Tahoe-Truckee Sanitation Agency
Master Sewer Plan

VOLUME 1: EXECUTIVE SUMMARY REPORT

FINAL | February 2022

Tahoe-Truckee Sanitation Agency
Master Sewer Plan

VOLUME 1:
EXECUTIVE SUMMARY REPORT

FINAL | February 2022

Digitally signed by Timothy J. Loper
Contact Info: Carollo Engineers, Inc.
Date: 2022.02.08 16:31:13-08'00'

REGISTERED PROFESSIONAL ENGINEER
TIMOTHY J. LOPER
No. 70847
CIVIL
STATE OF CALIFORNIA

Contents

Appendices

Tables

Figures

Abbreviations

AA	annual average
ADM	anaerobically digestible material
ADWF	average dry weather flow
Agency	Tahoe-Truckee Sanitation Agency
ASCWD	Alpine Springs County Water District
AWT	advanced wastewater treatment
BFE	base flood elevation
BNR	biological nitrogen removal
BOD	biological oxygen demand
BOD_5	5-day biochemical oxygen demand
BWF	base wastewater flow
C	capacity
Carollo	Carollo Engineers
CCTV	closed-caption television
CIP	capital improvement program/plan
CMMS	computerized maintenance management software/system
CMU	concrete masonry unit
COD	chemical oxygen demand
E&I	electrical and instrumentation
ENR	Engineering News-Record
FOG	fats, oils, grease
GIS	geographical information system
HOF	high occupancy flow
HPOAS	high-purity oxygen activated sludge
HVAC	heating, ventilation, and air conditioning
in	inches
LEL	lower explosive limit
LF	linear feet
LOS	levels of service
Master Plan	Master Sewer Plan
MCC	motor control center
MG	million gallons
mg/L	milligrams per liter
mgd	million gallons per day
MH	manhole
MPPS	multipurpose pump station
MW	maximum week

NCSD	Northstar Community Services District
NFPA	National Fire Protection Association
NPDES	National Pollutant Discharge Elimination System
NTPUD	North Tahoe Public Utility District
O	other
OVPSD	Olympic Valley Public Service District
PLC	programmable logic controller
PO	process optimization
PWWF	peak wet weather flow
R&R/RR	rehabilitation and replacement
RAS	return activated sludge
SAT	soil aquifer treatment
SOP	standard operating procedure
SSMP	Sanitary Sewer Master Plan
SSO	sanitary sewer overflow
TCPUD	Tahoe City Public Utility District
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TP	total phosphorus
TRI	Truckee River Interceptor
TSD	Truckee Sanitary District
TSS	total suspended solids
T-TSA/Agency	Tahoe-Truckee Sanitation Agency
TWAS	thickened waste-activated sludge
UV	ultraviolet
VFD	variable frequency drive
WaPUG	Wastewater Planning Users Group
WAS	waste activated sludge
WASSTRIP	waste activated sludge stripping to remove internal phosphorus
WRP	water reclamation plant

Tahoe-Truckee Sanitation Agency
Master Sewer Plan

VOLUME 1:
EXECUTIVE SUMMARY REPORT
FREQUENTLY ASKED QUESTIONS (FAQS)

FINAL | February 2022

Delineation of Services

Q: What is Tahoe-Truckee Sanitation Agency (T-TSA's) service area?

A: See Figure 1.1 below.

Q: Who are T-TSA's member districts?

A: T-TSA has five member districts: North Tahoe Public Utility District (NTPUD), Tahoe City Public Utility District (TCPUD), Alpine Springs County Water District (ASCWD), Olympic Valley Public Service District (OVPSD), and Truckee Sanitary District (TSD). (Northstar Community Services District [NCSD] also contributes wastewater to T-TSA, via TSD's sewer collection system, and is not considered a member district, although it is a contributing agency.)

Q: What infrastructure is T-TSA responsible for?

A: T-TSA owns, operates, and maintains the Truckee River Interceptor (TRI) and the Water Reclamation Plant (WRP).

Truckee River Interceptor

Q: Who connects directly to the TRI?

A: T-TSA's five member agencies discharge to the TRI.

Q: How is T-TSA preventing sanitary sewer overflows (SSOs) from the TRI?

A: T-TSA regularly performs digital inspections of the TRI every 3 to 4 years to video the inside of the pipe and note any observable defects. Additionally, as part of this Master Sewer Plan, a hydraulic model was developed, calibrated and various scenarios were run to confirm the hydraulic capacity of the TRI is sufficient to handle current and future peak wastewater flows without overflows. A few deficiencies were noted in this analysis for the projected future flow conditions and recommendations included in the capital improvements plan (CIP) for implementation.

Q: How reliable is the TRI?

A: Based on historic performance and the results of the condition assessment and hydraulic modeling conducted as part of this Master Sewer Plan, the TRI is a highly reliable system. A regular inspection program and implementation of the recommended projects in the CIP will provide for long term reliability of this system.

Q: What is the capacity of the TRI and is it adequate for current and future conditions?

A: The TRI has sufficient capacity to convey current peak wet weather flows (PWWF) of 21.9 million gallons per day (mgd) with a minimum of 2 feet of freeboard from the manhole rims. By 2045, the PWWF is projected to increase to 30 mgd. Similar to the existing system analysis, the TRI generally has sufficient capacity to convey future PWWFs, however there are two stretches of the TRI that do not have sufficient capacity to convey this future flow condition and are therefore included in the CIP.

-This Page Intentionally Left Blank-

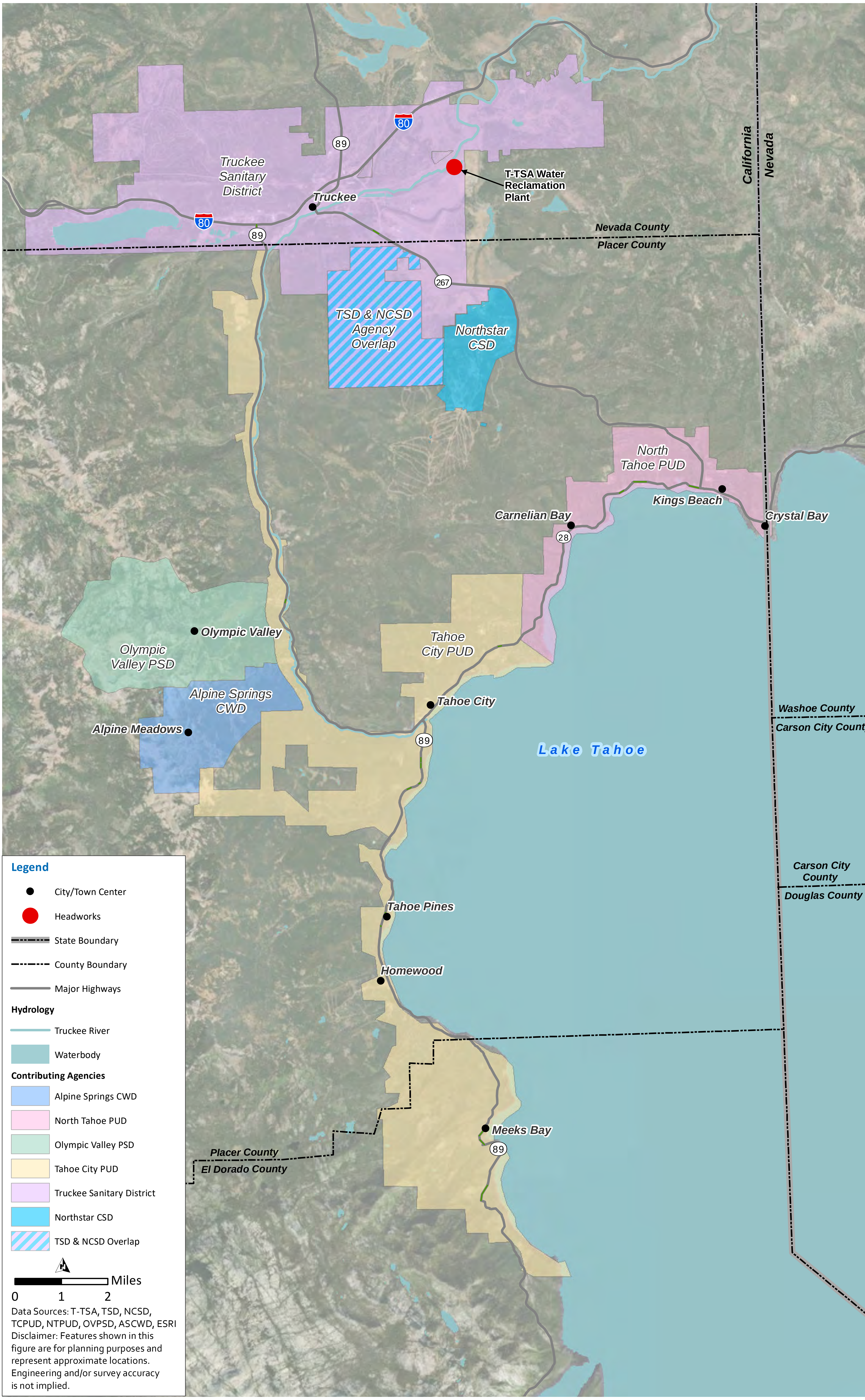


Figure 1.1 T-TSA Service Area

-This Page Intentionally Left Blank-

Q: What does the Master Sewer Plan/WRP Master Plan (Master Plan) say about the TRI's condition?

A: Multiple sources regarding the TRI's existing condition were reviewed, with the outcome that approximately 0.8 miles (4 percent) of the TRI found no defects, 9.6 miles (49 percent) have minor to moderate defects (grades 1, 2, or 3) and 9.2 miles (47 percent) have significant defects (grades 4 or 5). The majority of the grade 4 and 5 defects were the result of suspected manufacturing defects where pipeline reinforcement is visible. Due to the nature of these defects, Carollo Engineers (Carollo) and the District have reviewed historical inspection data to determine if these defects are degrading over time. Based on this analysis, it was determined that the there is no immediate risk of failure.

Additionally, a benchmark remaining service life analysis was conducted to understand the age of gravity sewers based on pipe material and installation year. The benchmark results forecast that 16.7 miles (85 percent) of the TRI have an estimated remaining service life of 36 years or less. Therefore, an overall TRI Renewal Program is recommended to periodically replace, repair, or line TRI segments. The TRI Truckee River crossings were uniquely reviewed as the consequence of a sewer pipeline failure within the banks of the Truckee River would be extremely high; several crossings are experiencing corrosion issues. For these reasons, three TRI river crossings are recommended to be lined in the near-term (5-year) and mid-term (10-year) planning horizon of the TRI CIP. Furthermore, the CIP includes both a Visible Reinforcement Study to augment T-TSA's ongoing TRI monitoring efforts and a TRI Renewal Program to address sewer infrastructure that is susceptible to failure through rehabilitation and replacement projects.

Q: How will the Master Plan address any concerns related to the TRI's condition and capacity?

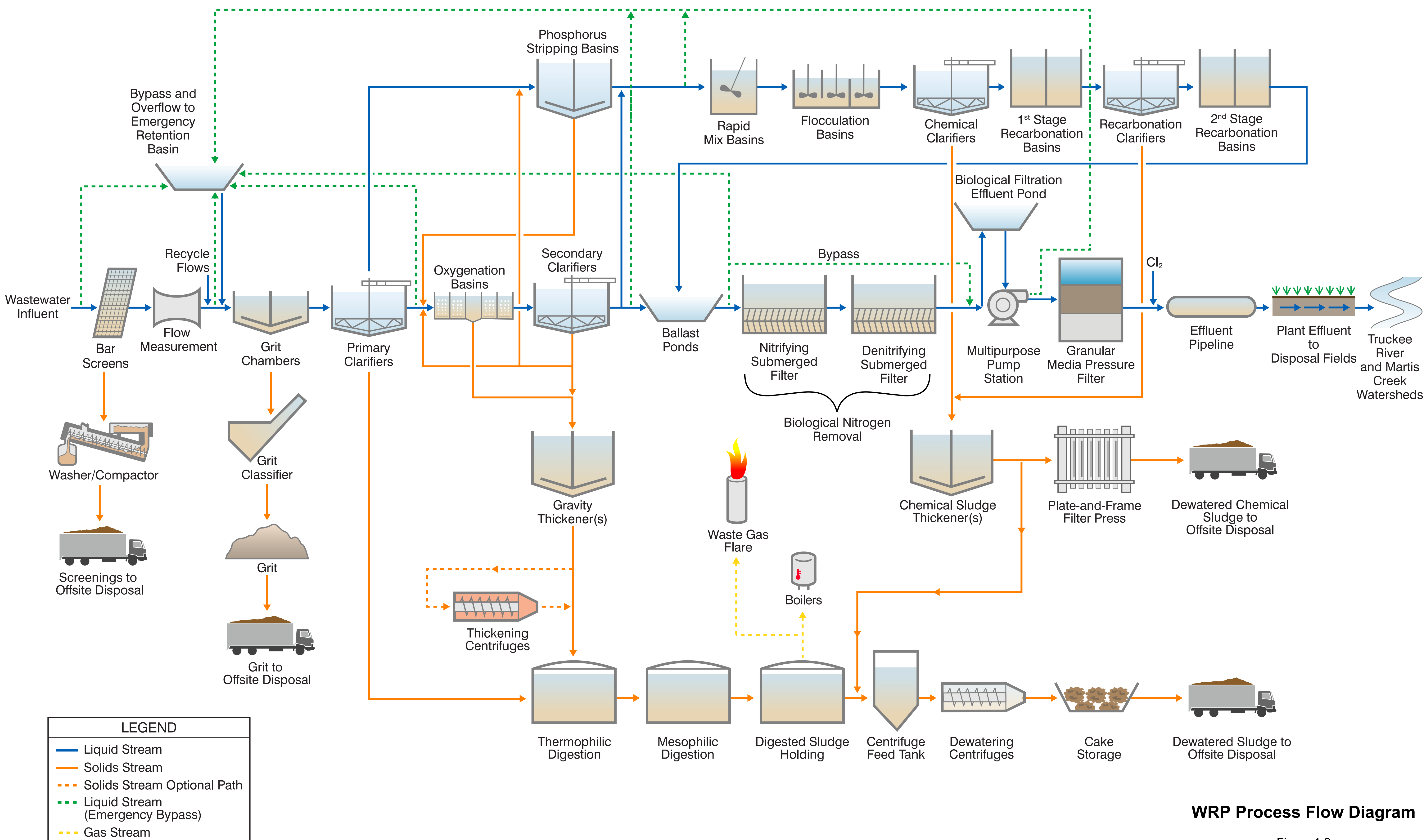
A: Any concerns related to the TRI's condition and capacity have been incorporated into the CIP for implementation within the 25 year planning horizon. These include both condition and capacity related projects.

Water Reclamation Plant/Wastewater Treatment

Q: How does T-TSA treat wastewater?

A: T-TSA uses several unit processes to treat influent wastewater. These include primary, secondary, and tertiary treatment. Primary processes are used to remove large solids and grit and include bar screens, vortex grit removal, and primary clarification. Secondary treatment is used to remove organic matter, referred to as biological oxygen demand (BOD) and includes oxygenation basins and secondary clarifiers. Tertiary, or advanced treatment processes are used to remove nutrients, including nitrogen and phosphorus, as well as small particles known as suspended solids, and includes phosphorus stripping, biological nitrogen removal, and granular media filtration processes. Tertiary treated water is then disinfected using chlorine prior to disposal to the disposal fields also known as soil aquifer treatment (SAT). Solids separated from the liquid processes are treated using anaerobic digestion and dewatering prior to hauling to a landfill. Figure 1.2 below provides a process flow diagram for the WRP treatment processes.

-This Page Intentionally Left Blank-



WRP Process Flow Diagram

Figure 1.2

Tahoe-Truckee Sanitation Agency
Master Sewer Plan

carollo

Tahoe-Truckee1221rf2-11384.ai

-This Page Intentionally Left Blank-

Q: What level of treatment does T-TSA provide?

A: The treatment level provided by the WRP is considered tertiary or advanced treatment as it provides a high level of nutrient load and solids reduction prior to disposal.

Q: Does T-TSA plan to treat wastewater differently in the future? Does the Master Plan have any new "cutting edge" treatment processes?

A: Not significantly. The current processes are able to meet the current regulatory requirements under the current and future projected flow and load conditions. However, some projects which look at process optimization are included in the CIP. Additionally, changing the disinfection process from the current use of gaseous chlorine to ultraviolet disinfection or some other form of disinfection to be determined at a later date is included in the CIP.

Q: How much wastewater can T-TSA treat?

A: T-TSA can treat peak instantaneous flows of up to 15.4 mgd although several unit processes are capable of handling much higher flows. Flows in excess of this can be temporarily stored onsite or offsite at the emergency storage ponds to be treated once peak flows subside.

Q: Is there excess/remaining capacity in the treatment process?

A: Yes, the current maximum week summer flow rate is 5.45 mgd (based on 2014-2018 flow data). The projected 2045 maximum week summer flow rate is 8.13 mgd, an increase of approximately 150 percent. Most of the process components have more than 8.13 mgd of process capacity.

Q: Where does the wastewater go once it is treated?

A: The treated effluent is discharged to the effluent disposal fields also known as the soil aquifer treatment located south of the WRP.

Q: Where does T-TSA dispose of the solids separated from the wastewater?

A: T-TSA disposes of its dewatered organic sludge to either Lockwood Regional Landfill in Sparks, Nevada or to Bently Ranch in Minden, Nevada. Dewatered chemical sludge as well as grit and rags are also transported to Lockwood Regional Landfill for disposal.

Q: Will solids disposal change based on the Master Plan?

A: No, this is not anticipated to change.

Q: What happens if the WRP is unable to handle the flow coming to the facility?

A: Flows in excess of the WRP peak instantaneous flow capacity of 15.4 mgd can be temporarily stored onsite or offsite in clay lined emergency storage ponds until the flows can be treated through the plant. The emergency storage facilities have a combined maximum useable storage capacity of approximately 42 million gallons (MG).

Q: Does T-TSA generate any power onsite?

A: Emergency standby generators are available to provide power in case of power outage. However, these generators are not designed or permitted to provide full time power generation. Digester gas is utilized onsite for heating.

Q: What is T-TSA doing to ensure safety of the chlorine gas disinfection system?

A: T-TSA follows stringent safety protocols at its chorine gas storage facility. The facility is fitted with a chlorine scrubber which would prevent any chlorine gas leaks from escaping the building. Additionally alarms and automatic shut-off devices are included at this facility to prevent leaks from the containers. However, T-TSA is replacing the existing scrubber system as part of the CIP.

Master Sewer Plan

Q: What planning period was assumed?

A: This Master Sewer Plan assumed a 25-year planning horizon to 2045.

Q: Does T-TSA have a priority for the infrastructure improvements and what is it based on?

A: Yes, projects were prioritized based on several factors including condition assessment, capacity assessment, and risk. Projects required for meeting future conditions were scheduled for later in the CIP whereas immediate concerns due to condition and imminent risk of failure were prioritized early in the CIP.

Q: How do we know when our infrastructure needs to be replaced?

A: All infrastructure has an anticipated useful service life which varies based on the type of infrastructure. Some infrastructures may degrade more rapidly than anticipated either based on the condition of operation or due to deferred maintenance. Additionally, capacity needs for the systems change as the population of the service area grows and/or regulatory requirements such as those for treatment of the wastewater change. All these factors are considered when determining whether the infrastructure is due for replacement.

Q: How were future flows projected?

A: Volume 2, Chapter 3 summarizes the historical and projected wastewater flows in the TRI to the WRP. Historical flow monitoring data from the years 2014-2018, peaking factors, and future development projects were used to determine the buildout flow projections for the T-TSA. Since T-TSA covers a wide region, its member districts' development plans were included in the flow projections.

Q: Was climate change considered?

A: Although the impacts of climate change were not directly considered, they are related in that they impact the peaking factors used which are based on recent flow monitoring data. The peak flow conditions often occur due to rain-on-snow events which will likely occur more frequently with climate change. The selected design storm for the purposes of this Master Plan is a 10-year, 24-hour design storm.

Q: The Master Plan makes reference to the common storm sizes to plan and design for are in the range of 5 to 25 years. It seems like we have had a number of 100-year storms in recent history. What's the justification for not using these 100-year storms as the selected design storm?

A: A 100-year design storm by definition has a 1 percent chance of occurrence in any given year. Sizing collection systems for 100-year design storms is usually cost prohibitive and not standard industry practice.

Q: Is T-TSA looking at ways of reducing their carbon footprint?

A: Although not specifically within the scope of this Master Sewer Plan, T-TSA continues to look for ways of reducing its carbon footprint. Included in the analysis are plant optimization projects which look to reduce the amount of methanol used at the facility as well as maximizing the onsite use of methane produced by the WRP.

Q: How often does the Master Sewer Plan and CIP get updated?

A: It is recommended that the Master Seer Plan be revisited and updated every 5 to 10 years.

Q: How did you come up with assumptions for growth patterns? COVID19 influx changed things – was that taken into account?

A: Since T-TSA covers a wide region, its member districts' development plans were included in the flow projections. Much of the analysis conducted for this Master Sewer Plan occurred pre-COVID19, therefore the impacts on population were not available. However, given the transient nature of the T-TSA service area, the master plan did consider high occupancy flow (HOF) conditions. Dry weather flows are typically much higher during holiday weekends. Historical flows for holiday weekends (i.e., high occupancy days) were analyzed to determine peak day flows into the TRI. These HOF conditions are still higher than the occupancy conditions seen post-COVID19, but there is now less of a difference between average dry weather flow (ADWF) and HOF conditions.

Q: Does the Master Plan address Regulatory compliance? Will anything need to be changed for T-TSA to remain in compliance with Regulatory agencies?

A: Yes, Volume 3, Chapter 5 – Regulatory Requirements, specifically looks at future regulatory scenarios and their impacts on T-TSA operations.

Q: What future regulatory scenarios were considered?

A: The analysis included in Volume 3, Chapter 5 – Regulatory Requirements, included potential regulatory changes associated with nutrient limits, total dissolved solids, the permitting framework, and emerging contaminants.

Funding/Rates

Q: How are T-TSA's services funded?

A: T-TSA services are funded by the rate payers of its member districts.

Q: How would our rates be affected by the Master Sewer Plan?

A: Typically a rate study would be performed to determine whether the current rates are adequate for funding the CIP. A rate study is outside the scope of the Master Sewer Plan.

Q: How will future improvements be paid for by new and/or existing customers?

A: This is also determined by rate studies. Typically capacity related improvements are covered by connection fees or development fees from new customers while rehabilitation and repair projects are funded by existing customers.

Q: Construction costs appear to be spiraling upwards at an alarming rate due to labor and material shortages on account of COVID. Do the costs included in the 25-year CIP include these recent market conditions?

A: The current CIP cost estimates are in November 2021 dollars. More recent escalations in project costs are not included but can easily be derived using the Engineering News-Record (ENR) cost indices.

General

Q: Where can I get more information?

A: The entire Master Sewer Plan is available for public review.

Tahoe-Truckee Sanitation Agency
Master Sewer Plan

VOLUME 1:
EXECUTIVE SUMMARY REPORT
CHAPTER 1:
BACKGROUND AND PLANNING PARAMETERS

FINAL | February 2022

Digitally signed by Timothy J. Loper
Contact Info: Carollo Engineers, Inc.
Date: 2022.02.08 16:30:37-08'00'

REGISTERED PROFESSIONAL ENGINEER
TIMOTHY J. LOPER
No. 70847
CIVIL
STATE OF CALIFORNIA

Chapter 1

BACKGROUND AND PLANNING PARAMETERS

The purpose of the Master Plan is to identify system deficiencies and recommend improvements along with planning level cost estimates.

1.1 Introduction

The T-TSA was formed May 1, 1972 to comply with the Porter-Cologne Water Quality Control Act and to provide wastewater treatment to the communities of north and west Lake Tahoe, Truckee, and the communities along the Truckee River corridor. T-TSA owns, operates, and maintains the TRI and regional WRP.

T-TSA is designated as the regional entity to transport, treat, and dispose of wastewater from five member districts: NTPUD, TCPUD, ASCWD, OVPSD, and TSD. (NCSD also contributes wastewater to T-TSA, via TSD's sewer collection system, and is not considered a member district, although it is a contributing agency). Figure 1.1 shows the T-TSA service area.

The Master Plan was initiated in March 2019 to provide a guiding document for T-TSA over the next 25 years. The Master Plan development has been driven by principles and criteria that are consistent with the T-TSA's Mission Statement. This chapter also presents the goals and level of service objectives of the Master Plan, which provides guidance for the Master Plan team to develop recommendations.

The Master Plan is a comprehensive document that assesses all the TRI and the WRP. The Master Plan includes the following:

- An overall vision, with specific goals and objectives to achieve that vision.
- Identification and development of projects, estimated costs, and recommended timing for:
  - Repair and replacement of WRP and TRI infrastructure.
  - New WRP facilities to meet existing and future regulations.
  - Improvements to address wet weather capacity in the TRI.
  - WRP process improvements.
- A recommended CIP and schedule with cash flow requirements for the next 25 years to assist the Agency in developing future budgets and making financial decisions.

Note that the recommended CIP was developed to address needs using available information and engineering analyses performed for the Master Plan. The Master Plan did not investigate financing strategies or rate impacts. As T-TSA moves forward with implementing the CIP over the next 25 years, updates or modifications are expected in response to new information as well as financing constraints.

-This Page Intentionally Left Blank-

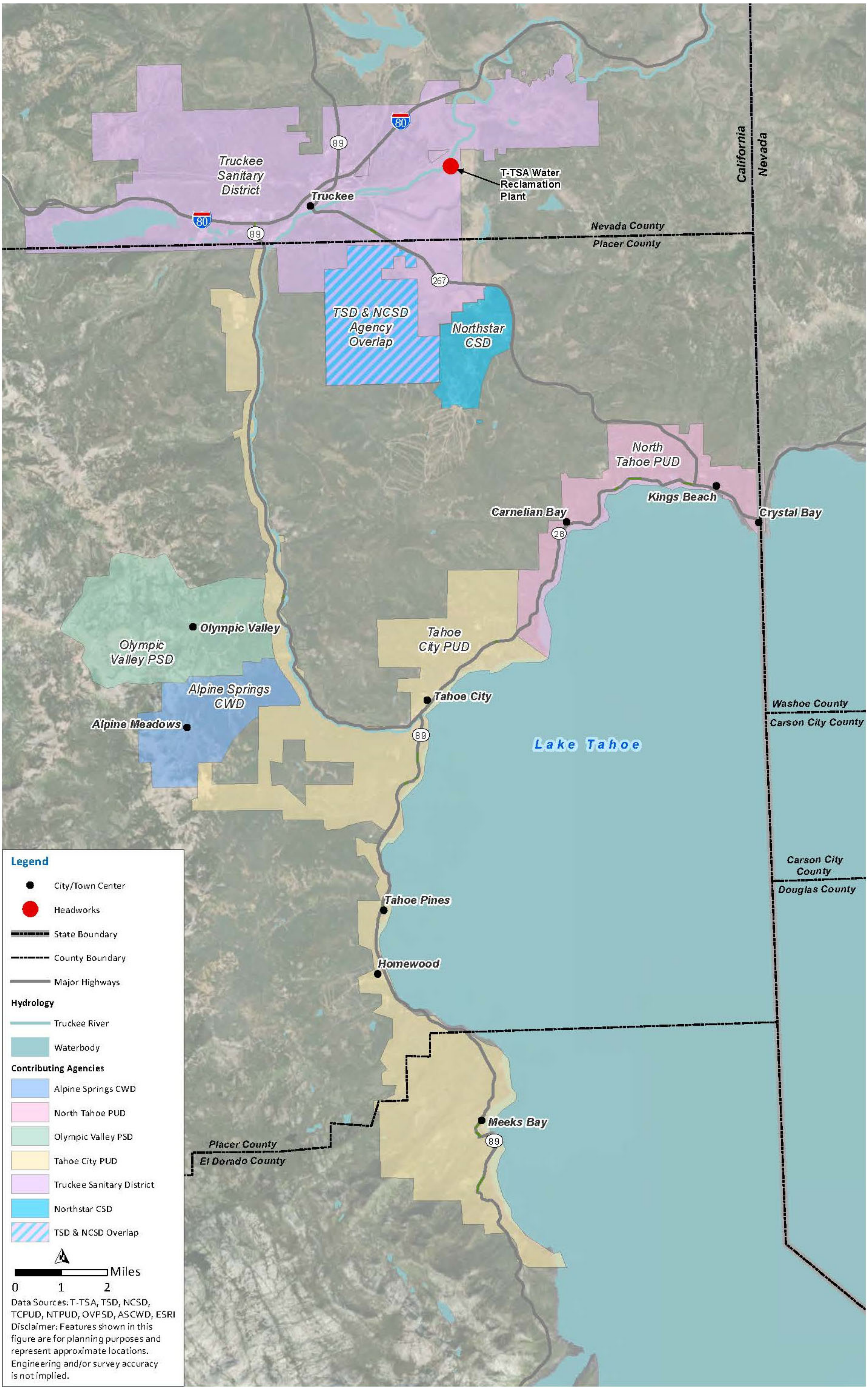


Figure 1.1 T-TSA Service Area

-This Page Intentionally Left Blank-

1.2 T-TSA Vision, Goals, and Objectives

Levels of service (LOS) were developed to guide the analysis and development of the Master Plan and to ensure the Master Plan enables T-TSA to meet its goals and objectives. The LOS are a collection of measures intended to align the decisions related to the capital projects with the values and expectations of the Agency's customers. The LOS are based on regulations, stakeholder values and expectations, and Agency initiatives.

T-TSA's Mission Statement was used to define the following primary goals:

- Operate and maintain the wastewater treatment plant and related facilities in a sound, efficient and effective manner.
- Maintain a workplace that fosters professional growth and job satisfaction.
- Protect its assets and investments through sound financial policies and practices.
- Improve service through long-range planning and the wise use of technology.
- Lead the discussion of strategy development for regional wastewater issues for the benefit of all customers and the environment.

The primary goals were then defined into the LOS goals and implementation strategies. The LOS were developed and reviewed with T-TSA staff and the Board to be consistent with T-TSA's mission statement, and were adopted by the Board in May 2019. Table 1.1 shows the T-TSA's LOS.

Table 1.1 T-TSA LOS

Master Plan Goals	LOS Goals	Master Plan Implementation Strategies
Operate and maintain the wastewater treatment plant and related facilities in a sound, efficient, and effective manner.		
	Operate WRP in full compliance with all federal and state regulatory requirements, with no permit violations	Develop regulatory alternatives that provide direction for evaluating WRP CIP alternatives for reliable permit compliance.
		Plan, size, and recommend facility improvements to maintain functions necessary for regulatory compliance.
		Maintain system reliability during emergency events and develop standard operating procedures (SOPs) to ensure critical systems are back online within prescribed targets after catastrophic events.
		Understand, evaluate, and plan facilities to mitigate the effects of climate change.
	Manage flows to prevent plant loading complications at WRP	Use new WRP Hydraulic Model to assess the flow capacity of the WRP and identify hydraulic bottlenecks and limitations. Recommend CIP improvements to mitigate these hydraulic issues.
		Develop alternatives to provide flow diversion for Glenshire and flow equalization for all raw sewage influent flows.
		Assess load impacts for the anticipated range of scenarios and recommend CIP improvements to alleviate impacts to WRP operations.

Master Plan Goals	LOS Goals	Master Plan Implementation Strategies
	Operate TRI with no SSOs	Continue TRI Inspection Program.
		Assess TRI capacity and predict potential areas of wet weather, condition, or operational related SSOs, and recommend CIP improvements to reduce the risk of SSOs.
		Quantify Infiltration and Inflow, and develop an understanding of its impact, such that critical decisions can be made regarding management of the TRI.
		Operate TRI in accordance with Sanitary Sewer Master Plan (SSMP).
	Operate WRP as efficiently as possible	Evaluate WRP equipment and unit processes for efficiency and provide recommendations for improvements that could improve efficiency.
		Optimize operation of WRP, including the reduction in energy and chemical use, while maintaining regulatory compliance.
		Consider total life cycle costs when evaluating CIP alternatives for implementation.
		Consider the "triple bottom line" when evaluating CIP alternatives for implementation.
Maintain a workplace that fosters professional growth and job satisfaction.		
	Protect employee health and safety	Maintain a safe workplace to mitigate employee health and safety risks through proactive safety programs and training, development of SOPs and updated Operations Manuals.
		Improve safety and redundancy in WRP structures, equipment and unit processes. This including conformance to current codes (such as National Fire Protection Association [NFPA] 820), providing adequate means of isolation for equipment and pipelines, replacing obsolete equipment that could pose hazards, and ensuring that facilities are structurally sound.
		Evaluate alternatives to potentially hazardous processes to address safety concerns.
	Maintain productive and engaged staff	Provide learning and growth opportunities for staff through prescribed training and career development programs.
Protect its assets and investments through sound financial policies and practices.		
	Achieve future rate stability	Use life-cycle cost to help make decisions.
		Develop justifiable cost of service estimates.
		Develop effective CIP prioritization to align with budget limitations.
		Provide adequate reserves to meet long-term financial objectives.
	Be cost efficient and fiscally responsible	Deliver levels of service at the lowest long-term life cycle cost (WRP) and lowest capital cost (TRI), without risk to regulatory compliance, safety, or public health.

Master Plan Goals	LOS Goals	Master Plan Implementation Strategies
		Minimize chemical expenditure and operational costs, by optimizing process operations and maintenance strategies.
		Consider fiscal optimization when making decisions.
	Implement computerized maintenance management software/system (CMMS) project as part of an ongoing Asset Management program	Use CMMS information to align present and future asset management program needs.
		Use WRP Condition Assessment, WRP Performance and Capacity Assessment, and predictive failure analysis to repair/rehabilitate/retrofit infrastructure in a cost-effective manner.
		Maintain all assets in good condition (i.e., reliable and redundant).
	Update the WRP and TRI CIPs on a regular basis	Incorporate Asset Management Policy for WRP and TRI when updating the CIP.
Improve service through long-range planning and the wise use of technology.		
	Understand Regional Growth to maintain adaptability	Collaborate with contributing agencies to understand long term planning parameters for growth and potential flow impacts.
		Collaborate with County Planning agencies.
		Develop understanding of potable water supply conditions to anticipate potential changes to flow or source water quality.
	Modify the system to adapt to climate change	Design new infrastructure to accommodate regional hydraulic and snowpack melt/runoff within the service life of the assets.
	Maximize long-term resource recovery	Identify recovery options for all resources including: fats, oils, grease (FOG), food waste/anaerobically digestible material (ADM), nutrients, sludge/Class B biosolids, and digester biogas.
Lead the discussion of strategy development for regional wastewater issues for the benefit of all customers and the environment.		
	Protect public health and the environment	Effectively and reliably contain all chemicals with no environmental releases.
		Identify projects that promote environmental stewardship.
		Evaluate and improve the odor control mitigation strategy.
	Be a good neighbor and responsible member of the community	Evaluate emission sources and consider improving to newer technologies.
		Identify projects that improve community relations.
		Participate in interdisciplinary projects where opportunities arise.
		Where possible, coordinate TRI and WRP projects with other agencies to minimize negative customer impacts, share resources, and minimize costs.

Master Plan Goals	LOS Goals	Master Plan Implementation Strategies
		Consider acceptance of hauled and piped septage from member districts.
	Be a regional leader	Create and execute agreements with member districts related to flow and load criteria.
	Provide excellent customer service	Determine how customer research results will be measured, communicated, and acted on.
		Develop and implement public outreach strategy.
	Continue public outreach program	Conduct scheduled tours.
		Participate in education outreach programs.

1.3 Existing Facilities

The nameplate, or permitted capacity of the WRP is defined based on the maximum 7-day flow rate of the plant (9.6 mgd). The original WRP was constructed in 1975 with major process capacity expansions in 1981, 1988, 1990, 1995, and 2003. Wastewater treatment at the WRP consists of screening, grit removal, primary clarification, high-purity oxygen activated sludge (HPOAS) treatment, phosphorus stripping, chemical phosphorus removal, recarbonation, biological nitrogen removal (BNR), granular media filtration, disinfection, and odor control. The final effluent from the WRP is discharged to disposal fields, via sub-surface flow. The effluent water eventually makes its way to the Truckee River and Martis Creek watersheds.

Biological solids operations consist of gravity thickening, anaerobic digestion, centrifuge dewatering, and a plate-and-frame filter press for excess chemical sludge dewatering and backup organic sludge dewatering. Chemical solids operations consist of gravity thickening, centrifuge dewatering, and a plate-and-frame filter press for excess chemical sludge dewatering and backup organic sludge dewatering. Dewatered organic sludge is transported by truck to either Lockwood Regional Landfill (owned by Waste Management) in Sparks, Nevada where it is disposed of, or to Bently Ranch in Minden, Nevada, where it is composted. Dewatered chemical sludge as well as grit and rags are also transported by truck to Lockwood Regional Landfill for disposal. All solids are hauled by a contractor.

Figure 1.2 shows a site plan of the existing WRP, and Figure 1.3 depicts the WRP treatment process flow diagram.

The TRI conveys wastewater by gravity flow from the north and west Lake Tahoe region beginning in Tahoe City following the Truckee River, and ultimately to the WRP. Wastewater from the member districts enters the TRI at various manholes; T-TSA does not allow direct customer sewer connections to the TRI. Since the majority of the TRI follows the Truckee River, much of it is located in a flood plain and the TRI crosses the Truckee River a number of times. The interceptor system consists of the TRI and its associated appurtenances, including 19.5 miles of gravity interceptor system pipe (varying in diameter from 18 to 42 inches), and 181 manholes. Figure 1.4 shows the existing T-TSA interceptor system.

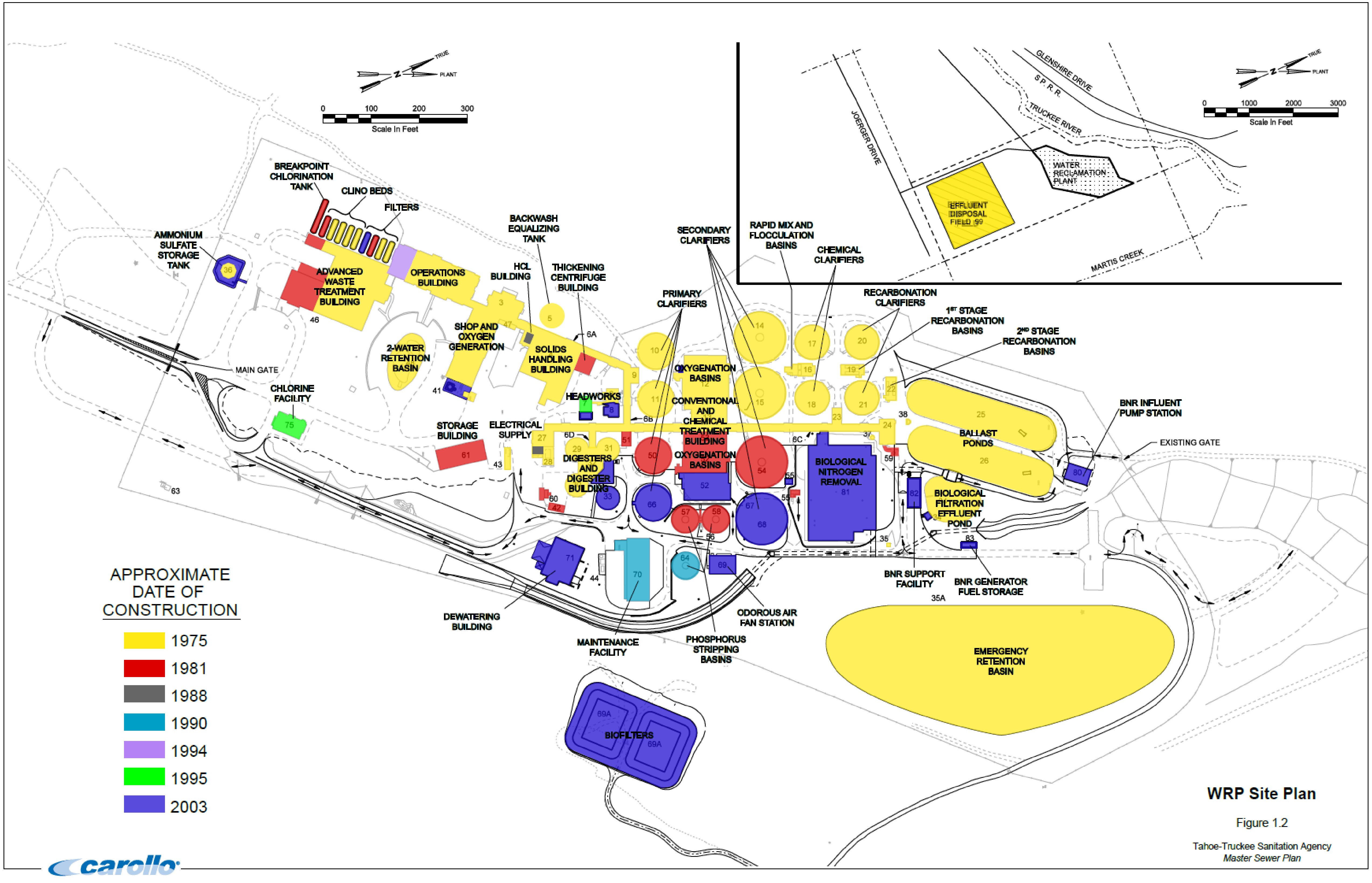


Figure 1.2 WRP Site Plan

-This Page Intentionally Left Blank-

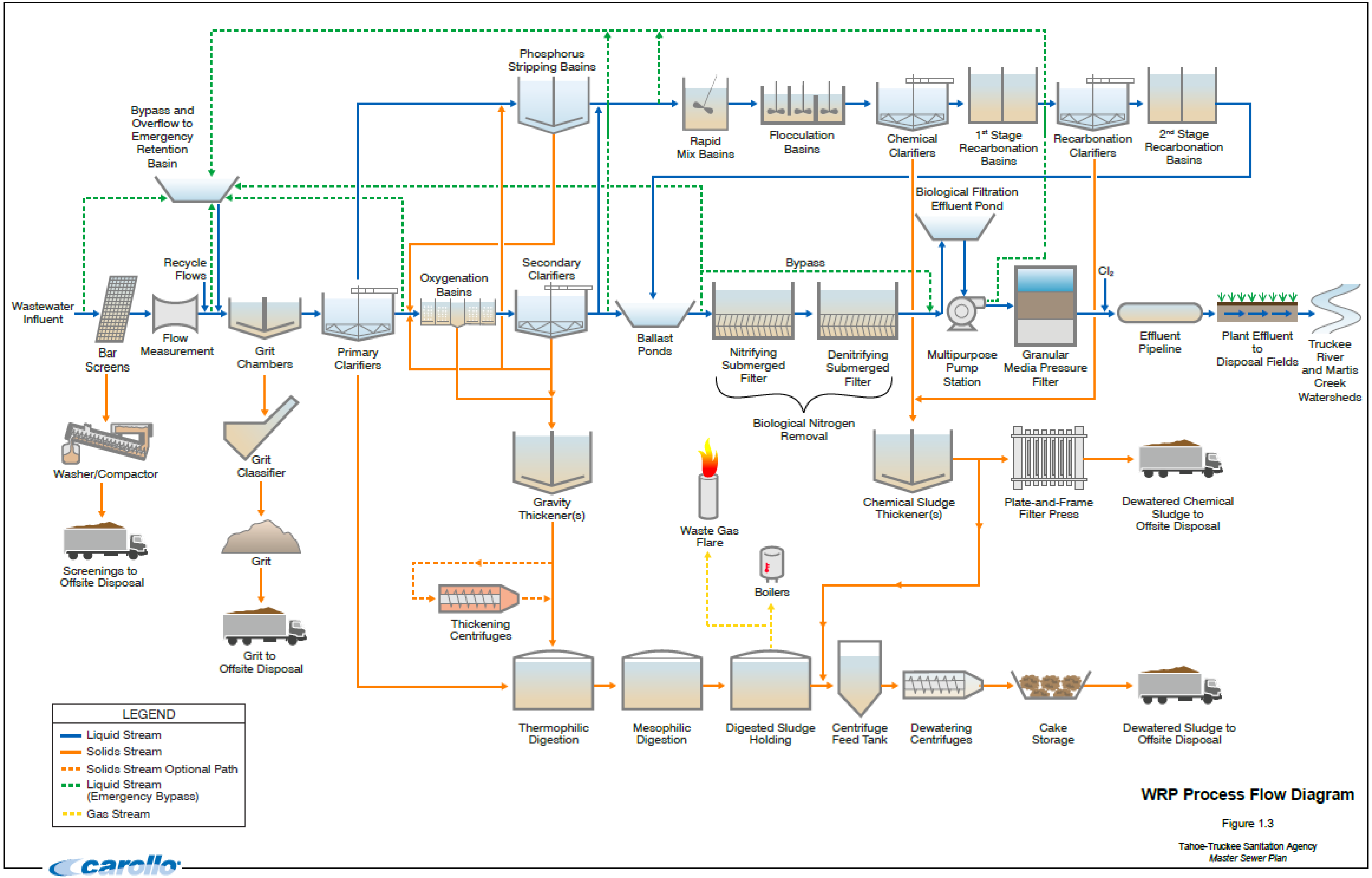


Figure 1.3 WRP Process Flow Diagram

-This Page Intentionally Left Blank-

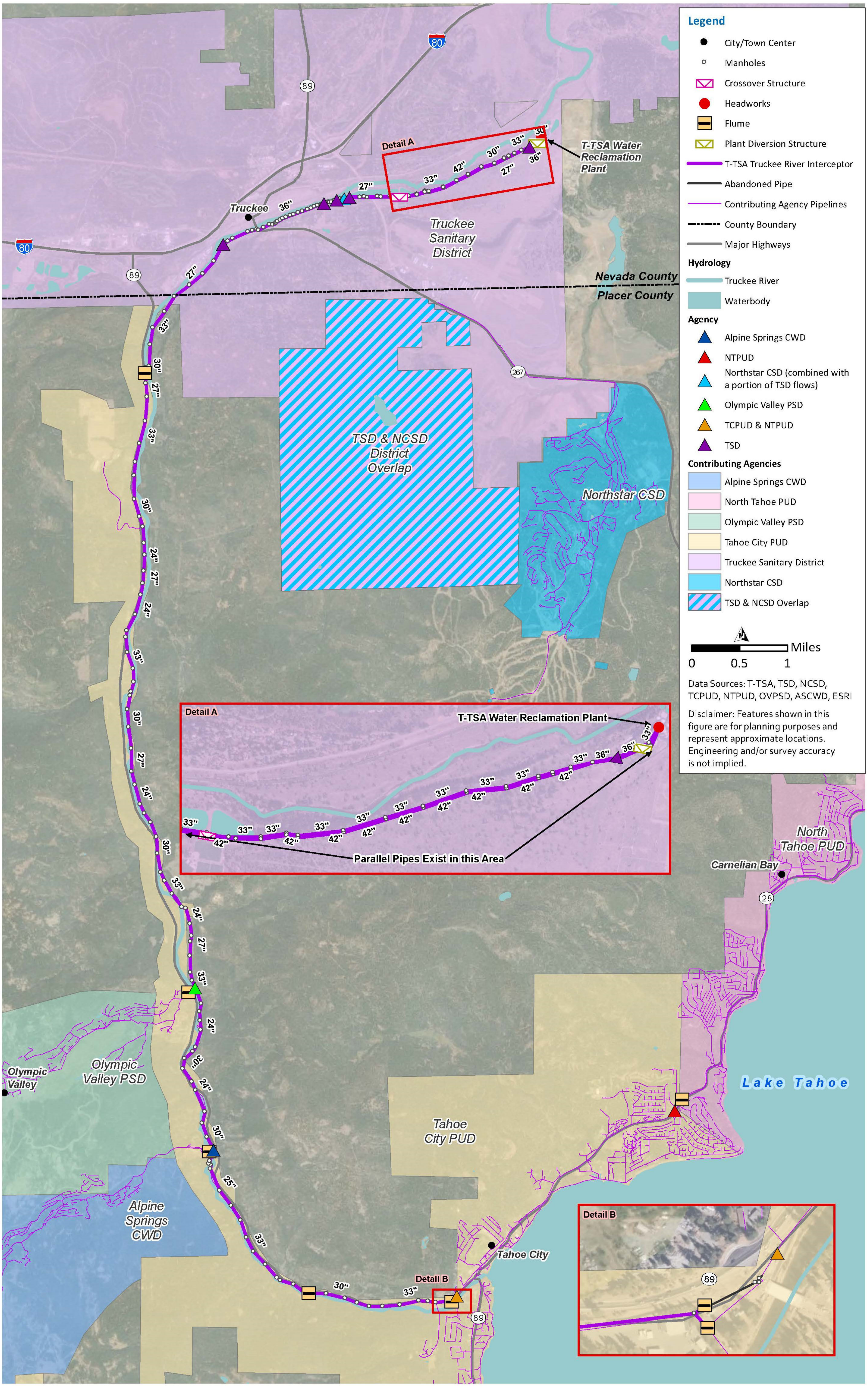


Figure 1.4 Existing Truckee River Interceptor System

-This Page Intentionally Left Blank-

1.4 Existing and Projected Flows and Loads

Historical flow rates, peaking factors, nutrient concentrations, and the organic strength of the wastewater for several different conditions were evaluated and summarized. Based on the anticipated future land use and associated population in the service area, flow and load projections were developed for T-TSA over a 25-year planning horizon to year 2045. The flow and load projections were used to identify which facilities at the TRI and WRP need to be expanded or upgraded during the 25-year planning period of the Master Plan.

Table 1.2 summarizes the existing and future dry and PWWF for the T-TSA. As shown in Table 1.2, the ADWF is projected to increase by 49 percent to 6.30 mgd by 2045, the HOF is projected to increase approximately 52 percent to 9.77 mgd by year 2045, and the PWWF is projected to increase by 37 percent to 29.99 by year 2045.

Table 1.2 Existing and Future Flow Summary

Flow Condition	Existing	2045
Base Wastewater Flow (BWF) (mgd)	3.34	5.11
ADWF (mgd)	4.22	6.30
HOF (mgd)	6.44	9.77
PWWF (mgd)	21.87	29.99
PWWF/HOF PF	3.40	3.07

The organic loads to the WRP are also expected to increase by 53 percent.

-This Page Intentionally Left Blank-

Tahoe-Truckee Sanitation Agency
Master Sewer Plan

VOLUME 1:
EXECUTIVE SUMMARY REPORT
CHAPTER 2:
COLLECTION SYSTEM

FINAL | February 2022

Digitally signed by Ryan F. Orgill
Contact Info: Carollo Engineers, Inc.
Date: 2022.02.08 17:07:24-08'00'

REGISTERED PROFESSIONAL ENGINEER
RYAN F. ORGILL
No. 75802
CIVIL
STATE OF CALIFORNIA

Chapter 2

COLLECTION SYSTEM

2.1 Introduction

This chapter is an executive summary of the TRI Master Plan prepared for T-TSA. Included is a brief summary of the content, key findings, and recommendations from each chapter of the Master Plan. For more information, the reader is directed to the individual chapters. The Master Plan was developed as part of a wastewater master planning process. The TRI Master Plan is Volume 2 of the overall Master Plan, which is a comprehensive plan for all Agency assets including the TRI and the WRP. The wastewater Master Plan is organized as shown below.

- Volume 1 – Executive Summary Report.
- Volume 2 – Collection System Master Plan.
- Volume 3 – Water Reclamation Plant Master Plan.

The planning period for this Master Plan is 25 years, ending in 2045.

2.2 Existing Facilities and Condition Assessment

Volume 2, Chapter 1 provides an overview of T-TSA's collection system and TRI, and a detailed description of the associated facilities. The interceptor system consists of the TRI and its associated appurtenances, including 19.5 miles of gravity interceptor system pipe (varying in diameter from 18 to 42 inches), and 181 manholes. T-TSA is designated as the regional entity to transport, treat, and dispose of wastewater from five member districts: NTPUD, TCPUD, ASCWD, OVPSD, and TSD. (NCSD also contributes wastewater to T-TSA, via TSD's sewer collection system, and is not considered a member district, although it is a contributing agency).

Figure 2.1 shows the existing T-TSA interceptor system.

-This Page Intentionally Left Blank-

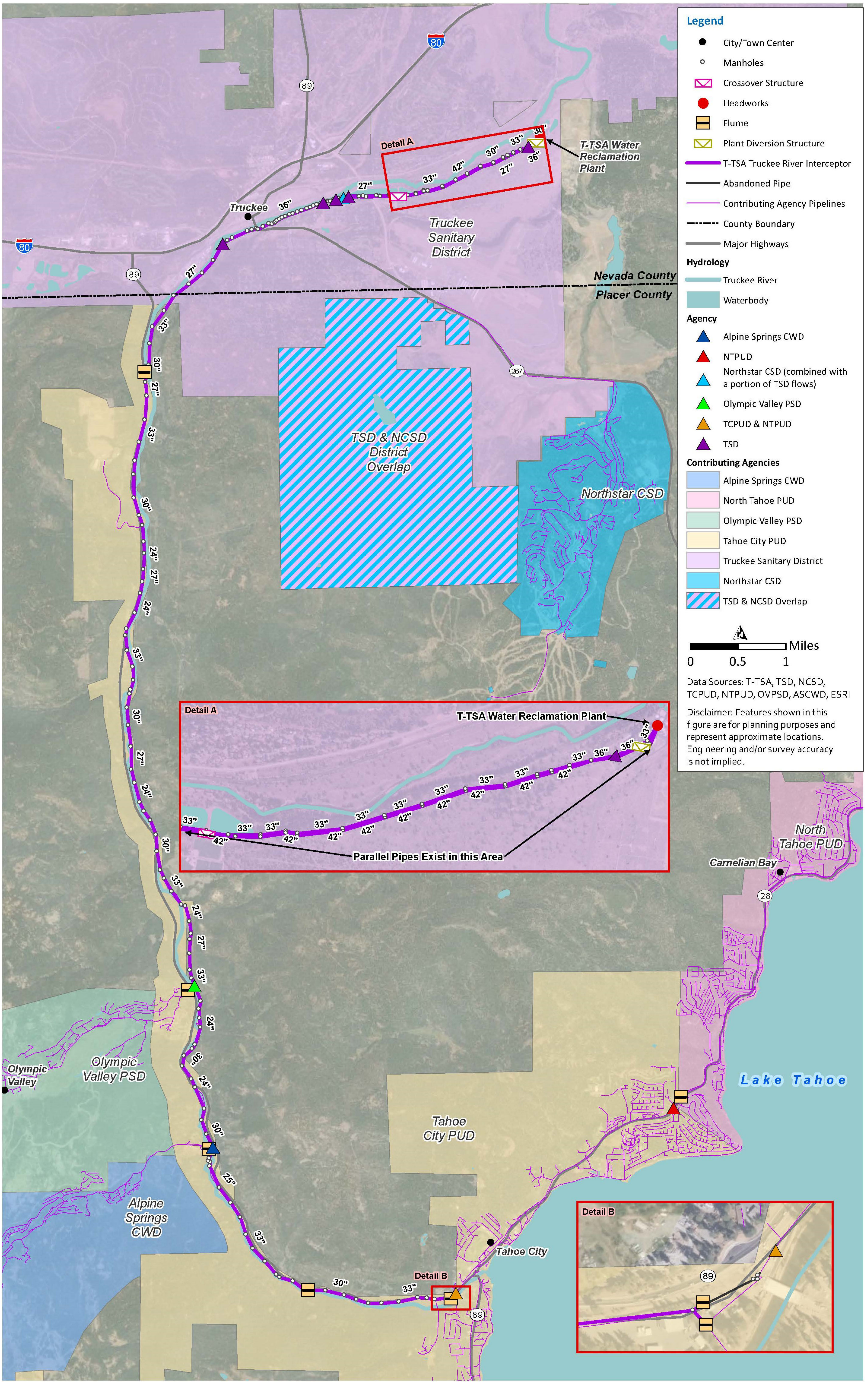


Figure 2.1 Existing Truckee River Interceptor System

-This Page Intentionally Left Blank-

Volume 2, Chapter 2 includes a description of the condition assessment performed on the TRI and recommendations related to anticipated rehabilitation and replacement projects. The key findings and recommendations are:

- Carollo collected and reviewed T-TSA data related to the TRI, including a geographical information system (GIS) database, T-TSA's digital scans inspection data, maintenance tables, and Agency staff input.
- A central database based on TRI maintenance tables was developed to provide a single view of the TRI's condition. The developed central database utilizes individual observations and defect coding to determine the condition of each pipeline. Several "surface reinforcement visible" defects were found throughout the TRI; however Carollo's review of these locations showed no significant change in pipe condition since its inception, which was verified by conversations with Agency staff. Therefore, a prudent approach is to review pipelines with such defects, and then determine the appropriate plan to address these defects.
- TRI Truckee River crossings were uniquely reviewed as the consequence of a sewer pipeline failure within the banks of the Truckee River would be extremely high; several crossings are experiencing corrosion issues. For these reasons, three TRI river crossings are recommended to be lined in the near-term (5-year) and mid-term (10-year) planning horizon of the TRI CIP.
- A benchmark remaining service life analysis was conducted to understand the age of gravity sewers based on pipe material and installation year. The benchmark results forecast that 16.7 miles (85 percent) of the TRI have an estimated remaining service life of 36 years or less. Therefore, an overall TRI Renewal Program is recommended to periodically replace, repair, or line TRI segments.

2.3 Wastewater Flows

Volume 2, Chapter 3 summarizes the historical and projected wastewater flows in the TRI to the WRP. Historical flow monitoring data from the years 2014-2018, peaking factors, and future development projects were used to determine the buildout flow projections for the T-TSA. Since T-TSA covers a wide region, its member districts' development plans were included in the flow projections. A discussion about the design storm characteristics and main components of wastewater flow within the collection system is also provided. The key findings and recommendations are:

- The selected design storm for the purposes of this Master Plan is a 10-year, 24-hour design storm.
- The T-TSA area's current ADWF is 4.22 mgd, and is projected to increase to approximately 6.30 mgd over the 25-year planning horizon.
- Given the transient nature of the T-TSA service area, dry weather flows are typically much higher during holiday weekends. Historical flows for holiday weekends (i.e., high occupancy days) were analyzed to determine peak day flows into the TRI. The current HOF is approximately 6.44 mgd, and the HOF is projected to increase to 9.77 mgd over the planning period.
- The T-TSA area's current PWWF is estimated to be roughly 21.8 mgd. This is projected to increase to approximately 30 mgd over the 25-year planning period.

2.4 Hydraulic Model Development and Calibration

Volume 2, Chapter 4 describes the development and calibration of the T-TSA's collection system hydraulic model. A description of the T-TSA's previous hydraulic model, the advantages of the newer modeling software being used for the Master Plan, and an outline of the steps used to build the model are provided. A detailed summary of the hydraulic model calibration steps, standards, and results for both dry weather and wet weather conditions is also provided. The key findings and recommendations are:

- InfoSWMMM by Innovyze was used to assemble T-TSA's hydraulic model.
- The hydraulic model was calibrated for both dry weather and wet weather flow conditions based on the data obtained during the flow monitoring program, which occurred from 2014 to 2018.
- The results of the dry and wet weather flow calibration process were compared against the recommendation on model verification contained in the "Code of Practice for the Hydraulic Modeling of Sewer Systems" published by Wastewater Planning Users Group (WaPUG) (WaPUG 2002).
- The calibration results indicated that the model predicts conditions similar to those observed in the field for both dry and wet weather conditions.
- The model provides an accurate representation of T-TSA's collection system to a level suitable for this Master Plan and for T-TSA's future hydraulic modeling needs.

2.5 Collection System Capacity Evaluation

Volume 2, Chapter 5 summarizes the hydraulic evaluation of the TRI and associated facilities. Included is a discussion of the evaluation criteria used for the analysis of the collection system capacity. The capacity of the T-TSA's collection system facilities were evaluated for both existing and future peak flow conditions against the planning criteria established in this chapter. The key findings and recommendations are:

- The TRI has sufficient capacity to convey current PWWF without exceeding the established flow depth criterion.
- The future system evaluation verifies that the existing system improvements were appropriately sized to convey future PWWFs, and also identifies the locations of existing sewers that are inadequately sized to convey future PWWFs. The TRI generally has sufficient capacity to convey future PWWF without exceeding the established flow depth criteria, however there were two gravity main sections that were flagged as deficient.

2.6 TRI CIP Recommendations

Volume 2, Chapter 6 describes the TRI CIP recommendations in detail. Volume 2, Chapter 7 summarizes the TRI CIP recommendations, including a list of TRI projects and recommended phasing for these projects. Based on the assessments and evaluations performed as part of this master planning effort a total of seven projects were identified. These TRI improvements address aging infrastructure and future capacity needs, as well as a study related to visible reinforcement in TRI segments.

Projects were separated into three categories based on the type of improvements: capacity (C), rehabilitation and replacement (RR), and other (O). These projects were grouped into five phases as shown below:

- Phase 1: Years 2022 through 2026.
- Phase 2: Years 2027 through 2031.
- Phase 3: Years 2032 through 2036.
- Phase 4: Years 2037 through 2041.
- Phase 5: Years 2042 through 2046.

Table 2.1 summarizes the recommended CIP projects and project phasing grouped by type of improvement.

-This Page Intentionally Left Blank-

Table 2.1 25-Year TRI CIP

Project ID	Project Name	Type of Improvement	Proposed Quantity (linear feet [LF])	Existing Size (inches [in])	Proposed Size (in)	Direct Unit Cost ($/LF)	Total Project Cost	Phase 1					Phase 2 2027-31	Phase 3 2032-36	Phase 4 2037-41	Phase 5 2042-46
								2022	2023	2024	2025	2026				
Capacity Improvements																
C-1	Gravity Main between manhole (MH) 57 and MH 62	Replace	4,290	24/27	30	$760	$7,180,000	$0	$0	$0	$0	$0	$0	$7,180,000	$0	$0
C-2	Gravity Main between MH 71 and MH 72	Replace	990	24	30	$760	$1,660,000	$0	$0	$0	$0	$0	$0	$0	$1,660,000	$0
Condition Assessment Improvements																
RR-1	River Crossing, Gravity Main between MH 33 and MH 35	Line	1,380	24	24	$830	$2,520,000	$252,000	$454,000	$1,814,000	$0	$0	$0	$0	$0	$0
RR-2	River Crossing, Gravity Main between MH 65 and MH 66	Line	220	30	30	$1,030	$500,000	$0	$0	$0	$50,000	$90,000	$360,000	$0	$0	$0
RR-3	River Crossing, Gravity Main between MH 88 and MH 89	Line	220	30	30	$1,030	$500,000	$0	$0	$0	$50,000	$90,000	$360,000	$0	$0	$0
RR-4	TRI Renewal Program	Line/Replace	Varies	Varies	Varies	Varies	$16,350,000	$0	$0	$0	$0	$0	$4,087,500	$4,087,500	$4,087,500	$4,087,500
Other Improvements																
O-1	Visible Reinforcement Study	--	--	--	--	--	$170,000	$105,000	$0	$0	$0	$0	$65,000	$0	$0	$0
Total CIP Cost						--	$28,875,000	$357,000	$454,000	$1,814,000	$100,000	$180,000	$4,872,500	$11,267,500	$5,747,500	$4,087,500
Estimated CIP Annual Cost						--	$1,155,000	$357,000	$454,000	$1,814,000	$100,000	$180,000	$974,500	$2,254,000	$1,150,000	$818,000

-This Page Intentionally Left Blank-

Tahoe-Truckee Sanitation Agency
Master Sewer Plan

VOLUME 1:
EXECUTIVE SUMMARY REPORT
CHAPTER 3:
WATER RECLAMATION PLANT

FINAL | February 2022

Digitally signed by Richard Luis Gutierrez
Contact Info: Carollo Engineers, Inc.
Date: 2022.02.08 13:33:46-08'00'

REGISTERED PROFESSIONAL ENGINEER
RICHARD LUIS GUTIERREZ
No. 72248
CIVIL
STATE OF CALIFORNIA

Chapter 3

WATER RECLAMATION PLANT

3.1 Introduction

This chapter provides an executive summary of the WRP Master Plan prepared for T-TSA. Included is a brief summary of the content, key findings, and recommendations from each chapter of the Master Plan. For more information, the reader is directed to the individual chapters. The Master Plan was developed as part of a wastewater master planning process. The WRP Master Plan is Volume 3 of the Master Plan, which is a comprehensive plan for all Agency assets including the collection system and the WRP. The Master Plan is organized as shown below.

- Volume 1 – Executive Summary Report.
- Volume 2 – Collection System Master Plan.
- Volume 3 – WRP Master Plan.

The planning period for this Master Plan is 25 years, ending in 2045.

3.2 Description of Existing Facilities

Volume 3, Chapter 1 provides an overview of T-TSA's WRP, and a detailed description of the facilities. The original plant was constructed in 1975 with major process capacity expansions in 1981, 1988, 1990, 1995, and 2003.

The WRP provides advanced treatment of all wastewater flows collected within the T-TSA service area. Wastewater treatment consists of screening, grit removal, primary clarification, HPOAS treatment, phosphorus stripping, chemical phosphorus removal, recarbonation, BNR, granular media filtration, disinfection, and odor control. The final effluent from the WRP is discharged to disposal fields, via sub-surface flow. The effluent water eventually makes its way to the Truckee River and Martis Creek watersheds, which are monitored.

Biological solids operations consist of gravity thickening, anaerobic digestion, centrifuge dewatering, and a plate-and-frame filter press for backup dewatering. Chemical solids operations consist of gravity thickening, centrifuge dewatering, and a plate-and-frame filter press for excess chemical sludge and backup organic sludge dewatering. Dewatered organic sludge is transported by truck to either Lockwood Regional Landfill (owned by Waste Management) in Sparks, Nevada where it is disposed of, or to Bently Ranch in Minden, Nevada, where it is composted. Dewatered chemical sludge as well as grit and rags are also transported by truck to Lockwood Regional Landfill for disposal. All solids are hauled by a contractor.

3.3 Flows and Loads

Volume 3, Chapter 2 summarizes the historical and projected future influent flows and loads to the WRP. The nameplate or permitted capacity of the WRP is defined based on the maximum 7-day dry weather (June 21 through September 21) flow rate of the plant (9.6 mgd). The permitted maximum instantaneous flow rate through the WRP is 15.4 mgd.

Historical flow rates, peaking factors, nutrient concentrations, and the organic strength of the wastewater for several different conditions were evaluated and summarized. Based on the anticipated future land use and associated population in the service area, flow and load projections were developed. The flow and load projections were used to identify which facilities at the WRP need to be expanded or upgraded during the 25-year planning period of the Master Plan. The key findings and recommendations are:

- The current ADWF is approximately 4.22 mgd and the HOF is approximately 6.44 mgd. As the population in the service area increases over the 25-year planning period, the ADWF is projected to increase by 49 percent to 6.30 mgd, and the HOF is projected to increase to 9.77 mgd.
- The organic loads to the WRP are also expected to increase by 53 percent.
- Based on collection system hydraulic modeling, the current PWWF to the WRP is estimated to be 21.87 mgd during a 10-year 24-hour design storm event. The PWWF to the WRP is estimated to increase to 29.99 mgd over the 25-year planning period of the Master Sewer Plan.
- The WRP is operating at higher peak flows and loads than anticipated in 2003.
- The current wastewater strength during annual average (AA) flow conditions is:
  - Total Suspended Solids (TSS) = 189 milligrams per liter (mg/L).
  - Chemical Oxygen Demand (COD) = 542 mg/L.
  - 5-Day Biochemical Oxygen Demand (BOD_5) = 265 mg/L.
  - Total Kjeldahl Nitrogen (TKN) = 53 mg/L.
  - Total Phosphorus (TP) = 5.6 mg/L.

3.4 Existing Facilities and Condition Assessment

Volume 3, Chapter 3 provides an overview of T-TSA's WRP, a description of the existing facilities, and a summary of the condition assessment performed on the WRP on April 21 to 23, 2019. The oldest parts of the WRP date back to 1975 when the plant was first constructed. A number of plant facilities remain from the original construction over 45 years ago. The following list of major plant upgrades and expansions have occurred since the plant was built:

- 1981 – Regional WRP Expansion.
- 1988 – WRP Improvements.
- 1990 – Phosphorus Stripper and Maintenance Facility.
- 1995 – Chlorine Building and Headworks Building Additions.
- 2003 – Expansion of WRP.

Figure 3.1 is a site plan of the existing WRP, which illustrates how the plant has expanded over the decades.

The intent of the visual condition assessment was to identify and prioritize repair and replacement needs for aging facilities and mitigate potential risks of failure. The assessment was based on observations from the assessment team, input from T-TSA staff, and a review of equipment data. Results from the assessment were incorporated into the 25-year CIP.

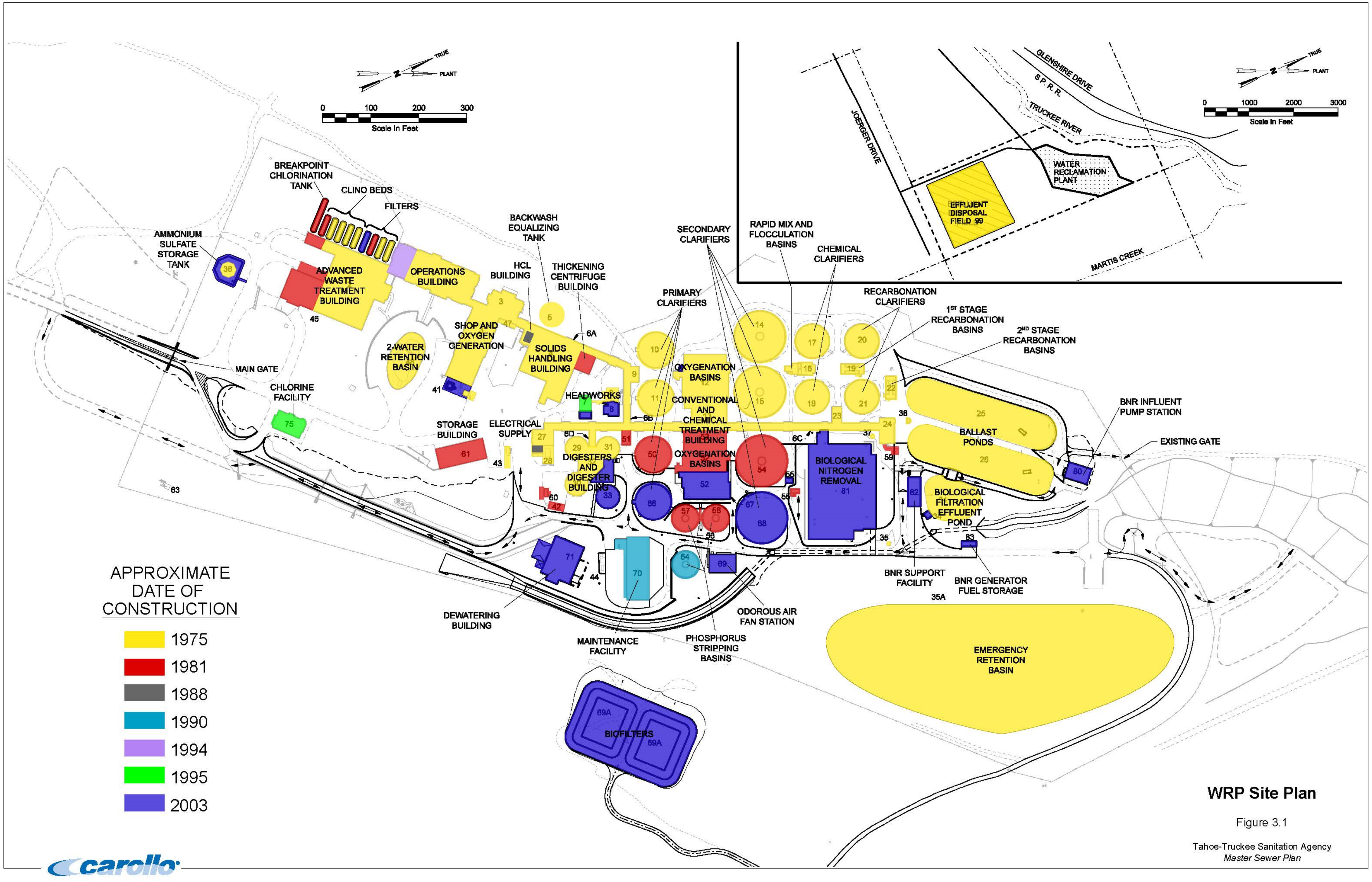


Figure 3.1 WRP Site Plan

-This Page Intentionally Left Blank-

The condition assessment determined that overall, the WRP is performing very well for its age, and good maintenance practices are reflected in the extended service life of many of the WRP assets. Nevertheless, there were several issues noted, and many assets will require repair or replacement during the 25-year planning period. Many of these assets are from the original construction and will be 70 years old by the end of the planning period, which is well beyond the expected useful service life of most mechanical and electrical equipment as well as piping and valves. A few areas were noted as being of particular concern and these projects have been identified for implementation in the first phase of the CIP. These include concrete repairs for various facilities including primary treatment, secondary treatment, and phosphorus removal and recarbonation areas. Mechanical equipment replacement for the lime conveyance system, chlorine gas scrubber, digesters, standby generators, and the 2W system, all of which are approaching the end of the useful service life. Electrical and instrumentation equipment replacement for various areas including replacement of older motor control centers (MCCs), variable frequency drives (VFDs), and programmable logic controllers (PLCs).

3.5 Performance and Capacity Assessments

Volume 3, Chapter 4 provides a summary of the performance and capacity assessments performed for the WRP. The capacity assessment was conducted in three stages: 1) detailed hydraulic analysis was first conducted to determine the hydraulic limitations of the unit processes using Visual Hydraulics V4.2 software, 2) liquid train treatment plant modeling using BioWin™ v.6.1 software was then conducted to determine the treatment limitations of the unit processes for the liquid treatment train, and 3) solids train treatment plant modeling using Excel software was conducted to determine the treatment limitations of the unit processes for the solids treatment train.

Figure 3.2 summarizes the capacity of the major process components of the liquid treatment, solids handling, and effluent disposal processes at the WRP, with the process capacity expressed as the maximum week Summer flow (between June 21 and September 21), the flow basis used in the existing waste discharge requirements. The length of each horizontal bar represents the capacity of each process component. The performance of each unit process provides a benchmark for the planning of new facilities and assessing capacity. Overall, the performance of the WRP is adequate and meets regulatory requirements. Additionally, most unit processes are in fair shape and perform well for their age. However, the performance of some unit processes should be optimized, specifically the grit chambers and BNR.

The WRP has sufficient hydraulic and treatment process capacity to handle the rated maximum instantaneous flow rate through the WRP of 15.4 mgd and has sufficient influent wet weather equalization storage capacity to accommodate future 25-year design storm conditions. All unit processes have sufficient capacity for current demands. Most unit processes also have adequate future capacity except during future maximum week (MW) flow conditions. Denitrification and some of the solids handling processes will require additional units or operational accommodations to provide adequate capacity for this condition.

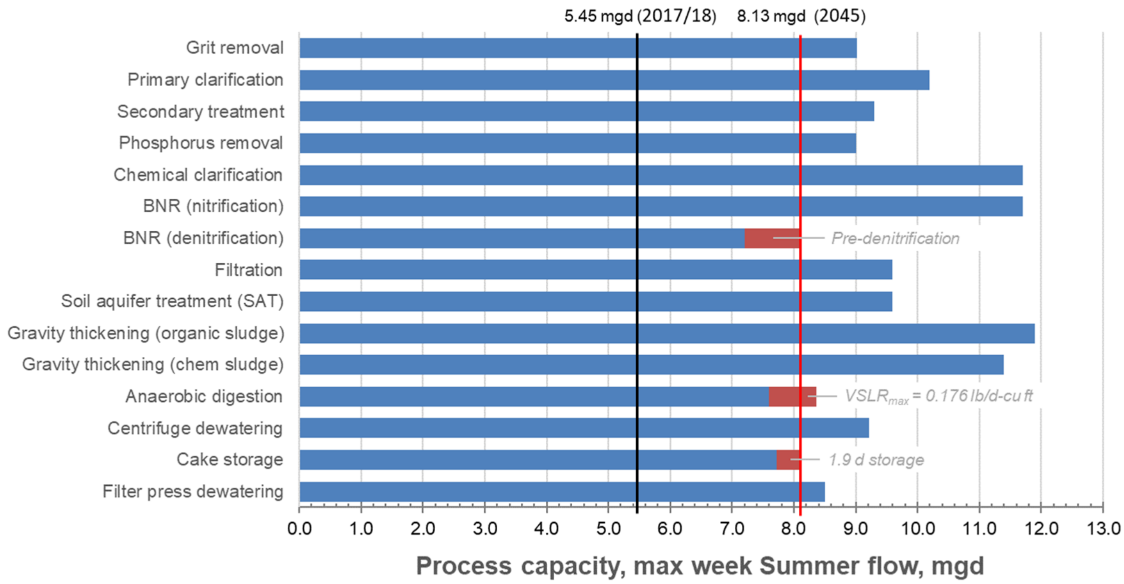


Figure 3.2 Process Capacity Summary

3.6 Regulatory Requirements

Volume 3, Chapter 5 summarizes the regulatory requirements that affect the operation of the WRP. It includes a comprehensive review of the regulations governing final effluent, solids treatment and disposal, and air emissions. It also includes a review of the potential impacts of future local, state, and federal regulations. Future regulatory scenarios were developed based on the analysis of T-TSA's existing permit requirements and identification/evaluation of future regulatory concerns based on various plans, policies, and actions by relevant regulating authorities.

Future water quality based regulatory scenarios are listed as follows:

- Existing Waste Discharge Requirements (No Change) – For this scenario it is assumed that T-TSA's waste discharge requirement would essentially not change.
- Waste Discharge Requirements with More Stringent Nutrient Limits – For this scenario it is assumed that T-TSA's waste discharge requirements would remain the same with the exception of more stringent nutrient limits to further reduce any impacts of T-TSA effluent on the Truckee River and Martis Creek, and to enhance attainment of receiving water quality objectives.
- Federal National Pollutant Discharge Elimination System (NPDES) Permit Program – This scenario assumes that T-TSA would be regulated under the Federal NPDES permitting program. It is assumed that potential new water quality based effluent limits would include metals and organics, lower disinfection byproduct limits, and limits for contaminants of emerging concern.
- Enhanced total dissolved solids (TDS) and Chloride Limits – This scenario assumes that more stringent requirements for TDS and chloride would be imposed, either under the existing permit framework or under the NPDES permit program.

It was recommended that the master plan address the following regulatory scenarios:

- Waste Discharge Requirements with More Stringent Nutrient Limits.
- Federal NPDES Permit Program.

For these scenarios both optimization of the existing treatment process and treatment plant upgrades were identified and evaluated.

3.7 WRP CIP Recommendations

Volume 3, Chapter 6 summarizes the WRP CIP recommendations which includes a list of projects and recommended phasing for these projects. Based on the assessments and evaluations performed as part of this master planning effort a total of 34 projects were identified in addition to several projects previously identified by T-TSA staff, touching almost every process area at the WRP. These WRP improvements address aging infrastructure, maintaining existing processes and equipment in good working condition, and optimizing the treatment processes to meet current and future capacity limitations and requirements. Proposed improvements related to rehabilitation are phased early in the CIP while future capacity or potential future regulatory requirements have been phased to later years in the CIP.

Projects were separated into three categories based on the type of improvements: RR, process optimization (PO), and C. These projects were grouped into five phases as shown below:

- Phase 1: Years 2022 through 2026.
- Phase 2: Years 2027 through 2031.
- Phase 3: Years 2032 through 2036.
- Phase 4: Years 2037 through 2041.
- Phase 5: Years 2042 through 2046.

Table 3.1 summarizes the recommended CIP projects and project phasing grouped by type of improvement.

-This Page Intentionally Left Blank-

Table 3.1 Proposed Improvements

Project ID	Project Name	Type of Improvement	Description	Reason	Proposed Phase
R&R Improvements					
CIP-01	Plant Coating Improvements	Repair	Recoat various equipment and facilities.	Improve longevity. In T-TSA's existing CIP.	Phase 1
CIP-02	Lab Equipment Replacements	Replace	Replace various aged equipment as needed.	Equipment has reached end of life span. In T-TSA's existing CIP.	Phase 1
CIP-03	Lime System Improvements	Replace	Replace hydrated lime conveyance system.	The system is difficult to operate.	Phase 1
CIP-04	Chlorine Scrubber Improvements	Replace	Replace chlorine gas scrubber.	The scrubber tank leaks into the secondary containment tank.	Phase 1
CIP-06	Translucent Panel Rehabilitation	Repair	Refurbish existing Kalwall® architectural panels.	Identified in T-TSA's current CIP due to age and condition of panels.	Phase 1
CIP-09	Centrifuge Rebuild	Repair	Rebuild one dewatering centrifuge.	Centrifuges have much wear on them and need to be repaired. Identified in T-TSA's current CIP.	Phase 1
CIP-14	Communications Network Replacement	Replace	Replace communications equipment and cabling.	Equipment has reached end of life span. Identified in T-TSA's current CIP.	Phase 1
CIPR-04	Maintenance/Electrical and Instrumentation (E&I) Shop Improvements	New	Relocate mechanical and E&I shops.	Identified in T-TSA's current CIP.	Phase 1
WRP-01	Primary and Secondary Treatment Repairs	Repair/Replace	Repair concrete masonry unit (CMU) walls and areas with water damage in concrete. Install gutters.	Concrete is beginning to show signs of water freeze/thaw damage and age.	Phase 1
WRP-02	Phosphorus Removal and Recarbonation Rehabilitation	Repair/Replace	Replace floc and recarbonation gates and repair concrete in clarifiers/basins.	Major spalling is present on interior/exterior concrete. The sluice/slide gates are severely corroded.	Phase 1
WRP-03 WRP-07 WRP-09 WRP-12 WRP-13	Plant Wide Electrical Improvements	Replace/New	Replace lower explosive limit (LEL) equipment, multiple MCCs, upgrade Generator 1, and other electrical and instrumentation equipment replacements and upgrades.	Aging, obsolete equipment will make it difficult to make quick repairs and troubleshoot plant errors. Failing equipment can affect plant operations.	Phase 1 Phase 2 Phase 3 Phase 4 Phase 5
WRP-05	Harmonic Filter Replacement for Area 71	Replace	Replace harmonic filters.	Harmonic filters have not been replaced since 2006.	Phase 1
WRP-08	Condition Assessment and Inspection	Inspect	Inspection of interior of various tanks, pipelines, and pump stations that have not had recent inspections performed.	Regular inspections are important to ensure plant operations are working efficiently and effectively.	Phase 1
WRP-10	Digestion Improvements	Replace/New	Replace boilers, heat exchangers, hot water circulation system, waste gas flare, PLCs, and steam lines.	The 1975 boilers are in poor condition and are a safety concern. The heat exchangers are improperly sized and electrical equipment within the boiler room is also a safety concern.	Phase 1
WRP-14	2-Water System Improvements	Replace	Replace hydropneumatic pressure tank and install new valve vault. Cost assumes construction of new facilities.	The buried yard valves are not easily accessible.	Phase 1
WRP-15	Grit System Improvements	Repair	Repair the structural concrete surface and recoat rake arms.	Concrete spalling present and beginning signs of corrosion on rake arms.	Phase 2
WRP-16	LEL Equipment Replacement	Replace	The project includes replacing LEL equipment for Facilities 13 and 53.	The equipment is obsolete and required for safety reasons.	Phase 1
WRP-17	Primary and Secondary Treatment Rehabilitation	Repair/Replace	Repair concrete throughout area and roof decks. Replace return activated sludge (RAS) pumps with higher capacity pumps, replace drives for Clarifier mechanisms, and replace oxygenation basin mixer drives.	Mechanisms need to be regularly recoated to extend their life. Mechanism drives have reached the end of their useful service life. Concrete is beginning to erode on structures. RAS pumps are aging and have capacity limitations.	Phase 1
WRP-19	Recarbonation Improvements	Repair	Repair concrete in basin.	Major cracks, spalling and holes are present in concrete.	Phase 2
WRP-22	Thickened Waste-Activated Sludge (TWAS) Pump Replacement	Replace	Replace TWAS pumps.	Address pump condition and age.	Phase 1
WRP-23	Solids Dewatering Improvements	Repair/Replace	Upgrade dewatering polymer feed system and rebuild centrifuge.	Older polymer system is not efficient. Centrifuges have a lot of hours and will need to be rebuilt and bearings replaced periodically.	Phase 2

-This Page Intentionally Left Blank-

Table 3.1 Proposed Improvements (continued)

Project ID	Project Name	Type of Improvement	Description	Reason	Proposed Phase
WRP-25	Filtration Rehabilitation	Repair	Recoat filtration tanks. Replace filter media.	Exterior coating is starting to degrade and showing signs of minor corrosion.	Phase 2
WRP-26	Advanced Wastewater Treatment (AWT) Improvements	Repair/Demolish	Resurface floor and structural beams, replace metal roof and demolish abandoned equipment.	Many of the AWT systems are no longer in use and are in poor condition. Portions of the building could be repurposed for future process needs.	Phase 2
WRP-27	Building Roof Replacements	Replace	Replace roof membrane/covering on plant buildings on a periodic basis.	Addresses roof leaks and limited life of roofing systems.	Phase 1-5
WRP-28	Odorous Air Treatment Improvements	Repair/Replace	Repair fans. Replace MCC-69 and biofilter media.	This work will be needed within the planning period based on the age of the facility.	Phase 5
WRP-30	Asphalt Sealing and Replacement	Repair	Seal and/or replace damaged asphalt. Cost is recurring for each Phase.	Asphalt needs to be maintained regularly to extend life.	Phase 1-5
WRP-32	Multipurpose Pump Station (MPPS) Improvements	Repair/Replace	Repair pump manifold. Replace MPPS pumps, VFDs, and soft starts.	Signs of corrosion are present on the pump manifold. Pumps and VFDs are nearing the end of their useful service life.	Phase 3
WRP-33	Miscellaneous Plant Rehabilitation	Replace	Replace sludge pumps/piping, Pump Rooms 53 and 13 mechanical equipment, flocculators, and scum pumps.	Equipment is original equipment from 1975 and is aging.	Phase 3
WRP-34	Plant Air System Upgrades	Replace	Replace plant air system tank and compressors. Address NFPA 820 compliance analysis findings.	This work is required based on the age and condition of the equipment as well as compliance with NFPA 820.	Phase 1
WRP-35	Plant-wide NFPA 820 Compliance Evaluation	Repair	This project consists of a study to evaluate compliance of various plant facilities with NFPA 820 standards.	This work is required to comply with NFPA 820 standards for fire protection.	Phase 1
WRP-36	Chemical Storage and Feed System Improvements	Replace	Removal and replacement of the sulfuric acid storage tank, removal of salt storage tanks, and replacement of various chemical feed pumps and control panels.	This work is required to replace old and obsolete equipment.	Phase 2
Capacity Improvements					
CIP-26	Odorous Air Biofilter Media Replacement	New	Replacement of biofilter media.	Identified in T-TSA's existing CIP.	Phase 1
CIP-31	Control Room Upgrades #02 and 13 - Remodel	Replace	Remodeling and updating of Control Rooms #02 and 13.	Identified in T-TSA's current CIP.	Phase 1
CIPR-01	Headworks Project	New	Install new bar screens, washer, compactors, flow diversion structures, bypass pumping, etc. Modify Headworks Building.	Identified in T-TSA's current CIP based on performance of existing equipment.	Phase 1
CIPR-03	Equipment/Vehicle Warehouse	New	Build new warehouse for storing T-TSA vehicles, heavy equipment, etc.	Identified in T-TSA's current CIP.	Phase 1
CIPR-13	Control Room Upgrades #02 and #13 - Heating, Ventilation, and Air Conditioning (HVAC)	Replace	Upgrade Control Room HVAC Equipment.	Identified in T-TSA's current CIP.	Phase 1
WRP-11	Effluent Disposal Field Expansion	New	Perform SAT Performance Evaluation Study. Construct additional effluent disposal fields.	Meet capacity for future effluent disposal.	Phase 3
WRP-18	Waste Activated Sludge (WAS) Thickening Improvements	Repair/Replace	Recoat thickener sludge collectors, replace sharples centrifuge and thickening controls. Replace digester pumps.	Equipment showing corrosion, centrifuges are old. Want to accommodate future capacity.	Phase 3
WRP-31	Offsite Flow Equalization Improvements	New	Build a new concrete lined 15 MG flow equalization basin, new inlet drain structure and piping and a new return pump station.	Provide storage of secondary effluent during a 25-year, 24-hour design storm event to provide additional operational flexibility.	Phase 4

-This Page Intentionally Left Blank-

Table 3.1 Proposed Improvements (continued)

Project ID	Project Name	Type of Improvement	Description	Reason	Proposed Phase
Process Optimization Improvements					
WRP-04	Waste Activated Sludge Stripping to Remove Internal Phosphorus (WASSTRIP) Implementation	New	Address phosphorous production at treatment plant and find viable solution to process remaining phosphorous.	Creates additional revenue for treatment plant and provides another means to get rid of phosphorous waste.	Phase 2
WRP-06	Nitrified Effluent Recycle Pilot	New	Perform pilot study on nitrified effluent recycle.	Determine whether recycling nitrified effluent could address capacity limitations in the denitrification cells, reduce WRP's methanol consumption and reduce odors.	Phase 1
WRP-20	Flow Equalization Improvements	New	Resurface ballast ponds and construct water cannons for ballast ponds and booster pumps for Washdown System.	The basin surface needs resurfacing and staff currently clean basins using a hose, which is labor intensive and time consuming.	Phase 3
WRP-21	Biogas Storage	New	Make improvements to gas storage.	Future regulations.	Phase 4
WRP-24	BNR Structural Retrofit and Nitrified Effluent Recycle	Repair/Replace/ New	Repair cracks in BNR structure, replace BNR beads, construct Nitrified Effluent Recycle pipeline, and new base flood elevation (BFE) sump, pump, and water cannons.	There are minor cracks in structure and concrete is slowly degrading. Nitrified Effluent Recycle will mitigate the need to add new denitrification cells and could have added benefits in reducing methanol consumption. The BFE sump and water cannon improvements will provide for easier draining and cleaning of the BFE pond.	Phase 2
WRP-29	Disinfection Process Modernization	New/Demolish	Construct new ultraviolet (UV) facility or other disinfection alternative for plant effluent disinfection. Costs assume in-vessel UV system. Demolish existing chlorine gas infrastructure and provide small sodium hypochlorite for recycled water needs.	Chlorine gas is hazardous to transport and poses a potential danger to the public. Sodium hypochlorite does not appear to be an option due to the plant's stringent TDS limits.	Phase 5

-This Page Intentionally Left Blank-

Tahoe-Truckee Sanitation Agency
Master Sewer Plan

VOLUME 1:
EXECUTIVE SUMMARY REPORT
CHAPTER 4:
RECOMMENDED AGENCY CIP

FINAL | February 2022

Digitally signed by Richard Luis Gutierrez
Contact Info: Carollo Engineers, Inc.
Date: 2022.02.08 13:34:11-08'00'

REGISTERED PROFESSIONAL ENGINEER
RICHARD LUIS GUTIERREZ
No. 72248
CIVIL
STATE OF CALIFORNIA

Chapter 4

RECOMMENDED AGENCY CIP

4.1 Key Features of the Recommended 25-Year Plan

The 25-year CIP is the culmination of the master sewer planning effort. The plan addresses the T-TSA facility needs over the next 25 years for both the TRI and the WRP. Projects are grouped into the following categories for each facility:

- Condition or Rehabilitation/Repair projects.
- Capacity improvement projects.
- Optimization or process enhancement projects.
- Other projects.

A summary of the various key elements of the CIP is provided in this chapter.

4.1.1 Addresses Aging Infrastructure

Much of the agency's infrastructure was constructed over 45 years ago and will be 70 years old at the end of the 25-year planning period. Most of T-TSA's facilities are in excellent condition for their age, due in large part to the agency's diligence with regular maintenance efforts. However, the visual condition assessment conducted of the WRP infrastructure as well as review of the TRI closed-caption television (CCTV) inspection logs identified several facilities that are approaching or beyond their anticipated service life which will require repairs or replacement in the next 25 years. To address these needs, approximately two thirds of the total projects identified will focus on repair and/or replacement of aging infrastructure.

4.1.2 Reduces Risk of Overflows from the TRI

The TRI hydraulic model and capacity evaluation identified two sections of the TRI, consisting of a total of 5,280 linear feet of pipeline, as being capacity deficient under future PWWF conditions. The CIP includes upsizing of these segments of the TRI in Phases 3 and 4 of the CIP to mitigate the risk of SSOs under these future PWWF conditions.

A risk-based approach was taken in prioritizing rehabilitation of the TRI. Three river crossing segments of the TRI were identified as requiring lining to address condition concerns in these high-risk areas during Phases 1 and 2 of the CIP. The CIP also includes the TRI Renewal Program, which addresses sewer infrastructure that is susceptible to failure through R&R projects. The TRI Renewal Program consists of an annual budget to ensure T-TSA has funding to complete future R&R projects. The actual R&R projects and phasing will be based on inspections as documented and evaluated in T-TSA's new TRI Asset Management Program. Results of the structural integrity analysis performed in the proposed Visible Reinforcement Study will also be used to determine actual R&R projects and phasing.

4.1.3 Addresses Future WRP Capacity Limitations

The WRP capacity assessment found that most of the WRP processes have sufficient capacity to handle both current and future projected flows and loads with a few exceptions. Future capacity limitations associated with the WAS thickening process, effluent disposal field, and flow equalization are addressed in this CIP.

4.1.4 Optimizes Existing Treatment Processes

The CIP includes six recommended projects to optimize or improve the WRP performance and address potential future regulatory requirements. Highlights of these are provided below.

4.1.4.1 Nitrified Effluent Recycle

The CIP includes implementing a pilot project followed by full scale implementation for recycling nitrified effluent from the BNR process to the headworks or primary clarifiers. As realized at other facilities with relatively minor additions of new infrastructure, this approach will mitigate capacity deficiencies in the BNR denitrification cells, allow for a reduction in the plant's methanol consumption, and also help to reduce plant odors.

4.1.4.2 WASSTRIP Implementation

The WASSTRIP project would be implemented in two phases, a study (including a business case evaluation) and pilot plant utilizing the Ostara Reactor system, followed by full implementation assuming the study results show the process to be beneficial from a cost/benefit standpoint. The pilot study will look at potential reductions in lime usage, reduction in chemical sludge production, and creating a marketable phosphorus product.

4.1.4.3 Flow Equalization Improvements

To improve the ability to clean the ballast ponds, a Washdown System consisting of water cannons and associated booster pumps would be constructed.

4.1.4.4 Biogas Storage

It is recommended that T-TSA budget for additional gas storage improvements as future regulations may require more biogas utilization.

4.1.4.5 Disinfection Process Modernization

This project consists of replacing the existing gaseous chlorine disinfection facility with UV disinfection, or some other disinfection alternative which may be more appropriate at the time of design and construction. The primary drivers for this project are the hazardous nature of chlorine gas, operational issues related to using chlorine gas, and the plant's stringent TDS effluent limits which could make conversion to liquid sodium hypochlorite disinfection infeasible.

4.1.5 Project Implementation

The recommended CIP in Volumes 2 and 3 of the Master Plan was developed to address the anticipated needs in the 25-year planning period. The recommended project timing was established using a risk-based approach for prioritizing asset replacement needs, the anticipated timing of new regulations, and other triggers.

Similar projects were grouped or bundled into larger CIP projects. This was done to reduce the number of projects and administrative effort, while still offering opportunities for general and specialty contractors to pursue and bid on projects they are best suited to construct.

The final CIP is provided in its entirety as an attachment herein. It is representative of the most accurate information available at this time and remains consistent with the Agency's goals and objectives. The final CIP also includes projects that T-TSA identified prior to initiating the Master Sewer Plan.

The total cost of the final CIP is $143 million over 25 years. Note that project costs were developed at a planning level, which is a Class 5 estimate as defined by the Association for the Advancement of Cost Engineering. This is intended to be a conservative estimate based on the information available at the time the cost estimate was prepared. Project costs include allowances for contingency, engineering, design, permitting, and construction administration and are in November 2021 dollars (ENR value of 14,421).

As the Agency moves forward with implementing the CIP, there are a few important considerations to note:

- As the Agency moves forward with implementing specific projects, the next phase of analysis or design will provide more accurate and up-to-date information for decision making. For example, for the pipelines recommended for relining, video inspections should be performed prior to project implementation to confirm that relining is necessary.
- The need and timing for all future projects, especially those that are planned for later in the planning period will continue to be updated with new information.

4.2 5-Year CIP

For the next 5 years (fiscal years 22/23 to 26/27), a key area of focus in the CIP will be rehabilitating and replacing assets. Although T-TSA has a robust maintenance program geared towards maximizing the service life of their assets, some of them are approaching or past their useful service life and may need replacement. Replacing these assets is very important to reduce the risk of SSOs, or to prevent a process failure at the WRP and the discharge of wastewater that has not been fully treated. The total cost of the Phase 1, 5-year CIP is $40.0 million in November 2021 dollars (ENR value of 14,421).

4.3 Recommended TRI CIP

Volume 2, Chapter 7 presents the preliminary CIP for the Collection System Master Plan and a summary of the associated capital costs. The CIP is an estimate of T-TSA's capital expenses over the next 25 years to address any limitations, rehabilitation needs, and recommended improvements to the Collection System. The CIP is intended to assist the T-TSA in planning future budgets and making financial decisions.

The key findings and recommendations for the preliminary CIP for the Collection System Master Plan are:

- The T-TSA should budget approximately $28.88 million dollars to fund Collection System projects over the next 25 years. Costs presented in this Master Plan are total project costs and include construction, engineering, legal, administrative, and permitting costs and estimating contingencies. The costs are presented in November 2021 dollars (ENR value of 14,421). Costs are not escalated to future years.

- The CIP is based on:
  - Implementing projects to address capacity deficiencies identified through the capacity evaluation described in Chapter 5. These projects are referred to as capacity projects.
  - Implementing projects to address rehabilitation needs identified through the condition assessment described in Chapter 2. These projects are referred to as rehabilitation projects and include:
    - Near-Term Rehabilitation Improvements. It is recommended these improvements be implemented in the first five years of the master plan. The timing of these projects is primarily a function of the evaluated risk score of the assets.
    - Long-Term Rehabilitation Improvements. These improvements rehabilitate all other assets identified through the condition assessment as requiring replacement over the master planning period. The timing of these projects is primarily a function of the evaluated remaining useful life of the assets.
  - Conducting regular master plan updates and studies to determine the scope and planning parameters of the major CIP projects identified in the Master Plan in further detail. These include the TRI Asset Management Program and Visible Reinforcement Study.

4.4 Recommended WRP CIP

Volume 3, Chapter 7 presents the preliminary CIP for the WRP Master Plan and a summary of the associated capital costs. The CIP is an estimate of T-TSA's capital expenses over the next 25 years to address any limitations, rehabilitation needs, and recommended improvements to the WRP. The CIP is intended to assist T-TSA in planning future budgets and making financial decisions.

The key findings and recommendations for the preliminary CIP for the WRP Master Plan are:

- The Agency should budget approximately $115.7 million dollars to fund WRP projects over the next 25 years. Costs presented in this Master Plan are total project costs and include construction, engineering, legal, administrative, and permitting costs and estimating contingencies. The costs are presented in November 2021 dollars (ENR value of 14,421). Costs are not escalated to future years.
- The CIP is based on implementing the recommendations described in Volume 3, Chapter 6 to accommodate rehabilitation needs, address future capacity deficiencies, mitigate for future regulatory scenarios and provide process improvements and optimization.

Appendix 4A

FINAL 25-YEAR CAPITAL IMPROVEMENT PLAN

Engineers...Working Wonders With Water®

TAHOE-TRUCKEE SANITATION AGENCY
MASTER SEWER PLAN

TASK : Master Sewer Plan CIP Improvements

ESTIMATE PREPARATION DATE : 12/16/2021

JOB # : 11384A.00

PREPARED BY : RLG

LOCATION : T-TSA WRP

REVIEWED BY : AG

LEGEND

CIP-##	Projects already defined within the Upgrade, Rehabilitation and Replacement Fund (Fund 06) not incorporated elsewhere
CIPR-##	Projects already defined within the Wastewater Capital Reserve Fund (Fund 02) not incorporated elsewhere
WRP-##	WRP Project
TRI-C-##	TRI Capacity Improvements Project
TRI-RR-##	TRI Rehabilitation Project
TRI-O-##	TRI Other Project

CIP Summary Table

					Fiscal Year								
Project ID	**Project**	**Type**	**Phase**	**Total**	**2022/23**	**2023/24**	**2024/25**	**2025/26**	**2026/27**	**2027-31**	**2032-36**	**2037-41**	**2042-46**
CIP-01	Plant Coating Improvements	RR	Phase 1A	**$ 480,000**	$ 480,000								
CIP-02	Lab Equipment Replacements	RR	Phase 1A	**$ 160,000**	$ 80,000	$ 26,666.67	$ 53,333.33						
CIP-03	Lime Systems Improvements	RR	Phase 1A	**$ 200,000**	$ 20,000	$ 180,000							
CIP-04	Chlorine Scrubber Improvements	RR	Phase 1A	**$ 1,150,000**	$ 1,150,000								
CIP-09	Centrifuge Rebuild	RR	Phase 1A	**$ 50,000**	$ 50,000								
CIP-31	Control Room Upgrades #02 and #13 - Remodel and Updates	C	Phase 1A	**$ 600,000**	$ 90,000	$ 510,000							
CIPR-01	Headworks Project (Barscreens, Washer Compactors)	C	Phase 1A	**$ 2,510,000**	$ 2,510,000								
CIPR-03	Equipment/Vehicle Warehouse	C	Phase 1A	**$ 2,100,000**	$ 2,100,000								
TRI-RR-01	River Crossing, Gravity Main between MH 33 and MH 35	RR	Phase 1A	**$ 2,520,000**	$ 252,000	$ 454,000	$ 1,814,000						
TRI-O-01	Visible Reinforcement Study	OP	Phase 1A	**$ 170,000**	$ 105,000					$ 65,000			
WRP-05	Harmonic Filter Replacement For Area 71	RR	Phase 1A	**$ 130,000**	$ 130,000								
WRP-08	Condition Assessment and Inspection	RR	Phase 1A	**$ 130,000**	$ 130,000								
WRP-10	Digestion Improvements Project	RR	Phase 1A	**$ 7,740,000**	$ 774,000	$ 3,483,000	$ 3,483,000						
WRP-14	2-Water System Improvements	RR	Phase 1A	**$ 320,000**	$ 32,000	$ 144,000	$ 144,000						
WRP-16	LEL Equipment Replacement	RR	Phase 1A	**$ 320,000**	$ 320,000								
WRP-30	Asphalt Sealing and Replacement Project	RR	Phase 1A	**$ 1,700,000**	$ 170,000			$ 170,000		$ 340,000	$ 340,000	$ 340,000	$ 340,000
WRP_35	Plant-wide NFPA 820 Compliance Evaluation	RR	Phase 1A	**$ 110,000**	$ 110,000								
CIP-14	Communications Network Replacement	RR	Phase 1B	**$ 210,000**		$ 210,000							
CIPR-13	Control Room Upgrades #02 & #13 - HVAC	C	Phase 1B	**$ 50,000**		$ 50,000							
WRP-34	Plant Air System Upgrades	RR	Phase 1B	**$ 1,710,000**		$ 1,710,000							
CIP-06	Translucent Panel Rehab	RR	Phase 1C	**$ 60,000**			$ 60,000						
CIPR-04	Maintenance/E&I Shop Improvements	RR	Phase 1C	**$ 790,000**			$ 790,000						
WRP-01	Primary and Secondary Treatment Repairs	RR	Phase 1C	**$ 510,000**			$ 51,000	$ 229,500	$ 229,500				
WRP-02	Phosphorus Removal and Recarb Rehabilitation	RR	Phase 1C	**$ 3,560,000**			$ 356,000	$ 1,602,000	$ 1,602,000				
WRP-03	Plant Wide Electrical Improvements (Phase 1)	RR	Phase 1C	**$ 580,000**			$ 290,000	$ 290,000					
WRP-06	Nitrified Effluent Recycle Pilot	OP	Phase 1C	**$ 420,000**			$ 42,000	$ 378,000					
WRP-17	Primary & Secondary Treatment Rehabilitation Project	RR	Phase 1C	**$ 10,150,000**			$ 1,015,000	$ 4,567,500	$ 4,567,500				
CIP-26	Odorous Air Biofilter Media Replacement	C	Phase 1D	**$ 50,000**				$ 50,000					
WRP-22	TWAS Pump Replacement Project	RR	Phase 1E	**$ 140,000**					$ 140,000				
WRP-27	Building Roof Replacements	RR	Phase 1E	**$ 12,570,000**					$ 2,514,000	$ 2,514,000	$ 2,514,000	$ 2,514,000	$ 2,514,000
TRI-RR-02	River Crossing, Gravity Main between MH 65 and MH 66	RR	Phase 2	**$ 500,000**				$ 50,000	$ 90,000	$ 360,000			
TRI-RR-03	River Crossing, Gravity Main between MH 88 and MH 89	RR	Phase 2	**$ 500,000**				$ 50,000	$ 90,000	$ 360,000			
TRI-RR-04	TRI Renewal Program	RR	Phase 2	**$ 16,350,000**						$ 4,087,500	$ 4,087,500	$ 4,087,500	$ 4,087,500
WRP-04	WASSTRIP Implementation	OP	Phase 2	**$ 3,950,000**						$ 3,950,000			
WRP-07	Plant Wide Electrical Improvements (Phase 2)	RR	Phase 2	**$ 4,670,000**						$ 4,670,000			
WRP-15	Grit System Improvements	RR	Phase 2	**$ 2,160,000**						$ 2,160,000			
WRP-19	Recarbonation Improvements	RR	Phase 2	**$ 540,000**						$ 540,000			
WRP-23	Solids Dewatering Improvements	RR	Phase 2	**$ 510,000**						$ 510,000			
WRP-24	BNR Structural Retrofit and Nitrified Effluent Recycle Project	OP	Phase 2	**$ 1,150,000**						$ 1,150,000			
WRP-25	Filtration Rehabilitation Project	RR	Phase 2	**$ 1,230,000**						$ 1,230,000			
WRP-26	AWT Improvements	RR	Phase 2	**$ 1,670,000**						$ 1,670,000			
WRP_36	Chemical Storage and Feed System Improvements	RR	Phase 2	**$ 350,000**						$ 350,000			
TRI-C-01	Gravity Main between MH 57 and MH 62	C	Phase 3	**$ 7,180,000**							$ 7,180,000		
WRP-09	Plant Wide Electrical Improvements Project (Phase 3)	RR	Phase 3	**$ 1,330,000**							$ 1,330,000		
WRP-11	Effluent Disposal Field Expansion Project	C	Phase 3	**$ 6,300,000**							$ 6,300,000		
WRP-18	WAS Thickening Improvements Project	C	Phase 3	**$ 1,710,000**							$ 1,710,000		
WRP-20	Flow Equalization Improvements Project	OP	Phase 3	**$ 1,590,000**							$ 1,590,000		
WRP-32	MPPS Improvements Project	RR	Phase 3	**$ 2,560,000**							$ 2,560,000		

TASK : Master Sewer Plan CIP Improvements

ESTIMATE PREPARATION DATE : 12/16/2021

JOB # : 11384A.00

PREPARED BY : RLG

LOCATION : T-TSA WRP

REVIEWED BY : AG

LEGEND

CIP-##	Projects already defined within the Upgrade, Rehabilitation and Replacement Fund (Fund 06) not incorporated elsewhere
CIPR-##	Projects already defined within the Wastewater Capital Reserve Fund (Fund 02) not incorporated elsewhere
WRP-##	WRP Project
TRI-C-##	TRI Capacity Improvements Project
TRI-RR-##	TRI Rehabilitation Project
TRI-O-##	TRI Other Project

CIP Summary Table

					Fiscal Year								
Project ID	**Project**	**Type**	**Phase**	**Total**	**2022/23**	**2023/24**	**2024/25**	**2025/26**	**2026/27**	**2027-31**	**2032-36**	**2037-41**	**2042-46**
WRP-33	Misc Plant Rehab Project	RR	Phase 3	**$ 4,090,000**							$ 4,090,000		
TRI-C-02	Gravity Main between MH 71 and MH 72	C	Phase 4	**$ 1,660,000**								$ 1,660,000	
WRP-12	Plant Wide Electrical Improvements (Phase 4)	RR	Phase 4	**$ 250,000**								$ 250,000	
WRP-21	Biogas Storage Project	OP	Phase 4	**$ 2,770,000**								$ 2,770,000	
WRP-31	Offsite Flow Equalization Improvements Project	C	Phase 4	**$ 10,490,000**								$ 10,490,000	
WRP-13	Plant Wide Electrical Improvements (Phase 5)	RR	Phase 5	**$ 2,890,000**									$ 2,890,000
WRP-28	Odorous Air Treatment Improvements Project	RR	Phase 5	**$ 390,000**									$ 390,000
WRP-29	Disinfection Process Modernization	OP	Phase 5	**$ 16,630,000**									$ 16,630,000
Total CIP Projects				**$ 144,610,000**	**$ 8,503,000**	**$ 6,767,667**	**$ 8,098,333**	**$ 7,387,000**	**$ 9,233,000**	**$ 23,956,500**	**$ 31,701,500**	**$ 22,111,500**	**$ 26,851,500**
CIP Projects Cost/yr				$ 5,784,400	$ 8,503,000	$ 6,767,667	$ 8,098,333	$ 7,387,000	$ 9,233,000	$ 4,791,300	$ 6,340,300	$ 4,422,300	$ 5,370,300