Ordinance 2025-09
Vineyard Water Master Plan

AN ORDINANCE OF THE CITY OF VINEYARD, UTAH, TO ESTABLISH THE VINEYARD WATER MASTER PLAN, IMPACT FEE FACILITIES PLAN, AND IMPACT FEE ANALYSIS; PROVIDING A REPEALER CLAUSE; PROVIDING A SAVINGS AND SEVERABILITY CLAUSE, PROVIDING FOR PUBLICATION BY SUMMARY; AND PROVIDING AN EFFECTIVE DATE.

WHEREAS, in compliance with Utah State Municipal Land Use, Development, and Management Act (LUDMA), the City established a master plan as a companion document to the General Plan; and

WHEREAS, the Vineyard Water Master Plan, Impact Fee Facilities Plan, and Impact Fee Analysis provides guidance to ensure that future development pays its fair share of infrastructure costs, aligning system planning with fiscal responsibility and regulatory compliance; and,

WHEREAS, the Planning Commission held a public hearing on May 21, 2025, and after fully considering public comment and staff recommendations, recommended approval to the City Council; and,

WHEREAS, the City Council reviewed the Water Master Plan and Impact Fee Facilities Plan, and the Impact Fee Analysis, and held a public hearing on May 28, 2025, and after fully considering public comment and staff and Planning Commission's recommendations,

NOW, THEREFORE, BE IT ORDAINED BY THE MAYOR AND COUNCIL OF THE CITY OF VINEYARD, UTAH:

Section 1: the Vineyard City Council adopts the Vineyard Water Master Plan And Impact Fee Facilities Plan and accepts the Impact Fee Analysis. Attached as exhibit A.

Section 2: REPEALER CLAUSE. All City and Vineyard Plans, which are in conflict with the Vineyard City, The Corridor Plan herewith are hereby repealed.

Section 3: SAVINGS AND SEVERABILITY CLAUSE. It is hereby declared to be the legislative intent that the provisions and parts of this Ordinance shall be severable. If any paragraph, part, section, subsection, clause, or phrase of this Ordinance is for any reason held to be invalid by a Court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of this Ordinance.

Section 4: PUBLICATION. This Ordinance, or a summary thereof, shall be published on the Utah Public Notice website and on Vineyard City's official website.

Section 5: EFFECTIVE DATE. This Ordinance shall be in full force and effect after its passage, approval, and publication according to law.

PASSED AND ADOPTED BY THE VINEYARD CITY COUNCIL ON THIS 28th DAY OF May 2025.

Mayor Julie Fullmer

Attest

City Recorder Pamela Spencer

VINEYARD
SEAL
UTAH

PASSAGE BY MUNICIPAL COUNCIL
ROLL CALL VOTE

ORDINANCE NO 2025-09

AN ORDINANCE OF THE CITY OF VINEYARD, UTAH, TO ESTABLISH THE VINEYARD WATER MASTER PLAN, IMPACT FEE FACILITIES PLAN, AND IMPACT FEE ANALYSIS; PROVIDING A REPEALER CLAUSE; PROVIDING A SAVINGS AND SEVERABILITY CLAUSE, PROVIDING FOR PUBLICATION BY SUMMARY; AND PROVIDING AN EFFECTIVE DATE.

ROLL CALL VOTE:	MOTION	SECOND	AYES	NAYS	ABSENT
MAYOR JULIE FULLMER			X		
COUNCILMEMBER SARA CAMERON		X	X		
COUNCILMEMBER BRETT CLAWSON					X
COUNCILMEMBER JACOB HOLDAWAY					X
COUNCILMEMBER MARDI SIFUENTES		X			
TOTALS			3		2

This Ordinance was passed by the City Council of Vineyard, Utah on the 28th day of May 2025, by a roll call vote as described above.

CITY RECORDER'S CERTIFICATE AND ATTEST

This Ordinance was recorded in the office of the Vineyard City Recorder on the 29th day of May 2025. I hereby certify and attest that the foregoing constitutes a true and accurate record of proceedings with respect to Ordinance No. 2025-09.

ATTEST:

Paula D. Spencer

Vineyard City Recorder

VINEYARD
SEAL
UTAH

DRINKING WATER MASTER PLAN AND CAPITAL FACILITIES PLAN

(HAL Project No.: 319.04.100)

DRAFT

May 2025

VINEYARD CITY

DRINKING WATER MASTER PLAN
AND CAPITAL FACILITY PLAN

(HAL Project No.: 319.04.100)

DRAFT

HANSEN ALLEN & LUCE INC ENGINEERS

May 2025

ACKNOWLEDGEMENTS

Hansen, Allen & Luce thanks the following individuals for their contributions to this project:

Vineyard City Government

Julie Fullmer, Mayor
Sara Cameron, Councilmember
Jacob Holdaway, Councilmember
Brett Clawson, Councilmember
Mardi Sifuentes, Councilmember

Vineyard City Staff

Eric Ellis, City Manager
Naseem Ghandour, P.E., Public Works Director/City Engineer
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Chris Jackson, Environmental Utilities Crew Lead
Morgan Brim, Community Development Director
Kristie Bayles, Finance Director
Patrick James, Assistant City Engineer
Cache Hancey, Senior Planner

Hansen, Allen & Luce, Inc.

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Marvin E. Allen, P.E., Senior Technical Advisor
Ridley J. Griggs, P.E., Project Manager

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GLOSSARY OF TECHNICAL TERMS

Average Daily Flow: The average yearly demand volume expressed in a flow rate.

Average Yearly Demand: The volume of water used during an entire year.

Buildout: When the development density reaches maximum allowed by planned development.

Demand: Required water flow rate or volume.

Distribution System: The network of pipes, valves and appurtenances contained within a water system.

Drinking Water: Water of sufficient quality for human consumption. Also referred to as Culinary or Potable water.

Equivalent Residential Connection: A measure used in comparing water demand from non-residential connections to residential connections.

Fire Flow Requirements: The rate of water delivery required to extinguish a particular fire. Usually, it is given in rate of flow (gallons per minute) for a specific period of time (hours).

Head: A measure of the pressure in a distribution system that is exerted by the water. Head represents the height of the free water surface (or pressure reduction valve setting) above any point in the hydraulic system.

Head Loss: The amount of pressure lost in a distribution system under dynamic conditions due to the wall roughness and other physical characteristics of pipes in the system.

Peak Day: The day(s) of the year in which a maximum amount of water is used in a 24-hour period.

Peak Day Demand: The average daily flow required to meet the needs imposed on a water system during the peak day(s) of the year.

Peak Instantaneous Demand: The flow required to meet the needs imposed on a water system during maximum flow on a peak day.

Pressure Reducing Valve (PRV): A valve used to reduce excessive pressure in a water distribution system.

Pressure Zone: The area within a distribution system in which water pressure is maintained within specified limits.

Service Area: Typically, the area within the boundaries of the entity or entities that participate in the ownership, planning, design, construction, operation and maintenance of a water system.

Static Pressure: The pressure exerted by water within the pipelines and other water system appurtenances when water is not flowing through the system, i.e., during periods of little or no water use.

Storage Reservoir: A facility used to store, contain and protect water until it is needed by the customers of a water system. Also referred to as a Storage Tank.

Transmission Pipeline: A pipeline that transfers water from a source to a reservoir or from a reservoir to a distribution system.

Water Conservation: Planned management of water to prevent waste.

ABBREVIATIONS AND UNITS

ac	acre [area]
ac-ft	acre-foot (1 ac-ft = 325,851 gal) [volume]
ASR	Aquifer Storage and Recovery
CIP	Capital Improvement Plan
CFP	Capital Facilities Plan
CUWCD	Central Utah Water Conservancy District
DIP	Ductile Iron Pipe
DBP	disinfection byproduct
EPA	U.S. Environmental Protection Agency
EPANET	EPA hydraulic network modeling software
ERC	Equivalent Residential Connection
ft	foot [length]
ft/s	feet per second [velocity]
gal	gallon [volume]
gpd	gallons per day [flow rate]
gpm	gallons per minute [flow rate]
HAL	Hansen, Allen & Luce, Inc.
hp	horsepower [power]
hr	hour [time]
IFA	Impact Fee Analysis
IFC	International Fire Code
IFFP	Impact Fee Facilities Plan
in.	inch [length]
kgal	thousand gallons [volume]
kW	kilowatt [power]
kWh	kilowatt hour [energy]
MG	million gallons [volume]
MGD	million gallons per day [flow rate]
mg/L	milligram per liter [concentration]
µg/L	microgram per liter [concentration]
mi	mile [length]
psi	pounds per square inch [pressure]
s	second [time]
SCADA	Supervisory Control and Data Acquisition
THM	trihalomethane
UV	ultraviolet radiation (disinfection method)
wsfu	water supply fixture unit
yr	year[time]

EXECUTIVE SUMMARY

PURPOSE OF STUDY

The purpose of this study is to help Vineyard City provide safe, efficient, and reliable drinking water service to its customers, both now and into the future, at the lowest reasonable cost.

PLANNING HORIZONS

The ultimate planning horizon for this study is the buildout condition of Vineyard City, which is projected to take place at approximately year 2055. However, this report provides guidance applicable at the following time intervals:

1. Near future: low-cost actions and best practices the City can implement to reduce costs and improve operations.
2. 10-year: system improvements needed within 10 years to provide capacity for anticipated new development. The cost of these improvements will be used to set impact fees and guide the formulation of near-term budgets.
3. 20-year: system improvements needed within 20 years for anticipated new development. These improvements are included in the capital facility plan to guide the formulation of longer-term budgets.
4. Future: all system improvements necessary to serve the City at year 2055 or when it is developed at the density defined by the City's current general plan and zoning ordinances. These recommendations will help the City secure key pieces of land and work with developers to properly plan for infrastructure that is compatible with the future system.

COMPONENTS OF A WATER DISTRIBUTION SYSTEM

The following components of a water distribution system were analyzed to determine the capacity and ability of the water system to meet existing and future water demands:

1. Source – the water used to supply the system.
2. Storage – a location to store water between the time it is delivered to the system and the time it is used by a customer.
3. Transmission - pipelines used to convey water between sources and storage locations.
4. Distribution – pipelines used to deliver water from storage locations to the customer.

Each of these components must have enough capacity and capability to serve existing and future customers. To ensure adequate capacity, this study proposes a level of service as a design standard for new development (as discussed in the following section).

METHODS

Water usage and water system data were used to develop a responsible level of service for each component (source, storage, transmission, distribution) of the water system. The level of service was used to develop a computer model of the existing system, evaluate the existing system, and identify existing deficiencies.

The land use element of the general plan, population projections, development concept plans, and the proposed level of service were used to forecast the magnitude and locations of future water demands in the City. Computer modeling and other tools were used to determine what infrastructure is necessary to best meet these demands.

SYSTEM VULNERABILITIES

The system was analyzed to identify existing vulnerabilities and areas which need improvements to support future growth. Table ES-1 contains a summary of system vulnerabilities. Further information about these vulnerabilities is described in detail in the report.

Table ES-1
System Vulnerabilities

ID	Description	Notes
V1	**Source Water Availability**	Some current water supply agreements are temporary. The City has secured approximately 3,500 ac-ft/yr in long-term water supply through Central Utah Water Conservancy District (CUWCD), but additional water will be necessary to meet projected future demands.
V2	**Storage Capacity**	Vineyard relies on temporary agreements for storage capacity.
V3	**Distribution Limitations**	Existing distribution pipes have finite capacity. Some are nearing their maximum capacity.
V4	**Rapid Growth**	Heavy development pressure and increased development densities can put a strain on available water resources and infrastructure capacity.

Recommended solutions to these vulnerabilities are shown in Table ES-2 and described in detail in the report.

Table ES-2
Proposed Solutions to System Vulnerabilities

Description	Notes	Vulnerabilities Addressed
Source Acquisition Strategy	This plan highlights the need for a multifaceted source acquisition strategy that includes the following: • Working to secure additional source capacity • Commissioning a secondary water master plan to determine the most cost-effective ways to provide irrigation-quality water to landscapes currently irrigated from the drinking water system • Acquiring water rights and water shares as they become available • Update City policy to require that developers provide their own water for development	V1, V4
Backbone Infrastructure Project	Major water distribution infrastructure necessary to accommodate future growth and independent system operation when temporary contracts expire was identified as part of the master planning process and is now under construction. This infrastructure included the following: • A 6.0 MG storage tank • A pump station • Distribution pipelines	V2, V3, V4
Distribution Projects	Properly sized pipelines will be installed as development occurs to preserve capacity for existing users while accommodating growth.	V3, V4

CAPITAL FACILITY PLAN

Projects necessary to address system vulnerabilities and support growth over the next 20 years are identified and described in the Capital Facility Plan. Conceptual-level cost estimates were prepared for each project. Projects were classified as either (1) Projects related to growth in the system as a whole; or (2) Projects that will become necessary only when an area develops. Projects related to system growth are needed within a specific timeframe and are eligible to be repaid by impact fees. Development-driven projects also provide a system benefit and are impact fee-eligible, but do not need to be scheduled for a specific timeframe. Typically, the City works with developers to get these projects installed as growth occurs.

System growth will necessitate four major capital projects within the next 20 years. These projects have an estimated cost of **$38,454,000** (see Table ES-3).

Table ES-3
System Growth-Related Capital Projects (0 – 20 Years)

Type & Phasing Year	Map ID	Recommended Project	Cost (2024 Dollars)[1]
Storage, Distribution – Growth Project **2024**	1	**Backbone Infrastructure Project:** Construct major storage and distribution facilities. This project includes the following (quantities are approximate): • Pump Station • 6.0 MG Storage Tank • 800 ft of 36-inch pipe (Vineyard Connector) • 2,700 ft of 30-inch pipe (Vineyard Connector) • 10,400 ft of 24-inch pipe (Vineyard Connector) • 2,500 ft of 18-inch pipe (between Vineyard Connector and 400 N along train tracks) • 1,300 ft of 16-inch pipe (400 N) • 2,300 ft of 12-inch pipe (Mill Rd)	$30,155,157
Distribution – Growth Project **2026**	2	**Mill Road North Extension:** Construct about 5,500 feet of 16-inch diameter pipeline between Vineyard Connector and 1600 N as Mill Road is constructed.	$2,191,000
Distribution – Growth Project **5-10 yrs**	3	**Pump Station Upgrade:** Equip the pump station with additional pumps to meet growing demands.	$708,000
Storage – Growth Project **10+ yrs**	4	**Storage Expansion:** Construct an additional 3 MG storage tank.	$5,400,000
Total			**$38,454,000**

1. Costs listed are in 2024 dollars and are not adjusted for inflation.

Development will require additional distribution pipelines and booster stations to be installed or upsized throughout the 20-year capital facility planning project period. These projects are discussed in detail in Chapter 9.

CONCLUSIONS

Key conclusions from this master planning effort are as follows:

1. More annual source capacity will be needed to meet projected future demands. The City should take all possible actions to bolster their water supply. Key strategies to pursue are as follows:
    a. Pursue additional source water.
    b. Prepare a secondary water master plan to find ways to use irrigation-quality water to replace current irrigation demands served by drinking water.
    c. Acquire additional water rights and water shares.
    d. Explore developing independent water sources.
2. Planned infrastructure projects must be constructed at the proper size and at an appropriate pace to support development.

CHAPTER 1 INTRODUCTION

PURPOSE AND SCOPE

The purpose of this master plan is to provide direction to Vineyard City regarding decisions that will be made now and into the future to provide an adequate drinking water system for its customers at the most reasonable cost. Recommendations are based on demand data, growth projections, standards of the Utah Division of Drinking Water (DDW), city zoning, the Vineyard City general plan, known planned developments, and standard engineering practices.

The master plan is a study of the City's drinking water system and customer water use. The following topics are addressed herein: general planning, growth projections, water rights, water loss, water rates, impact fees, source requirements, storage requirements, and distribution system requirements. Operational parameters for the City's drinking water system were reviewed, and recommendations were made to optimize the system based on stability, ease of use, and cost. Based on this study, needed capital improvements have been identified with conceptual-level cost estimates for the recommended improvements.

The results of the study are limited by the accuracy of growth projections, data provided by the City, and other assumptions used in preparing the study. It is expected that the City will review and update this master plan every 5–10 years as new information about development, system performance, or water use becomes available.

BACKGROUND

The City of Vineyard is located in north-central Utah County on the eastern shore of Utah Lake. Vineyard began as an agricultural settlement when its first settlers arrived in 1855. In the 1940s, the Geneva Steel Mill was constructed on about 1600 acres of land in Vineyard where it operated until the 1990s. The Geneva Steel Mill property remained idle throughout the 1990s and 2000s until market conditions motivated investors to redevelop the site beginning in 2013.

Vineyard has earned the distinction as one of the most rapidly growing cities in Utah with a population of just 139 residents in 2010 expanding to an estimated 14,000 by year 2018 (Vineyard General Plan, 2019). Continued rapid growth in Vineyard is expected due to its welcoming atmosphere, proximity to the thriving Provo-Orem metropolitan area, excellent recreational opportunities, and a variety of appealing and affordable housing options.

Vineyard must soon make several key decisions to ensure their drinking water facilities will have adequate capacity to serve future growth. The City commissioned this study to ensure that decisions made now will be appropriate for the future and that the drinking water system will support Vineyard as it grows.

WATER SUPPLY AND DEMAND

Water supply and customer demand are key components of the master plan. Sufficient water must be available to supply the demands placed upon the system by its customers, both now and in the future. Existing demand in the system and projected future water use were considered as a part of the master planning effort.

MASTER PLANNING METHODOLOGY

Drinking water systems consist of water sources, storage facilities, transmission pipes, distribution pipes, pump stations, valves, and other components. Design and operation of the individual components must be coordinated so that they operate efficiently under a range of demands and conditions. The system must be capable of responding to daily and seasonal variations in demand while simultaneously providing sufficient capacity for firefighting and other emergency situations.

Identifying present and future water system needs is essential in the management and planning of a water system. Existing water demands were calculated from SCADA data and billed water use. Existing water use data, together with planned land uses in the City General Plan (and proposed development concepts), were used to project future water use.

This report follows the DDW requirements of Rule R309-510 (“Facility Design and Operation: Minimum Sizing Requirements”) and Rule R309-105 (“Administration: General Responsibilities of Public Water Systems”) of the Utah Administrative Code. The report addresses sources, storage, distribution, minimum pressures, hydraulic modeling, capital improvements, funding, and other topics pertinent to Vineyard City’s drinking water system.

A level of service (LOS) has been designated for the water system. The level of service is the water volume and pressure standard that the drinking water system is designed to meet. Level of service is regulated by Utah Administrative Rule 309, which is administered by DDW. Development of LOS criteria is discussed in subsequent chapters.

Computer models of the City’s drinking water system were prepared to simulate the performance of facilities under existing and future conditions. System improvement recommendations were prepared from the analysis and are presented in this report.

CHAPTER 2 EXISTING SYSTEM

This chapter addresses key aspects of the existing drinking water system. It is intended to give an overview and provide context for subsequent chapters, which will contain more detailed information.

PHYSICAL INFRASTRUCTURE

Vineyard City operates a drinking water system that serves most of the residents and businesses within its boundaries. The existing drinking water system includes 2 pressure zones and about 40 miles of pipe with diameters ranging from 8 inches to 14 inches. Figure 2-1 shows an overview of key existing drinking water infrastructure.

The system is presently divided into two pressure zones.

North Pressure Zone

The North Pressure Zone is served by wholesale connections to Central Utah Water Conservancy District (CUWCD). A PRV vault located near the intersection of 800 N and Geneva Road provides the majority of flow to the zone. A connection on 1600 N provides additional capacity. Water is provided from CUWCD on demand. Emergency interconnections with Lindon City also exist in two locations.

South Pressure Zone

The South Pressure Zone is served from the Orem drinking water system, with the majority of flow supplied through a connection near the intersection of Center Street and Geneva Road. Additional connections on 400 S and within the Sleepy Ridge subdivision are available on an emergency basis. Water is provided from Orem on demand.

Sources

Sources supplying the Vineyard City water system are as follows:

- CUWCD: The CUWCD system provides source to the north pressure zone.
- Orem City: Orem City provides source to the south pressure zone.

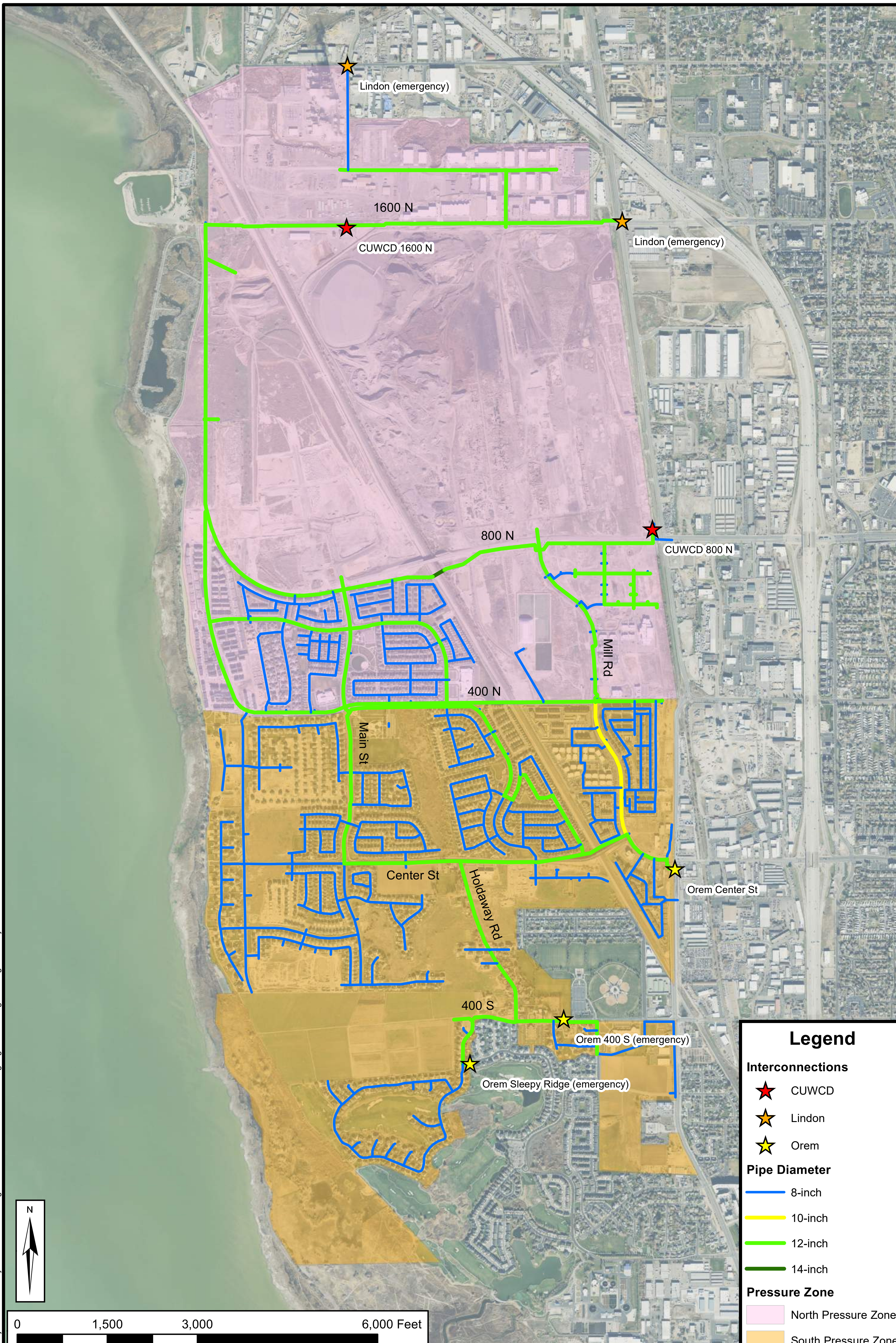
Vineyard City has supply contracts with each entity to provide capacity for peak day, peak instantaneous, peak day plus fire, and average yearly flows.

Storage Facilities

The drinking water system is presently served by storage held in the CUWCD and Orem systems. These facilities provide fire protection storage and equalization storage to the system.

Pressurized Irrigation System

Vineyard operates a pressurized irrigation (PI) system that provides water service to certain institutional properties. It will also be expanded to some other properties in the future. Figure 2-2 shows the existing service area of the PI system.



Date: 2/20/2024
Document Path: H:\Projects\319 - Vineyard\04.100 Drinking Water Master Plan\GIS\Working\Fig 2-1 Existing Drinking Water System.mxd

HANSEN ALLEN & LUCE inc ENGINEERS

VINEYARD DRINKING WATER MASTER PLAN

EXISTING DRINKING WATER SYSTEM

FIGURE 2-1

Date: 6/21/2024
Document Path: H:\Projects\319 - Vineyard\04.100 Drinking Water Master Plan\GIS\Working\Fig 2-2 Pressurized Irrigation Service Areas.mxd

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VINEYARD DRINKING WATER MASTER PLAN

PRESSURIZED IRRIGATION SERVICE AREAS

FIGURE 2-2

The PI system is supplied by Lake Bottom Canal Co. and several shallow wells. There is also a crossover connection that can be utilized to provide water from the drinking water system, if necessary, although it has not been used in several years. The PI system is not discussed in detail in this master plan, although its effects on existing and future drinking water demand have been taken into account.

EQUIVALENT RESIDENTIAL CONNECTIONS

Drinking water demands are expressed in terms of equivalent residential connections (ERCs), also sometimes referred to as equivalent residential units (ERUs). The use of ERCs is a standard engineering practice to describe the entire system in a common unit of measurement. One ERC is equal to the average demand of an average single-family, detached residential connection in the R-1-8 zoning districts. Other types of residential and non-residential demands are converted to ERCs for planning purposes. For example, a commercial building requiring six times as much water as a typical single-family, detached residential connection is assigned an ERC count of 6.

EXISTING SERVICE

A review of available information revealed an estimated 3,330 ERCs was served by the drinking water system at the beginning of year 2023. A characterization of ERCs by pressure zone is included in Table 2-1.

Table 2-1
Existing Service by Pressure Zone

Pressure Zone	ERCs
North	1,090
South	2,240
Total	**3,330**

CHAPTER 3 WATER SOURCES AND DEMAND

This chapter presents an overview of existing source requirements and water demands.

EXISTING WATER SOURCES

Vineyard uses drinking water from the Orem City drinking water system and CUWCD. The City also has emergency connections to the Lindon City drinking water system. Table 3-1 contains the capacity of each drinking water source.

Table 3-1
Existing Drinking Water Sources

Source	Zone	Connection Diameter (inch)	Peak Instantaneous Source Capacity[1] (gpm)	Annual Source Capacity[2] (ac-ft)
1600 N CUWCD Vault	North	6”	2,100	1,036
800 N CUWCD Vault	North	6” and 12”	5,800	
Mill Rd Orem Vault	South	2” and 8”	4,500	1,435
400 S Orem Vault	South	10”	2,100	
Sleepy Ridge Orem Vault[3]	South	8”	2,100	
Total		**-**	**11,300**	**2,471**

1. Rated meter capacity or modeled pipe capacity, whichever is limiting. Listed total is less than the sum of each meter’s capacity because some meters have incompatible hydraulic grades and cannot be used at the same time.
2. Contract capacity. Defined as the amount of water contracted to be sold to Vineyard by Orem City and CUWCD. Orem total includes 35 ac-ft owned by Vineyard through CWP.
3. The Sleepy Ridge vault is strictly for emergency uses. The hydraulic grade provided by Orem at this location is less than the normal operating hydraulic grade in the Vineyard system.

Vineyard owns 35 ac-ft of CUWCD water that is currently delivered to the South pressure zone through the Orem system. All other water used in Vineyard is owned either by CUWCD or Orem City and made accessible to Vineyard through legal agreements and purchase contracts.

LEVEL OF SERVICE

In 2018, House Bill 303 amended Section 19-4-114 of the Utah Code (the Safe Drinking Water Act). The new code directs the Utah Division of Drinking Water to establish system-specific water source and storage minimum sizing requirements (rather than prescribing statewide sizing standards) based on at least three years of water use data and/or an engineering study.

Vineyard City commissioned HAL to prepare an engineering study to determine sizing requirements for the system. This study is included in Appendix A. A summary of the level of service is included in Table 3-2.

Table 3-2
Level of Service Parameters

Parameter	Level of Service[1]
Peak Day Demand	1,248 gpd/ERC
Average Yearly Demand	590 gpd/ERC 0.66 ac-ft/ERC

1. The level of service accounts for both indoor uses and irrigation from the drinking water system.

EXISTING WATER SOURCE REQUIREMENTS

According to DDW standards (Section R309-510-7), water sources must be able to meet both the expected water demand on the peak day (flow requirement) and the average demand over the course of one year (volume requirement).

Existing Peak Day Demand

Peak day demand is the water demand on the day of the year with the highest water use. Existing peak day demand is computed according to the level of service.

Existing Peak Instantaneous Demand

Peak instantaneous demand was determined by evaluating measured source flow data to identify diurnal trends. It was determined that peak instantaneous flow in the system is approximately 1.7 times the peak day flow.

Table 3-3 shows the computed peak day and peak instantaneous demand by pressure zone.

Table 3-3
Existing Peak Day Demand by Pressure Zone

Existing Zone(s)	ERCs	Peak Day Demand (gpm)[1]	Peak Instantaneous Demand (gpm)[1]	Existing Supply (gpm)	Surplus (+) or Deficit (−)
North	1,090	945	1,606	6,800	+5,194
South	2,240	1,941	3,300	4,500	+1,200
Total	**3,330**	**2,886**	**4,906**	**11,300**	**6,394**

1. Demand accounts for both indoor uses and irrigation from the drinking water system.

System facilities have physical capacity to meet peak day demand at the level of service. Contract capacity is an additional constraint not accounted for in Table 3-3.

Existing Pump Stations

Vineyard does not currently operate any pump stations.

Existing Average Yearly Demand

Average yearly demand is the volume of water used during an entire year, and is evaluated to verify that system sources can supply enough annual volume to meet demand under existing and future conditions. Average yearly demand must be considered for both indoor use and all irrigable acreage served by the drinking water system. Table 3-4 includes a summary of average yearly demand requirements for the drinking water system.

Table 3-4
Existing Average Yearly Demand by Pressure Zone

Existing Zone(s)	ERCs	Existing Demand (ac-ft/yr)	Existing Supply (ac-ft/yr)	Surplus (+) or Deficit (−)
North	1,090	719	1,036	+317
South	2,240	1,478	1,435	-43
Total	**3,330**	**2,198**	**2,136**	**+273**

1. Demand accounts for both indoor uses and irrigation from the drinking water system.

At the level of service, there is a slight existing deficiency in the South Zone. However, due to ongoing conservation efforts, actual water use has been lower than the level of service in recent years, and has stayed within contract limits.

SUMMARY – EXISTING SOURCES

Key aspects of existing sources are as follows:

- Vineyard is supplied solely through wholesale connections.
- At the level of service in this master plan, existing sources have physical capacity to meet demands at the peak day condition.
- Annual source volumes are provided based on wholesale contracts. At the level of service, a slight deficit exists in the South Zone. However, recent conservation efforts have kept actual use below the contract maximum volume.

CHAPTER 4 WATER STORAGE

EXISTING WATER STORAGE

The City's existing drinking water system is served by storage located in the CUWCD and Orem drinking water systems. Available storage capacity in these systems is shown in Table 4-1.

Table 4-1
Capacity of Existing Storage

Existing Zone	Orem Storage (MG)	CUWCD Storage (MG)[2]	Total Storage (MG)
North	0.0	2.0	2.0
South	0.5[1]	2.0	2.5
Total	**0.5**	**4.0**	**4.5**

1. Vineyard owns 0.5 MG of storage in the CUWCD tank that serves the Orem system
2. Vineyard currently has agreement to use 4.0 MG of storage in the CUWCD system, of which up to 2.0 MG can be utilized via delivery through the Orem system

EXISTING WATER STORAGE REQUIREMENTS

According to DDW standards outlined in Section R309-510-8, storage tanks must be able to provide: 1) fire suppression storage to supply water for firefighting; 2) emergency storage, as deemed necessary; and 3) equalization storage volume to make up the difference between source and demand. Each of the requirements is addressed below.

Fire Suppression Storage

Fire suppression storage is required for water systems that provide water for firefighting (Subsection R309-510-8(3)). The local fire authority determines the need for fire suppression storage.

Vineyard City is served by the Orem City Fire Department. Contact information for the Orem City Fire department is as follows:

Fire Chief: Marc Sanderson

Phone: 801-229-7021

Address: 300 E 1000 S
Orem, UT 84058

Vineyard City personnel reported that a fire flow capacity of 2,500 gpm for 4 hours would satisfy requirements for existing buildings in the North Zone, and that a requirement of 2,000 gpm for 4 hours would satisfy requirements in the South Zone. Table 4-2 summarizes the existing fire suppression storage assumed in each zone.

Table 4-2
Existing Required Fire Suppression Storage by Zone

Existing Zone	Fire Suppression Storage (MG)
North	0.60
South	0.48
Total	**1.08**

Equalization Storage

The proposed level of service for equalization storage in the drinking water system is 590 gal/ERC as calculated in the City's sizing study. See Appendix A.

Emergency Storage

While there are no specific DDW requirements for emergency storage (Subsection R309-510-8(4)), water systems can choose to maintain emergency storage to mitigate risks, provide system reliability, and protect public health and welfare. Emergency storage may be used in case of pipeline failures, equipment failures, power outages, source contamination, and natural disasters.

Vineyard has not specified emergency storage additional to the equalization and fire flow requirements in the system.

A summary of level of service for water storage is included in Table 4-3.

Table 4-3
Level of Service Parameters

Parameter	Level of Service
Equalization Storage	590 gal/ERC
Minimum Fire Storage	1,500 gpm for 2 hours
Maximum Fire Storage	2,500 gpm for 4 hours

Table 4-4 lists the equalization storage requirement by pressure zone, as well as total storage requirements, computed according to the level of service.

Table 4-4
Existing Drinking Water Storage Requirements by Zone

Zone	ERCs	Equalization (MG)	Fire (MG)	Emergency (MG)	Total Required Storage (MG)	Existing Storage (MG)	Remaining Capacity (MG)
North	1,090	0.64	0.60	0	1.24	2.0	+0.76
South	2,240	1.32	0.48	0	1.80	2.5	+0.70
Total	**3,330**	**1.96**	**1.08**	**0**	**3.04**	**4.5**	**+1.46**

SUMMARY – EXISTING STORAGE

Key aspects of existing storage facilities are as follows:

- Vineyard City has adequate storage capacity remaining in both pressure zones.
- The 2.5 MG of storage capacity serving the South Zone is defined in a temporary agreement set to expire in 2025. This capacity will need to be replaced.
- The 2.0 MG of storage capacity in the CUWCD system (currently serving the north zone) is defined in a perpetual agreement and will be used into the future.

CHAPTER 5 WATER DISTRIBUTION

HYDRAULIC MODEL

Development

A computer model of the City's drinking water distribution system was developed to analyze the performance of the existing and future distribution system and to prepare solutions for existing facilities not meeting the distribution system requirements. The model was developed with the software EPANET 2.0, published by the U.S. Environmental Protection Agency (EPA 2014; Rossman 2000). EPANET simulates the hydraulic behavior of pipe networks. Sources, pipes, tanks, valves, controls, and other data used to develop the model were obtained from GIS data of the city's drinking water system and other information supplied by the City.

HAL developed models for two phases of drinking water system development. The first phase was a model representing the existing system (existing model). This model was used to calibrate the model and identify deficiencies in the existing system. Calibration was performed using fire hydrant tests and by comparing model results to the City's SCADA output. Calibration data is included in Appendix B. The second phase was a model representing future conditions and the improvements necessary to accommodate growth (future model).

Model Components

The two basic elements of the model are pipes and nodes. A pipe is described by its inside diameter, length, minor friction loss factors, and a roughness value associated with friction head losses. A pipe can contain elbows, bends, valves, pumps, and other operational elements. Nodes are the endpoints of a pipe and can be categorized as junction nodes or boundary nodes. A junction node is a point where two or more pipes meet, where a change in pipe diameter occurs, or where flow is added (source) or removed (demand). A boundary node is a point where the hydraulic grade is known (a reservoir, tank, or PRV). Other components include tanks, reservoirs, pumps, valves, and controls.

The model is not an exact replica of the actual water system. Pipeline locations used in the model are approximate and not every pipeline may be included in the model, although efforts were made to make the model as complete and accurate as possible. Moreover, it is not necessary to include all of the distribution system pipes in the model to accurately simulate its performance.

<u>Pipe Network</u>

The pipe network layout originated from GIS data provided by the City. Elevation information was obtained from LIDAR data. Pipes in the system are generally PVC. Darcy-Weisbach roughness coefficients for pipes in this model ranged from 0.4 – 1.0, which is typical for these pipe materials in EPANET (Rossman 2000, 31).

<u>Water Demands</u>

Water demands were allocated in the model based on billed usage and billing addresses. Demand was determined for each billing address, and the addresses were geocoded in order to link the demands to a physical location. The geocoded demands were then assigned to the closest model node. With the proper spatial distribution, demands were scaled to reach the peak day demand determined in Chapter 3. For the future model, future demands were estimated according to the zoning and density shown in the City's general plan, and development concepts with approval. Future demands were assigned to new nodes representing the expected location of new development in each pressure zone.

The pattern of water demand over a 24-hour period is called the diurnal curve or daily demand curve. Output from the Vineyard City SCADA system was used to derive a diurnal curve for the system. It has a peaking factor of 1.7, meaning that peak instantaneous demand is approximately 1.7 times the peak day demand. The diurnal curve was put into the model to simulate changes in water demand throughout the day.

In summary, the spatial distribution of demands followed geocoded water use data; the flow and volume of demands followed the proposed level of service described in Chapter 3; and the temporal pattern of demand followed typical diurnal curves.

<u>Water Sources and Storage Tanks</u>

The sources of water in the model are the City's existing and planned future wholesale connections. These connections are represented by a reservoir and a control valve. Future tank location, height, diameter, and volume are represented in the future model scenarios. The extended-period model predicts water levels in the planned future tank as it fills and empties to meet demand in the system.

ANALYSIS METHODOLOGY

HAL used extended-period and steady-state modeling to analyze the performance of the water system with current and projected future demands. An extended-period model represents system behavior over a period of time: tanks filling and draining, pumps turning on or off, pressures fluctuating, and flows shifting in response to demands. A steady-state model represents a snapshot of system performance. The peak day extended period model was used to set system conditions for the steady-state model, analyze system controls and the performance of the system over time, and to analyze system recommendations for performance over time. The steady-state model was used for analyzing the peak day plus fire flow conditions.

Four operating conditions were analyzed with the extended period model: Static conditions, peak day conditions, peak instantaneous conditions, and peak day plus fire flow conditions. Each of these conditions is a worst-case situation so the performance of the distribution system may be analyzed for compliance with DDW standards and City preferences.

EXISTING WATER DISTRIBUTION SYSTEM

Vineyard City's drinking water distribution system consists of all pipelines, valves, fittings, and other appurtenances used to convey water from sources and storage tanks to water users. The existing water system contains approximately 40 miles of pipe with diameters of 8 inches to 14 inches. Table 5-2 presents a summary of pipe length by diameter.

Table 5-1
Summary of Pipe Length by Diameter

Pipe Diameter (inches)	Total Length (Miles)
8	25.8
10	0.45
12	14.1
14	0.04

Performance of the drinking water system was evaluated using the hydraulic model according to the requirements listed in Table 5-2.

Table 5-2
Compliance of Existing
Distribution System with Utah Rule

Condition	Requirement[1]	System Design Flow[2]	Compliance Status
Peak Day	Minimum 40 psi service pressure	2,886 gpm	All connections comply.
Peak Instantaneous	Minimum 30 psi service pressure	4,906 gpm	All connections comply.
Peak Day plus Fire Flow[3]	Minimum 20 psi service pressure	2,886 gpm plus fire flow	Results are as shown on Figure 5-2.

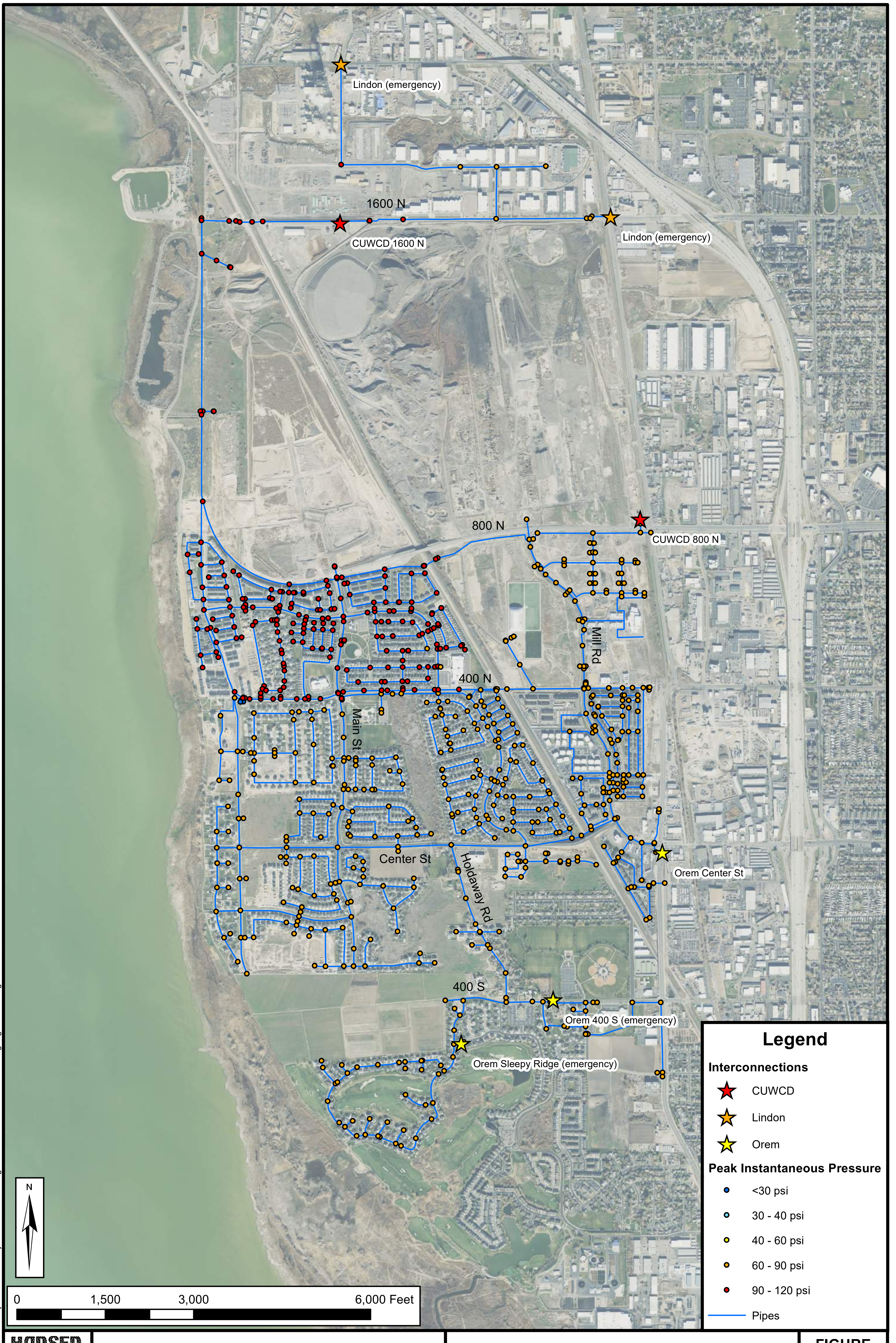
1. Requirements are as stated in Utah Code R309-105-9(2).
2. Peak day flow was multiplied by a factor of 1.7 to produce peak instantaneous flow.
3. The maximum fire flow requirement in Vineyard is 2,500 gpm. See Chapter 4 for details.

Modeled peak instantaneous pressures are shown on Figure 5-1.

Fire Flow

Figure 5-2 shows the modeled fire flow capacity available to the system. Noteworthy observations regarding fire flow are listed below:

- All residential areas of the system have a minimum available fire flow of 1,500 gpm except for Sleepy Ridge, which is slightly below 1,500 gpm during the peak day condition due to increasing system demands.
- All commercial and industrial areas have a minimum available fire flow of 2,000 gpm.
- The dead-end pipe along Geneva Road at approximately 575 S does not have 1,500 gpm of available fire flow capacity. However, it does not appear to provide fire protection to any structures at that location, so it is not consequential at this time. Any future proposed developments in the area should be carefully evaluated to ensure minimum fire flow capacity is available to them.



Date: 2/21/2024
Document Path: H:\Projects\319 - Vineyard\04.100 Drinking Water Master Plan\GIS\Working\Fig 5-1 Existing Peak Instantaneous Pressure.mxd

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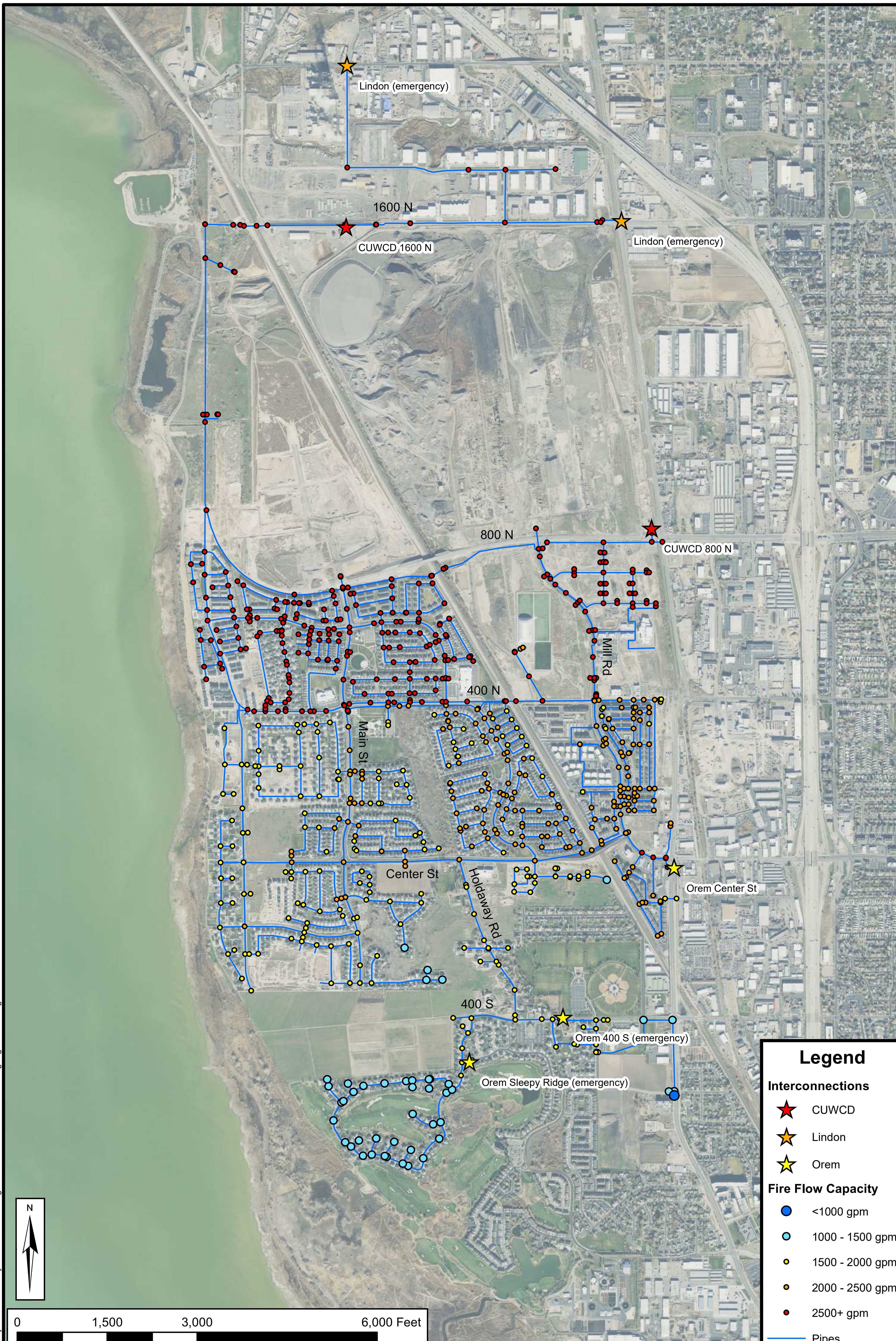
VINEYARD DRINKING WATER MASTER PLAN	MODELED EXISTING PEAK INSTANTANEOUS PRESSURE	FIGURE 5-1



Date: 2/21/2024
Document Path: H:\Projects\319 - Vineyard\04.100 Drinking Water Master Plan\GIS\Working\Fig 5-2 Existing Fire Flow.mxd

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VINEYARD DRINKING WATER MASTER PLAN	MODELED EXISTING FIRE FLOW CAPACITY	FIGURE 5-2

The Capital Facility Plan in Chapter 9 includes recommended projects to improve fire flow in these areas. Further consultation with the fire authority may be needed to determine which of these areas are deficient vs. which have appropriate exceptions.

Modeling should not always be viewed as a substitution for physical hydrant testing. Ideally, the model and physical testing will both be used to better understand the distribution system. For best results, physical fire flow tests should be conducted during periods of peak demand (July and August) and during times of day when demands are not at a minimum. If physical fire flow tests are performed at times other than peak demand, they will not represent the peak day demand case, when pressures are likely to be lowest. When compared to flow tests not taken at peak day demand, the hydraulic model will typically be more conservative than the physical test, because it simulates peak day demand.

Physical hydrant tests are still valuable and recommended because they provide model calibration points and enable the City to detect limitations in the field which may not be reflected in the hydraulic model (such as closed or partially closed valves, construction flaws, discrepancies between reality and GIS data, or other unexpected conditions which would affect fire flow).

When designing fire suppression systems for buildings, designers should be advised that results obtained during a flow test are not necessarily representative of peak day or anticipated future demands. The level of service is to provide a residual pressure of 20 psi during fire flow events, so it is recommended that fire suppression system designers should not assume that a residual pressure of more than 20 psi will be available.

CHAPTER 6 SYSTEM GROWTH

This chapter addresses existing and projected future growth in the service area of the Vineyard City drinking water system.

GROWTH PROJECTIONS

The development of impact fees requires growth projections over the next ten years. In addition to impact fee projects, this report will also highlight anticipated projects 10-20 years out in the Capital Facilities Plan section of this report.

Historic trends in growth, input from the Vineyard City Community Development Department, and development plans were considered in the development of growth projections used for this study. Detailed information is included in Appendix C. Figure 6-1 shows the historic and projected population for Vineyard City through 2050. Residential population is not expected to grow substantially past about 2050.

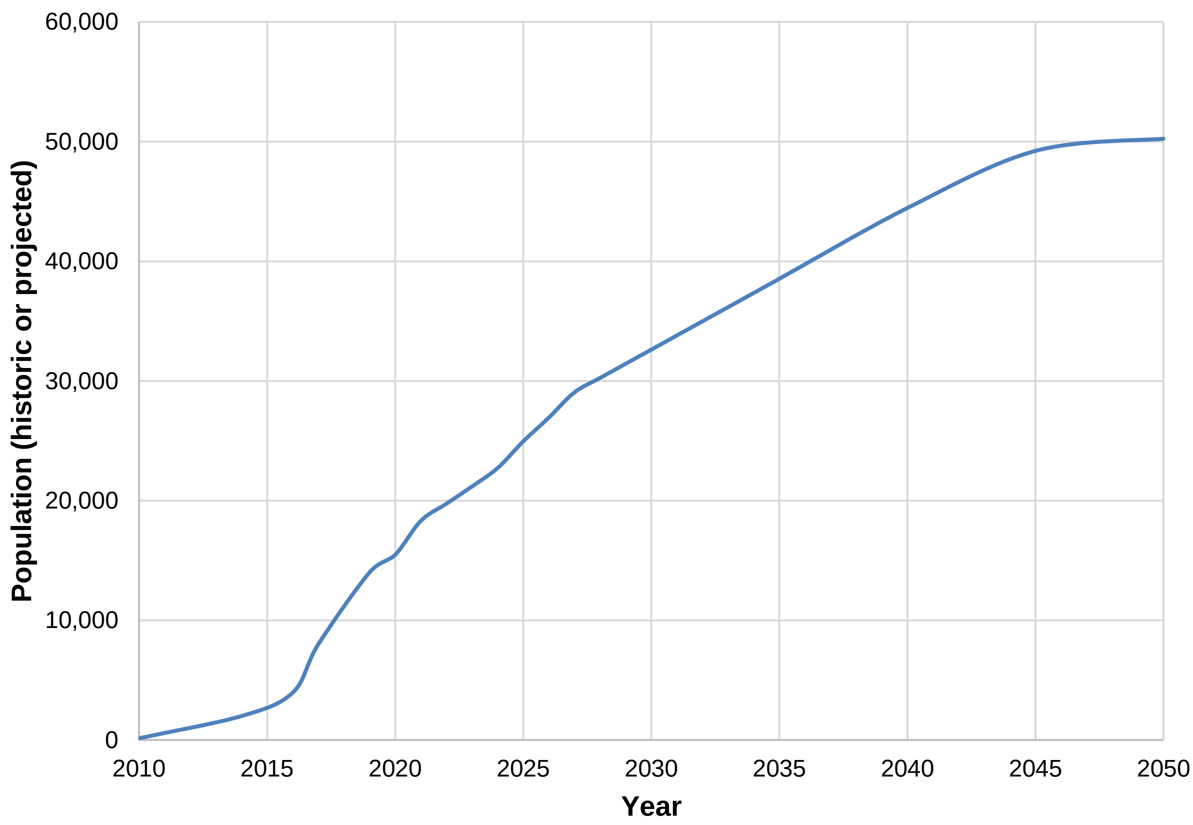
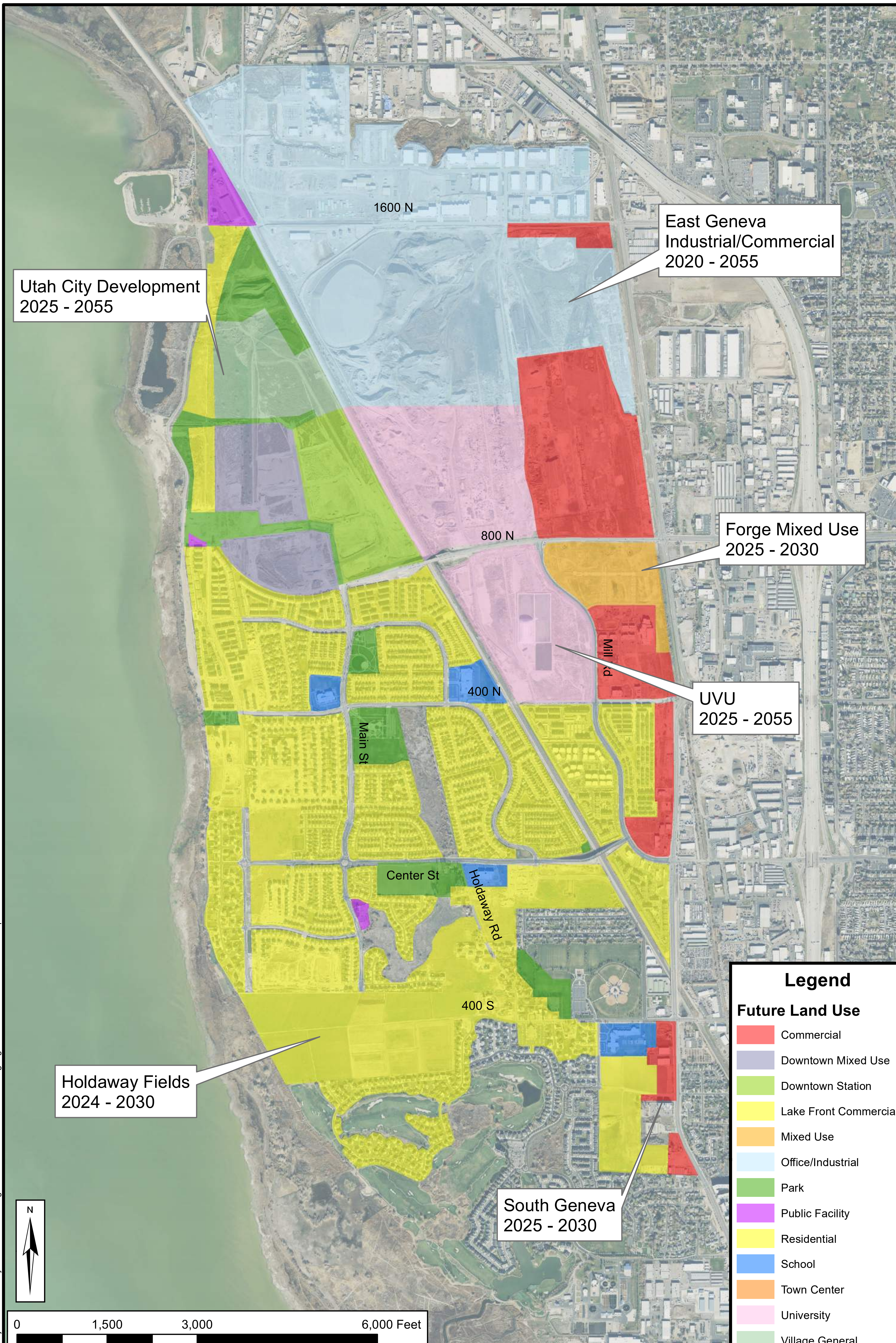


Figure 6-1: Vineyard City Historic and Projected Population

FUTURE SERVICE

Expected future water service in Vineyard was forecasted based on projected growth in population and anticipated future land uses. Detailed information on growth projections is included in Appendix C. Planned future land uses within the service area of the Vineyard City water system and expected timing of growth are shown in Figure 6-2.



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VINEYARD DRINKING WATER MASTER PLAN

PLANNED FUTURE LAND USES AND ANTICIPATED GROWTH TIMING

FIGURE 6-2

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Projected areas of growth are intended to represent a reasonable projection based on information available at this time. However, this master plan can be adapted if growth occurs faster or slower than projected. Table 6-1 includes projected ERCs and irrigated acreage at selected time intervals.

Table 6-1
Projected Future Service

Time Period	Projected ERCs
Existing	3,330
10 Year	7,610
20 Year	9,420
Buildout	10,260

Year-by-year projections used to develop the Capital Facility Plan are included in Appendix C.

While growth projections are an essential component of this master plan, it should be noted that system capacity is dependent on the number of ERCs in the system. Infrastructure improvements should be made when certain ERC counts are reached – which may occur in a different year than is projected in this plan. Timing for capital improvement projects should be determined based on the development that actually occurs in the system, rather than a target date which is not known with certainty.

CHAPTER 7 FUTURE WATER REQUIREMENTS

This chapter addresses future water source and storage needs in Vineyard based on projected growth.

WATER USE BY LAND USE

Peak day and average yearly water use for existing and planned future nonresidential and mixed-use land use types within Vineyard City are shown in Table 7-1.

Table 7-1
Projected Water Use by Land Use – Nonresidential or Mixed Use

Land Use Type	Peak Day Demand (gpm/ac)	Average Yearly Demand (ac-ft/ac)
Business Park	1.90	1.10
Commercial	1.90	1.10
Downtown Mixed Use	5.64	8.36
Downtown Station	8.91	13.16
Flex Office Industry	2.90	1.65
Lakefront Commercial	4.64	6.31
Manufacturing/Industrial	2.90	1.65
Park (with PI service)	0.70	0.25
Park (without PI service)	6.70	3.50
Public Facilities	3.80	2.00
Regional Commercial	1.90	1.10
School	4.80	2.50
The Forge (Mixed-Use)	3.38	6.05
University	2.27	2.81
Village General	5.46	7.88

Peak day and average yearly water use for residential uses are shown in Table 7-2. These were based on analysis of actual data for existing users and projected indoor usage for future urban condo units.

Table 7-2
Projected Water Use by Land Use – Residential

Land Use Type	Peak Day Demand (gpd/unit)	Average Yearly Demand (ac-ft/unit)
Single-Family Unit	1,248	0.66
Townhome	621	0.32
Condo	414	0.22
Urban Condo[1]	155	0.17

1. Urban condos are smaller units on average and are expected in the downtown area and in the Forge Development. They will have no associated irrigated acreage. Other condo units in Vineyard are associated with irrigated areas, which results in a higher water requirement.

PROJECTED WATER REQUIREMENTS

Projected future water requirements for the water system are based on projected population growth and development, the level of service for the water system, and projected water uses as shown in Tables 7-1 and 7-2.

Future Peak Day Demand

Projected peak day demand at key intervals is computed as shown in Table 7-3.

Table 7-3
Projected Future Peak Day Demand

Time Period	ERCs	Peak Day Demand (gpm)
Existing	3,330	2,886
10 Year	7,610	6,595
20 Year	9,420	8,164
Buildout	10,260	8,892

Future peak day demand will be supplied through wholesale connections to CUWCD.

Future Average Yearly Demand

Projected average yearly demand at key intervals is shown in Table 7-4.

Table 7-4
Projected Future Average Yearly Demand

Time Period	Average Yearly Demand (ac-ft/yr)
Existing	2,198
10 Year	5,615
20 Year	8,450
Buildout	8,528

Future Storage

Future storage requirements were computed at the level of service of and assuming a maximum fire flow requirement of 2,500 gpm for 4 hours (600,000 gal) once the zones are combined. Table 7-5 shows computed total requirements at key time intervals.

Table 7-5
Projected Future Storage Requirements

Time Period	Equalization Storage (MG)	Fire Storage (MG)	Total Storage Required (MG)
Existing	1.96	1.08	3.04
10 Year	5.01	0.60	5.61
20 Year	7.54	0.60	8.14
Buildout	7.61	0.60	8.21

Future System Flow Requirements

Demands and requirements for the future water distribution system are shown in Table 7-6.

Table 7-6
Design Parameters for
Future Distribution System

Condition	Requirement[1]	System Design Flow[2]
Peak Day	Minimum 40 psi service pressure	8,892
Peak Instantaneous	Minimum 30 psi service pressure	15,116
Peak Day plus Fire Flow[3]	Minimum 20 psi service pressure	11,392

1. Requirements are as stated in Utah Code R309-105-9(2).
2. Peak day flow was multiplied by a factor of 1.7 to produce peak instantaneous flow.
3. The maximum fire flow requirement at buildout is projected to be 2,500 gpm.

DESIGN AND PERFORMANCE CRITERIA

Summaries of the key design criteria and demand requirements for the drinking water system are included in Table 7-7 for reference.

Table 7-7
System Design Criteria

	Criteria	Existing Requirements	Estimated Future Requirements
Equivalent Residential Connections	Billing data/LOS	3,330 ERC	10,260 ERC
Source			
Peak Day Demand	Section R309-510-7/LOS	2,886 gpm	8,892 gpm
Average Yearly Demand	Section R309-510-7/LOS	2,198 ac-ft	8,528 ac-ft
Storage			
Equalization	Section R309-501-8/LOS	1.96 MG	7.61 MG
Emergency	City preference	0.00 MG	0.00 MG
Fire Suppression	IFC/ Fire Marshall	1.08 MG	0.60 MG
Total		3.04 MG	8.21 MG
Distribution			
Peak Instantaneous			
Minimum Peak Day Fire Flow	Meter data/LOS	4,906 gpm	15,116 gpm
Min. Pressure:	IFC/ Fire Marshall/LOS	1,500 gpm @ 20psi	1,500 gpm @ 20psi
Preferred	City Preference	75 psi	75 psi
Peak Day	Section R309-510-9/LOS[1]	40 psi	40 psi
Peak Instantaneous	Section R309-510-9/LOS[1]	30 psi	30 psi

1. Minimum pressure values match State of Utah standards. Vineyard City has indicated preference for the system to operate at service pressures of at least 75 psi.

CHAPTER 8 FUTURE SYSTEM

This chapter addresses the recommended future construction and operation of the distribution system.

FUTURE NEEDS AND STRATEGIES

Strategies to secure necessary water and infrastructure capacity are discussed in this section.

Source Needs

A comparison of projected buildout average yearly demands and the currently planned 5-year contract buydown with CUWCD is shown in Table 8-1.

Table 8-1
Comparison of Future Average
Yearly Supply and Projected Demand

Condition	Average Yearly Demand (ac-ft/yr)
5-Year Contract Buydown	3,500
10-Year Projected Demand	5,332
Buildout Projected Demand	8,528
Future Need	**5,028**

It must be noted that Vineyard currently has sufficient source capacity to meet existing demands and support some growth; however, more source capacity is required for the City to even meet projected 10-year future average yearly demand. Additional source water must be secured to serve planned development.

Presently, CUWCD is the only source for the existing drinking water system, and has indicated that there is no capacity for Vineyard to secure additional water beyond the 5-year contract buydown amount of 3,500 ac-ft. As such, Vineyard will need to seek additional supply in other ways. Possible strategies to provide adequate source water for future needs are as follows:

- Explore the possibility of leasing or otherwise securing additional source capacity from neighboring cities, water districts, or water entities.
- Reduce existing drinking water demand using any of the following alternatives:
  - Expand secondary water use
  - Conserve additional water
- Develop independent water sources
- Update City policy to require that developers provide their own water for development

It is anticipated that a combination of the above strategies will be implemented over time. Considering the time it takes to develop and construct water sources, immediate effort will be needed to keep up with projected growth in demand. A secondary water master plan is recommended as soon as possible to evaluate the extent to which secondary water can be used within the City. As a high-level estimate, a City-wide secondary water system could replace between 2,000 and 3,000 ac-ft of projected demand at the buildout condition.

Storage Needs

Vineyard is currently constructing a rectangular 6.0 MG concrete tank. Additional area is available to accommodate an additional concrete tank at the time when more storage capacity becomes necessary. Additionally, Vineyard has secured 2.0 MG of storage capacity in the CUWCD system under a perpetual agreement.

A comparison of the capacity of the storage tank under construction and the estimated future buildout storage requirement is shown in Table 8-2.

Table 8-2
Comparison of Existing Storage Capacity and Projected Requirements

Condition	Capacity (MG)
Tank Phase 1 Capacity	6.00
Tank Phase 2 Expansion[1]	3.00
CUWCD Agreement[2]	2.00
Buildout Projected Requirement	8.21
Future Surplus	**+2.79**

1. Extra capacity is needed due to changing plans in the Town Center and future sizing will be refined with further study.
2. CUWCD storage to be used for fire flow and emergency storage.

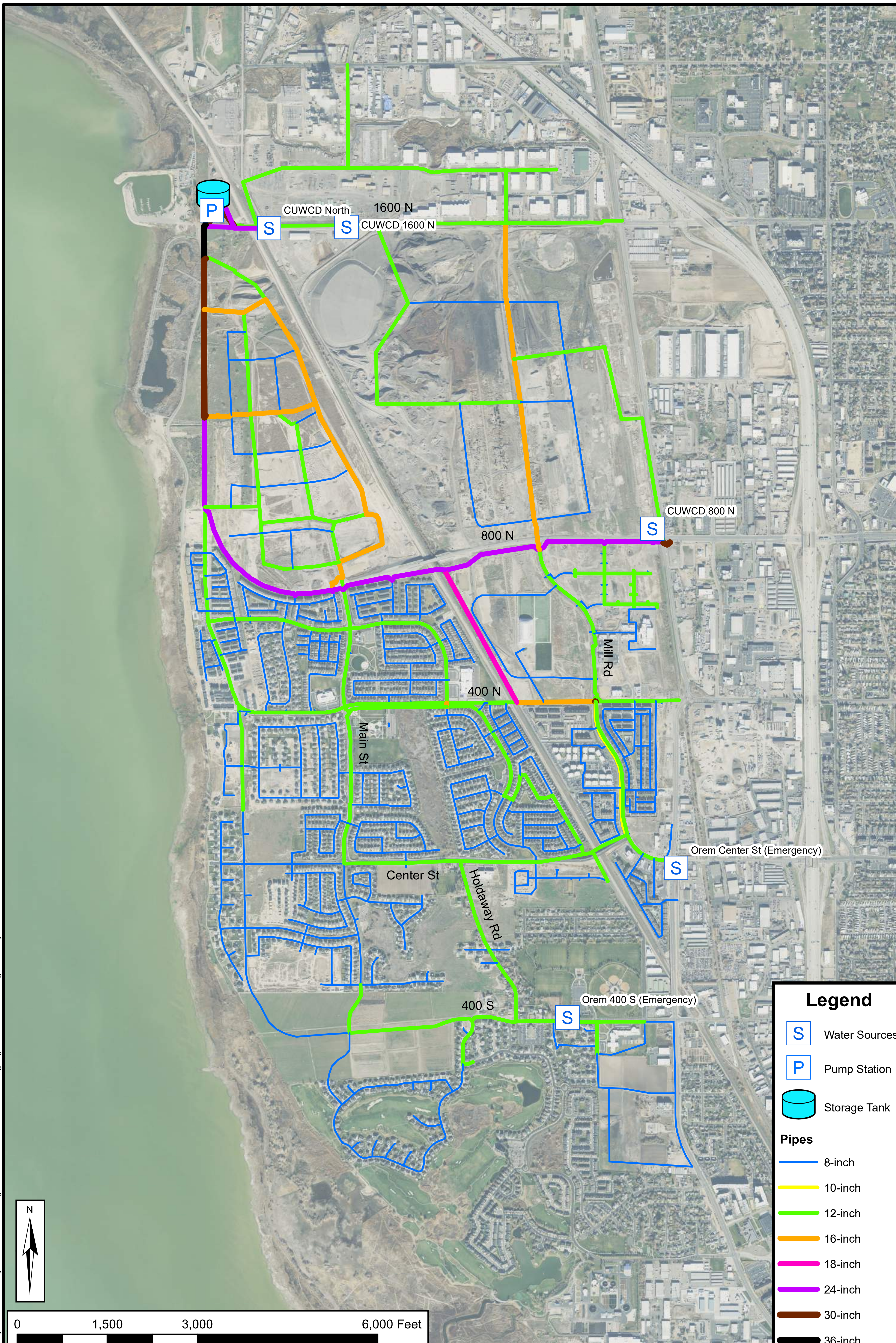
When additional storage capacity becomes necessary, an additional tank will be constructed. As land use plans and regulations evolve, the size of the additional tank will be studied and defined in more detail prior to design and construction.

Distribution Needs

Additional distribution pipes will be needed to serve developing areas. As developments are proposed, detailed hydraulic modeling evaluations will be conducted on proposed infrastructure to verify that adequate pressure and fire flow capacity will be available to serve the proposed development.

FUTURE SYSTEM

Important aspects of the future system are discussed in this section. Figure 8-1 shows a summary of key system infrastructure.



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VINEYARD DRINKING WATER MASTER PLAN

FUTURE DRINKING WATER SYSTEM

FIGURE 8-1

Date: 6/21/2024
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Sources

The City's water supply arrangement with Orem City is temporary. The City has entered into a long-term supply agreement with CUWCD to provide additional source capacity. Planned future connections to the CUWCD system are as follows:

- 800 N and Geneva Road: this connection is anticipated to provide the majority of flow to the system and will be operated to provide constant daily flow to the system. It is being reconstructed to increase its flow capacity.
- Existing 1600 N: this existing connection will remain available for use as needed.
- Future 1600 N tank fill: this connection will allow Vineyard to fill the tank directly from the CUWCD system.

Storage Facilities

All necessary storage will be constructed on a single site at the northern end of the City. The City is currently constructing a rectangular tank with 6 MG of capacity. The tank is situated on the site so that an additional tank can be constructed to add more volume when needed.

The preliminary planned size of the future tank is 3 MG. Vineyard City personnel selected this size to achieve good cost value (in terms of dollars per gallon) and provide additional buffer for operation and emergency events. Before construction, more detailed study will be performed to verify the tank is appropriately sized.

Pressure Zones

The existing pressure zones were mainly established for administrative reasons. Once the City stops receiving water from the Orem system, a single pressure zone will be established.

Pump Stations

A single pump station will serve the system. Water from the CUWCD system will be provided to the Vineyard system at a constant daily flow rate, with the tank and pump station being used to meet varying demands. During times when system demand exceeds the source flow rate, the pump station will supply additional water from the tank to meet demands. During times when the source flow rate exceeds system demands, a pressure sustaining valve will operate to send excess water to the storage tank. The pump station will also provide fire flow capacity.

Under normal operations, peak instantaneous demand will be supplied from connections to CUWCD and by the pump station. In rare circumstances where normal pressure is not available from the CUWCD system, the pump station will need to provide flow to the entire system.

Table 8-3 includes a summary of the capacity of the pump station and projected buildout peak instantaneous demand. The pump station has been designed to supply peak instantaneous capacity at the projected buildout condition.

Table 8-3
Comparison of Future Peak
Instantaneous Supply and Projected Demand

Condition	Peak Day Demand (gpm)
Pump Station Capacity	16,000
Buildout Peak Instantaneous Demand	15,116
Surplus	**+884**

Distribution Pipes

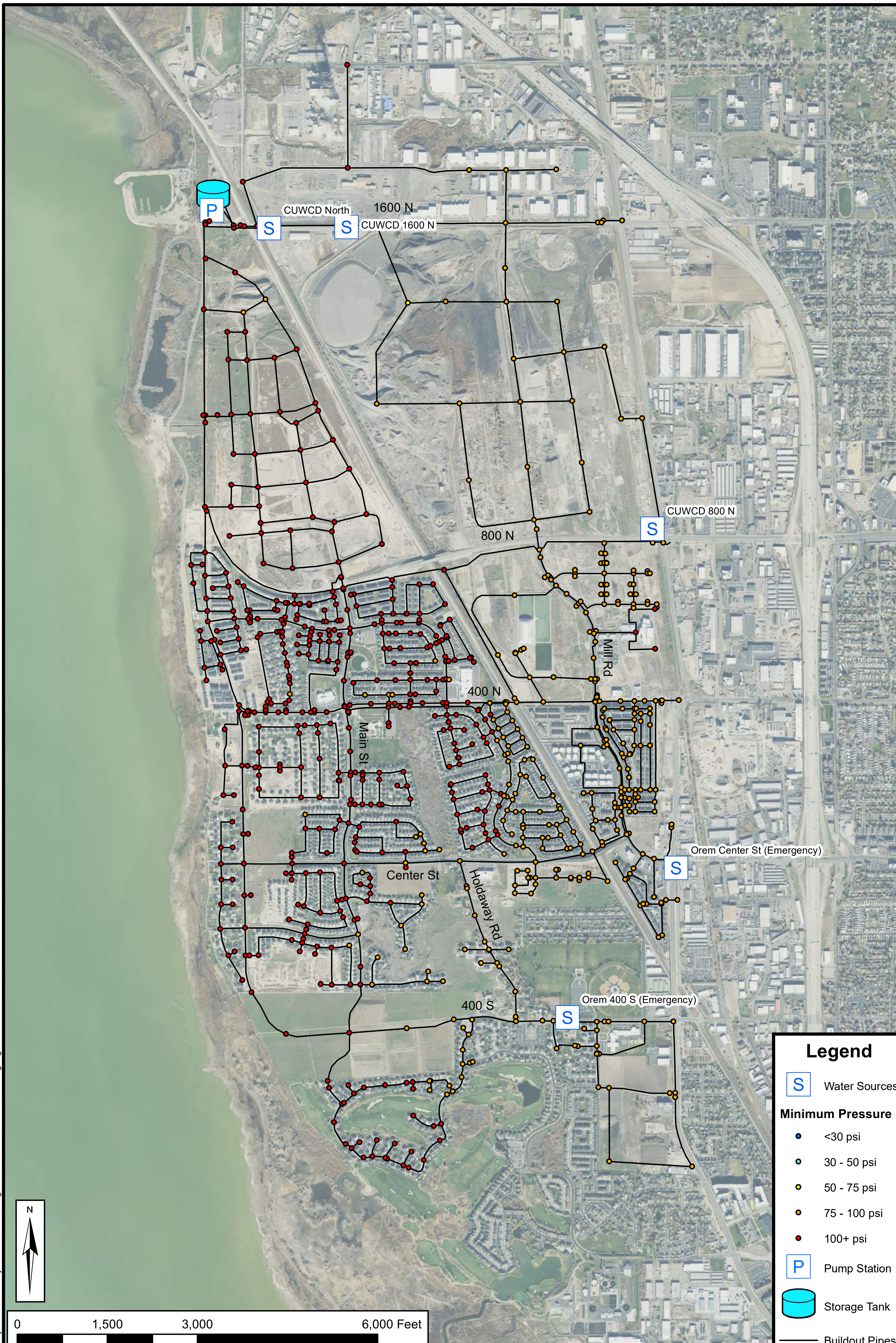
The hydraulic model was used to determine the necessary size of major distribution pipes along preferred alignments as identified by City personnel.

The alignment of the future Vineyard Connector Road was identified as the preferred alignment for major backbone infrastructure. Additional major distribution pipelines south of Vineyard connector were also necessary. The preferred alignment for these pipelines was identified as extending alongside the train tracks between Vineyard Connector and 400 N, as well as additional segments of pipe in 400 N and Mill Road. All of these pipelines were designed as a single project, which is currently under construction as of the date of publication.

Additional distribution pipelines will need to be constructed as development occurs. Sizes and alignments of these pipes should generally mirror those shown in Figure 8-1. Additional 8-inch diameter pipelines to provide local distribution will also be necessary. Refinement is expected to occur as developments are proposed and as road alignments are better defined in the future.

Hydraulic Performance

The buildout system was designed to meet all regulatory requirements while supplying projected demands as shown in Table 7-4. Future modeled peak instantaneous pressures are shown on Figure 8-2.



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VINEYARD DRINKING WATER MASTER PLAN	MODELED FUTURE MINIMUM PRESSURES	FIGURE 8-2

Date: 6/21/2024
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CHAPTER 9 CAPITAL FACILITY PLAN

INTRODUCTION

The purpose of this section is to identify the drinking water facilities that are required for the 20-year planning period to meet the demands placed on the system by future development. Proposed facilities were sized to meet buildout requirements and located to accommodate 20-year growth projections. Each capital facility plan project will require a detailed design analysis before construction to ensure that the location and sizing is appropriate for the actual growth that has taken place since this capital facility plan (CFP) was developed. Specific projects with estimated costs are presented in this chapter.

GROWTH PROJECTIONS

Capital Facilities Plan projects were identified based on the projected growth as described in Chapter 6 and the planned future water system as described in Chapter 8.

METHODOLOGY

Growth projections were used to forecast future water demands on a year-by-year basis, which were then compared to the capacity of existing source and storage facilities. This analysis showed the year that additional capacity would be necessary. Solutions were then identified to enable the City to meet demands at the proposed level of service.

Hydraulic modeling scenarios were developed for the purpose of assessing the system operation and capacity with future demands added to the system. The models were used to identify problem areas in the system and to identify the most efficient way to make improvements to distribution pipelines, sources, pumps, and storage facilities. Solutions and alternatives were discussed with City staff.

The future system was evaluated in the same manner as the existing system, by modeling (1) peak instantaneous demands and (2) peak day demands plus fire flow conditions.

RECOMMENDED PROJECTS AND COSTS

As discussed in previous chapters, source, storage, and distribution system capacity expansion will be needed to meet the demands of future growth. Cost estimates for the recommended projects are summarized in the following tables and included with further detail in Appendix D.

Unit costs for the construction cost estimates are based on conceptual level engineering. Sources used to estimate construction costs include:

1. “Means Heavy Construction Cost Data, 2024"
2. Price quotes from equipment suppliers
3. Recent construction bids for similar work

All costs are presented in 2024 dollars.

Precision of Cost Estimates

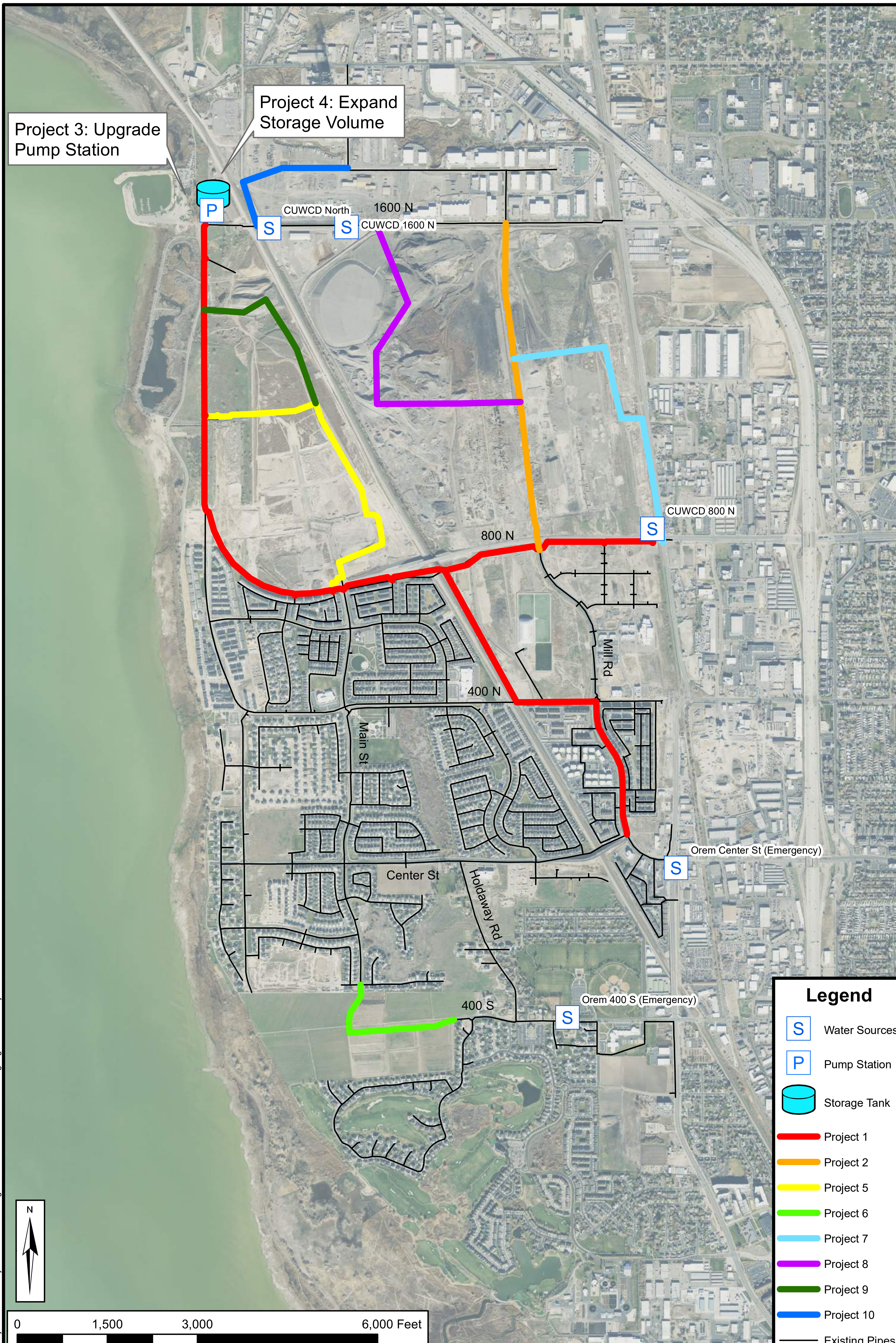
Master plan projects are a high-level representation of the infrastructure the City will need to construct in order to correct deficiencies or meet growth. However, due to the many unknown factors at this stage of design (such as alignment and depth of pipelines, utility conflicts, the cost of land and easements, construction methodology, types of equipment and material to be used, interest and inflation rates, permitting requirements, etc.), there is a significant level of uncertainty in estimated costs.

Every effort has been made to produce cost estimates which will help the City prepare a responsible budget that will meet the City's needs without being excessive or unreasonable. However, it is recommended that the City plan additional contingency into the budget when preparing to complete individual projects.

GROWTH-RELATED PROJECTS

Projects were defined based on projected growth in water demand, projected development patterns, and output from the hydraulic model. Cost estimates were defined for projects anticipated to develop within 10-year and 20-year horizons. Costs were also estimated for projects which are chiefly development-driven.

Table 9-1 includes summary information about projects related to system growth. These projects are shown on Figure 9-1.



Date: 6/21/2024
Document Path: H:\Projects\319 - Vineyard\04.100 Drinking Water Master Plan\GIS\Working\Fig 9-1 CFP Projects.mxd

HANSEN ALLEN & LUCE INC ENGINEERS

VINEYARD DRINKING WATER MASTER PLAN

CAPITAL FACILITIES PLAN PROJECTS

FIGURE 9-1

Table 9-1
Recommended Growth Projects

Type & Phasing Year	Map ID	Recommended Project	Cost (2024 Dollars)[1,2]
Storage, Distribution – Growth Project **2024**	1	**Backbone Infrastructure Project:** Construct major storage and distribution facilities. This project includes the following (quantities are approximate): • Pump Station • 6.0 MG Storage Tank • 800 ft of 36-inch pipe (Vineyard Connector) • 2,700 ft of 30-inch pipe (Vineyard Connector) • 10,400 ft of 24-inch pipe (Vineyard Connector) • 2,500 ft of 18-inch pipe (between Vineyard Connector and 400 N along train tracks) • 1,300 ft of 16-inch pipe (400 N) • 2,300 ft of 12-inch pipe (Mill Rd)	$30,155,157
Distribution – Growth Project **2026**	2	**Mill Road North Extension:** Construct about 5,500 feet of 16-inch diameter pipeline between Vineyard Connector and 1600 N as Mill Road is constructed.	$2,191,000
Distribution – Growth Project **5-10 yrs**	3	**Pump Station Upgrade:** Equip the pump station with additional pumps to meet growing demands.	$708,000
Storage – Growth Project **10+ yrs**	4	**Storage Expansion:** Construct an additional 3 MG storage tank.	$5,400,000
Total			**$38,454,000**

1. Costs listed are in 2024 dollars and are not adjusted for inflation.
2. Costs for Project 1 are final construction costs. Costs for other projects are estimated.

Some pipelines must be installed as developments occur. Many of these will provide local conveyance only and will not be addressed in detail in this master plan. Some development-driven projects have more regional implications and need to have adequate capacity for future users. These projects are shown on Figure 9-1 and summarized in Table 9-2.

Table 9-2
Development-Driven Projects

Type & Est. Phasing Year	Map ID	Recommended Project	Total Cost[1,2] (2024 Dollars)
Distribution – Development Driven **0-10 yrs**	5	**South Downtown Distribution:** Construct about 5,500 feet of 16-inch diameter pipeline through the southern Downtown area to provide distribution and fire flow capacity as the area develops.	$2,191,000
Distribution – Development Driven **0-10 yrs**	6	**Holdaway Farms Distribution:** Construct about 2,600 feet of 12-inch diameter pipeline through the Holdaway Farms area to connect existing pipes in 400 S and Main St.	$911,000
Distribution – Development Driven **5-10 yrs**	7	**East Geneva Distribution 1:** Construct about 5,200 feet of 12-inch diameter pipeline to create a looped connection from Vineyard Connector/Geneva Road through to Mill Road to provide distribution and fire flow capacity.	$1,822,000
Distribution – Development Driven **10+ yrs**	8	**East Geneva Distribution 2:** Construct about 5,600 feet of 12-inch diameter pipeline to create a looped connection from 1600 N through to Mill Road to provide distribution and fire flow capacity.	$1,962,000
Distribution – Development Driven **10+ yrs**	9	**North Downtown Distribution:** Construct about 3,000 feet of 16-inch diameter pipeline through the northern Downtown area to provide distribution and fire flow capacity as the area develops.	$1,195,000
Distribution – Development Driven **10+ yrs**	10	**North Industrial Distribution:** Construct about 2,600 feet of 12-inch diameter pipeline to connect 2000 N and 1600 N as the area develops.	$911,000
Total			**$8,992,000**

1. Costs listed are in 2024 dollars and are not adjusted for inflation.
2. It is anticipated that these projects may be installed by the developer with City participation.

FUNDING OPTIONS

Funding options for the recommended projects, in addition to water use fees, include: general obligation bonds, revenue bonds, State/Federal grants and loans, and impact fees. In reality, the City may need to consider a combination of these funding options. The following discussion describes each of these options.

General Obligation Bonds

This form of debt enables the City to issue general obligation bonds for capital improvements and replacement. General Obligation (G.O.) bonds would be used for items not typically financed through the Water Revenue Bonds (for example, the purchase of water source to ensure a sufficient water supply for the City in the future). G.O. bonds are debt instruments backed by the full faith and credit of the City which would be secured by an unconditional pledge of the City to levy assessments, charges, or ad valorem taxes necessary to retire the bonds. G.O. bonds are the lowest-cost form of debt financing available to local governments and can be combined with other revenue sources such as specific fees, or special assessment charges to form a dual security through the City's revenue-generating authority. These bonds are supported by the City as a whole, so the amount of debt issued for the water system is limited to a fixed percentage of the real market value for taxable property within the City. G.O. bonds must be approved by a citizen vote.

Revenue Bonds

This form of debt financing is also available to the City for utility-related capital improvements. Unlike G.O. bonds, revenue bonds are not backed by the City as a whole, but constitute a lien against the water service charge revenues of a Water Utility. Revenue bonds present a greater risk to the lender than do G.O. bonds, since repayment of debt depends on an adequate revenue stream, legally defensible rate structure, and sound fiscal management by the issuing jurisdiction. Due to this increased risk, revenue bonds generally require a higher interest rate than G.O. bonds, although current interest rates are quite low. This type of debt also has very specific coverage requirements in the form of a reserve fund specifying an amount, usually expressed in terms of average or maximum debt service due in any future year. This debt service is required to be held as a cash reserve for annual debt service payment to the benefit of bondholders. Typically, voter approval is not required when issuing revenue bonds.

State or Federal Grants and Loans

Historically, both local and county governments have experienced significant infrastructure funding support from state and federal government agencies in the form of block grants, direct grants in aid, interagency loans, and general revenue sharing. Federal expenditure pressures and virtual elimination of federal revenue sharing are clear indicators that local government may be left to its own devices regarding infrastructure finance in general. However, state or federal grants and loans should be further investigated as a possible funding source for needed water system improvements.

It is also important to assess likely trends regarding state or federal assistance in infrastructure financing. Future trends indicate that grants will be replaced by loans through a public works revolving fund. Local governments can expect to access these revolving funds or public works trust funds by demonstrating both the need for and the ability to repay the borrowed monies, with interest. As with the revenue bonds discussed earlier, the ability of infrastructure programs to wisely manage their own finances will be a key element in evaluating whether many secondary funding sources, such as federal/state loans, will be available to the City.

Impact Fees

The Utah Impact Fees Act, codified in Title 11, Chapter 36a, of the Utah Code, authorizes municipalities to collect impact fees to fund public facilities. An impact fee is "a payment of money imposed upon new development activity . . . to mitigate the impact of the new development on public infrastructure" (Subsection 11-36a-102(8)). Impact fees enable local governments to finance infrastructure improvements without burdening existing development with costs that are exclusively attributable to growth.

Impact fees can be applied to water-related facilities under the Utah Impact Fees Act. The Act is designed to provide a logical and clear framework for establishing new development assessments. It is also designed to establish the basis for the fee calculation which the City must follow in order to comply with the statute. The fundamental objective for the fee structure is the imposition on new development of only those costs associated with providing or expanding water infrastructure to meet the capacity needs created by that specific new development. Impact fees cannot be applied retroactively.

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APPENDIX A

System-Specific Sizing Requirements

MEMORANDUM

DATE:	December 31, 2023
TO:	Nathan Lunstad Plan Review Program Manager Utah Division of Drinking Water 195 North 1950 West Salt Lake City, UT 84116
FROM:	Ridley Griggs, M.Eng., P.E. Hansen, Allen & Luce, Inc. (HAL) 859 W South Jordan Parkway South Jordan, Utah 84095
SUBJECT:	Vineyard City system-specific sizing

Summary

The purpose of this memorandum is to request updated system-specific sizing requirements for Vineyard City, Utah.

Vineyard's sizing standards were last defined based on an engineering study provided by HAL to the DDW in 2019. Since then, several years have passed, and additional water use data is available.

The proposed system-specific sizing requirements in this memorandum are based on standard DDW guidance and actual water use data. The minimum sizing requirements proposed in this study are summarized in **Table 1**. Supporting information, assumptions, and justifications used to produce these numbers are included in subsequent sections and appendices.

Table 1: Proposed Vineyard City System-Specific Sizing Requirements

	Requirement	Value
Proposed Equalization Storage Sizing	Average Annual	590 gallons per ERC
Proposed Source Sizing	Peak Day	1,248 gallons per day per ERC (0.87 gpm/ERC)

Background

Water production and billing data have been extensively evaluated during this effort, and are used herein to propose minimum sizing requirements for the Vineyard City drinking water system. The past three years of water use data (2020-2022) were reviewed and found acceptable for purposes of establishing minimum sizing requirements.

Available data

Vineyard City meters and bills customers for their drinking water use. The billing reports obtained from Vineyard included monthly totals of drinking water use separated into four categories: Commercial, Institutional, Residential and Industrial. The billing data showed highest usage in the months of July and August. The billing data was found to be complete.

Vineyard City purchases its water from Orem City and CUWCD.

Methodology

The methodology used for calculations is consistent with that found in DDW guidance.

Equivalent Residential Connections

Table 2 shows the ERC count for Vineyard City at the end of years 2020 through 2022.

Table 2: Vineyard City ERCs

Year	ERCs
2022	3,326
2021	3,179
2020	3,017

Storage and Average Yearly Demand

The proposed storage requirement is equivalent to the volume of water used by one ERC on an average day. Average Yearly Demand was calculated per ERC, based on water production and consumption data provided by the City.

Table 4 shows the average yearly demand and storage requirements for years 2020 through 2022.

Table 4: Vineyard City Proposed Storage Requirement per ERC

Year	ERCs	Water Produced (ac-ft)	Water Wholesaled (ac-ft)	Average Yearly Demand (ac-ft/ERC)	Storage Requirement (gal/ERC)
2022	3,326	1,916.17	0	0.58	514
2021	3,179	1,952.75	94.36	0.58	522
2020	3,017	2,155.41	159.18	0.66	590

Average Yearly Demand is calculated as follows:

Average Yearly Demand per ERC = (Water Produced – Water Wholesaled) / ERC

Storage Requirement is calculated as follows:

Storage Requirement = (Avg Yearly Demand per ERC) / (365 days/yr)

The highest requirement of these three years is **590 gal/ERC** or **0.66 ac-ft/ERC**.

Peak Day Source

Peak Day production data was recorded and reported for years 2020 through 2022 and used to compute peak day demand per ERC. See **Table 5**.

Table 5: Vineyard City Peak Day Source Requirement per ERC

Year	ERCs	Peak Day Production (Ac-Ft)	Peak Day Requirement (gpd/ERC)
2022	3,326	10.99	1,077
2021	3,179	10.62	1,088
2020	3,017	11.56	1,248

Peak Month Residential Production is calculated as follows:

*Peak Month Production = Peak Month Billed * (1 + Percent Non-Revenue Water)*

Peak Day Requirement is calculated as follows:

Peak Day Requirement = Peak Day Production / ERCs

The highest requirement of these three years is **1,248 gpd/ERC**.

Proposed System Sizing

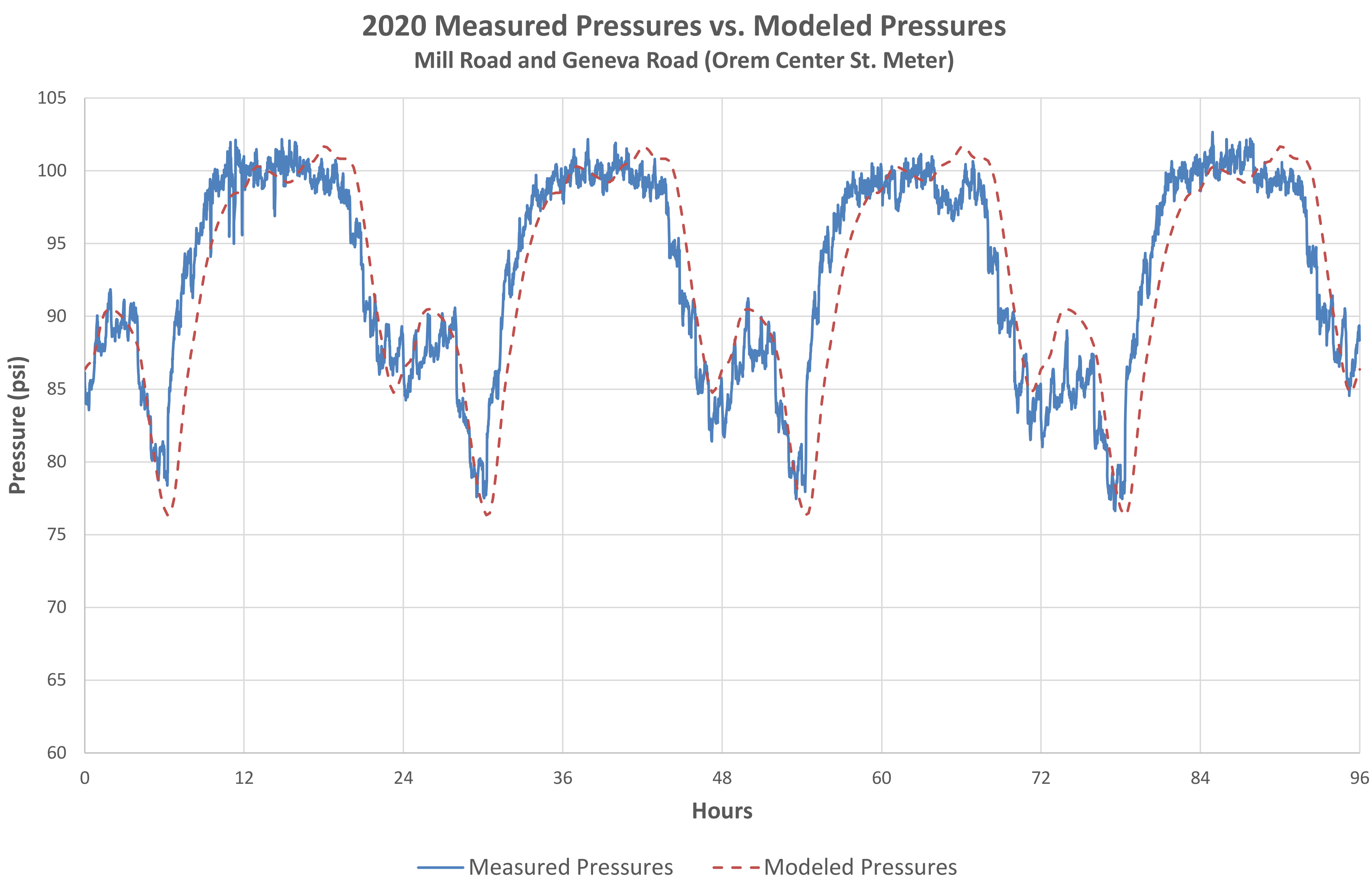
The proposed system sizing values for one ERC are shown in **Table 6**.

Table 6: Proposed minimum sizing requirements

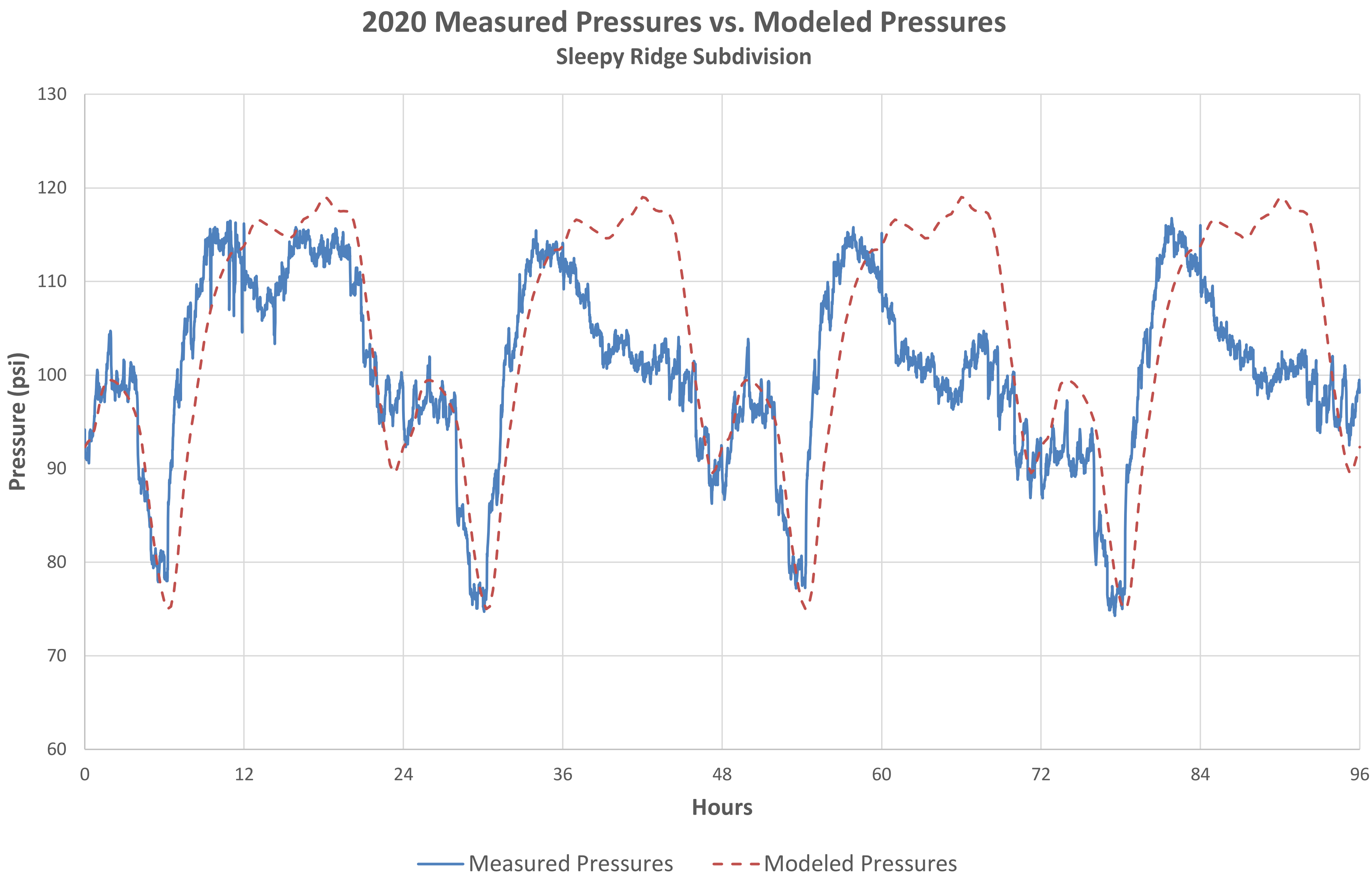
Requirement per ERC	Proposed Value
Peak Day Source (gpd)	1,248
Storage (gal)	590

APPENDIX B

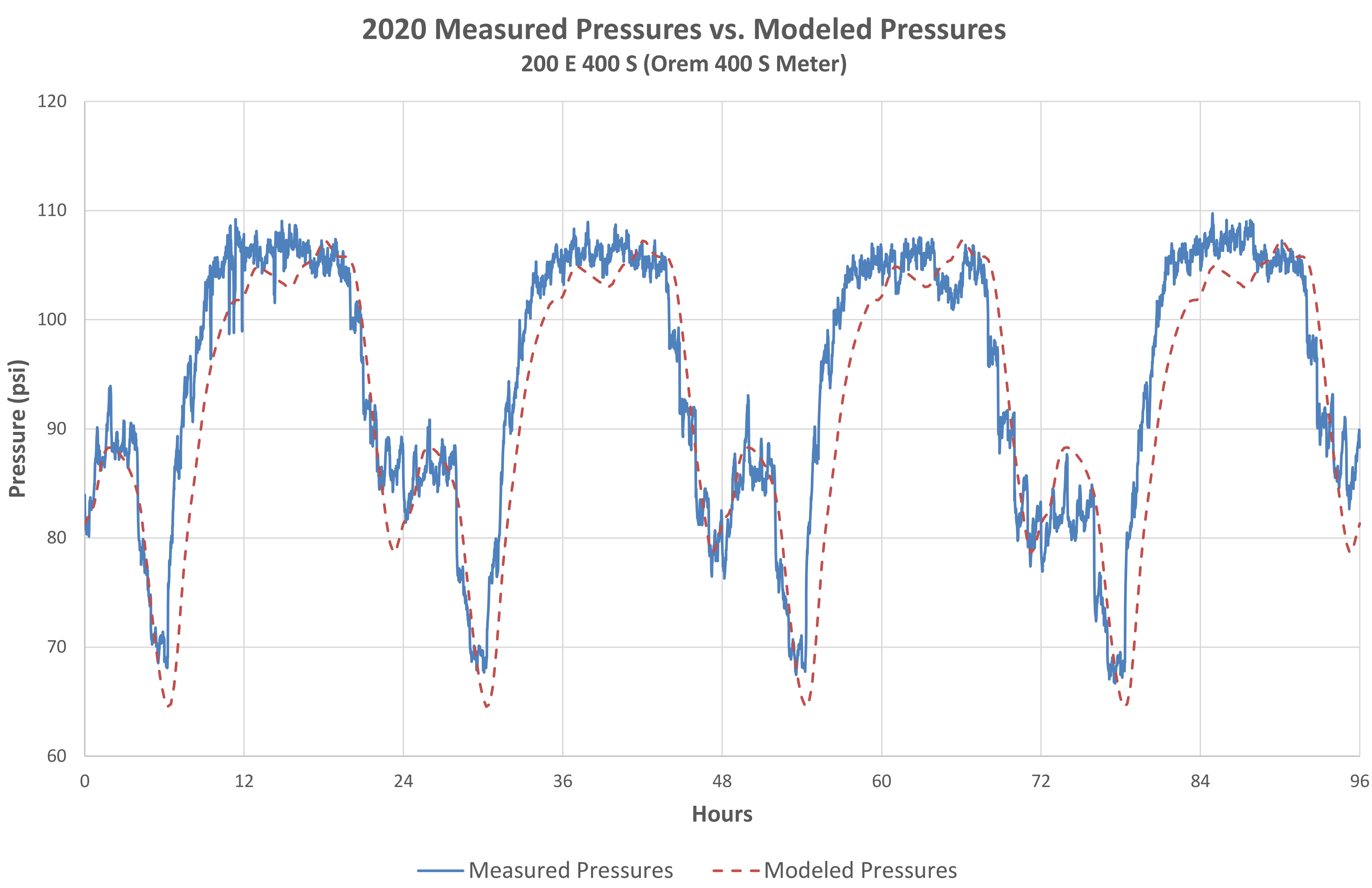
Model Calibration Data



2020 Measured Pressures vs. Modeled Pressures
Mill Road and Geneva Road (Orem Center St. Meter)
Pressure (psi)
105
100
95
90
85
80
75
70
65
60
0
12
24
36
48
60
72
84
96
Hours
Measured Pressures
Modeled Pressures



2020 Measured Pressures vs. Modeled Pressures
Sleepy Ridge Subdivision
Pressure (psi)
130
120
110
100
90
80
70
60
0
12
24
36
48
60
72
84
96
Hours
Measured Pressures
Modeled Pressures


2020 Measured Pressures vs. Modeled Pressures
200 E 400 S (Orem 400 S Meter)
Pressure (psi)
120
110
100
90
80
70
60
0
12
24
36
48
60
72
84
96
Hours
Measured Pressures
Modeled Pressures

APPENDIX C

Growth Projections

Residential Demand Summary

Year	Housing units					Population	Water Requirements		
	Single-family units	Townhomes	Town Center/Forge Condos	Other condos	Total units		Peak Day Demand (gpm)	Average Yearly Demand (ac-ft/yr)	Storage Requirement (MG)
2023	1935	1355	0	2335	5625	22500	3047	2130	1.99
2024	2151	1412	720	2335	6618	24816	3336	2555	2.39
2025	2367	1412	1440	2335	7554	26904	3601	2962	2.77
2026	2583	1412	2160	2335	8490	28992	3866	3369	3.15
2027	2607	1412	2880	2335	9234	30312	3964	3666	3.42
2028	2607	1412	3600	2335	9954	31536	4042	3949	3.67
2029	2607	1412	4320	2335	10674	32760	4119	4233	3.92
2030	2607	1412	5040	2335	11394	33984	4197	4516	4.18
2031	2607	1412	5760	2335	12114	35208	4274	4800	4.43
2032	2607	1412	6480	2335	12834	36432	4352	5083	4.68
2033	2607	1412	7200	2335	13554	37656	4429	5366	4.94
2034	2607	1412	7920	2335	14274	38880	4507	5650	5.19
2035	2607	1412	8640	2335	14994	40104	4584	5933	5.44
2036	2607	1412	9360	2335	15714	41328	4662	6217	5.70
2037	2607	1412	10080	2335	16434	42552	4739	6500	5.95
2038	2607	1412	10800	2335	17154	43776	4817	6783	6.20
2039	2607	1412	11520	2335	17874	45000	4894	7067	6.46
2040	2607	1412	12240	2335	18594	46224	4972	7350	6.71
2041	2607	1412	12960	2335	19314	47448	5049	7634	6.96
2042	2607	1412	13680	2335	20034	48672	5127	7917	7.22
2043	2607	1412	14400	2335	20754	49896	5204	8200	7.47
2044	2607	1412	14600	2335	20954	50236	5226	8279	7.54
2045	2607	1412	14600	2335	20954	50236	5226	8279	7.54
2046	2607	1412	14600	2335	20954	50236	5226	8279	7.54
2047	2607	1412	14600	2335	20954	50236	5226	8279	7.54
2048	2607	1412	14600	2335	20954	50236	5226	8279	7.54
2049	2607	1412	14600	2335	20954	50236	5226	8279	7.54
2050	2607	1412	14600	2335	20954	50236	5226	8279	7.54
2051	2607	1412	14600	2335	20954	50236	5226	8279	7.54
2052	2607	1412	14600	2335	20954	50236	5226	8279	7.54
2053	2607	1412	14600	2335	20954	50236	5226	8279	7.54
2054	2607	1412	14600	2335	20954	50236	5226	8279	7.54
2055	2607	1412	14600	2335	20954	50236	5226	8279	7.54

Nonresidential Demand Summary

Area	Acreage	Buildout PDD (gpm)	Buildout Av. Yearly Demand (ac-ft/yr)	Year Development Starts	Years to Buildout
North Industrial/East Geneva	593.0	1719.7	978.5	2020	35
UVU	225.0	532.0	658.4	2025	30
East Side Commercial	130.0	247.0	143.0	2024	15
Megaplex/The Yard	40.8	77.5	44.9	2020	5
Geneva Frontage Central	23.2	44.1	25.5	2020	10
Geneva Frontage South	16.9	32.1	18.6	2025	3
Town Center	323.3	158.2	218.8	2024	20
The Forge	46.0	87.7	278.3	2025	5

Year	Peak Day Demand (gpm)	Average Yearly Demand (ac-ft/yr)	Storage Requirement (MG)
2023	381	221.0	0.20
2024	470	278.4	0.25
2025	589	410.5	0.37
2026	709	542.6	0.48
2027	828	674.7	0.60
2028	938	801.1	0.72
2029	1047	927.5	0.83
2030	1135	995.9	0.89
2031	1223	1064.4	0.95
2032	1311	1132.8	1.01
2033	1399	1201.3	1.07
2034	1488	1269.7	1.13
2035	1576	1338.2	1.19
2036	1664	1406.6	1.26
2037	1752	1475.1	1.32
2038	1840	1543.5	1.38
2039	1911	1602.4	1.43
2040	1983	1661.3	1.48
2041	2055	1720.3	1.54
2042	2126	1779.2	1.59
2043	2198	1838.1	1.64
2044	2261	1886.1	1.68
2045	2325	1934.1	1.73
2046	2389	1982.0	1.77
2047	2452	2030.0	1.81
2048	2516	2078.0	1.86
2049	2580	2126.0	1.90
2050	2644	2174.0	1.94
2051	2707	2221.9	1.98
2052	2771	2269.9	2.03
2053	2835	2317.9	2.07
2054	2898	2365.9	2.11
2055	2898	2365.9	2.11

Total Demand Summary

Year	Peak Day Demand (gpm)	Average Yearly Demand (ac-ft/yr)	ERCs
2023	3917	2234.7	4519
2024	4295	2660.0	4956
2025	4679	3066.9	5399
2026	5102	3494.4	5887
2027	5359	3812.1	6184
2028	5586	4116.0	6445
2029	5812	4419.9	6706
2030	6017	4723.8	6943
2031	6262	5048.6	7225
2032	6427	5332.0	7416
2033	6593	5615.4	7607
2034	6758	5898.8	7798
2035	6924	6182.2	7989
2036	7089	6465.6	8180
2037	7255	6749.1	8371
2038	7421	7032.5	8562
2039	7570	7315.9	8734
2040	7719	7599.3	8906
2041	7868	7882.7	9078
2042	8017	8166.2	9250
2043	8166	8449.6	9422
2044	8251	8528.3	9521
2045	8315	8528.3	9594
2046	8379	8528.3	9668
2047	8442	8528.3	9741
2048	8506	8528.3	9815
2049	8570	8528.3	9888
2050	8633	8528.3	9962
2051	8697	8528.3	10035
2052	8761	8528.3	10109
2053	8824	8528.3	10182
2054	8888	8528.3	10255
2055	8888	8528.3	10255

APPENDIX D

Estimated Project Costs

Vineyard City Capital Facility Plan
Drinking Water Recommended Improvements
Preliminary Engineers Cost Estimates

	Item	Unit	Unit Price	Quantity		Total Price
1	***Backbone Infrastructure Project***					
	6 MG Tank and Pump Station*	LS	$16,401,404.69	1	$	16,401,405
	Pipelines*	LS	$13,753,752.52	1	$	13,753,753
	* Actual Contract Costs		Engineering & Admin. (included above)		$	-
			Contingency (N/A)		$	-
			Total to Backbone Infrastructure Project		**$**	**30,155,157**
2	***Mill Road North Extension***					
	16-inch diameter pipe	LF	$ 332	5500	$	1,826,000
			Engineering & Admin. (10%)		$	182,600
			Contingency (10%)		$	182,600
			Total to Mill Road North Extension		**$**	**2,191,000**
3	***Pump Station Upgrade***					
	400 hP pump	LS	$ 120,000	2	$	240,000
	VFD and Conductors	LS	$ 100,000	2	$	200,000
	Generator	LS	$ 150,000	1	$	150,000
			Engineering & Admin. (10%)		$	59,000
			Contingency (10%)		$	59,000
			Total to Pump Station Upgrade		**$**	**708,000**
4	***Storage Expansion***					
	Concrete Storage Tank	GAL	$ 1.50	3000000	$	4,500,000
			Engineering & Admin. (10%)		$	450,000
			Contingency (10%)		$	450,000
			Total to Storage Expansion		**$**	**5,400,000**
5	***South Downtown Distribution***					
	16-inch diameter pipe	LF	$ 332	5500	$	1,826,000
			Engineering & Admin. (10%)		$	182,600
			Contingency (10%)		$	182,600
			Total to South Downtown Distribution		**$**	**2,191,000**
6	***Holdaway Farms Distribution***					
	12-inch diameter pipe	LF	$ 292	2600	$	759,200
			Engineering & Admin. (10%)		$	75,920
			Contingency (10%)		$	75,920
			Total to Holdaway Farms Distribution		**$**	**911,000**
7	***East Geneva Distribution 1***					
	12-inch diameter pipe	LF	$ 292	5200	$	1,518,400
			Engineering & Admin. (10%)		$	151,840
			Contingency (10%)		$	151,840
			Total to East Geneva Distribution 1		**$**	**1,822,000**
8	***East Geneva Distribution 2***					
	12-inch diameter pipe	LF	$ 292	5600	$	1,635,200
			Engineering & Admin. (10%)		$	163,520
			Contingency (10%)		$	163,520
			Total to East Geneva Distribution 2		**$**	**1,962,000**
9	***North Downtown Distribution***					
	16-inch diameter pipe	LF	$ 332	3000	$	996,000
			Engineering & Admin. (10%)		$	99,600
			Contingency (10%)		$	99,600
			Total to North Downtown Distribution		**$**	**1,195,000**
10	***North Industrial Distribution***					
	12-inch diameter pipe	LF	$ 292	2600	$	759,200
			Engineering & Admin. (10%)		$	75,920
			Contingency (10%)		$	75,920
			Total to North Industrial Distribution		**$**	**911,000**
			Total Costs		**$**	**47,446,000**

APPENDIX E

Checklist for Hydraulic Model Design Elements Report

DRINKING WATER
IMPACT FEE FACILITY PLAN

(HAL Project No.: 319.04.100)

DRAFT

May 2025

VINEYARD CITY

DRINKING WATER IMPACT FEE FACILITY PLAN

(HAL Project No.: 319.04.100)

DRAFT

Ridley J. Griggs, P.E.
Project Manager

HANSEN ALLEN & LUCE INC ENGINEERS

May 2025

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CHAPTER 1 INTRODUCTION

PURPOSE AND SCOPE

The City of Vineyard is located in north-central Utah County on the eastern shore of Utah Lake. The City is experiencing growth. To ensure availability of funds for growth-related infrastructure projects, an Impact Fee Facility Plan (IFFP) was commissioned by the City.

This report identifies those items that the Utah Impact Fees Act specifically requires, including demands placed upon existing facilities by new development and the proposed means by which the municipality will meet those demands.

IMPACT FEE COLLECTION

An impact fee is a one-time charge on new development to pay for that portion of a public facility that is required to support that new development. Impact fees enable local governments to finance public facility improvements necessary for growth, without burdening existing customers with costs that are exclusively attributable to growth.

In order to determine the appropriate impact fee, the cost of the facilities associated with future development must be proportionately distributed. As a guideline in determining the "proportionate share", the fee must be found to be roughly proportionate and reasonably related to the impact caused by the new development.

CAPITAL FACILITIES PLAN

A drinking water system master plan was prepared in conjunction with this analysis and is incorporated by reference into this analysis.

The master plan for the City's drinking water system is more comprehensive than the IFFP. It provides the basis for the IFFP and IFA and identifies all capital facilities required of the drinking water system for the 20-year planning range, including maintenance, repair, replacement, and growth-related projects. The recommendations made within the master plan are in compliance with current City policies and standard engineering practices.

A hydraulic model of the drinking water system was prepared to aid in the analyses performed to complete the drinking water system master plan. The model was used to assess existing performance, to establish a proposed level of service and to confirm the effectiveness of the proposed capital facility projects to maintain the proposed level of service over the next 10 years.

CHAPTER 2 SYSTEM DEMAND AND CAPACITY

GENERAL

The purpose of this section is to identify the current level of service, characterize the facilities of the existing system, and determine the remaining capacity of these facilities.

The existing drinking water system is comprised of a distribution network, water storage facilities, and water sources. These facilities are found within two pressure zones. Figure 2-1 illustrates the existing water system and its service area.

LEVEL OF SERVICE

A level of service (LOS) has been established for Vineyard City for the drinking water system. The level of service establishes the sizing criteria for the Area's distribution facilities, source facilities, storage facilities, and water rights. The level of service standards are shown below:

Level of Service

- Peak Day Demand: 1,248 gpd/ERC
- Indoor Storage Capacity (Equalization): 590 gallons/ERC
- Indoor Fire Storage Capacity: 58 gallons/ERC (0.6 MG fire storage requirement at buildout divided by the number of ERCs at buildout (10,260))
- Distribution Capacity: 40 psi minimum during peak day demand conditions, and 30 psi minimum during peak instantaneous conditions

Fire Suppression

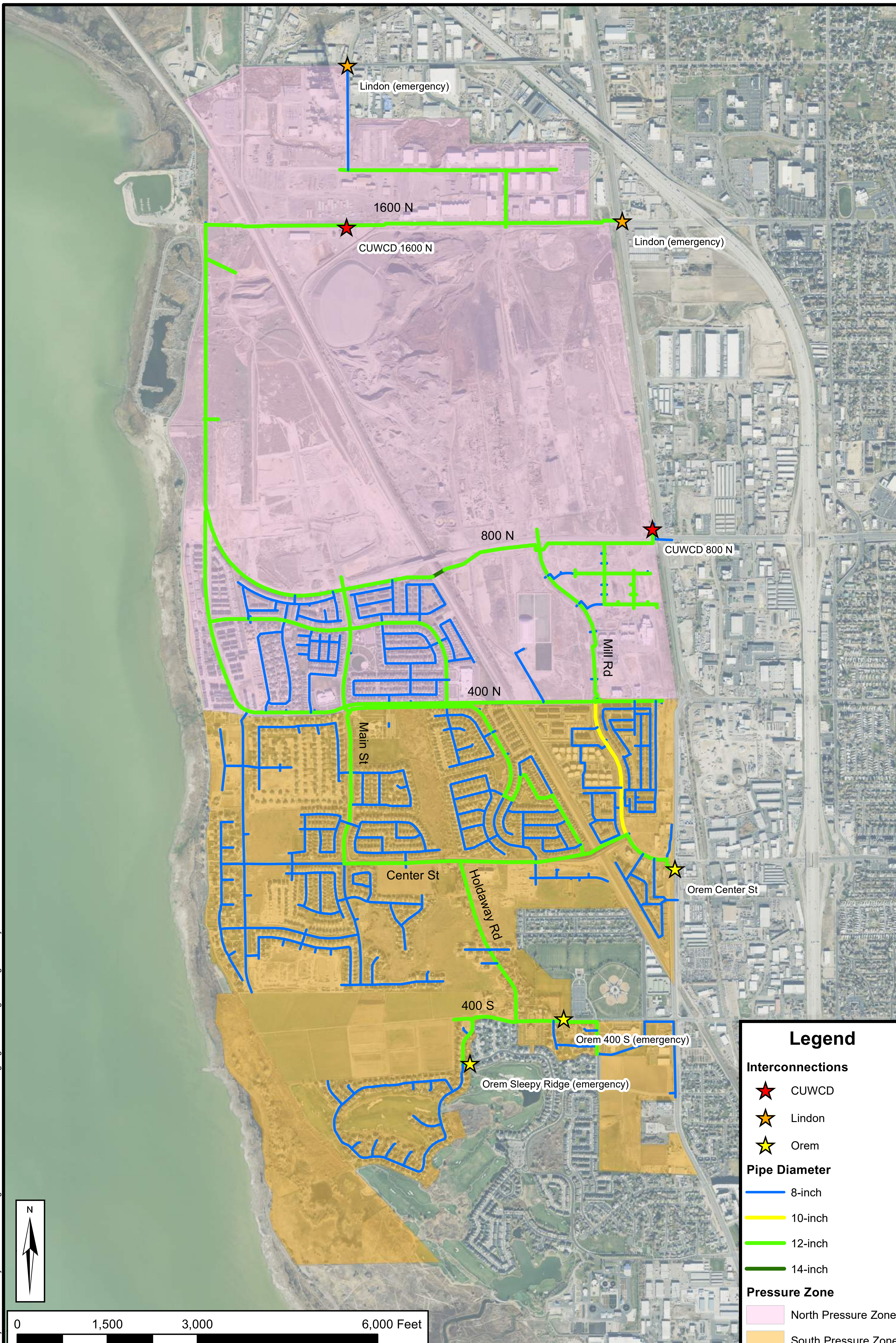
- Minimum Fire Flow: 1,500 gpm for 2 hours
- Maximum Fire Flow: 2,500 gpm for 4 hours
- Fire Storage (buildout): 600,000 gallons
- Minimum Pressure: 20 psi residual during peak day + fire flow event

EXISTING AND FUTURE EQUIVALENT RESIDENTIAL CONNECTIONS

Water demands from non-residential water users, such as commercial, industrial, or civic water users have been determined in terms of an Equivalent Residential Connection (ERC). The use of ERCs is a common engineering practice used to describe the entire system's usage based on a common unit of measurement. An ERC is equal to the average demand of one average single-family residential connection in Vineyard City. Using ERCs for analysis is a way to allocate existing and future demands over non-residential land uses.

Vineyard operates a pressurized irrigation (PI) system that provides water service to certain institutional properties. It will also be expanded to some other properties in the future.

Table 2-1 includes a summary of ERCs for each pressure zone under existing conditions and at buildout.



Date: 2/20/2024
Document Path: H:\Projects\319 - Vineyard\04.100 Drinking Water Master Plan\GIS\Working\Fig 2-1 Existing Drinking Water System.mxd

HANSEN ALLEN & LUCE INC ENGINEERS

VINEYARD DRINKING WATER MASTER PLAN	EXISTING DRINKING WATER SYSTEM	FIGURE 2-1

Table 2-1
Existing and Future Service by Pressure Zone

Pressure Zone	Existing ERCs	Buildout ERCs[1]
North	1,090	-
South	2,240	-
Total	**3,330**	**10,260**

1. At buildout, the system will have one pressure zone.

METHODOLOGY USED TO DETERMINE EXISTING SYSTEM CAPACITY

Each component of the drinking water system were assessed in terms of gallons per minute (for peak day source), acre-feet per year (for annual source), or gallons (for storage). Demands on each component were computed by applying the level of service to the number of ERCs. The difference between the capacity of the component and the demand on the component is the component's remaining capacity, which can be used to serve ERCs. A hydraulic model was developed for the purpose of assessing system operation and distribution capacity.

SOURCE CAPACITY

Source capacity in the drinking water system is currently provided through agreements with the City of Orem and Central Utah Water Conservancy District (CUWCD). Vineyard is currently working to secure additional source capacity with CUWCD and is planning to assess fees for this water separate from the impact fee. As such, source capacity is not covered in detail in this IFFP.

STORAGE CAPACITY

Storage capacity in the drinking water system is currently provided through agreements with the City of Orem and Central Utah Water Conservancy District (CUWCD). The City has secured long-term storage capacity in the CUWCD system. The storage agreement with the City of Orem is temporary. Storage capacity secured through long-term agreement is listed in Table 2-2. Capacity secured through temporary agreements is not listed.

Table 2-2
Existing Storage Capacity

Parameter	Storage (MG)
Long-Term Capacity[1]	2.00
System Requirement[2]	3.04
Difference	**-1.04**

1. Long-term storage capacity secured through agreements with CUWCD.
2. See Table 4-4 in the Drinking Water Master Plan

Currently, the City does not have long-term excess storage capacity secured through contract agreements but is meeting current requirements through a temporary agreement with Orem.

DISTRIBUTION SYSTEM

Pipe diameters range from 4 inches to 20 inches, with the majority being 8 inches in diameter. The function of the larger pipes in the system is to facilitate filling of the storage tanks and meet peak day and fire flow demands. Smaller pipes facilitate local distribution. Figure 2-1 in the Drinking Water Master Plan illustrates the existing distribution pipelines. A hydraulic model was used to identify future pipeline projects (see Chapter 3 for details). All pipeline projects were sized to meet projected buildout requirements. A summary of capacity remaining in the distribution system is summarized in Table 2-3.

Table 2-3
Capacity of Distribution Pipes

System Component	Capacity (ERCs)	Existing (ERCs)	Remaining Capacity (ERCs)
Distribution Pipes	10,260	3,330	6,930

CHAPTER 3 IMPACT FEE FACILITY PLAN

This section relies on the data presented in the previous sections to identify projects needed to support future growth, their planned capacity, and their estimated costs. Also included in this section are the possible revenue sources that the City may consider for funding the recommended projects.

GROWTH PROJECTIONS

The development of impact fees requires growth projections over the next ten years. Growth projections for Vineyard City were made by incorporating the growth rate presented in the Master Plan. Total growth projections for the City through the 10-year planning horizon are summarized in Table 3-1. Areas of projected growth are shown in Figure 3-1.

Table 3-1
Growth Projections

Year	ERCs
2024	3,330
2025	3,935
2026	4,549
2027	5,226
2028	5,637
2029	5,999
2030	6,361
2031	6,689
2032	7,080
2033	7,345
2034	7,610
10-year Difference	**+4,280**

The existing system served about 3,330 ERCs at the beginning of 2024. Projected growth adds 4,280 ERCs in the next 10 years for a total of 7,610 ERCs.

FUTURE STORAGE REQUIREMENTS

Projected storage requirements for Vineyard City are calculated based on anticipated growth in the next ten years and the LOS. Table 3-2 shows source requirements for future growth.

Table 3-2
10-Year Storage Requirements and Capacity

10-Year Growth (ERCs)	Level of Service (gal/ERC)	Requirement (MG)	Capacity Remaining[1] (MG)	Surplus/Deficit (MG)
4,280	590	2.53	-1.04	-3.57

1. See Table 2-2.

Table 3-3 indicates that the existing storage capacity is inadequate to meet demands in the 10-year window. Additional storage capacity is needed.

Impact fees for source and storage will be computed based on the cost of existing facilities and future projects needed to provide capacity within the 10-year planning window.

COST OF FUTURE FACILITIES

The facilities and costs presented in Table 3-3 and Table 3-4 and shown on Figure 9-1 in the Drinking Water Master Plan represent future projects that are impact fee eligible. These proposed projects are essential to maintain the current level of service while accommodating future growth within the next 10 years. The facility sizing for the future proposed projects was based on the proposed level of service with growth projections and hydraulic modeling. The proposed impact fee will be based on the projected cost of future construction projects. Detailed cost estimates for the impact fee-eligible projects are included in Appendix A.

There are no projects listed in the Drinking Water Master Plan which are 100% related to correcting existing deficiencies.

Cost estimates of the projects that are only partially impact fee eligible are described in Table 3-3.

Table 3-3
Estimated Cost of Future Facilities Partially Impact Fee Eligible

Project	Map ID	Type of Project	Total Cost	% Impact Fee Eligible	Total Impact Fee Eligible Cost
6.0 MG Storage Tank	1	Storage	$10,539,102	64%[1]	$6,746,015
Booster Pump Station	1	Distribution	$7,026,068	68%[2]	$4,745,678
Pipeline Projects (see Table 9-1 of the Drinking Water Master Plan)	1	Distribution	$14,270,267	68%[2]	$9,638,689
Total		**-**	**$31,835,437**	**-**	**$21,130,381**

1. Eligible cost is calculated as the remainder of the total number of existing ERCs (3,330) divided by the total number of ERCs (9,252) served from 6.0 MG storage tanks. Number of ERCs were found by dividing the storage capacity the LOS at buildout (Equalization: 590 gal/ERC & Fire Storage: 58 gal/ERC).
2. Impact fee eligible for the distribution facilities was conservatively estimated as the difference between the existing ERC count (3,330) and the projected ERC count at 2060 (10,260).

Cost estimates for the future projects shown in Table 3-4 are considered to be 100% eligible as they are only necessary to support future growth. Each of these projects is planned to be constructed within the next 10 years and are sized to provide capacity through buildout.

Table 3-4
Estimated Cost of Future Facilities Fully Impact Fee Eligible

Project	Map ID	Distribution	Storage	Total
Mill Road North Extension	2	$2,191,000	$0	**$2,191,000**
Pump Station Upgrade	3	$708,000	$0	**$708,000**
South Downtown Distribution	5	$2,191,000	$0	**$2,191,000**
Holdaway Farms Distribution	6	$911,000	$0	**$911,000**
East Geneva Distribution 1	7	$1,822,000	$0	**$1,822,000**
Total		**$7,823,000**	**$0**	**$7,823,000**

Planning

Planning services are also needed to support growth. The City intends to update their master plans approximately every 5 years and their impact fee studies approximately every 3 years. Considering this schedule, and the cost of the most recent impact fee updates, the ERCs served by each plan update were calculated as shown in Table 3-5.

Date: 4/30/2025
Document Path: H:\Projects\319 - Vineyard\04.100 Drinking Water Master Plan\GIS\Working\Figure 3-1 Projected 10-Yr Capital Facilities Plan Growth Areas.mxd

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VINEYARD CITY
DRINKING WATER SYSTEM

PROJECTED 10-YEAR
GROWTH AREAS

FIGURE
3-1

Table 3-5
Planning Component of Impact Fee

Planning Document	Cost	% of Plan Associated with Growth[1]	ERCs Served[2]
2024 Drinking Water System Master Plan	$107,932.00	60%	1,896
2024 IFFP and IFA	$20,200.00	100%	2,669
Total	**$128,132.00**	**-**	**-**

1. Percentages to growth for the master plan was based on a review of the scope of the plan and associated fees for tasks associated with the existing system and future growth. The IFFP and IFA are 100% associated with growth.
2. ERCs served was defined as the amount of ERCs expected to develop during the 5-year life of the master plan and the 3-year life of the IFFP and IFA, respectively. See Table 3-1.

IMPACT FEES BY METER SIZE

Vineyard City assesses impact fees based on meter size. Vineyard considers a standard 3/4-inch meter as one ERC. Larger meters are assessed a capacity in ERCs based on American Water Works Association (AWWA) capacity factors. See Appendix B. Table 3-6 includes a summary of ERCs by meter size.

Table 3-6
ERCs by Meter Size

Meter Size	ERCs
3/4”	1
1”	1.67
1 ½”	3.33
2”	5.33
3”	10.00
4”	16.67
6”	33.33
8”	53.33
10”	76.67

NON-STANDARD IMPACT FEES

In cases where it is determined that the use of meter sizes to assess impact fees would not lead to an equitable result, ERCs may instead be calculated based on estimated peak day demand as follows:

$$\text{ERCs} = (\text{peak day demand, gpd}) \;/\; (1{,}248\ \text{gpd/ERC})$$

Examples where a meter size may not produce an equitable result include instances where a development uses multiple meters rather than a single meter or when the meter multiplier does not accurately reflect the expected multiplier of the customer as compared to a standard ERC.

REFERENCES

State of Utah. 2014c. Utah Code Annotated, Section Utah Code 11-36a: Impact Fees Act

Vineyard City. 2025. Hansen, Allen & Luce. Drinking Water System Master Plan

APPENDIX A

Estimated Project Costs

Vineyard City Capital Facility Plan
Drinking Water Recommended Improvements
Preliminary Engineers Cost Estimates

	Item	Unit	Unit Price	Quantity	Total Price
1	***Backbone Infrastructure Project***				
	6 MG Tank and Pump Station*	LS	$16,401,404.69	1	$ 16,401,405
	Pipelines*	LS	$13,753,752.52	1	$ 13,753,753
	* Actual Contract Costs		Engineering & Admin. (included above)		$ -
			Contingency (N/A)		$ -
			Total to Backbone Infrastructure Project		**$ 30,155,157**
2	***Mill Road North Extension***				
	16-inch diameter pipe	LF	$ 332	5500	$ 1,826,000
			Engineering & Admin. (10%)		$ 182,600
			Contingency (10%)		$ 182,600
			Total to Mill Road North Extension		**$ 2,191,000**
3	***Pump Station Upgrade***				
	400 hP pump	LS	$ 120,000	2	$ 240,000
	VFD and Conductors	LS	$ 100,000	2	$ 200,000
	Generator	LS	$ 150,000	1	$ 150,000
			Engineering & Admin. (10%)		$ 59,000
			Contingency (10%)		$ 59,000
			Total to Pump Station Upgrade		**$ 708,000**
4	***Storage Expansion***				
	Concrete Storage Tank	GAL	$ 1.50	3000000	$ 4,500,000
			Engineering & Admin. (10%)		$ 450,000
			Contingency (10%)		$ 450,000
			Total to Storage Expansion		**$ 5,400,000**
5	***South Downtown Distribution***				
	16-inch diameter pipe	LF	$ 332	5500	$ 1,826,000
			Engineering & Admin. (10%)		$ 182,600
			Contingency (10%)		$ 182,600
			Total to South Downtown Distribution		**$ 2,191,000**
6	***Holdaway Farms Distribution***				
	12-inch diameter pipe	LF	$ 292	2600	$ 759,200
			Engineering & Admin. (10%)		$ 75,920
			Contingency (10%)		$ 75,920
			Total to Holdaway Farms Distribution		**$ 911,000**
7	***East Geneva Distribution 1***				
	12-inch diameter pipe	LF	$ 292	5200	$ 1,518,400
			Engineering & Admin. (10%)		$ 151,840
			Contingency (10%)		$ 151,840
			Total to East Geneva Distribution 1		**$ 1,822,000**
8	***East Geneva Distribution 2***				
	12-inch diameter pipe	LF	$ 292	5600	$ 1,635,200
			Engineering & Admin. (10%)		$ 163,520
			Contingency (10%)		$ 163,520
			Total to East Geneva Distribution 2		**$ 1,962,000**
9	***North Downtown Distribution***				
	16-inch diameter pipe	LF	$ 332	3000	$ 996,000
			Engineering & Admin. (10%)		$ 99,600
			Contingency (10%)		$ 99,600
			Total to North Downtown Distribution		**$ 1,195,000**
10	***North Industrial Distribution***				
	12-inch diameter pipe	LF	$ 292	2600	$ 759,200
			Engineering & Admin. (10%)		$ 75,920
			Contingency (10%)		$ 75,920
			Total to North Industrial Distribution		**$ 911,000**
			Total Costs		**$ 47,446,000**

APPENDIX B

AWWA Meter Multipliers

Meter Size	AWWA (capacity)	Factor based on 3/4
5/8 inch	20	0.67
3/4 inch	30	1.00
1 inch	50	1.67
1-1/2 inch	100	3.33
2 inch	160	5.33
3 inch	300	10.00
4 inch	500	16.67
6 inch	1,000	33.33
8 inch	1,600	53.33
10 inch	2,300	76.67
12 inch	4,300	143.33
14 inch	6,400	213.33
16 inch	9,160	305.33
18 inch	14,650	488.33
20 inch	18,500	616.67

VINEYARD

DRAFT Drinking Water Impact Fee Analysis

May 2025

ZIONS PUBLIC FINANCE, INC.

EXECUTIVE SUMMARY

An impact fee is a one-time fee imposed on new development activity to mitigate the impact of new development on capital facilities. In conjunction with this Impact Fee Analysis, Hansen Allen & Luce, Inc. prepared the Vineyard Drinking Water Impact Fee Facilities Plan (IFFP) dated May 2025. The IFFP forms the basis for this impact fee analysis.

The recommended impact fee structure presented in this analysis has been prepared to satisfy the Impact Fees Act, Utah Code Ann. § 11-36a-101 et. seq., and represents the maximum impact fees Vineyard ("City") may assess. The City will be required to use revenue sources other than impact fees to fund any projects that constitute repair and replacement, cure any existing deficiencies, or increase the level of service for existing users.

Drinking Water Demand

The City is anticipated to grow by 4,280 equivalent residential connections (ERCs) between 2024 and 2034 – the timeframe of the IFFP analysis.[1]

Drinking Water Service Levels

Drinking water service levels have been designed to ensure that service levels are maintained to meet the demands of new development and are included, in detail, later in this IFA.

Water Service Area

There is one service area for water that encompasses the boundaries of Vineyard City.

Excess Capacity

According to the IFFP, there is excess capacity in the water distribution system to serve an additional 6,930 ERCs. A review of the City's Asset List calculates the impact fee eligible amount at $1,299,730 that will serve new development over the next 10 years. No source capacity has been included in the IFFP because this capacity is currently provided separately through agreements with the City of Orem and CUWCD. Water storage capacity is showing an existing deficiency of 3.57 MG. This deficiency cannot be paid for with impact fees.

New Construction

Total new construction costs required by growth over the next 10 years are projected to reach $6,746,015 for storage and $22,207,367 for distribution projects.

Water System Impact Fee Calculation

The gross fee is first calculated, followed by credits to be made for the portion of future projects that will benefit existing development.

TABLE 1: MAXIMUM GROSS FEE PER ERC

Summary	Amount
Existing Buy-In Costs	$187.55

[1] IFFP, p. 3-1.

Summary	Amount
Interest on Bonds	$1,101.01
New Construction	$4,343.67
Consultant Costs	$41.72
Fund Balance	($14.13)
Subtotal before Credits	**$5,659.82**

Credits must be made for the proportionate share of new projects that benefit existing development so that new development does not pay more than its proportionate share of costs. According to the IFFP, the cost of new projects that benefit existing development is $10,705,055. These projects are anticipated to be paid for with increased rates, spread over 10 years, and therefore new development must be credited so that it does not pay the full impact fee as well as higher rates.

Credits must also be made for future payments on the outstanding Series 2023 Water and Wastewater Revenue Bond issued in the amount of $14,350,000. Water is responsible for 90 percent of the bond. Credits for future payments are then subtracted from the maximum gross fee shown in Table 1 to show the maximum impact fee per year.

TABLE 2: MAXIMUM GROSS FEE PER ERC PER YEAR

Year	Gross Fee per ERC	NPV - Deficiency Projects Credit	NPV - Outstanding Bond Credit	Maximum Fee per ERC
2025	$5,659.82	$1,467.51	$596.99	$3,595.32
2026	$5,659.82	$1,268.84	$559.47	$3,831.52
2027	$5,659.82	$1,096.96	$529.25	$4,033.61
2028	$5,659.82	$946.96	$505.18	$4,207.68
2029	$5,659.82	$804.40	$483.46	$4,371.96
2030	$5,659.82	$666.18	$463.40	$4,530.25
2031	$5,659.82	$531.19	$445.04	$4,683.59
2032	$5,659.82	$397.71	$427.77	$4,834.34
2033	$5,659.82	$266.40	$411.84	$4,981.59
2034	$5,659.82	$133.97	$396.49	$5,129.36

Residential units (per door) are charged based on a ¾” meter size (1 ERC) while all nonresidential development is charged based on meter size.

TABLE 3: FEES BASED ON METER SIZE

Meter Size	ERCs	2025	2026	2027	2028	2029	2030
3/4”	1	$3,595.32	$3,831.52	$4,033.61	$4,207.68	$4,371.96	$4,530.25
1”	1.67	$6,004.18	$6,398.63	$6,736.13	$7,026.83	$7,301.18	$7,565.51
1 ½”	3.33	$11,972.41	$12,758.95	$13,431.93	$14,011.58	$14,558.64	$15,085.73
2”	5.33	$19,163.04	$20,421.98	$21,499.16	$22,426.94	$23,302.56	$24,146.22
3”	10	$35,953.17	$38,315.15	$40,336.13	$42,076.82	$43,719.63	$45,302.48

Meter Size	ERCs	2025	2026	2027	2028	2029	2030
4”	16.67	$59,933.94	$63,871.36	$67,240.34	$70,142.05	$72,880.62	$75,519.24
6”	33.33	$119,831.92	$127,704.41	$134,440.34	$140,242.03	$145,717.52	$150,993.18
8”	53.33	$191,738.27	$204,334.71	$215,112.60	$224,395.66	$233,156.77	$241,598.15
10”	76.67	$275,652.97	$293,762.28	$309,257.14	$322,602.94	$335,198.38	$347,334.15

Non-Standard Fee Adjustment

In cases where it is determined that the use of meter sizes to assess impact fees would not lead to an equitable result, ERCs may instead be calculated based on estimated peak day demand as follows:

ERCs = (peak day demand, gpd) / (1,248 gpd/ERC)

Examples where a meter size may not produce an equitable result include instances where a development uses multiple meters rather than a single meter or when the meter multiplier does not accurately reflect the expected multiplier of the customer as compared to a standard ERC.

The resulting number of ERCs is then multiplied by the ¾” (1 ERC) maximum fee for the appropriate year as shown in Table 2.

CHAPTER 1: OVERVIEW OF THE CULINARY WATER IMPACT FEES

Summary

An impact fee is intended to recover the City’s costs of building culinary water system capacity to serve new residential and non-residential development rather than passing these growth-related costs on to existing users through rates. The Utah Impact Fees Act allows only certain costs to be included in an impact fee so that only the fair cost of expansionary projects or existing unused capacity paid for by the City is assessed through an impact fee.

Costs to be Included in the Impact Fee

The impact fees proposed in this analysis are calculated based upon:

- Buy-in to existing, excess capacity;
- New capital infrastructure that will serve new development; and
- Professional and planning expenses related to the construction of system improvements that will serve new development.
- Necessary credits

The costs that cannot be included in the impact fee are as follows:

- Costs for projects that cure system deficiencies;
- Costs for projects that increase the LOS above that which is currently provided;

- Operations and maintenance costs;
- Costs of facilities funded by grants or other funds that the City does not have to repay; and
- Costs of reconstruction of facilities that do not have capacity to serve new growth.

Utah Code Legal Requirements

Utah law requires that communities and special districts prepare an Impact Fee Analysis (IFA) before enacting an impact fee. Utah law also requires that communities/districts give notice of their intent to prepare and adopt an IFA. This IFA follows all legal requirements as outlined below. The City has retained Zions Public Finance, Inc. (ZPFI) to prepare this Impact Fee Analysis in accordance with legal requirements.

Notice of Intent to Prepare Impact Fee Analysis

A local political subdivision must provide written notice of its intent to prepare an IFA before preparing the Plan (Utah Code §11-36a-503). This notice must be posted on the Utah Public Notice website. The City has complied with this noticing requirement for the IFA by posting notice.

Preparation of Impact Fee Analysis

Utah Code requires that each local political subdivision, before imposing an impact fee, prepare an impact fee analysis. (Utah Code 11-36a-304).

Section 11-36a-304 of the Utah Code outlines the requirements of an impact fee analysis which is required to:

(1) An impact fee analysis shall:

(a) identify the anticipated impact on or consumption of any existing capacity of a public facility by the anticipated development activity;

(b) identify the anticipated impact on system improvements required by the anticipated development activity to maintain the established level of service for each public facility;

(c) demonstrate how the anticipated impacts described in Subsections (1)(a) and (b) are reasonably related to the anticipated development activity;

(d) estimate the proportionate share of:
(i) the costs for existing capacity that will be recouped; and
(ii) the costs of impacts on system improvements that are reasonably related to the new development activity; and

(e) identify how the impact fee was calculated.

(2) In analyzing whether or not the proportionate share of the costs of public facilities are reasonably related to the new development activity, the local political subdivision or private entity, as the case may be, shall identify, if applicable:

(a) the cost of each existing public facility that has excess capacity to serve the anticipated development resulting from the new development activity;

(b) the cost of system improvements for each public facility;

(c) other than impact fees, the manner of financing for each public facility, such as user charges, special assessments, bonded indebtedness, general taxes, or federal grants;

(d) the relative extent to which development activity will contribute to financing the excess capacity of and system improvements for each existing public facility, by such means as user charges, special assessments, or payment from the proceeds of general taxes;

(e) the relative extent to which development activity will contribute to the cost of existing public facilities and system improvements in the future;

(f) the extent to which the development activity is entitled to a credit against impact fees because the development activity will dedicate system improvements or public facilities that will offset the demand for system improvements, inside or outside the proposed development;

(g) extraordinary costs, if any, in servicing the newly-developed properties; and

(h) the time-price differential inherent in fair comparisons of amounts paid at different times.

Certification of Impact Fee Analysis

Utah Code states that an Impact Fee Analysis shall include a written certification from the person or entity that prepares the Impact Fee Analysis. This certification is included at the conclusion of this analysis.

CHAPTER 2: IMPACT FROM GROWTH ON THE CITY'S FACILITIES AND LEVEL OF SERVICE

Utah Code 11-36a-304(1)(a)

Projected Water Demand

Table 4 shows ERC growth projections which will place additional demand on the City's culinary water system. The City's culinary water system serves 3,330 equivalent residential connections (ERCs) which will grow to an estimated 7,610 ERCs by 2034.

Water Service Area

ERCs within Vineyard are projected to grow as follows:

TABLE 4: GROWTH IN DEMAND

Year	ERCs
2024	3,330
2025	3,935
2026	4,549
2027	5,226
2028	5,637
2029	5,999
2030	6,361
2031	6,689
2032	7,080
2033	7,345
2034	7,610

Source: IFFP, 3-1

Existing and Proposed LOS Analysis

Level of service (LOS) defines the water capital facility demands that a typical ERC will require and should pay for with impact fees. The IFFP defines service levels as follows:

Level of Service

- Peak Day Demand: 1,248 gpd/ERC
- Indoor Storage Capacity (Equalization): 590 gallons/ERC
- Indoor Fire Storage Capacity: 58 gallons/ERC (0.6 MG fire storage requirement at buildout divided by the number of ERCs at buildout (10,260))
- Distribution Capacity: 40 psi minimum during peak day demand conditions, and 30 psi minimum during peak instantaneous conditions

Fire Suppression

- Minimum Fire Flow: 1,500 gpm for 2 hours

- Maximum Fire Flow: 2,500 gpm for 4 hours
- Fire Storage (buildout): 600,000 gallons
- Minimum Pressure: 20 psi residual during peak day + fire flow event[2]

Utah Code 11-36a-304(1)(b)(c)

Excess Capacity

No source capacity has been included in the IFFP because this capacity is currently provided separately through agreements with the City of Orem and CUWCD. Water storage capacity is showing an existing deficit of 3.57MG. This deficiency cannot be paid for with impact fees.

TABLE 5: WATER STORAGE EXISTING DEFICIT

10-Year Growth (ERCs)	Level of Service (gal/ERC)	Requirement (MG)	Capacity Remaining (MG)	Surplus/Deficit (MG)
4,280	590	2.53	-1.04	-3.57

The IFFP identifies total capacity of the distribution system as 10,260 ERCs. With 3,330 existing ERCs, that leaves capacity for another 6,930 ERCs. The existing system has an actual cost of $1,924,276 for impact-fee eligible projects.[3] Of this amount, $1,299,730 represents excess capacity, calculated as the percentage of remaining capacity (6,930 ERCs) compared to total capacity of the existing system (10,260 ERCs).

TABLE 6: EXISTING EXCESS CAPACITY

Excess Capacity	Amount
Total Excess Capacity Distribution Cost	$1,924,276
Remaining Capacity - ERCs	6,930
% of Capacity Remaining	67.5%
Cost of Excess Capacity to New Growth	$1,299,730
Source: Vineyard Asset List; IFFP p. 2-3; ZPFI	

CHAPTER 4: SYSTEM IMPROVEMENTS REQUIRED FROM DEVELOPMENT ACTIVITY

Utah Code 11-36a-304(1)(b)(c)

The means by which the City will meet growth demands include constructing the following projects as set forth in the Impact Fee Facilities Plan. Table 6 includes projects that will partially benefit existing development as well as new development.

[2] IFFP, p. 2-1
[3] Vineyard Asset List

TABLE 7: NEW CONSTRUCTION IMPROVEMENTS – EXISTING AND NEW DEVELOPMENT

Project	Total Cost	Type	% Impact Fee Eligible	Total Impact Fee Eligible Cost	Capacity ERCs	Cost to Existing Development
6.0 MG Storage Tank	$10,539,102	Storage	64%	$6,746,015	9,252	$3,793,087
Booster Pump Station	$7,026,068	Distribution	68%	$4,745,678	10,260	$2,280,390
Pipeline Projects	$14,270,267	Distribution	68%	$9,638,689	10,260	$4,631,578
TOTAL	**$31,835,437**		**-**	**$21,130,381**		**$10,705,055**
Source: IFFP, p. 3-3						

Table 8 includes new construction projects that are solely needed to meet the demands of new growth in Vineyard.

TABLE 8 : NEW CONSTRUCTION IMPROVEMENTS – NEW DEVELOPMENT

Project	Distribution	Storage	Total
Mill Road North Extension	$2,191,000	$0	**$2,191,000**
Pump Station Upgrade	$708,000	$0	**$708,000**
South Downtown Distribution	$2,191,000	$0	**$2,191,000**
Holdaway Farms Distribution	$911,000	$0	**$911,000**
East Geneva Distribution	$1,822,000	$0	**$1,822,000**
TOTAL	**$7,823,000**	**$0**	**$7,823,000**
Source: IFFP, p. 3-3			

CHAPTER 5: PROPORTIONATE SHARE ANALYSIS

Maximum Legal Culinary Water Impact Fee per ERC

The Impact Fees Act requires the Impact Fee Analysis to estimate the proportionate share of the future and actual cost of existing system improvements that benefit new growth that can be recouped through impact fees. The impact fee for existing assets must be based on the actual costs (when excess capacity is available) while the fees for construction of new facilities can be based on reasonable future costs of the system.

Existing Excess Capacity

The impact-fee eligible actual cost of the City's culinary water system that will serve an additional 6,930 ERCs by 2034 is $1,924,276 with $1,299,730 of the cost of the excess capacity allocated to growth between 2024 and 2034. Therefore, the buy-in cost is $187.55 per ERC.

TABLE 9: EXCESS CAPACITY PROPORTIONATE SHARE CALCULATION

Excess Capacity	Amount
Total Excess Capacity Distribution Cost	$1,924,276
Remaining Capacity - ERCs	6,930
% of Capacity Remaining	67.5%
Cost of Excess Capacity to New Growth	$1,299,730
Cost per ERC	**$187.55**

Interest costs can be included for the Series 2023 Water and Sewer Revenue Bonds which are used to fund existing facilities. The total interest cost on the bond is $12,551,493. Culinary water is responsible for 90 percent of the interest cost which is spread among the total capacity (10,260 ERCs) served by the projects funded by the bond.

TABLE 10: INTEREST COST PROPORTIONATE SHARE CALCULATION

Interest Calculation on Outstanding Bond	Amount
Total Interest Cost to Culinary Water	$11,296,344
Capacity ERCs of Outstanding Bond	10,260
Interest Cost per ERC	**$1,101.01**

New Construction

The storage construction project identified in Table 7 previously has a total capacity of 9,252 ERCs. With 3,330 existing ERCs, capacity remains to serve another 5,922 ERCs. New development between 2024 and 2034 represents 72.3 percent of the remaining capacity. Therefore, this results in a cost of $1,139.14 per ERC.

TABLE 11: NEW CONSTRUCTION PROJECTS - STORAGE

New Improvements - Storage	Amount
Impact-Fee Eligible Cost	$6,746,015
Total ERC Capacity	9,252
Total ERC Capacity Remaining	5,922
Growth in ERCs, 2024-2034	4,280
% of Total Capacity Consumed, 2024-2034	72.3%
Cost to Growth, 2024-2034	$4,875,539
Cost per ERC	**$1,139.14**

The distribution construction projects identified in Tables 7 and 8 previously have a total capacity of 10,260 ERCs. With 3,330 existing ERCs, capacity remains to serve another 6,930 ERCs. New development between 2024 and 2034 represents 61.76 percent of the remaining capacity (4,280 ERCs / 6,930 ERCs). Therefore, this results in a cost of $3,204.53 per ERC.

TABLE 12: NEW CONSTRUCTION PROJECTS - DISTRIBUTION

New Improvements - Distribution	Amount
Impact-Fee Eligible	$22,207,367
Total ERC Capacity	10,260

New Improvements - Distribution	Amount
Total ERC Capacity Remaining	6,930
Capacity Consumed 2024-2034	61.76%
Cost to Growth, 2024-2034	$13,715,372
Growth in ERCs, 2024-2034	4,280
Cost per ERC	**$3,204.53**

Consultant Costs

Consultant costs are an allowable expense and result in a proportionate share cost of $41.72 per ERC.

TABLE 13: CONSULTANT COSTS

Consultant Cost	Amount
Master Plan Cost to Growth	$64,759.20
ERCs Served	1,896
Cost per ERC	**$34.16**
IFFP/IFA Cost to Growth	$20,200
ERCs Served	2,669
Cost per ERC	**$7.57**
TOTAL	**$41.72**

Fund Balance

The fund balance of $60,480.25[4] can be used to offset some of the construction costs of new projects shown in Tables 7 and 8. A credit of $14.13 per ERC is therefore applied to the new construction cost per ERC.

TABLE 14: IMPACT FEE FUND BALANCE CREDIT

Impact Fee Fund Balance	Amount
Fund Balance	$60,480.25
Growth in ERCs, 2024-2034	4,280
Credit per ERC	**($14.13)**

Summary of Gross Impact Fee Before Credits

The gross impact fee includes buy-in costs for existing, excess capacity, interest cost on the outstanding bond, new construction costs (less fund balance) and consultant costs.

TABLE 15: SUMMARY OF GROSS FEE

Summary	Amount
Existing Buy-In Costs	$187.55
Interest on Bonds	$1,101.01
New Construction	$4,343.67

[4] Source: Vineyard City

Summary	Amount
Consultant Costs	$41.72
Fund Balance	($14.13)
Subtotal before Credits	**$5,659.82**

Credits Against Impact Fees

Credits must be made for the proportionate share of new projects that benefit existing development as well as the Series 2023 Water/Wastewater Revenue Bond so that new development is not charged more than its fair share.

The proportionate share of new projects benefitting existing development is $10,705,055 based on the IFFP which is anticipated to be paid for with increased rates, spread over 10 years, and therefore new development must be credited so that it does not pay the full impact fee as well as higher rates.

TABLE 16: CREDITS ON PROJECTS BENEFITTING EXISTING DEVELOPMENT

Year	ERCs	Payment	Payment per ERC	NPV*
2025	3,935	$1,070,506	$272.05	$1,467.51
2026	4,549	$1,070,506	$235.33	$1,268.84
2027	5,226	$1,070,506	$204.84	$1,096.96
2028	5,637	$1,070,506	$189.91	$946.96
2029	5,999	$1,070,506	$178.45	$804.40
2030	6,361	$1,070,506	$168.29	$666.18
2031	6,689	$1,070,506	$160.04	$531.19
2032	7,080	$1,070,506	$151.20	$397.71
2033	7,345	$1,070,506	$145.75	$266.40
2034	7,610	$1,070,506	$140.67	$133.97
*NPV = net present value discounted at 5 percent				

There is an outstanding Series 2023 Water/Wastewater Revenue Bond issued for $14,350,000. Culinary water is responsible for 90 percent of the bond costs. Impact fees should cover the bond costs associated with new development; however, a credit must be made for the portion of the bond that benefits existing development so that new development does not pay more than its fair share.

TABLE 17: CREDITS FOR SERIES 2023 WATER/WASTEWATER REVENUE BOND

Year	P+I	Proportionate Share	Existing Development Share	ERCs	Payment per ERC	NPV*
2025	$907,638	$816,874	$265,126	3,935	$67.38	$596.99
2026	$906,138	$815,524	$264,688	4,549	$58.19	$559.47
2027	$904,138	$813,724	$264,103	5,226	$50.54	$529.25
2028	$906,638	$815,974	$264,834	5,637	$46.98	$505.18

Year	P+I	Proportionate Share	Existing Development Share	ERCs	Payment per ERC	NPV*
2029	$908,388	$817,549	$265,345	5,999	$44.23	$483.46
2030	$904,388	$813,949	$264,176	6,361	$41.53	$463.40
2031	$904,888	$814,399	$264,322	6,689	$39.52	$445.04
2032	$904,638	$814,174	$264,249	7,080	$37.32	$427.77
2033	$903,638	$813,274	$263,957	7,345	$35.94	$411.84

*NPV = net present value discounted at 5 percent

The maximum impact fee per ERC is calculated by subtracting the two credits from the gross impact fee shown in Table 15.

TABLE 18: MAXIMUM FEE PER ERC

Year	Gross Fee per ERC	NPV - Deficiency Projects Credit	NPV - Outstanding Bond Credit	Maximum Fee per ERC
2025	$5,659.82	$1,467.51	$596.99	$3,595.32
2026	$5,659.82	$1,268.84	$559.47	$3,831.52
2027	$5,659.82	$1,096.96	$529.25	$4,033.61
2028	$5,659.82	$946.96	$505.18	$4,207.68
2029	$5,659.82	$804.40	$483.46	$4,371.96
2030	$5,659.82	$666.18	$463.40	$4,530.25
2031	$5,659.82	$531.19	$445.04	$4,683.59
2032	$5,659.82	$397.71	$427.77	$4,834.34
2033	$5,659.82	$266.40	$411.84	$4,981.59
2034	$5,659.82	$133.97	$396.49	$5,129.36

CHAPTER 6: MAXIMUM FEES

Residential units (per door) are charged based on a ¾” meter size (1 ERC) while all nonresidential development is charged based on meter size.

TABLE 19: MAXIMUM FEE PER ERC BY METER SIZE

Meter Size	ERCs	2025	2026	2027	2028	2029	2030
3/4”	1	$3,595.32	$3,831.52	$4,033.61	$4,207.68	$4,371.96	$4,530.25
1”	1.67	$6,004.18	$6,398.63	$6,736.13	$7,026.83	$7,301.18	$7,565.51
1 ½”	3.33	$11,972.41	$12,758.95	$13,431.93	$14,011.58	$14,558.64	$15,085.73
2”	5.33	$19,163.04	$20,421.98	$21,499.16	$22,426.94	$23,302.56	$24,146.22
3”	10	$35,953.17	$38,315.15	$40,336.13	$42,076.82	$43,719.63	$45,302.48
4”	16.67	$59,933.94	$63,871.36	$67,240.34	$70,142.05	$72,880.62	$75,519.24
6”	33.33	$119,831.92	$127,704.41	$134,440.34	$140,242.03	$145,717.52	$150,993.18

8"	53.33	$191,738.27	$204,334.71	$215,112.60	$224,395.66	$233,156.77	$241,598.15
10"	76.67	$275,652.97	$293,762.28	$309,257.14	$322,602.94	$335,198.38	$347,334.15

Non-Standard Fee Adjustment

In cases where it is determined that the use of meter sizes to assess impact fees would not lead to an equitable result, ERCs may instead be calculated based on estimated peak day demand as follows:

ERCs = (peak day demand, gpd) / (1,248 gpd/ERC)

Examples where a meter size may not produce an equitable result include instances where a development uses multiple meters rather than a single meter or when the meter multiplier does not accurately reflect the expected multiplier of the customer as compared to a standard ERC.

The resulting number of ERCs is then multiplied by the ¾" (1 ERC) maximum fee for the appropriate year.

CERTIFICATION

Zions Public Finance, Inc. certifies that the attached impact fee analysis:

1. includes only the cost of public facilities that are:
    a. allowed under the Impact Fees Act; and
    b. actually incurred; or
    c. projected to be incurred or encumbered within six years after the day on which each impact fee is paid;

2. does not include:
    a. costs of operation and maintenance of public facilities; or
    b. cost for qualifying public facilities that will raise the level of service for the facilities, through impact fees, above the level of service that is supported by existing residents;

3. offset costs with grants or other alternate sources of payment; and

4. complies in each and every relevant respect with the Impact Fees Act.

CERTIFICATE OF POSTING

I, THE DULY APPOINTED CITY RECORDER FOR VINEYARD, UTAH, HEREBY CERTIFY THAT COPIES OF THE FOREGOING **ORDINANCE SUMMARY** FOR ORDINANCE 2025-09 WERE POSTED AT THE FOLLOWING PUBLIC PLACES WITHIN THE MUNICIPALITY ON THE 29th DAY OF May 2025. WHICH PUBLIC PLACES ARE:

POSTED:

1. VINEYARD CITY OFFICES; 125 SOUTH MAIN
2. VINEYARD CITY WEBSITE; www.vineyard.utah.gov
3. UTAH PUBLIC NOTICE WEBSITE

AND THAT SAID NOTICE REMAINED SO POSTED AND AVAILABLE UNTIL THE 30th DAY OF JUNE 2025.

Paula D. Spencer

Name/Signature

City Recorder

Title