse
  - » Compliance with Title 17
  - » Property owners permits with LRWQCB
- Construction related permits and approvals
  - » RW distribution pipelines
    - – CA Construction General Permit
    - – Alpine County building/grading permit
  - » Treatment plant modifications
    - – TRPA Permit for WWTP facility footprint expansion
    - – City of South Lake Tahoe building/grading permit for WWTP facility footprint expansion
    - – Alpine County building/grading permit for split treatment facility

Medium

- Recycled Water Permits/Regulations
  - » SNMP likely required with new / amended WDRs

High

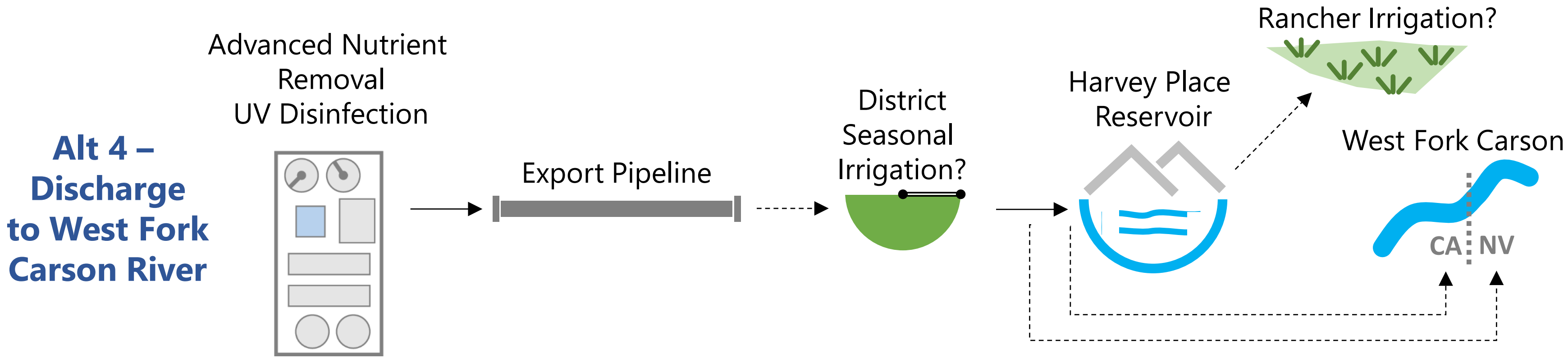
TRPA = Tahoe Regional Planning Agency

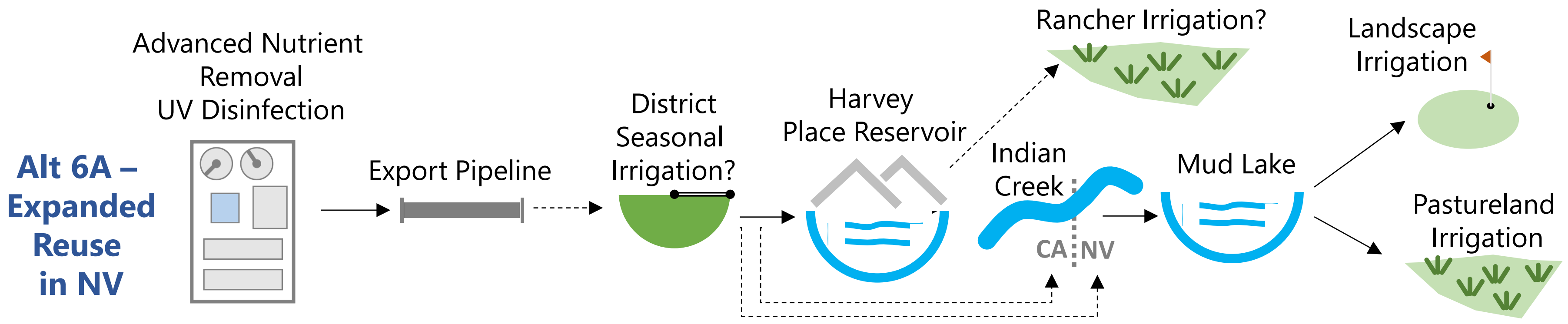
Discussion

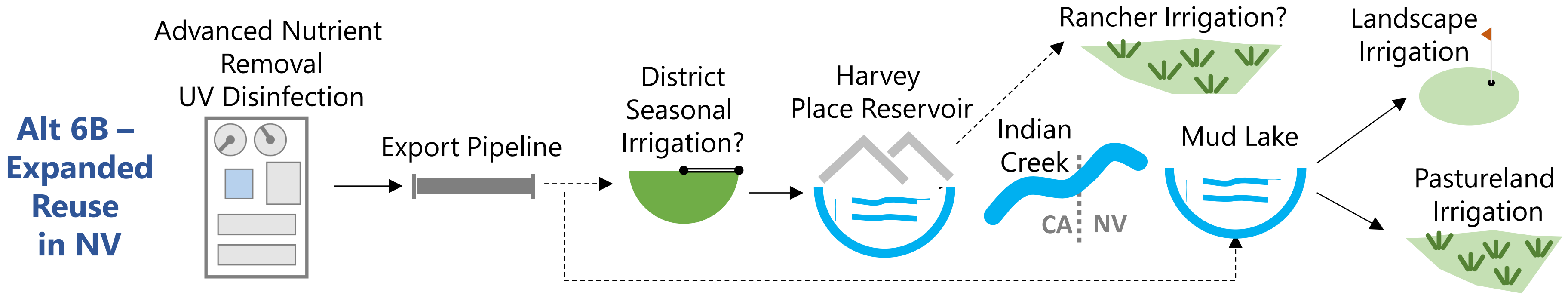
Alternatives 4, 6A, 6B

Key Similarities - Water Quality Objectives

Alternatives 4, 6A, 6B







UV = ultraviolet

Alternatives 4, 6A, 6B

TN = total nitrogen
TP = total phosphorus
TDS – total dissolved solids
RMHQs = Requirements to Maintain Existing Higher Quality

Alt 4 – Discharge to West Fork Carson River

West Fork Carson

Most Restrictive Water Quality Objectives

TP mg/L	TN mg/L	TDS mg/L	Chloride mg/L
0.03	0.25	70	2.5

Alt 6A – Expanded Reuse in NV

Indian Creek

Most Restrictive Water Quality Objectives (RMHQs for Antidegradation)

TP mg/L	TN mg/L	TDS mg/L	Chloride mg/L
-	0.5	180	8

Alt 6B – Expanded Reuse in NV

Mud Lake

Most Restrictive Water Quality Objectives (RMHQs for Antidegradation)

TP mg/L	TN mg/L	TDS mg/L	Chloride mg/L
0.016	0.4	70	3

- TN and TP objectives are similar – very low
- TDS and chloride objectives are low
- Treatment Approach – Limits of technology
  - » Excluding reverse osmosis treatment due to concentrate disposal challenges
  - » No outfall to ocean
  - » Treatment requires energy intensive, industrial process

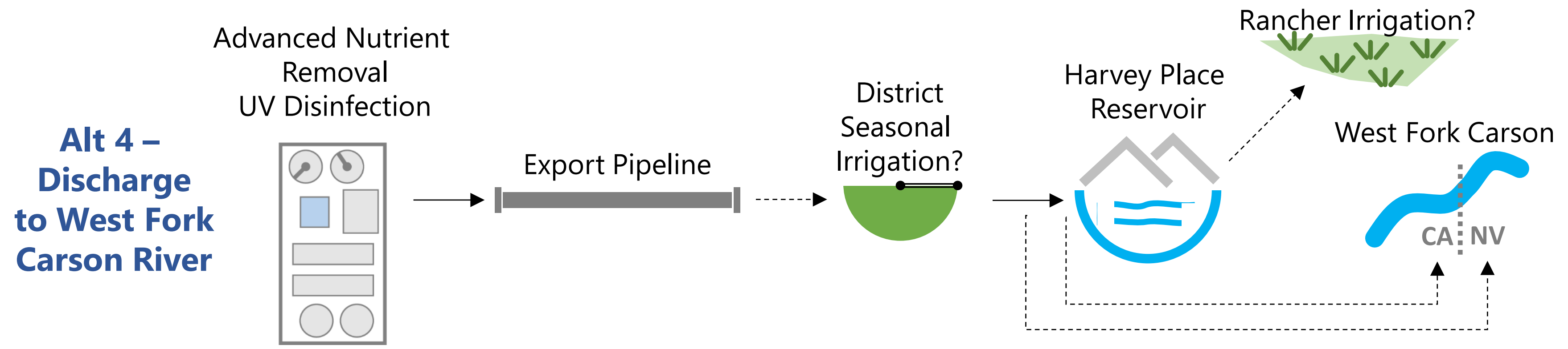
Anticipated Treated Effluent Concentrations- Advanced Nutrient Removal and UV Disinfection

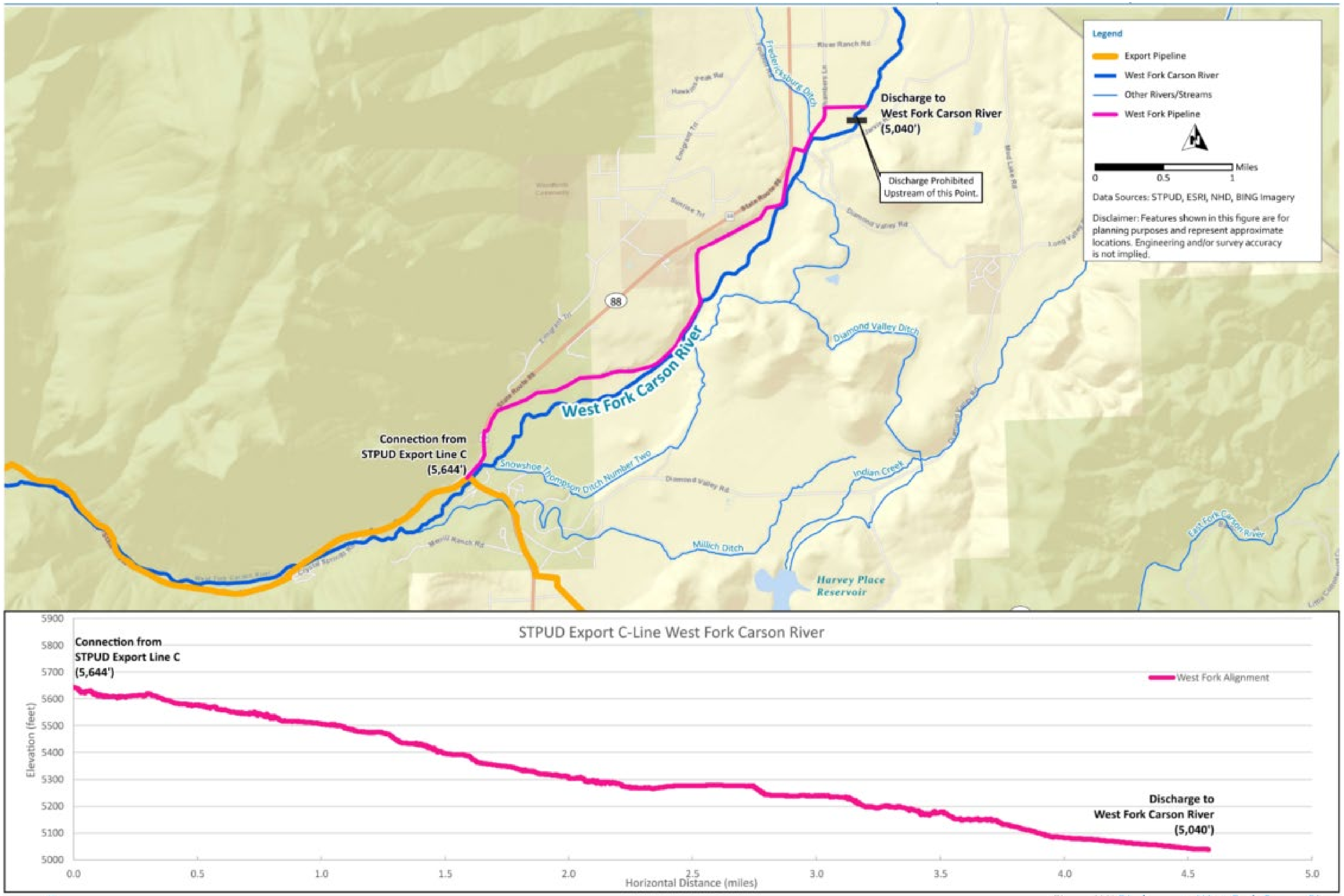
Total P mg/L	Total N mg/L	TDS mg/L	Chloride mg/L
0.5	2	270 (Existing)	58 (Existing)

Alternative 4

Discharge to West Fork Carson River and Use in Nevada

Alternative 4 – Discharge to West Fork Carson River



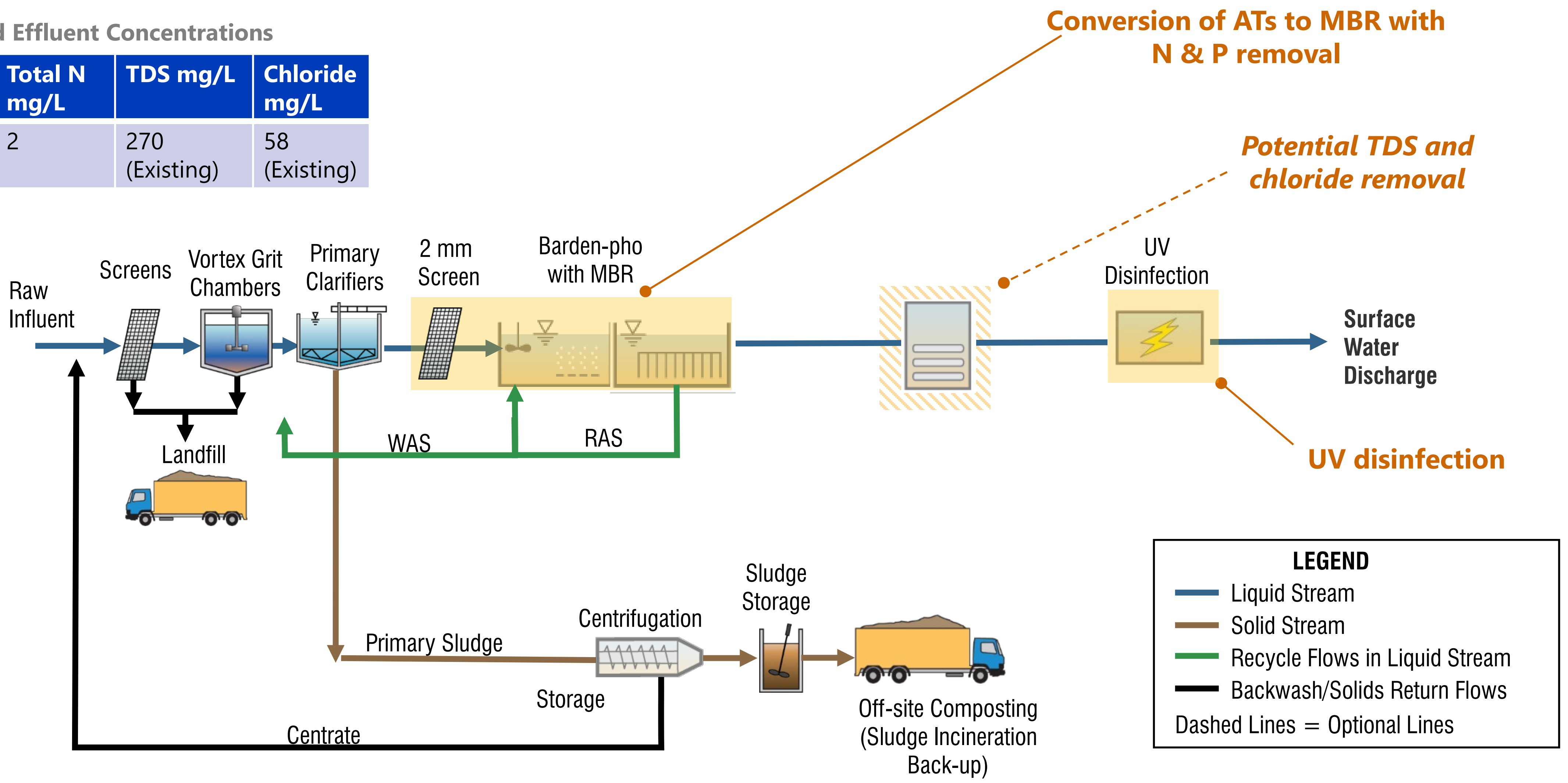


- Alpine County 1965 Ordinance
  - » Recycled water discharge location specified
- 4.5 miles of 16" pipe

Treatment Upgrades

Anticipated Effluent Concentrations

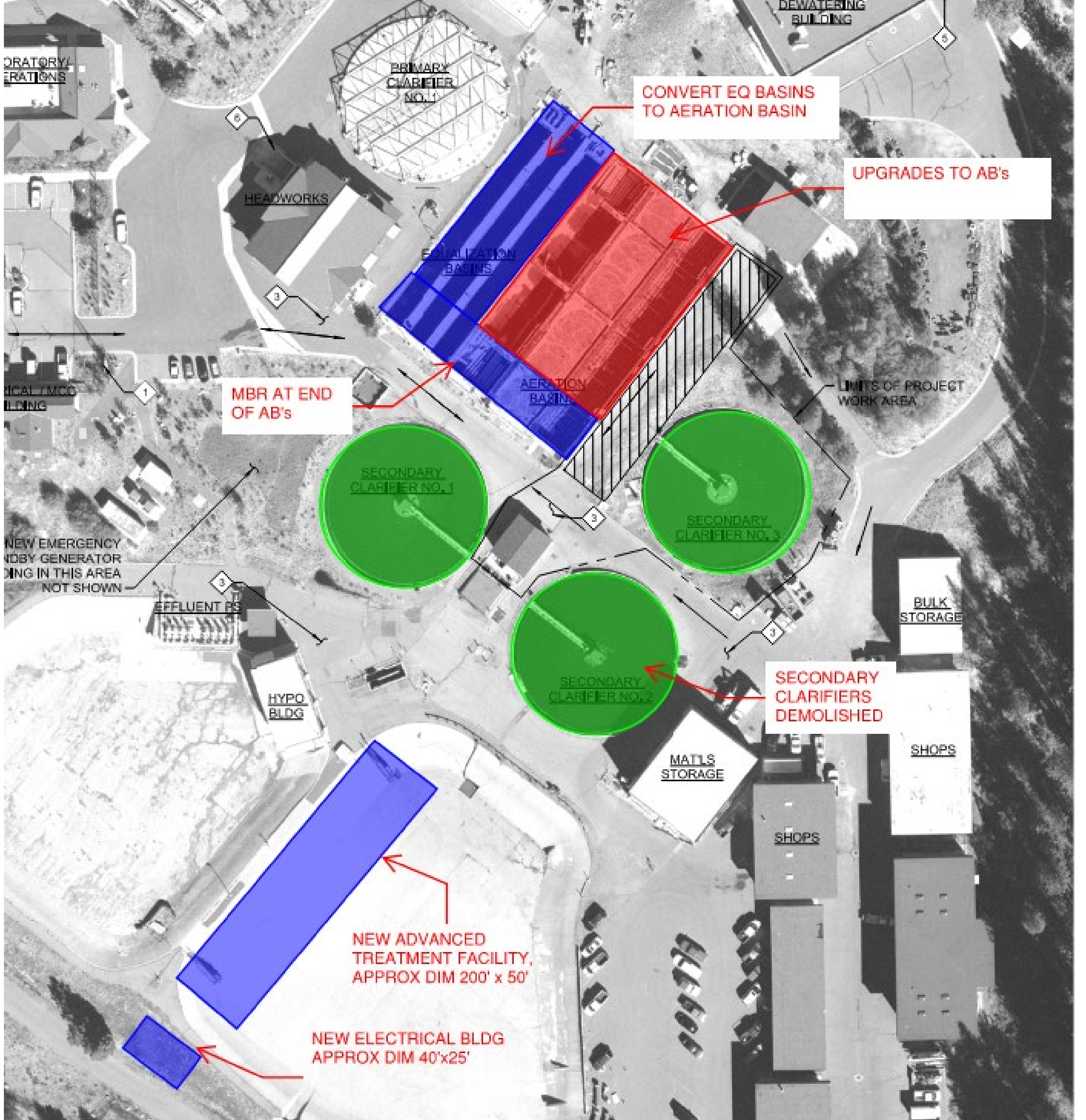
Total P mg/L	Total N mg/L	TDS mg/L	Chloride mg/L
0.5	2	270 (Existing)	58 (Existing)



mm = millimeter
AT = aeration tank
MBR = membrane bioreactor

Treatment Upgrades and Layout

- Additional screening (2 mm)
- Convert EQ Basins into additional Aeration Basin
- Aeration Basin Upgrades
- MBR at end of ABs
- Secondary Clarifiers not needed
- New Advanced Water Purification Facility



EQ = equalization
ML = mixed liquor
AB = aeration basin

Cost Estimates, Energy, and GHG Assessment

- Key Components/Assumptions
  - » Treatment plant upgrades
  - » Conveyance pipeline from Export Pipeline to West Fork Carson River (~4.5 miles long)
- Energy Demands
  - » Energy demands associated with export to Alpine County
  - » Increased energy demands for treatment as compared to existing system
    - – Additional pumping
    - – Nutrient removal
    - – UV disinfection
- GHG
  - » Increase as compared to existing system
    - – Increased energy for treatment
    - – Increased chemical addition for nutrient removal

Component	Value
Demands	
- Assumed total equivalent to STPUD future flows* * Discharge capacity is uncertain	6,053 AFY
Cost Estimate	
- Treatment	$ 224M
- Conveyance from Export Pipeline to West Fork Carson River	$ 20M
- TOTAL COSTS	**$ 244M**

RO = reverse osmosis
CDFW = California Department of Fish and Wildlife
USACE = United States Army Corps of Engineers

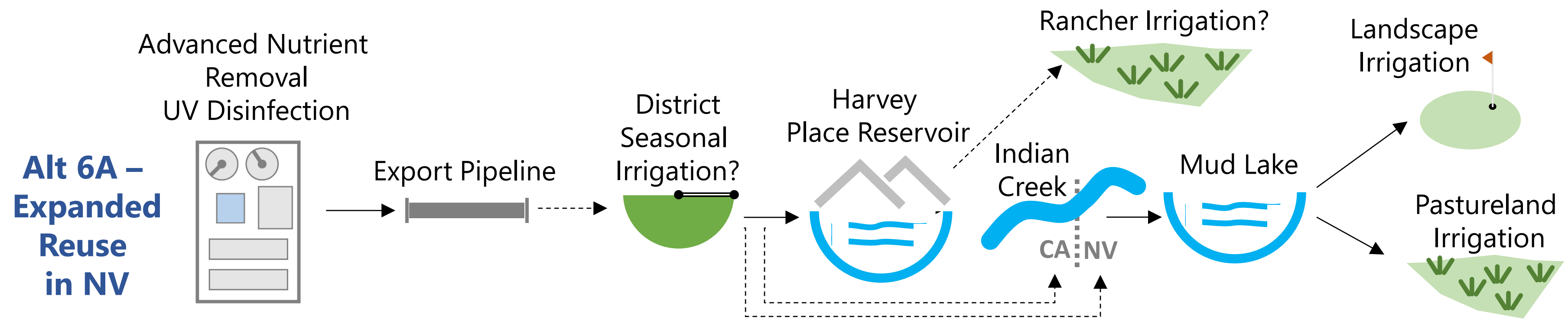
Regulations and Permits – Range of Complexity

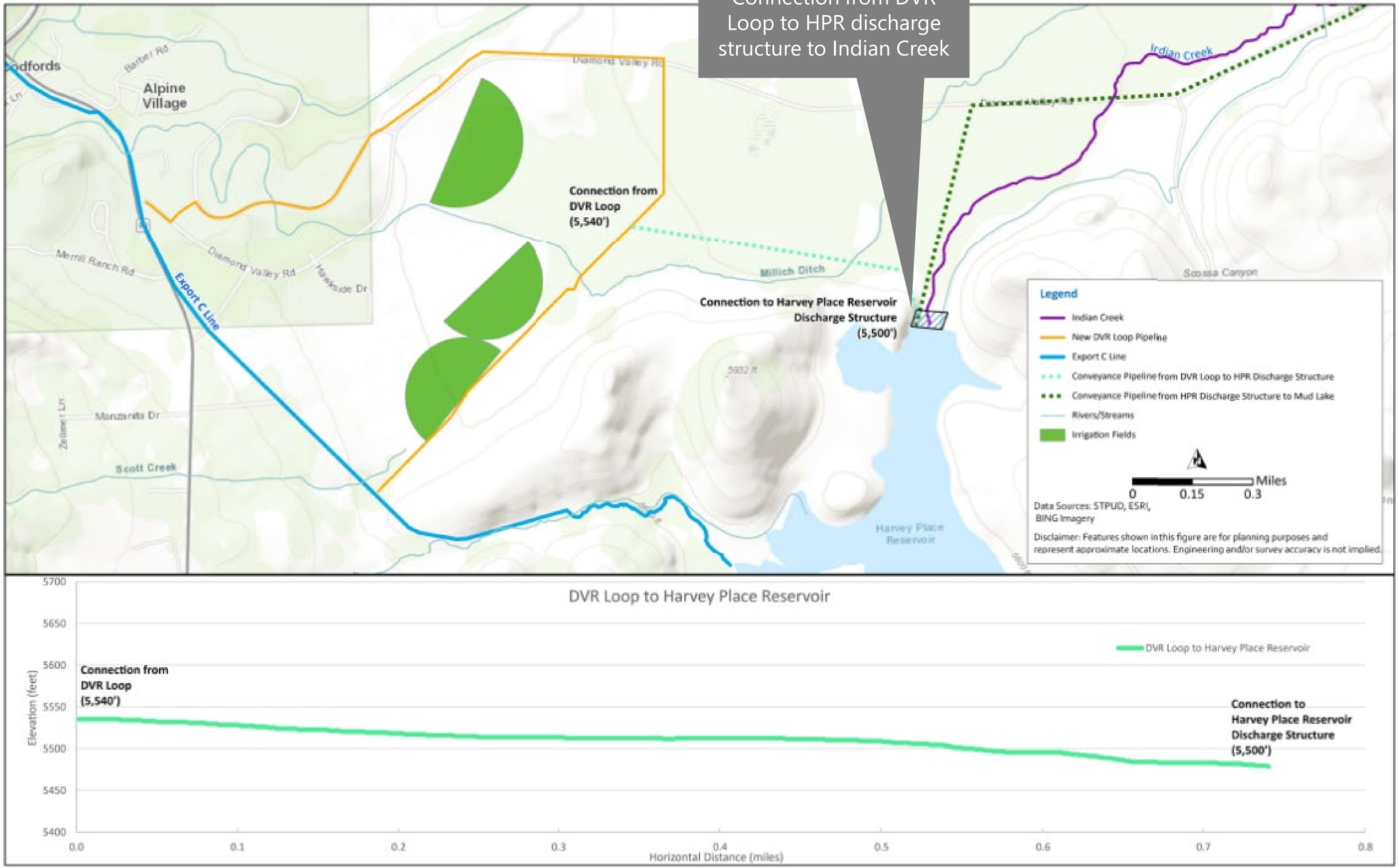
Low	Medium	High
• Construction related permits and approvals » Treatment plant modifications – TRPA Permit for WWTP facility footprint expansion – City of South Lake Tahoe building/grading permit for WWTP facility footprint expansion » Pipeline from C-Line to discharge point – CA Construction General Permit – Alpine County building/grading permit		• Discharge Permits/Regulations » Mixing zone allowance would be required to meet water quality objectives. » Likely that discharge will need to meet water quality objectives at end of pipe. These standards would not be obtainable without (or potentially with) a non-RO based treatment train. » Antidegradation and existing impairments present additional challenges to obtaining a permit » NDEP approval based on attainment of water quality standards at the Stateline • Construction related permits and approvals » New outfall to West Fork Carson River – CDFW Lake and Streambed Alteration Agreement – USACE Section 404 permit if work occurs below Ordinary High-Water Mark – LRWQCB 401 Water Quality Certification

Alternative 6A

Expanded Class A or B Reuse in Nevada via Discharge to Indian Creek

Alternative 6A – Expanded Reuse in Nevada via Discharge to Indian Creek





HPR = Harvey Place Reservoir

Cost Estimates, Energy, and GHG Assessment

- Key Components/Assumptions
  - » Treatment plant upgrades
  - » Use of existing discharge structure from Harvey Place Reservoir to Indian Creek
  - » Conveyance pipeline from DVR Loop to Indian Creek
- Energy Demands
  - » Increase as compared to existing system
  - » Energy demands associated with export to Alpine County
- GHG
  - » Increase as compared to existing system
    - – Increased energy for treatment

Component	Value
Demands	
- Assumed total equivalent to STPUD future flows* * Discharge capacity is uncertain	6,053 AFY
Cost Estimate	
- Treatment	$ 224M
- Conveyance from DVR Loop to Indian Creek	$ 3M
- TOTAL COSTS	**$ 227M**

Regulations and Permits – Range of Complexity

Low	Medium	High

Low

- Construction related permits and approvals
  - » Treatment plant modifications
    - – TRPA Permit for WWTP facility footprint expansion
    - – City of South Lake Tahoe building/grading permit for WWTP facility footprint expansion
  - » Pipeline from DVR Loop to Harvey Place Reservoir discharge into Indian Creek
    - – CA Construction General Permit
    - – Alpine County building/grading permit

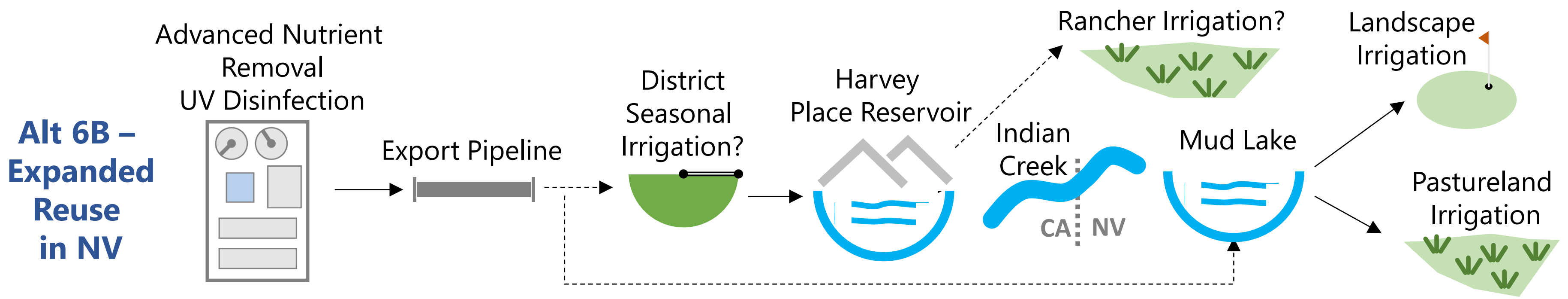
High

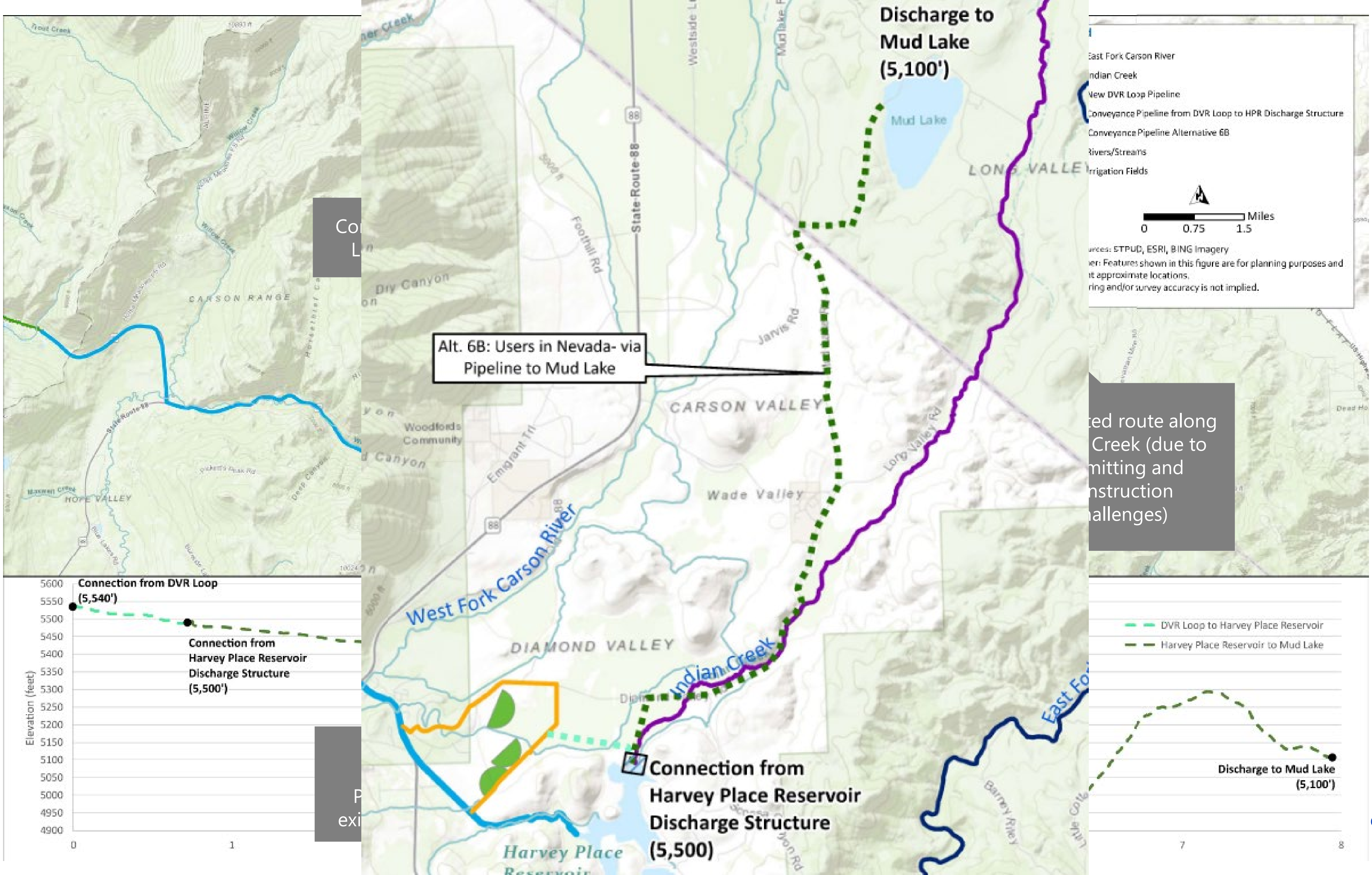
- Discharge Permits/Regulations
  - » LRWQCB approval would apply downstream standards to Indian Creek, which would be East Fork Carson Standards.
  - » Mixing zone allowance would be required to meet water quality objectives.
  - » Likely that discharge will need to meet water quality objectives at end of pipe. These standards would not be obtainable without (or potentially with) a non-RO based treatment train.
  - » NDEP approval based on attainment of water quality standards at the Stateline
  - » Antidegradation presents additional challenges to obtaining a permit. RMHQs for East Fork Carson River may be applied.

Alternative 6B

Expanded Class A or B Reuse in Nevada via Discharge to Mud Lake

Alternative 6B – Expanded Reuse in Nevada via Discharge to Mud Lake





Discharge to
Mud Lake
(5,100')
Mud Lake
LONG VALLEY
Alt. 6B: Users in Nevada- via
Pipeline to Mud Lake
CARSON VALLEY
Wade Valley
Woodfords
Community
West Fork Carson River
DIAMOND VALLEY
Indian Creek
East Fork
Connection from
Harvey Place Reservoir
Discharge Structure
(5,500)
Harvey Place
State Route 88
Foothill Rd
Jarvis Rd
Long Valley Rd
Emigrant Trl
Dry Canyon
CARSON RANGE
HOPE VALLEY
East Fork Carson River
Indian Creek
New DVR Loop Pipeline
Conveyance Pipeline from DVR Loop to HPR Discharge Structure
Conveyance Pipeline Alternative 6B
Rivers/Streams
Irrigation Fields
Miles
0 0.75 1.5
Sources: STPUD, ESRI, BING Imagery
Features shown in this figure are for planning purposes and at approximate locations.
ring and/or survey accuracy is not implied.
ted route along
Creek (due to
mitting and
nstruction
allenges)
Connection from DVR Loop
(5,540')
Connection from
Harvey Place Reservoir
Discharge Structure
(5,500')
Elevation (feet)
5600
5550
5500
5450
5400
5350
5300
5250
5200
5150
5100
5050
5000
4950
4900
0
1
7
8
DVR Loop to Harvey Place Reservoir
Harvey Place Reservoir to Mud Lake
Discharge to Mud Lake
(5,100')

Cost Estimates, Energy, and GHG Assessment

- Key Components/Assumptions
  - » Treatment Plant Upgrades
  - » Conveyance pipeline from DVR Loop to Mud Lake
- Energy Demands
  - » Increase as compared to existing system
  - » Energy demands associated with export to Alpine County
- GHG
  - » Increase as compared to existing system
    - – Increased energy for treatment

Component	Value
Demands	
- Assumed total equivalent to STPUD future flows* * Discharge capacity is uncertain	6,053 AFY
Cost Estimate	
- Treatment	$ 224M
- Conveyance from DVR Loop to Mud Lake	$ 37M
- TOTAL COSTS	**$ 261M**

Regulations and Permits – Range of Complexity

Low

- Construction related permits and approvals
  - » Treatment plant modifications
    - – TRPA Permit for WWTP facility footprint expansion
    - – City of South Lake Tahoe building/grading permit for WWTP facility footprint expansion
  - » Pipeline from DVR Loop to Mud Lake
    - – CA Construction General Permit
    - – Alpine County building/grading permit for pipeline
    - – Alpine County Encroachment Permit
    - – Douglas County building/grading permit for pipeline (and outfall)
    - – NDEP Stormwater Permit

Medium

- Construction related permits and approvals
  - » Pipeline from DVR Loop to Mud Lake
    - – NDEP Working in Waterways Permit

High

- Discharge Permits/Regulations
  - » NDEP would use tributary rule, West Fork Carson River, as governing standards for Mud Lake
  - » Mixing zone allowance would be required to meet water quality objectives.
  - » Possible that discharge will need to meet water quality objectives at end of pipe. These standards would not be obtainable without (or potentially with) a non-RO based treatment train.
  - » Antidegradation presents additional challenges to obtaining a permit. RMHQs for West Fork Carson River may be applied.

Discussion

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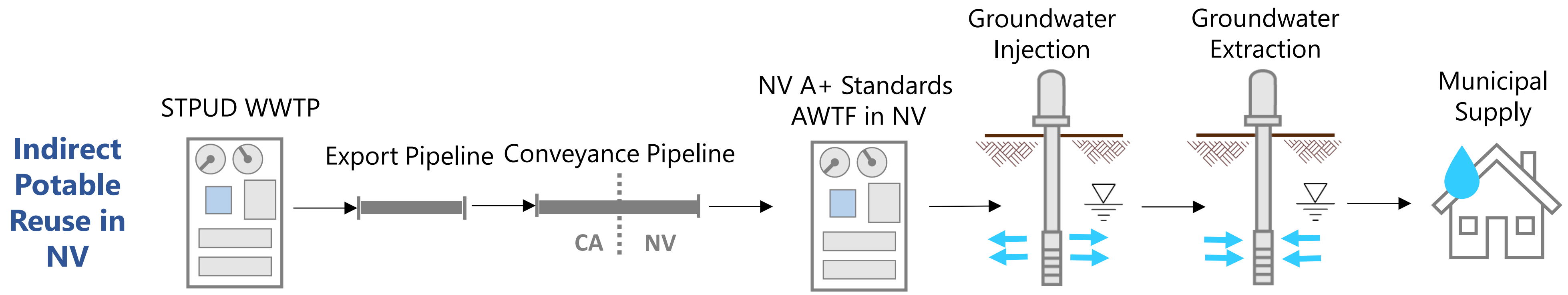
Alternative 6C

IPR in Nevada

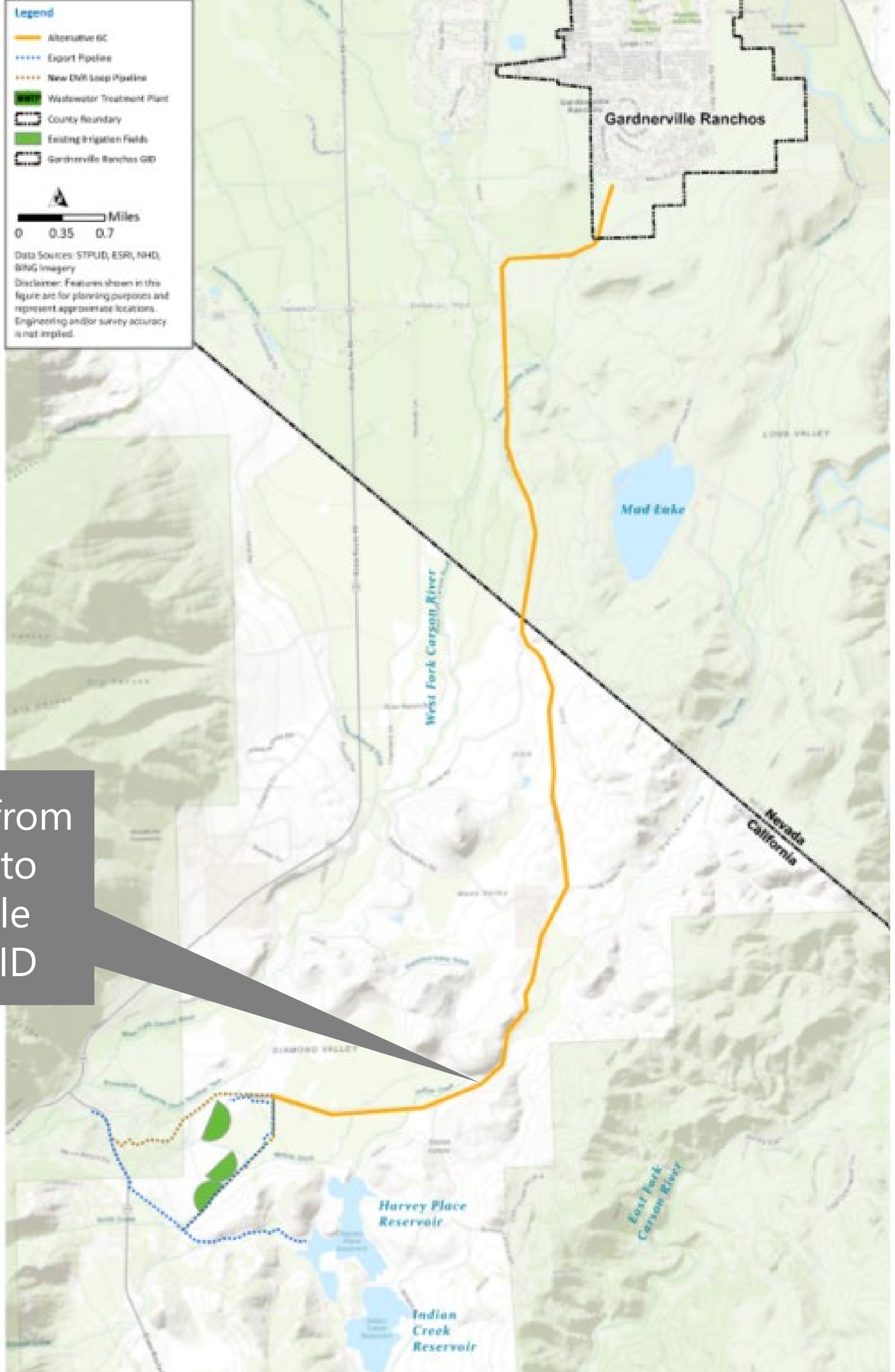
Alternative 6C – IPR in Nevada



AWTF = advanced water treatment facility

Alternative 6C – Conveyance Pipeline

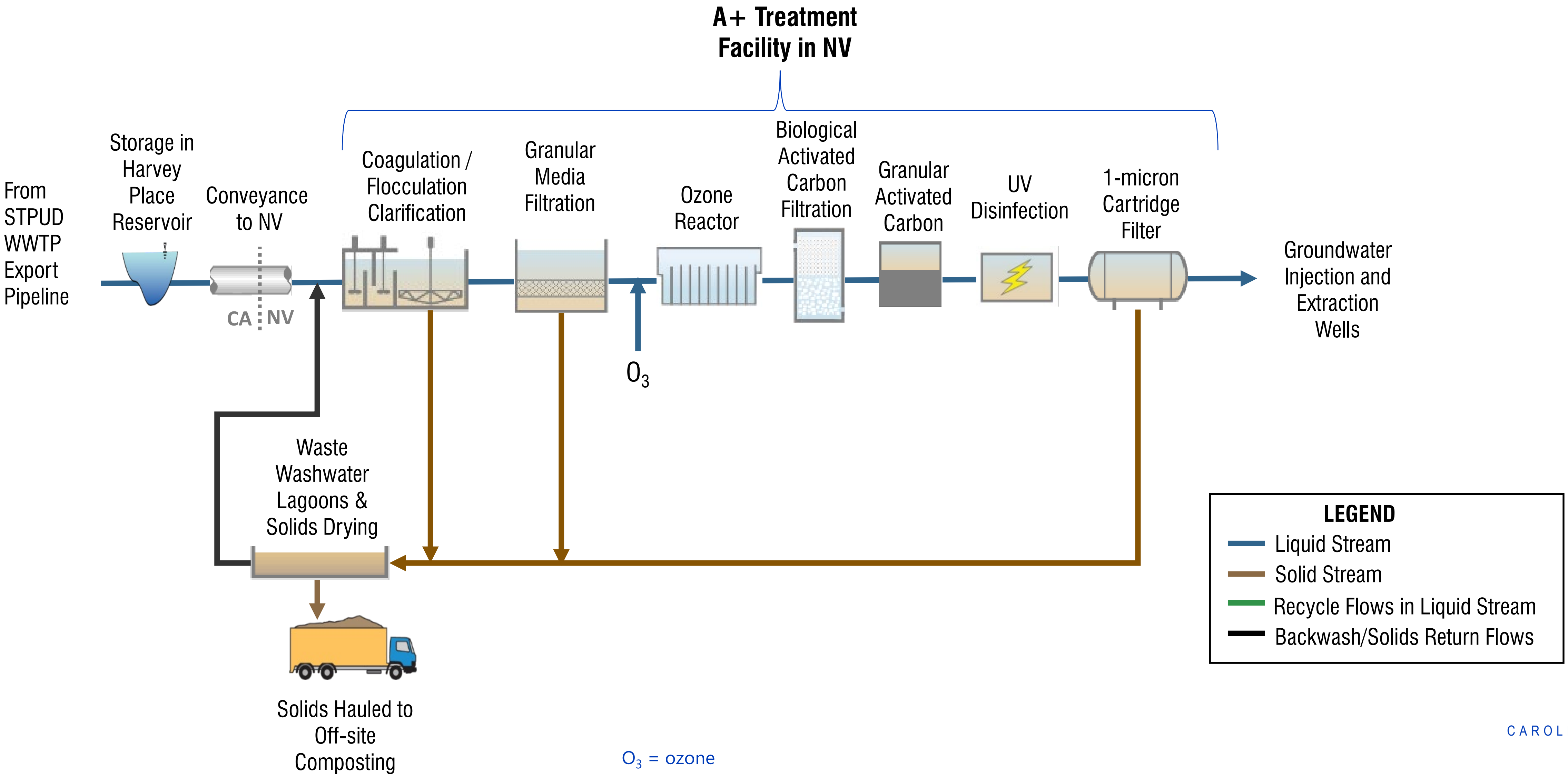
- Potable reuse in the Gardnerville Ranchos area
  - » 10 miles of 20″ pipe



Connection from DVR Loop to Gardnerville Ranchos GID

GID = General Improvement District

Alternative 6C – Treatment Train, Assumed Split Treatment where Advanced Treatment is Located in NV



O_3 = ozone

Cost Estimates, Energy, and GHG Assessment

- Key Components/Assumptions
  - » A+ Advanced Water Treatment Facility in Nevada
  - » Conveyance pipeline from DVR Loop to GRGID
  - » Groundwater injection wells
  - » Potential groundwater extraction wells (GRGID had 6 wells in production as of 2014)
- Energy Demands
  - » Increase as compared to existing system
  - » Energy demands associated with export to Alpine County and treatment
- GHG
  - » Increase as compared to existing system
    - – Increased energy for treatment
    - – Increased chemicals for treatment

Component	Value
Demands	
- GRGID demands	3,460 AFY
- GRGID groundwater pumped in 2020	2,971 AFY
Cost Estimate	
- Treatment Land acquisition not included Groundwater extraction wells not included	$ 265M
- Conveyance to GRGID	$ 52M
- TOTAL COSTS	**$ 317M**

GRGID = Gardnerville Ranchos General Improvement District

Regulations and Permits – Range of Complexity

Low	Medium	High

Low

- Pipeline from Export Line / DVR Loop or HPR to GRGID
  - » CA Construction General Permit
  - » Alpine County building/grading permit for pipeline
  - » Douglas County building/grading permit
  - » NDEP Stormwater Permit

Medium

- Construction related permits and approvals
  - » Advanced water treatment facility
    - – Douglas County building/grading permit
    - – NDEP Stormwater Permit (>1 acre of disturbance)
  - » Groundwater injection wells
    - – Compliance with NDEP's Underground Injection Control Program

High

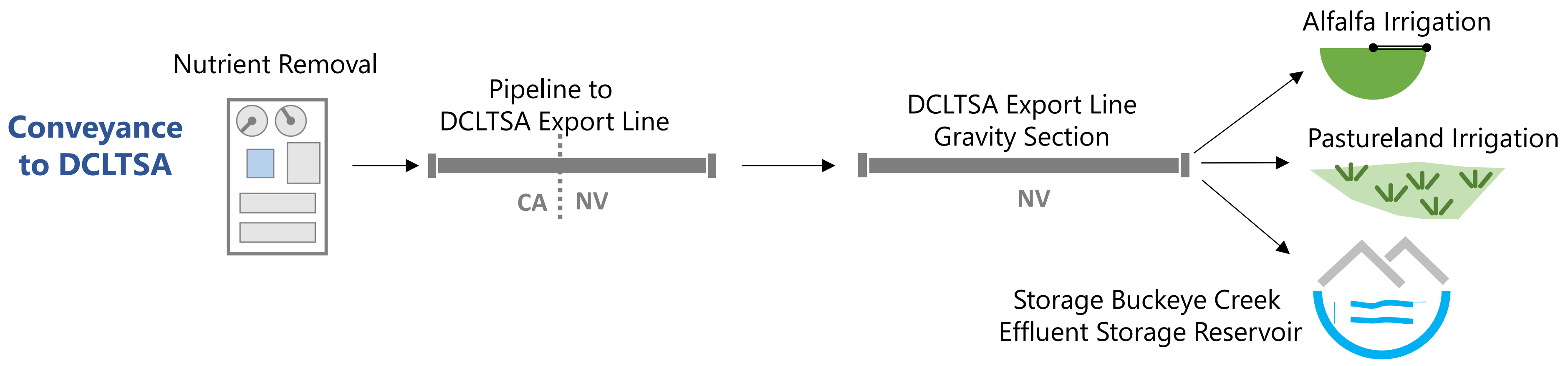
- Recycled Water Permits/Regulations
  - » Attainment with NDEP A+ Standards
    - – Pathogen log reduction
    - – Compliance with all Federal and State Drinking Water Standards
    - – Engineering Report

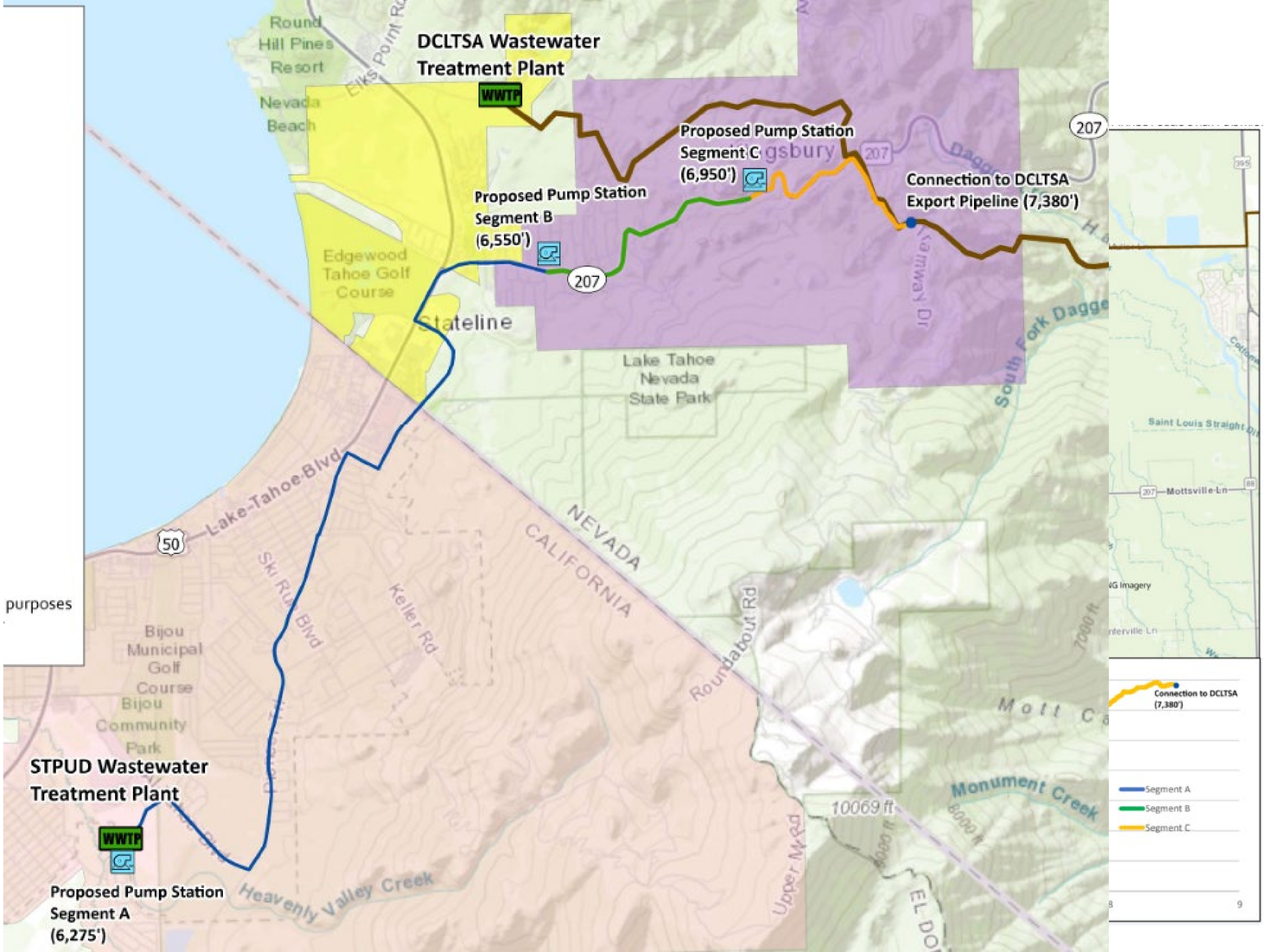
Discussion

Alternative 7A

Conveyance to DCLTSA with Reuse in Nevada

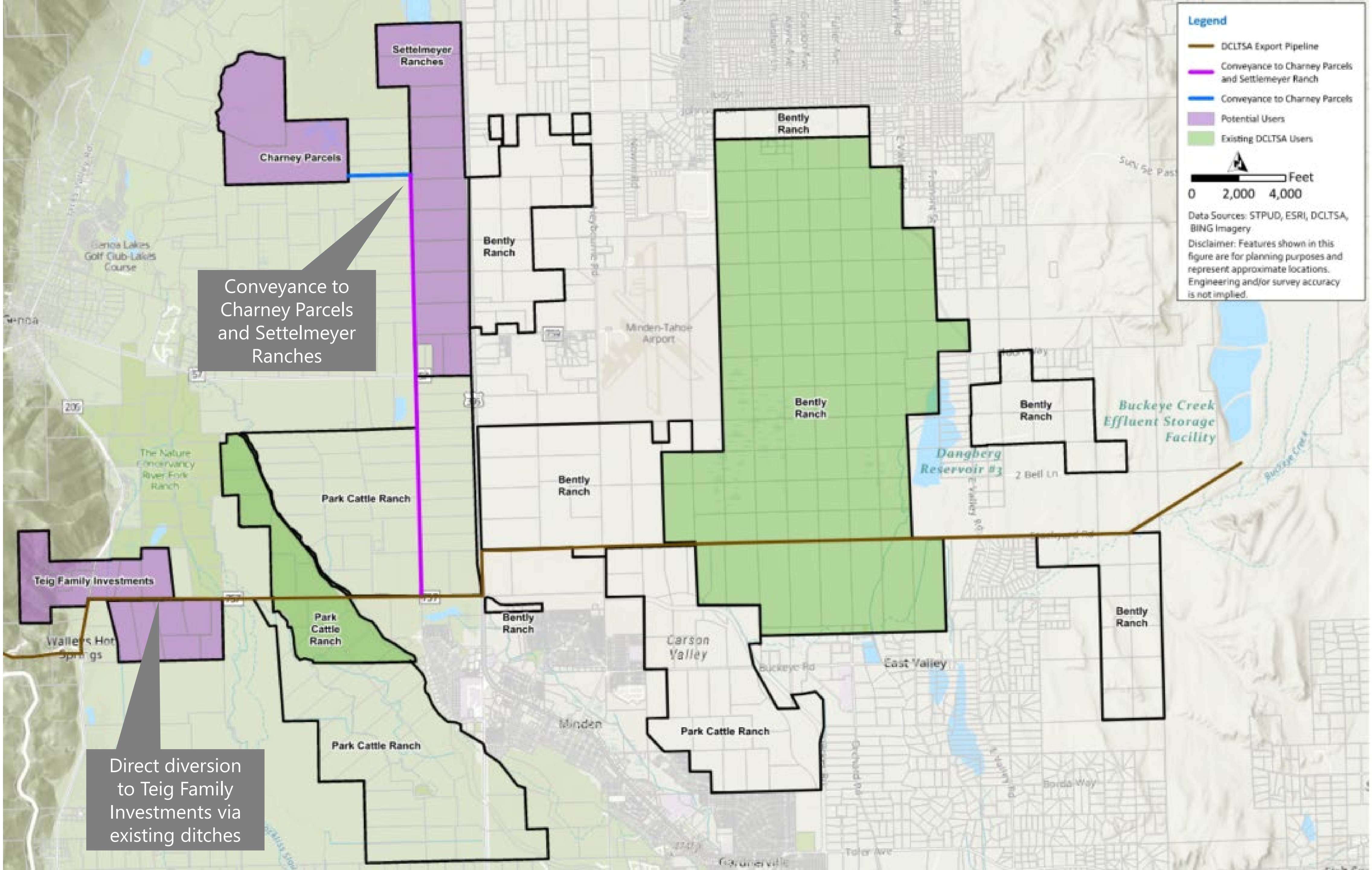
Alternative 7A – Conveyance to Douglas County Lake Tahoe Sewer Authority with Reuse in Nevada



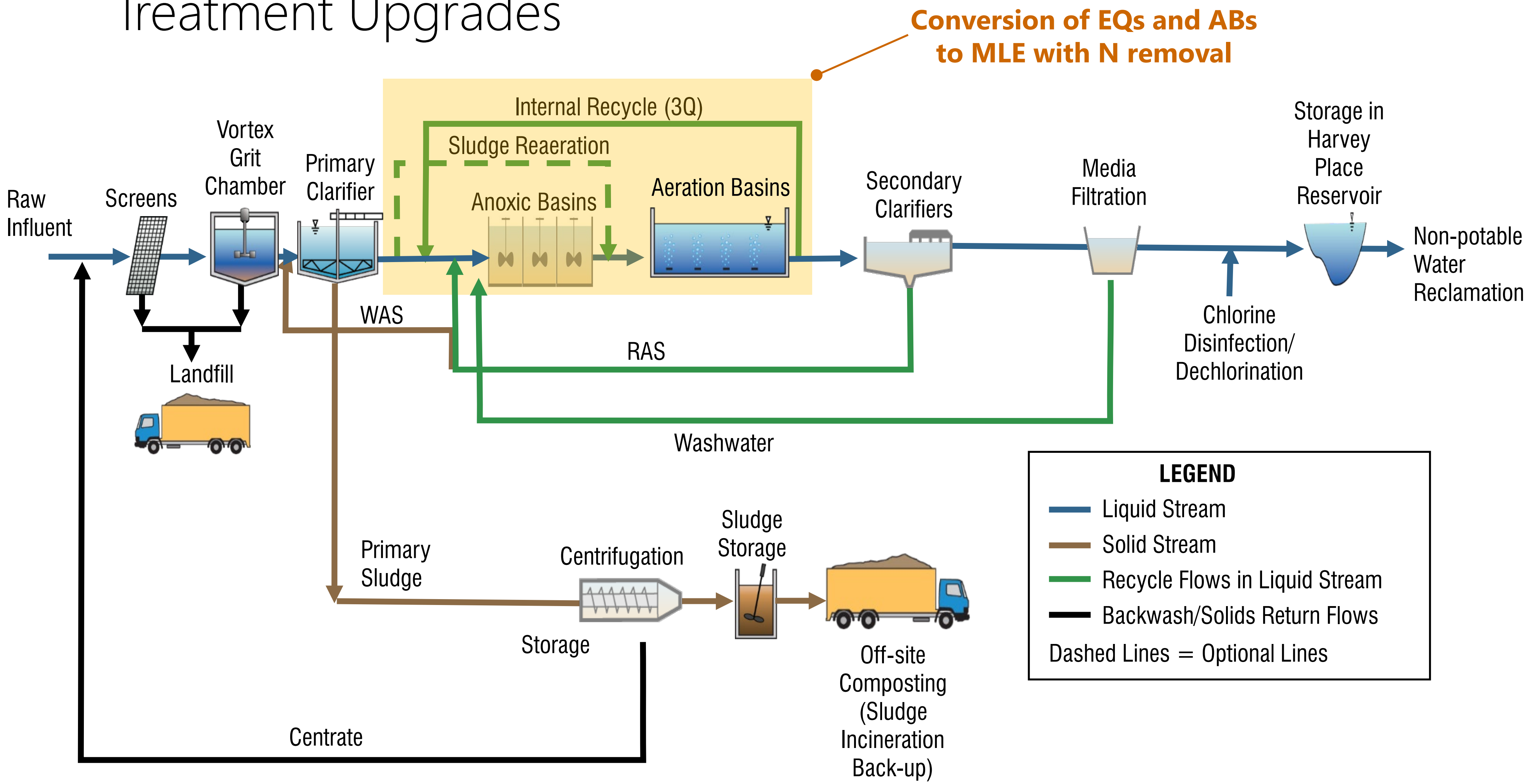


- 8+ miles of 16" pipeline
- 2 lift stations
- Likely need to replace DCLTSA's pipeline to upsize 10", 12", and 14" sections
  - » 3.64 miles

KGID = Kingsbury General Improvement District


Legend
DCLTSA Export Pipeline
Conveyance to Charney Parcels and Settlemeyer Ranch
Conveyance to Charney Parcels
Potential Users
Existing DCLTSA Users
Feet
0 2,000 4,000
Data Sources: STPUD, ESRI, DCLTSA, BING Imagery
Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.
Settelmeyer Ranches
Charney Parcels
Bently Ranch
Bently Ranch
Bently Ranch
Bently Ranch
Bently Ranch
Bently Ranch
Bently Ranch
Park Cattle Ranch
Park Cattle Ranch
Park Cattle Ranch
Park Cattle Ranch
Teig Family Investments
Genoa Lakes Golf Club-Lakes Course
The Nature Conservancy River Fork Ranch
Minden-Tahoe Airport
Buckeye Creek Effluent Storage Facility
Dangberg Reservoir #3
Carson Valley
East Valley
Minden
Gardnerville
Conveyance to Charney Parcels and Settelmeyer Ranches
Direct diversion to Teig Family Investments via existing ditches

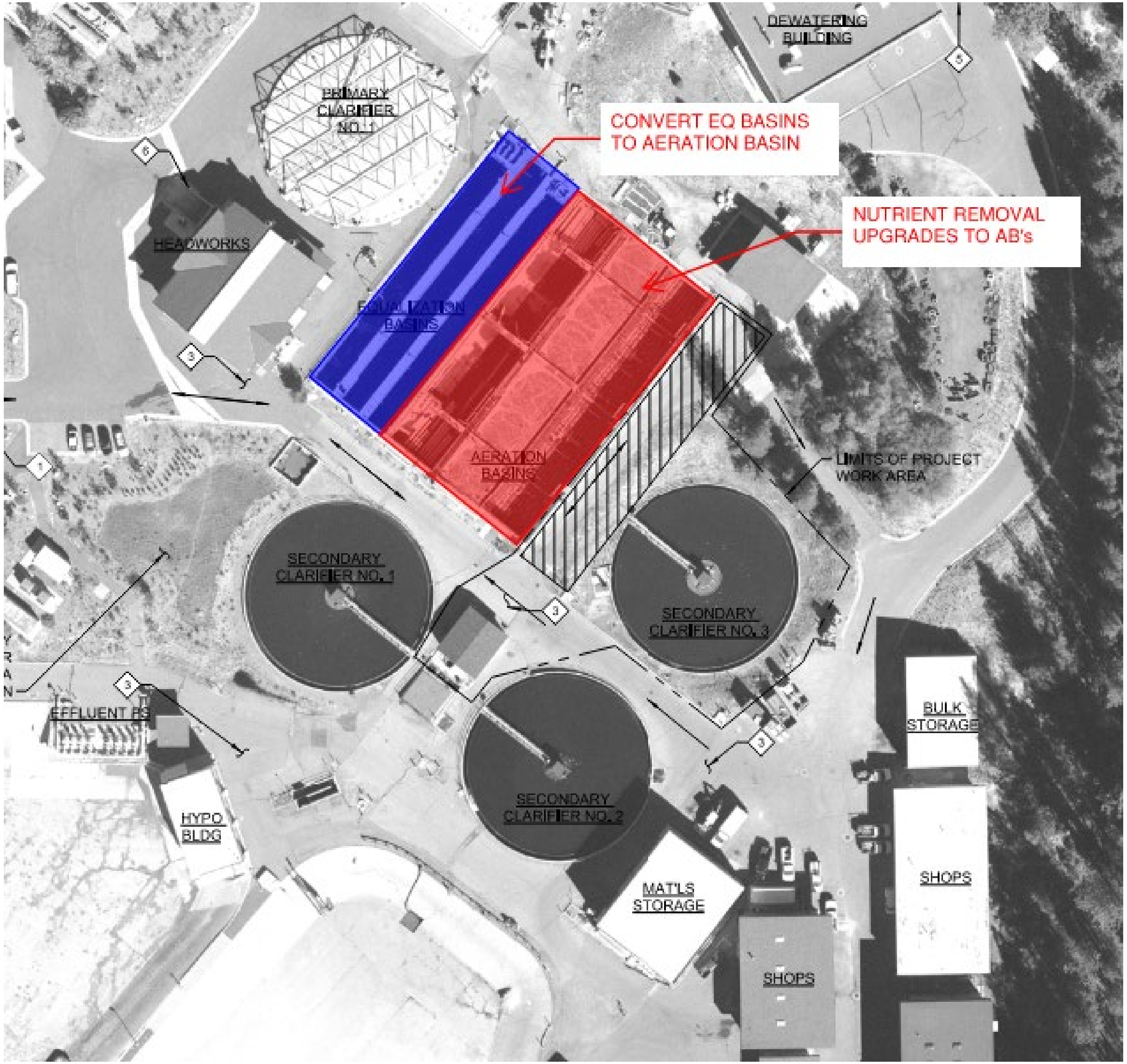
Treatment Upgrades



MLE = modified Ludzak-Ettinger process

Treatment Upgrades and Layout

- Convert EQ Basins into additional Aeration Basin
- Aeration Basin Upgrades
  - » Baffles for zones
  - » ML Return Pumps
  - » RAS Feed Improvements
  - » Aeration upgrades



Cost Estimates, Energy, and GHG Assessment

- Key Components/Assumptions
  - » Treatment plant modifications
    - – Conversion of EQ basins and ABs to MLE with N removal
  - » Pipeline from STPUD to DCLTSA export line (gravity segment)
  - » Replacement pipeline in NV from connection point to Carson Valley
  - » RW distribution pipelines in NV
  - » Lining of entire Buckeye Creek Effluent Storage Reservoir (1,893 AF capacity) to store excess recycled water
- Energy Demands
  - » Energy demands for treatment (greater than existing)
  - » Energy demands associated with conveyance (pumping) to DCLTSA and export to Carson Valley
- GHG
  - » GHG associated with treatment and pumping

Component	Value
Potential Additional Irrigation Areas	
- Teig	1,474 acres
- Settelmeyer	2,083 acres
- Charney	1,200 acres
Demands	16,650 AFY
Cost Estimate	
- Treatment	$ 32M
- Conveyance from STPUD to DCLTSA	$ 108M
- Replacement of DCLTSA pipeline	$ 17M
- Distribution pipelines	$ 12M
- Lining of Buckeye Creek Effluent Storage Reservoir	$ 15M
- TOTAL COSTS	**$ 184M**

AF = acre-feet

Regulations and Permits – Range of Complexity

Low

- Recycled Water Permits/Regulations
  - » NV – Updated Reclaimed Water Management Plan
- Construction related permits and approvals
  - » NV – Distribution pipelines to new users
    - – NDEP Stormwater Permit
    - – Douglas County Grading Permit
  - » CA – Treatment plant modifications
    - – TRPA Permit for WWTP facility footprint expansion
    - – City of South Lake Tahoe building/grading permit

Medium

- Operating agreement with DCLTSA
- Recycled Water Permits/Regulations
  - » NDEP and LRWQCB coordination on approval of treatment process to meet NDEP recycled water standards
  - » NDEP – New DCLTSA Discharge Permit with additional requirements for STPUD effluent at the point of connection
- Construction related permits and approvals
  - » Replacement pipeline in NV from connection point to Carson Valley
    - – NDEP Stormwater Permit
    - – USFS Special Use Permits
    - – NDSL Right of Entry
    - – NDOT Encroachment Permit

High

- Construction related permits and approvals
  - » Pipeline from STPUD to DCLTSA export line (gravity segment) and lift stations
    - – CA Construction General Permit
    - – NDEP Stormwater Permit
    - – TRPA Permit
    - – USFS Special Use Permits (LTBMU and HTNF, if NFS lands affected)
    - – CSLT, Douglas County, Caltrans, NDOT Encroachment Permits

USFS = United States Forest Service
NDSL = Nevada Division of State Lands
NDOT = Nevada Department of Transportation
LTBMU = Lake Tahoe Basin Management Unit
HTNF = Humboldt-Toiyabe National Forest
NFS = National Forest System
CSLT = City of South Lake Tahoe

Discussion

System Modifications

System Modifications

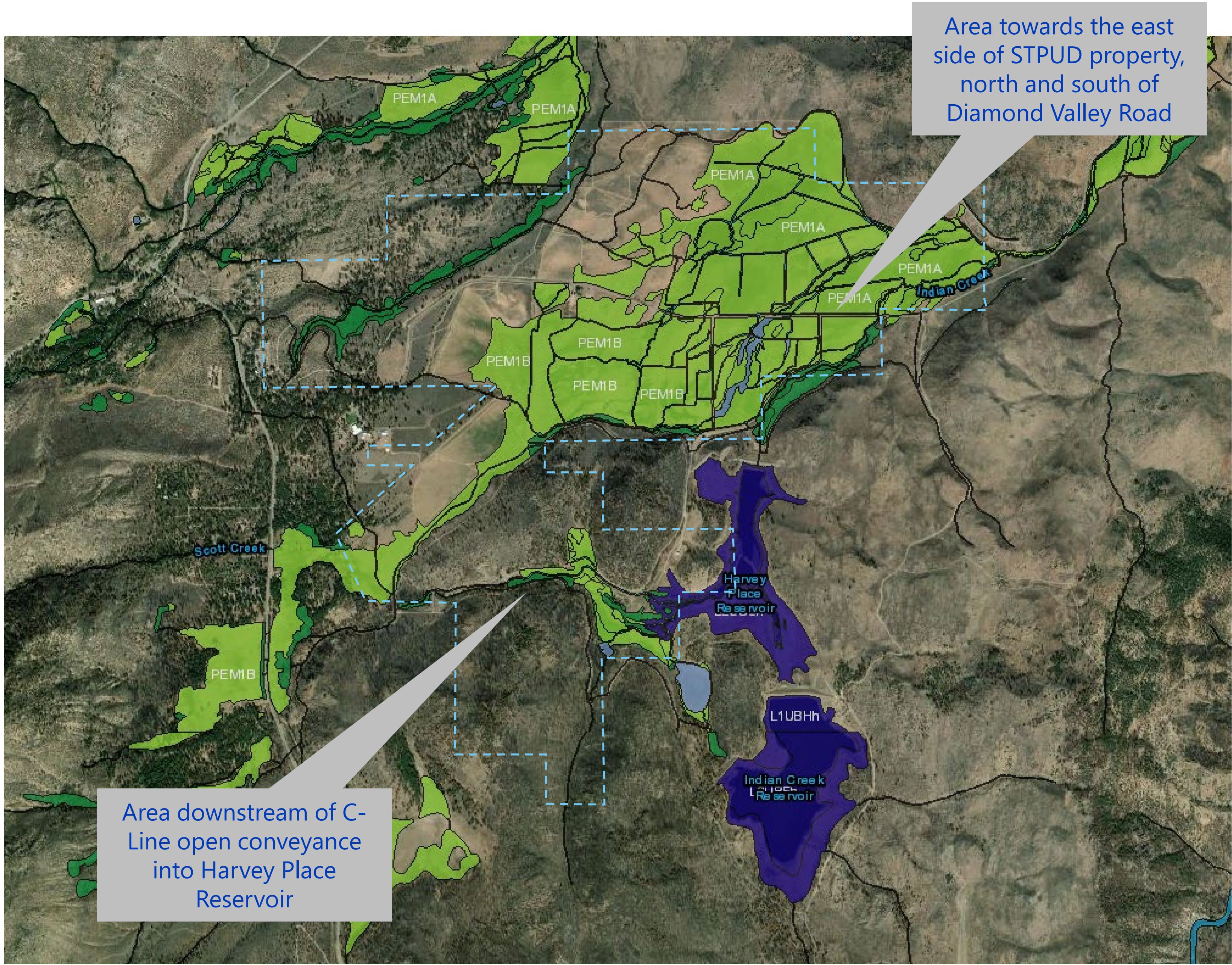
System Modifications	Applicable Alternatives	Description
Urban Fire Protection	All	High-level analysis/discussion on limited potential benefit as compared to regulatory complexity and cost
Tunneling	All	Long-distance large diameter tunneling eliminated based on cost Trenchless tunneling for shorter distances – Considered for any new pipeline alignment based on potential benefits of reducing overall pipe length, avoiding environmental impacts (e.g., creek crossings), avoiding a community/traffic impact, etc.
Split Treatment	Alternative 3: Expanded Reuse in Alpine County with Disinfected Tertiary Alternatives 6C: Expanded Reuse in NV (IPR)	Split treatment for alternatives with nutrient removal eliminated Split treatment for filtration and disinfection processes in Alternative 3 Split treatment for production of secondary effluent and A+ treatment train for Alternative 6C
Constructed Wetlands	All (except 7A)	Constructed wetlands on District property
Export System Energy Recovery	All	Expanded capacity for energy recovery on STPUD export pipeline New energy recovery system on DCLTSA export pipeline

System Modification

Constructed Wetlands

Constructed Wetlands

- Potential Benefits
  - » Storage capacity
  - » Compensatory mitigation “credits” for future District use
  - » Mitigation bank for credits to be sold to others for loss of wetlands
  - » Source of carbon sequestration
- Potential Locations
  - » Constraints
    - – Within District Property
    - – Not planned for future recycled water use or emergency application
    - – Avoid jurisdictional wetlands due to permitting challenges

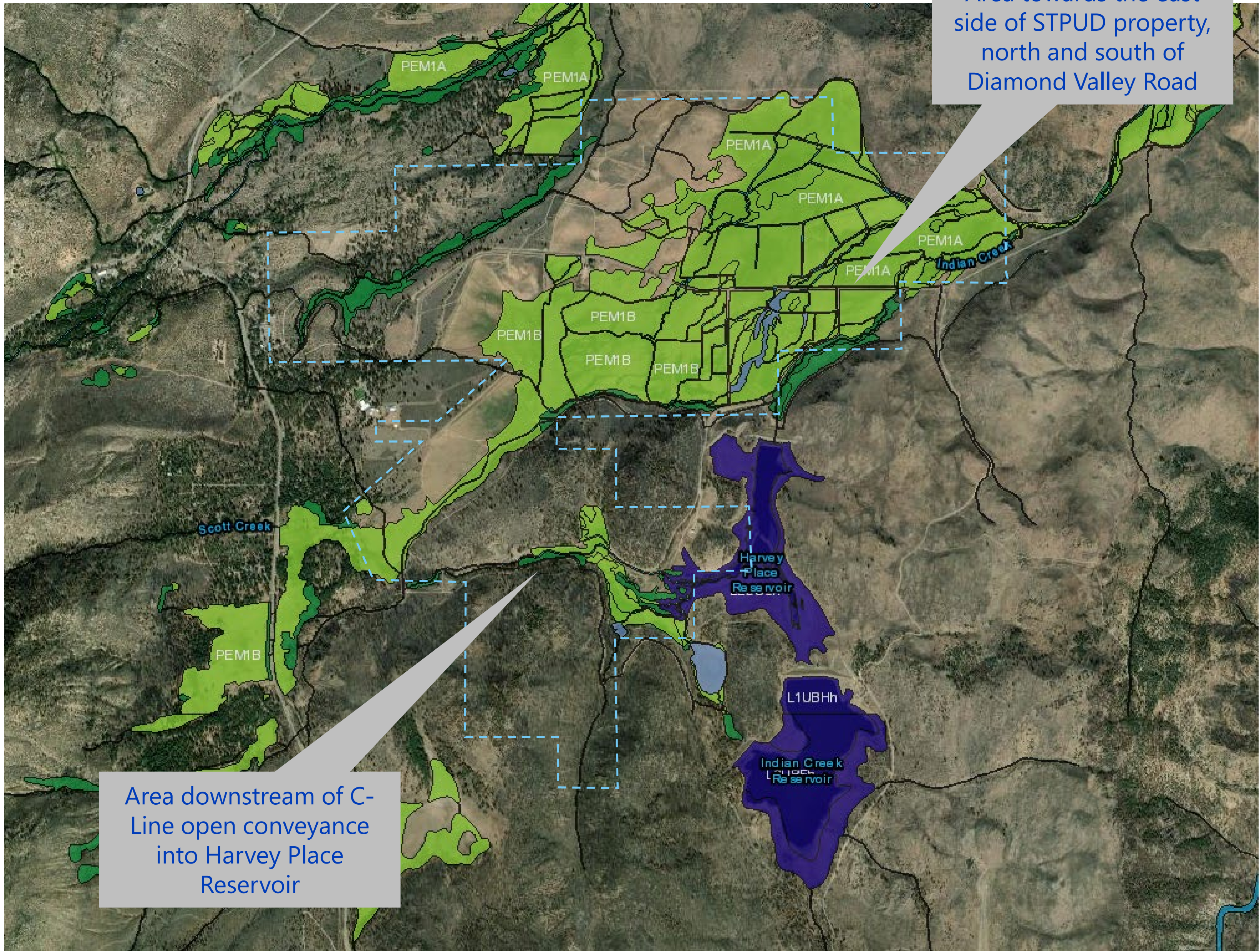


Source: National Wetlands Inventory (usgs.gov)

National Wetlands Mapping

Simplify to just c-line wetlands

- Near Diamond Valley Road
  - » Much of the area near DVR is mapped as wetlands (aka aquatic resources)
  - » Field verification would be necessary to determine if these are jurisdictional aquatic resources
- Area downstream of C-Line
  - » Much of the area near DVR is mapped as wetlands (aka aquatic resources)
  - » Determine if the existing wetlands are "established treatment wetlands" adjacent to uplands (not aquatic resources)
    - – If "established treatment wetlands" then permitting their expansion would be easier



Constructed Wetlands

- Permit Needs (if no aquatic resources are affected)
  - » CA Construction General Permit (>1 acre)
  - » Alpine County Building Permit
  - » WDR permit amendment
- Permit Needs (if aquatic resources are affected [*very challenging]*)
  - » CWA 404, 401 compliance
  - » LSAA, State Wetland Procedures, Porter-Cologne Act compliance

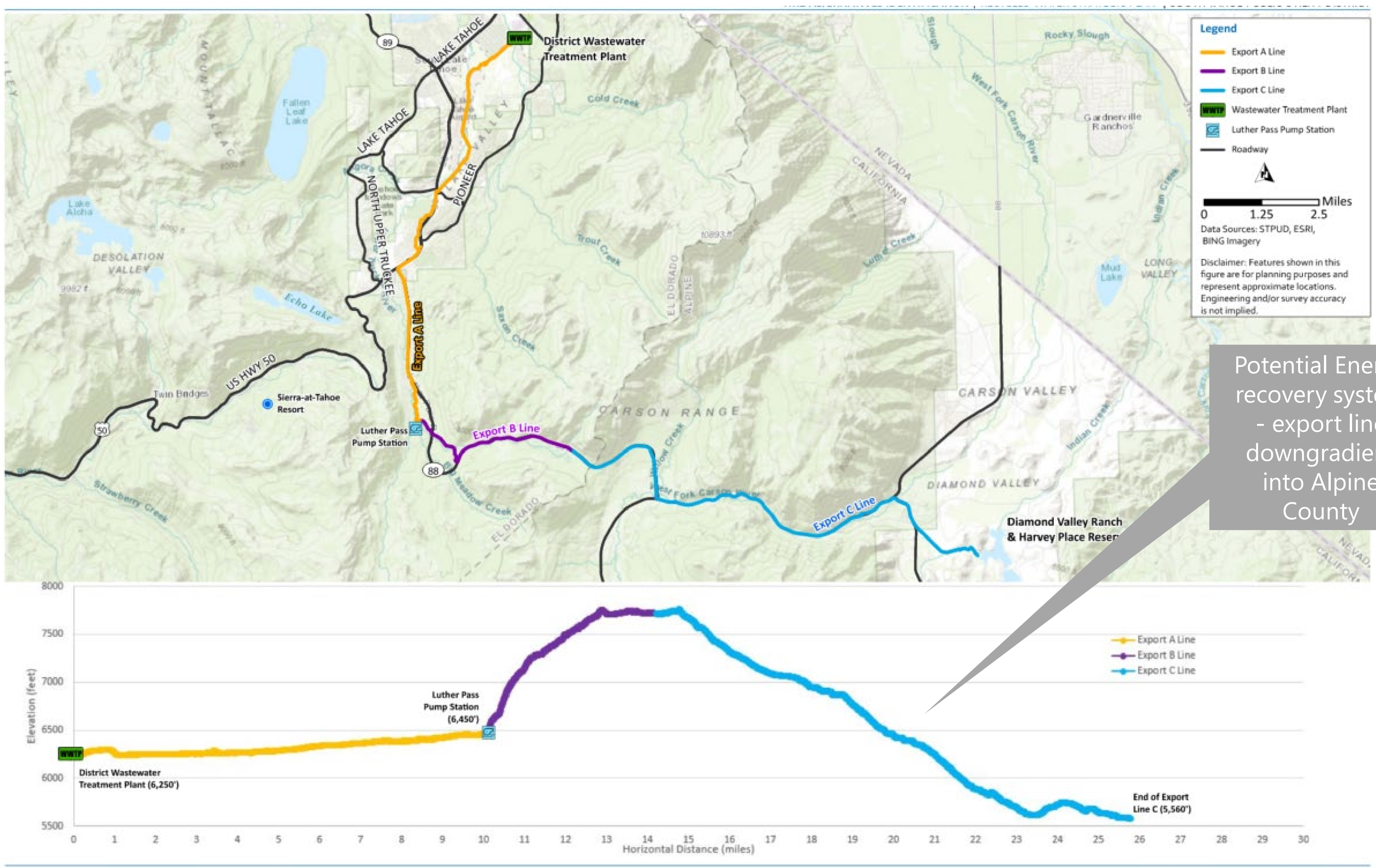
Source: NativeAWA

CWA = Clean Water Act
LSAA = Lake or Streambed Alteration Agreement

System Modification

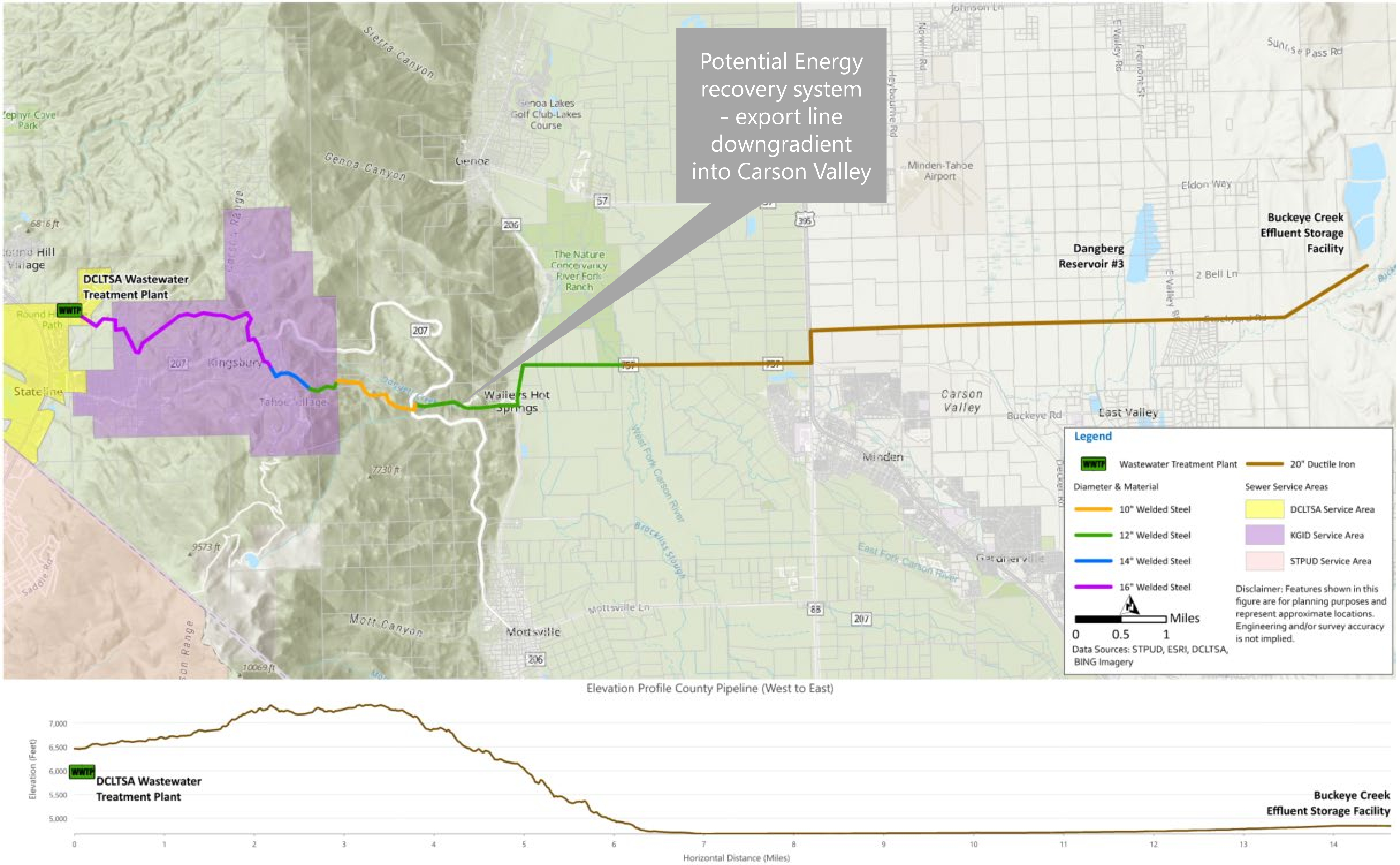
Export System Energy Recovery

STPUD Export System



Potential Energy recovery system - export line downgradient into Alpine County

DCLTSA Export System

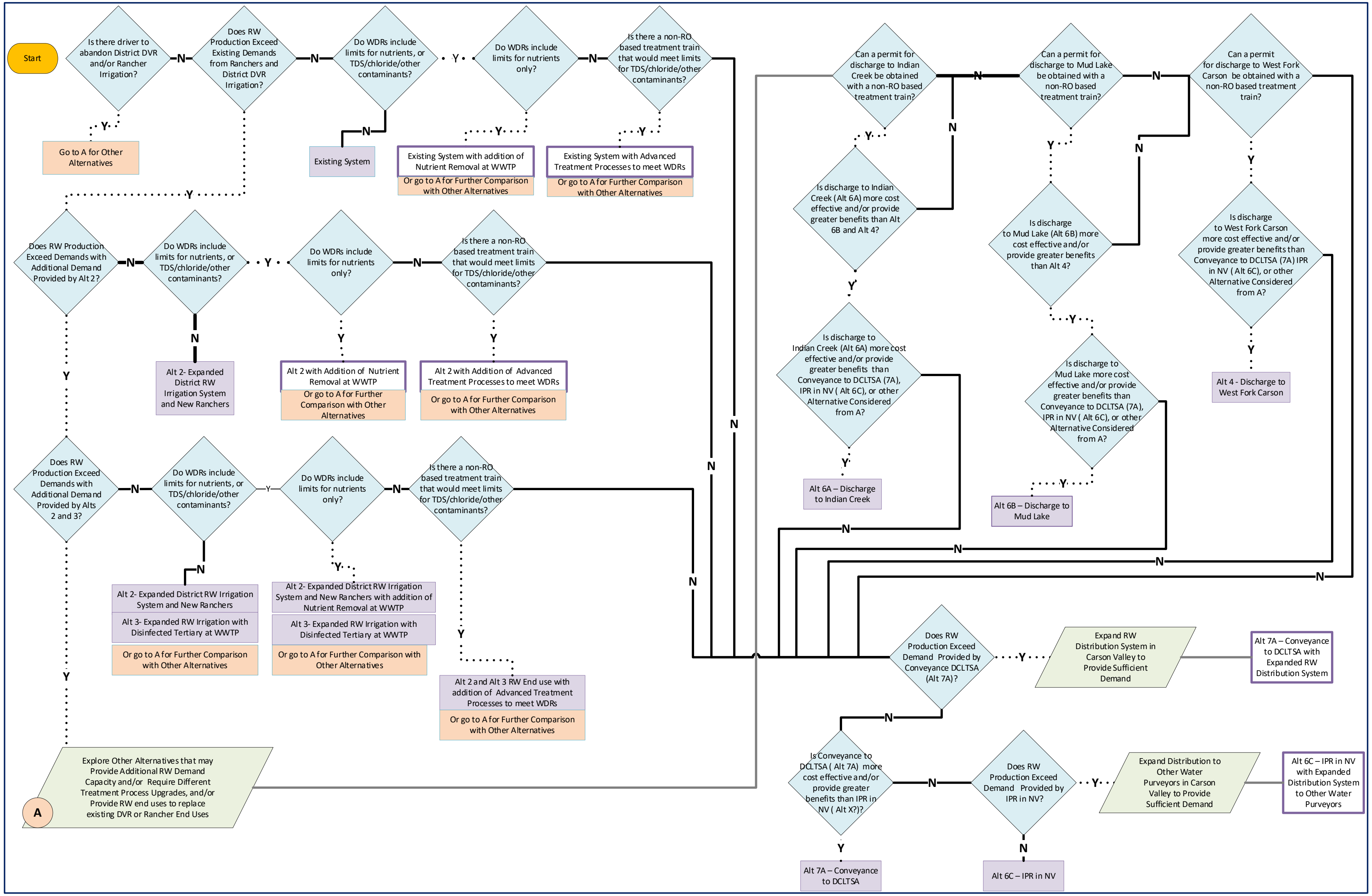


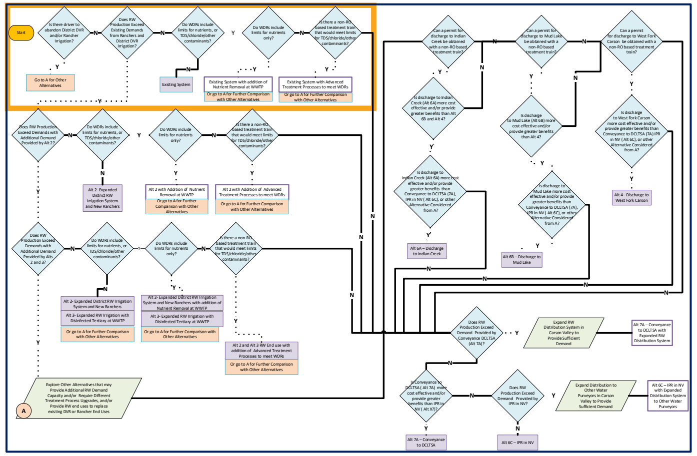
Discussion

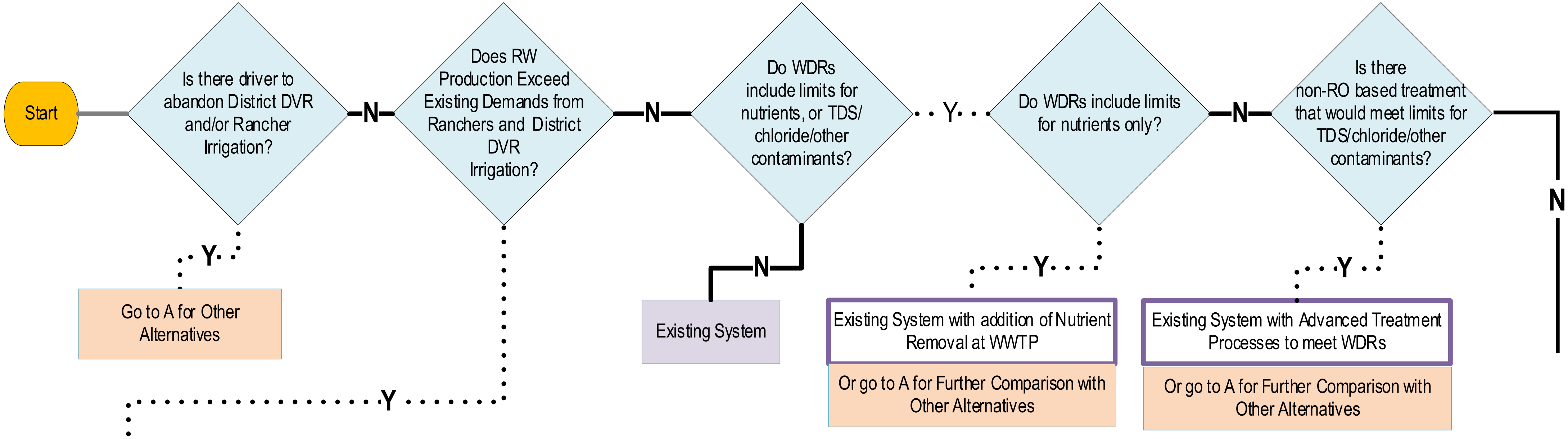
03

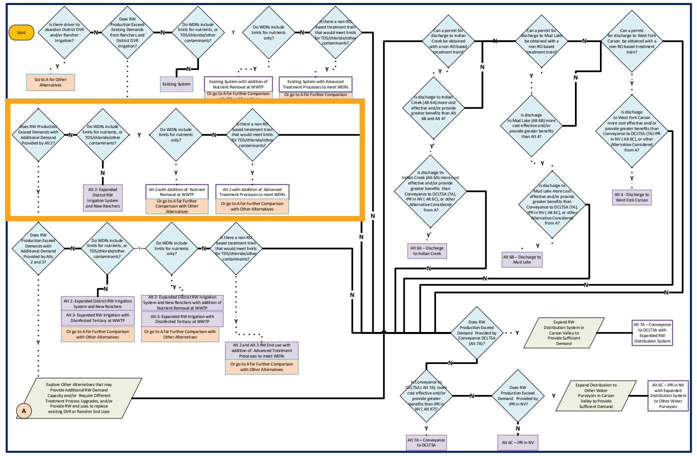
Decision Tree

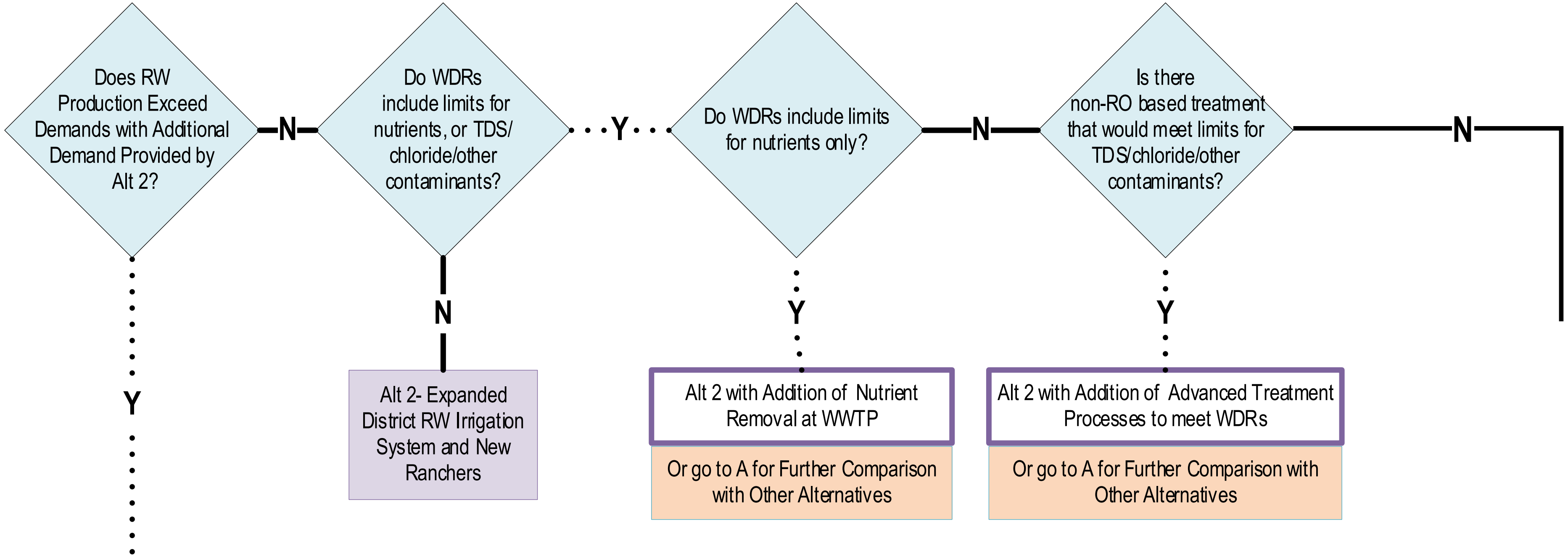
Alternatives Decision Tree

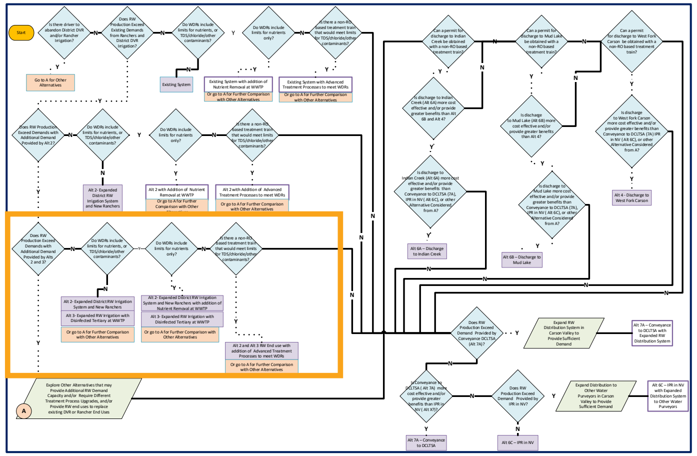


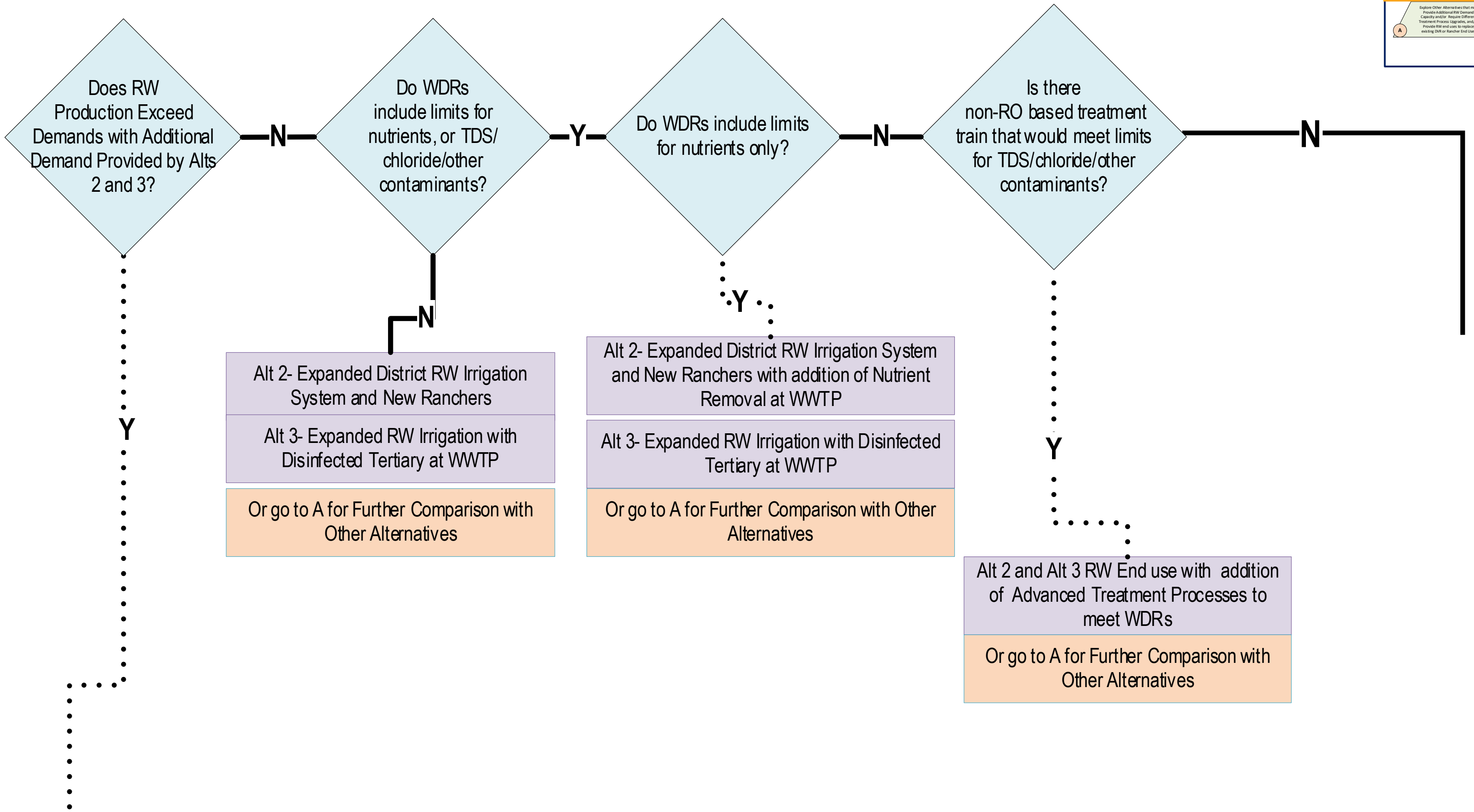


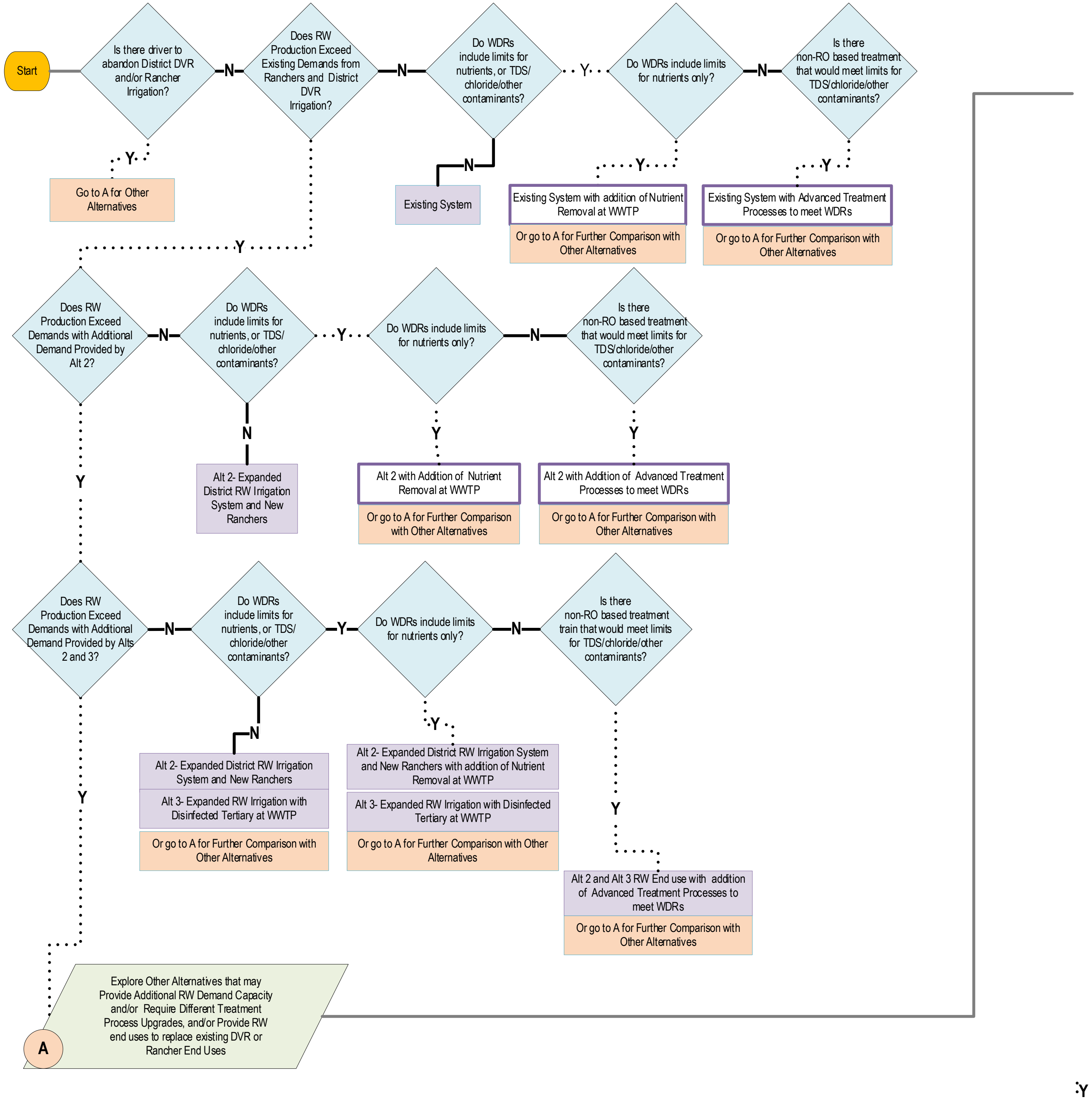

Start
Is there driver to abandon District DVR and/or Rancher Irrigation?
N
Does RW Production Exceed Existing Demands from Ranchers and District DVR Irrigation?
N
Do WDRs include limits for nutrients, or TDS/ chloride/other contaminants?
Y
Do WDRs include limits for nutrients only?
N
Is there non-RO based treatment that would meet limits for TDS/chloride/other contaminants?
N
Y
Go to A for Other Alternatives
Y
N
Existing System
Y
Existing System with addition of Nutrient Removal at WWTP
Or go to A for Further Comparison with Other Alternatives
Y
Existing System with Advanced Treatment Processes to meet WDRs
Or go to A for Further Comparison with Other Alternatives



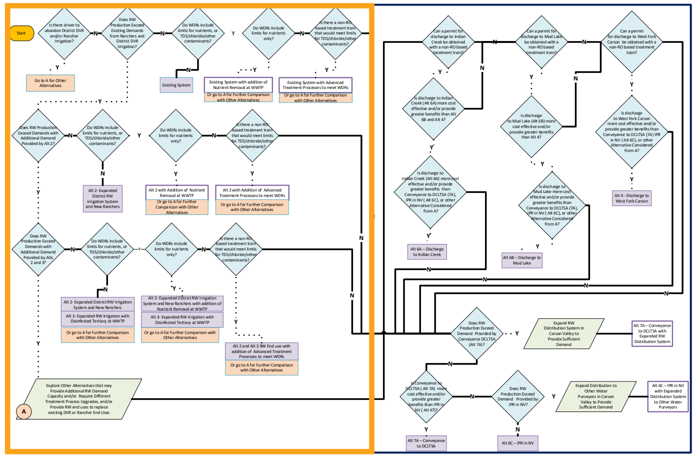

Does RW Production Exceed Demands with Additional Demand Provided by Alt 2?
N
Y
Do WDRs include limits for nutrients, or TDS/ chloride/other contaminants?
N
Alt 2- Expanded District RW Irrigation System and New Ranchers
Y
Do WDRs include limits for nutrients only?
Y
Alt 2 with Addition of Nutrient Removal at WWTP
Or go to A for Further Comparison with Other Alternatives
N
Is there non-RO based treatment that would meet limits for TDS/chloride/other contaminants?
Y
Alt 2 with Addition of Advanced Treatment Processes to meet WDRs
Or go to A for Further Comparison with Other Alternatives
N

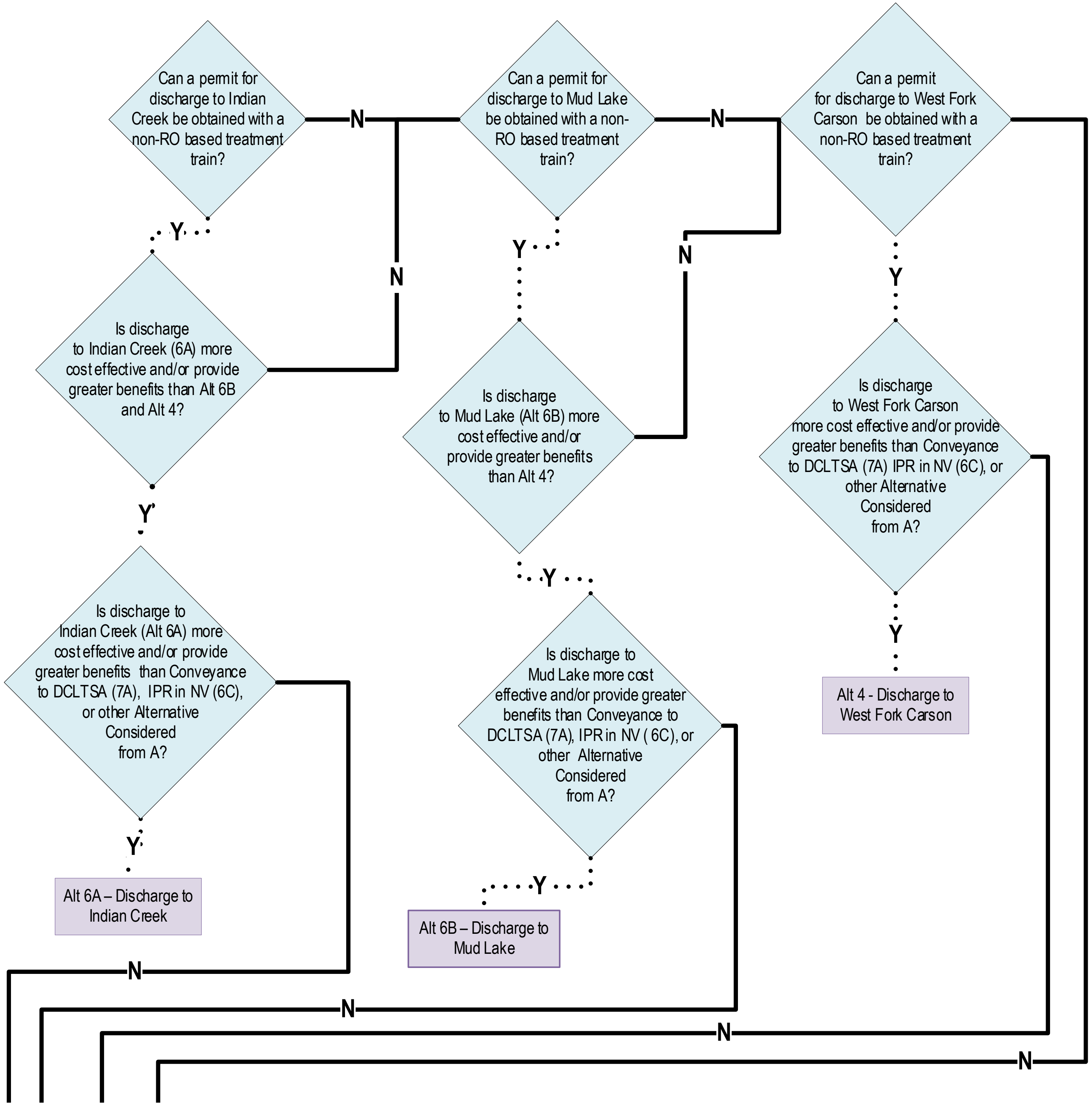


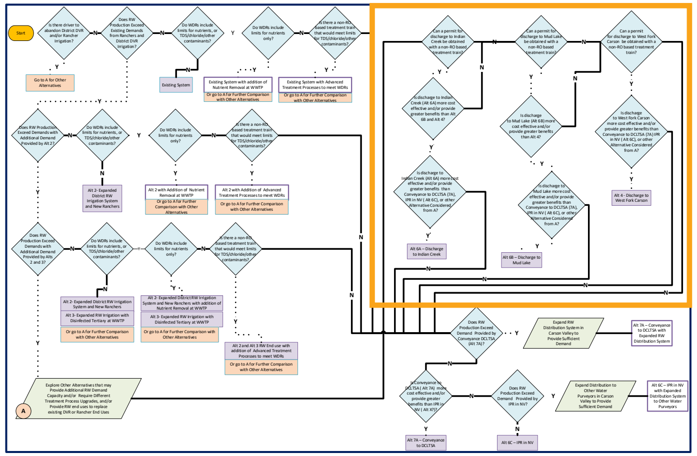

Does RW Production Exceed Demands with Additional Demand Provided by Alts 2 and 3?
N
Do WDRs include limits for nutrients, or TDS/ chloride/other contaminants?
Y
Do WDRs include limits for nutrients only?
N
Is there non-RO based treatment train that would meet limits for TDS/chloride/other contaminants?
N
N
Alt 2- Expanded District RW Irrigation System and New Ranchers
Alt 3- Expanded RW Irrigation with Disinfected Tertiary at WWTP
Or go to A for Further Comparison with Other Alternatives
Y
Alt 2- Expanded District RW Irrigation System and New Ranchers with addition of Nutrient Removal at WWTP
Alt 3- Expanded RW Irrigation with Disinfected Tertiary at WWTP
Or go to A for Further Comparison with Other Alternatives
Y
Alt 2 and Alt 3 RW End use with addition of Advanced Treatment Processes to meet WDRs
Or go to A for Further Comparison with Other Alternatives
Y

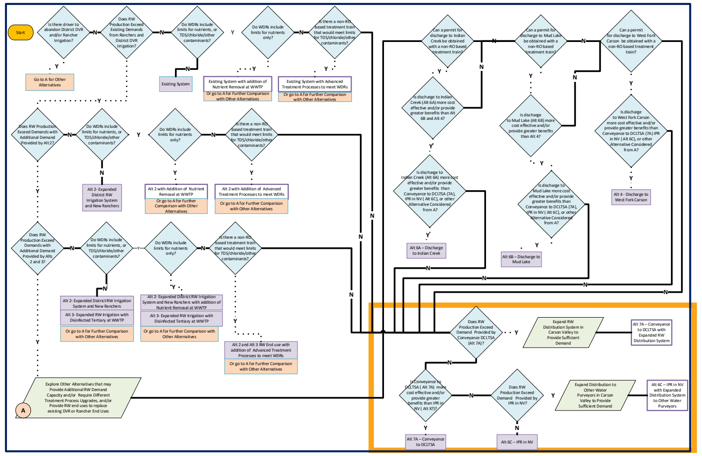


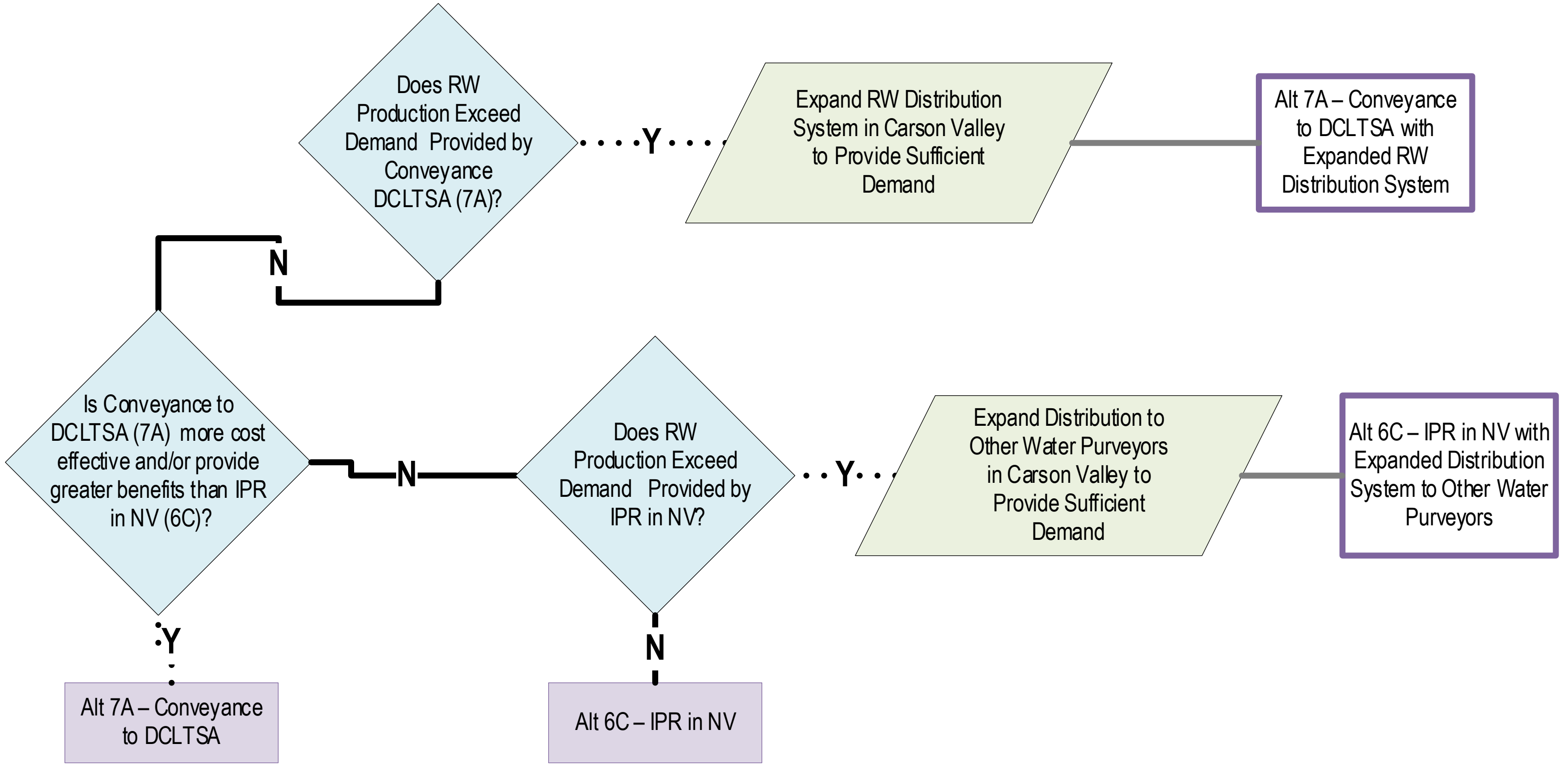
Start
Is there driver to abandon District DVR and/or Rancher Irrigation?
N
Does RW Production Exceed Existing Demands from Ranchers and District DVR Irrigation?
N
Do WDRs include limits for nutrients, or TDS/ chloride/other contaminants?
Y
Do WDRs include limits for nutrients only?
N
Is there non-RO based treatment that would meet limits for TDS/chloride/other contaminants?
Y
Go to A for Other Alternatives
N
Existing System
Y
Existing System with addition of Nutrient Removal at WWTP
Or go to A for Further Comparison with Other Alternatives
Y
Existing System with Advanced Treatment Processes to meet WDRs
Or go to A for Further Comparison with Other Alternatives
Y
Does RW Production Exceed Demands with Additional Demand Provided by Alt 2?
N
Do WDRs include limits for nutrients, or TDS/ chloride/other contaminants?
Y
Do WDRs include limits for nutrients only?
N
Is there non-RO based treatment that would meet limits for TDS/chloride/other contaminants?
N
Alt 2- Expanded District RW Irrigation System and New Ranchers
Y
Alt 2 with Addition of Nutrient Removal at WWTP
Or go to A for Further Comparison with Other Alternatives
Y
Alt 2 with Addition of Advanced Treatment Processes to meet WDRs
Or go to A for Further Comparison with Other Alternatives
Y
Does RW Production Exceed Demands with Additional Demand Provided by Alts 2 and 3?
N
Do WDRs include limits for nutrients, or TDS/ chloride/other contaminants?
Y
Do WDRs include limits for nutrients only?
N
Is there non-RO based treatment train that would meet limits for TDS/chloride/other contaminants?
N
Alt 2- Expanded District RW Irrigation System and New Ranchers
Alt 3- Expanded RW Irrigation with Disinfected Tertiary at WWTP
Or go to A for Further Comparison with Other Alternatives
Y
Alt 2- Expanded District RW Irrigation System and New Ranchers with addition of Nutrient Removal at WWTP
Alt 3- Expanded RW Irrigation with Disinfected Tertiary at WWTP
Or go to A for Further Comparison with Other Alternatives
Y
Alt 2 and Alt 3 RW End use with addition of Advanced Treatment Processes to meet WDRs
Or go to A for Further Comparison with Other Alternatives
Y
A
Explore Other Alternatives that may Provide Additional RW Demand Capacity and/or Require Different Treatment Process Upgrades, and/or Provide RW end uses to replace existing DVR or Rancher End Uses
:Y




Can a permit for discharge to Indian Creek be obtained with a non-RO based treatment train?
N
Y
Can a permit for discharge to Mud Lake be obtained with a non-RO based treatment train?
N
Y
Can a permit for discharge to West Fork Carson be obtained with a non-RO based treatment train?
Y
Is discharge to Indian Creek (6A) more cost effective and/or provide greater benefits than Alt 6B and Alt 4?
N
Y
Is discharge to Mud Lake (Alt 6B) more cost effective and/or provide greater benefits than Alt 4?
N
Y
Is discharge to West Fork Carson more cost effective and/or provide greater benefits than Conveyance to DCLTSA (7A) IPR in NV (6C), or other Alternative Considered from A?
Y
Alt 4 - Discharge to West Fork Carson
Is discharge to Indian Creek (Alt 6A) more cost effective and/or provide greater benefits than Conveyance to DCLTSA (7A), IPR in NV (6C), or other Alternative Considered from A?
Y
Alt 6A – Discharge to Indian Creek
Is discharge to Mud Lake more cost effective and/or provide greater benefits than Conveyance to DCLTSA (7A), IPR in NV (6C), or other Alternative Considered from A?
Y
Alt 6B – Discharge to Mud Lake
N
N
N
N







Does RW Production Exceed Demand Provided by Conveyance DCLTSA (7A)?
Y
Expand RW Distribution System in Carson Valley to Provide Sufficient Demand
Alt 7A – Conveyance to DCLTSA with Expanded RW Distribution System
N
Is Conveyance to DCLTSA (7A) more cost effective and/or provide greater benefits than IPR in NV (6C)?
N
Does RW Production Exceed Demand Provided by IPR in NV?
Y
Expand Distribution to Other Water Purveyors in Carson Valley to Provide Sufficient Demand
Alt 6C – IPR in NV with Expanded Distribution System to Other Water Purveyors
Y
Alt 7A – Conveyance to DCLTSA
N
Alt 6C – IPR in NV

05

Decisions, Action Items, Next Steps

Next steps

June

- 6th SAG Meeting

July

- Administrative Draft Strategic Plan to District

August

- Public and SAG Meeting
- End of Month - Draft Strategic Plan

Posted on website

Open to SAG and/or public comment

September

- Final Board Presentation

October

- End of Month - Final Strategic Plan

TM = technical memorandum

Appendix D:

June 6, 2024 Meeting Minutes

MEETING MINUTES

RECYCLED WATER STRATEGIC PLAN

South Tahoe Public Utility District

Issue Date: June 19, 2024

Project No.: 200689

Purpose:	Recycled Water Strategic Plan SAG Alternatives Evaluation Workshop		
Meeting Date:	June 6, 2024		
Meeting Location:	In Person at STPUD Offices and via Teams		
Prepared By:	Carollo Team		
Attendees:	**Client:**	**Carollo:**	**SAG Attendees:**
	Julie Ryan	Steve Caswell	Ed James (Carson Water Subconservancy District)
	Shelly Thomsen	Elisa Garvey	Joe Nady (Washoe Tribe Legal Counsel)
		Ricky Gutierrez	Shay Navarro (TRPA Watershed and Water Quality Program Manager)
		Coral Taylor	Carl Ruschmeyer (Alpine Watershed Group chair)
		Margaret Skillicorn (ESI)	Jason Burke (City of South Lake Tahoe)
Distribution:	Attendees		

Discussion:

The following is our understanding of the subject matter covered in this conference. If this differs from your understanding, please notify us.

Meeting Purpose

The objectives of this meeting are to:

- Update SAG on the Phase 2 Alternatives and System Modifications
- Get Feedback and Input from SAG on Phase 2 Alternatives and System Modifications

Agenda

- Phase 2 – Overview
- Phase 2 – Alternatives Evaluation
  - 7 alternatives (plus existing system)
  - 5 system modifications
- Decision Diagram

- Next steps

Key Area Discussion Notes

- Phase 2 – Overview
  - *Ed:* What is the current capacity of the plant?
    - *Answer:* It is permitted for 7.7 mgd, average flows are 3 mgd. Over 50 years, flows are expected to double, projected to be 5.4 mgd (6,000 AFY) average flows.
  - *Shelly:* Noted that downstream of Harvey Place Reservoir (HPR) the District provides ranchers water for free, but those ranchers are near retirement. The ranchers' kids might not need the water or want to ranch anymore. This alternative (Alt 2) takes into consideration what happens if the ranchers' offspring do not want to ranch, and therefore don't need water.

- Phase 2 – Alternatives Evaluation
  - Alternative 2 and Alternative 3 discussion
    - *Julie:* SNMP – do we currently have this?
      - *Answer:* No.
    - *Joe:* Have we received any input from Washoe Tribe until now?
      - *Answer:* No.
    - *Jason:* Would SNMP be subject to Lahontan or NDEP review, or both?
      - *Answer:* NDEP does not have jurisdiction, but there is a public process that they could provide comment on this.
    - *Jason:* SNMP is a CA requirement?
      - *Answer:* Yes, through RW Policy in CA.

  - Alternative 4, 6A, and 6B discussion
    - *Ed:* Would it make sense to do split treatment for these?
      - *Answer:* No, because the consideration was that all the RW would go to water discharge, but no irrigation. Biological processes get complicated if flows are split.
    - *Julie:* These alts are the most similar to how District used to operate before HPR was constructed. It was complicated with water quality and permitting.
      - *Ricky:* MBR is easier to control than previous processes, do not need as much chemical use.
      - *Julie:* So, from an administrative operational perspective, it is too complicated?
      - *Elisa:* Correct, permitting, and administrative hurdles are more complicated and challenging than they used to be.
    - *Shelly:* Reminder that even though there are so many reasons this may not work – how are these alternatives carried through? Phase 1 had a lot of alternatives that were even more challenging and less feasible. We aren't looking to make a decision today about what the District should do, but we need to keep in mind that the landscape keeps changing, and these alternatives could come into play if some drivers come into play.
    - *Julie:* There are other compounding factors, like RO not being feasible because the District is too far from the ocean, even though things are being done elsewhere.
    - *Jason:* Other places still have stringent WQ requirements, and you have to manage salt and nutrients even where water shortages are drivers. There are equal concerns besides just Lake Tahoe.

- Alternative 6C discussion
  - *Julie:* Is it specific to it being a California municipal supply? (compared to NV)
    - *Answer:* So far no one in California has done what Elisa explained.
  - *Ed:* Another problem is you don't have that demand in Alpine County, correct?
    - *Answer:* Correct.
  - *Julie:* Is there a terrain element to it too that might be limiting for spreading and injection?
    - *Answer:* It is possible for spreading. We didn't go down that road because of regulatory issues. It's still considered a discharge of effluent.
  - *Ed:* So, is the 3460 AFY the future demand?
    - *Answer:* Yes. It was from GRGID's master planning.
    - *Steve:* It could be more.
    - *Coral:* This only looked at the GRGID needs, but there might be other needs down there.
  - *Ed:* if you were to put the recycled water in a spreading basin, would treatment requirements be less? If you look at the whole watershed, there may be demands further downstream, outside of Douglas County.
    - *Elisa*: Noted that discharging to the ground could still be considered the functional equivalent to a point source discharge based on time of travel, etc. The Maui Case throws a wrench into the concept of groundwater discharge. NDEP would probably look at this the same as the Maui Case.
  - *Julie:* Even if we replaced their entire supply with District water, that wouldn't use all the District water – correct? And the District would need to keep existing operations?
    - *Answer:* Correct, this alternative would only be chosen if all District flow could be utilized.
  - *Ed:* In Carson Water's Subconservancy District's 30-year plan, they could only assume another 500 AFY. There are other things in play that may have a need for water supply. There is growth in that area, the demand for it is not significant when looking at what we're doing in our 30-year plan.

- Alternative 7A discussion
  - *Julie:* Wondering why a 16" pipeline was proposed, since it's much smaller than the District's existing pipeline.
    - Action: Carollo to investigate the sizing of pipeline, consider making this larger to accommodate up to 8 mgd.
  - *Julie:* On the plus side of regulatory permits, the high ranked permits are in the District's wheelhouse, and these are do-able, and they are familiar with these. Technologically simpler.
  - *Jason:* What are your assumptions with the pipelines and repaving?
    - *Answer:* The assumption would be that repaving would be the full lane.

- General questions:
  - *Ed:* Your best alternative is that you have existing infrastructure today, and there are irrigators on the NV side, south of existing operations. Why didn't we look at irrigating southern part in NV from HPR? Ed sees an exchange. Surface water could be dedicated

to the river/surface water rights sold to downstream users and irrigators would use the recycled water. Maybe this is something to consider as another alternative.

- *Elisa*: We are open to talking about this with Ed if there are needs for land application. Maybe that is an option. It would be an expansion of Alt 2 or 3. We didn't get that from the NV state engineer, but it was noted that they have their water rights.
- Action: Carollo to investigate additional Secondary 23 or Tertiary Disinfected users in NV. Meet with Ed James about other potential users in this area. (Expansion of users for Alt 2 or Alt 3). Maybe 2A and 3A. Consider connecting to the end of Diamond Ditch and moving on.

- *Steve*: At least two of our ranchers cross statelines.
- *Julie*: Thought it was good input. It would be good for the District to research what Ed suggested and modify, or link onto Alt. 2 and 3.

- System Modifications discussion
  - *Ed:* It's much more expensive now to construct a tunnel than in the 1860s with low-cost labor.

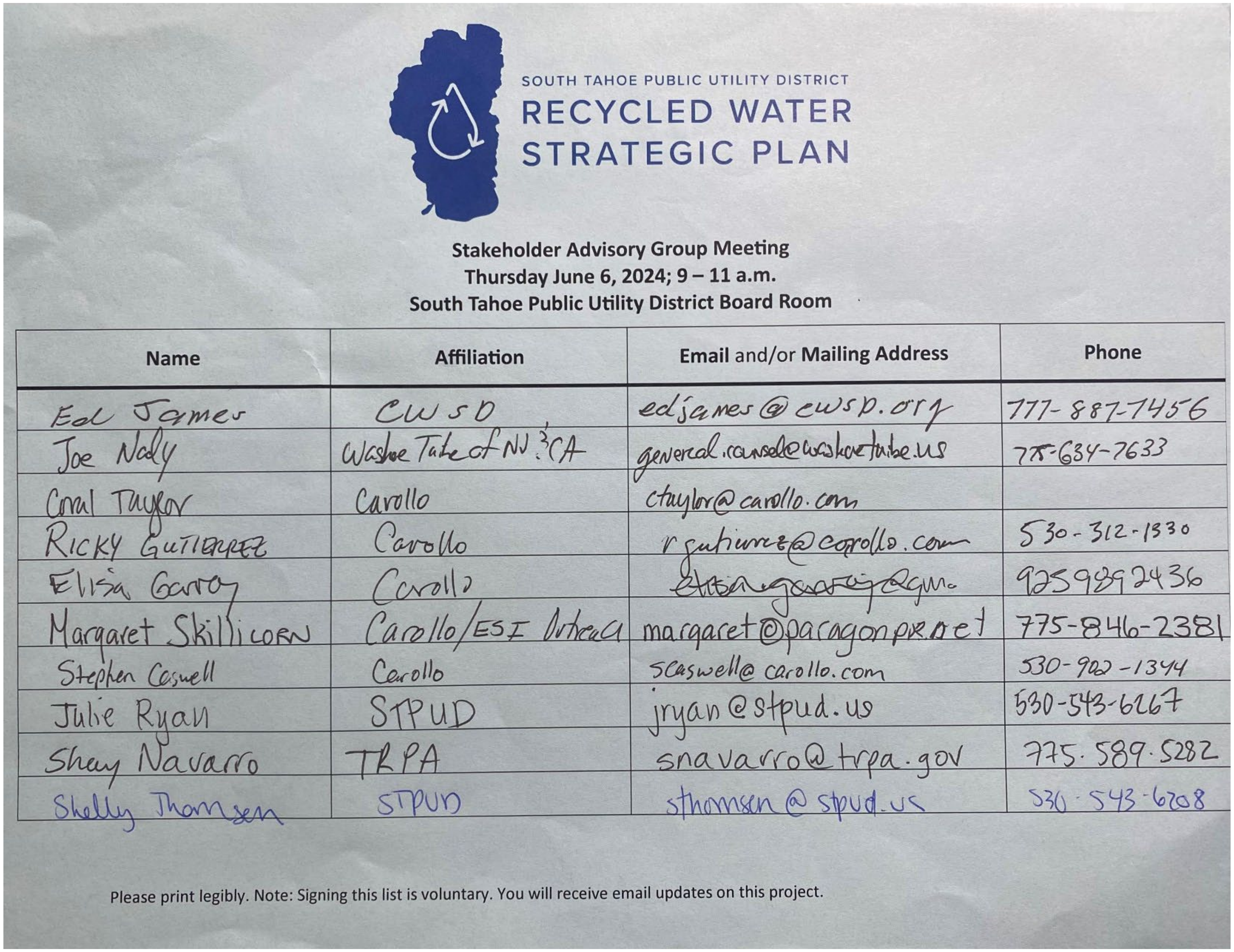
- Decision Tree
  - *Julie:* Noted that the left side is the "simpler/easier" alternatives, and the right side includes the more challenging and expensive alternatives.

- Next Steps
  - *Julie:* Wanted to verify that Strategic Plan will be compilation of products to date plus an executive summary. In 10, 20, 30 years it will be difficult for people to understand, maybe?
    - *Steve and Elisa*: Will have this in the plan - this is where we sit today. There will also be an accompanying narrative discussion.
  - *Julie:* Is there an intention as part of the Strategic Plan to use the decision tree as an example to investigate challenges District sees today?
    - Yes, we would also use the Multi-Criteria Decision Analysis tool as well for the District's current situation (aging infrastructure, uncertainty of Rancher contracts, changes to WWTP).

Decisions, Action Items, Next Steps

- Action Items
  - Carollo to investigate sizing of pipeline from STPUD to DCLTSA, consider making this larger to accommodate up to 8 mgd.
  - Carollo to investigate additional Secondary 23 or Tertiary Disinfected users in NV.
    - Meet with Ed, Julie, Elisa, Ricky, Steve, Coral about other potential users in this area.

Sign-in Sheet



SOUTH TAHOE PUBLIC UTILITY DISTRICT
RECYCLED WATER STRATEGIC PLAN

Stakeholder Advisory Group Meeting
Thursday June 6, 2024; 9 – 11 a.m.
South Tahoe Public Utility District Board Room

Name	Affiliation	Email and/or Mailing Address	Phone
Ed James	CWSD	edjames@cwsp.org	777-887-7456
Joe Nely	Washoe Tribe of NV & CA	generalcounsel@washoetribe.us	775-634-7633
Coral Taylor	Carollo	ctaylor@carollo.com	
Ricky Gutierrez	Carollo	rgutierrez@carollo.com	530-312-1330
Elisa Garvey	Carollo	[illegible]	9259892436
Margaret Skillicorn	Carollo/ESI Outreach	margaret@paragonpr.net	775-846-2381
Stephen Caswell	Carollo	scaswell@carollo.com	530-902-1344
Julie Ryan	STPUD	jryan@stpud.us	530-543-6267
Shay Navarro	TRPA	snavarro@trpa.gov	775.589.5282
Shelly Thomsen	STPUD	sthomsen@stpud.us	530.543.6208

Please print legibly. Note: Signing this list is voluntary. You will receive email updates on this project.

SOUTH TAHOE PUBLIC UTILITY DISTRICT

RECYCLED WATER STRATEGIC PLAN

Stakeholder Advisory Group Meeting
Thursday June 6, 2024; 9 – 11 a.m.
South Tahoe Public Utility District Board Room

Name	Affiliation	Email and/or Mailing Address	Phone
Carl Ruschmeyer	AWG	rushky@charter.net	(775) 690-1437
Jason Burke	City of SLT	jburke@cityofslt.us	530-542-6038

Please print legibly. Note: Signing this list is voluntary. You will receive email updates on this project.

Appendix D:

October 24, 2024 Meeting Materials

October 24, 2024, meeting materials to be published following meeting.

Appendix D:

October 24, 2024 Meeting Minutes

October 24, 2024, meeting materials to be published following meeting.