Sunrise Beach Village



Leigh Thomas, PE HR Green

# Water Distribution System Improvements



### Phase 1: Mapping, Modeling and Planning

* **Phase 1 Focus:**



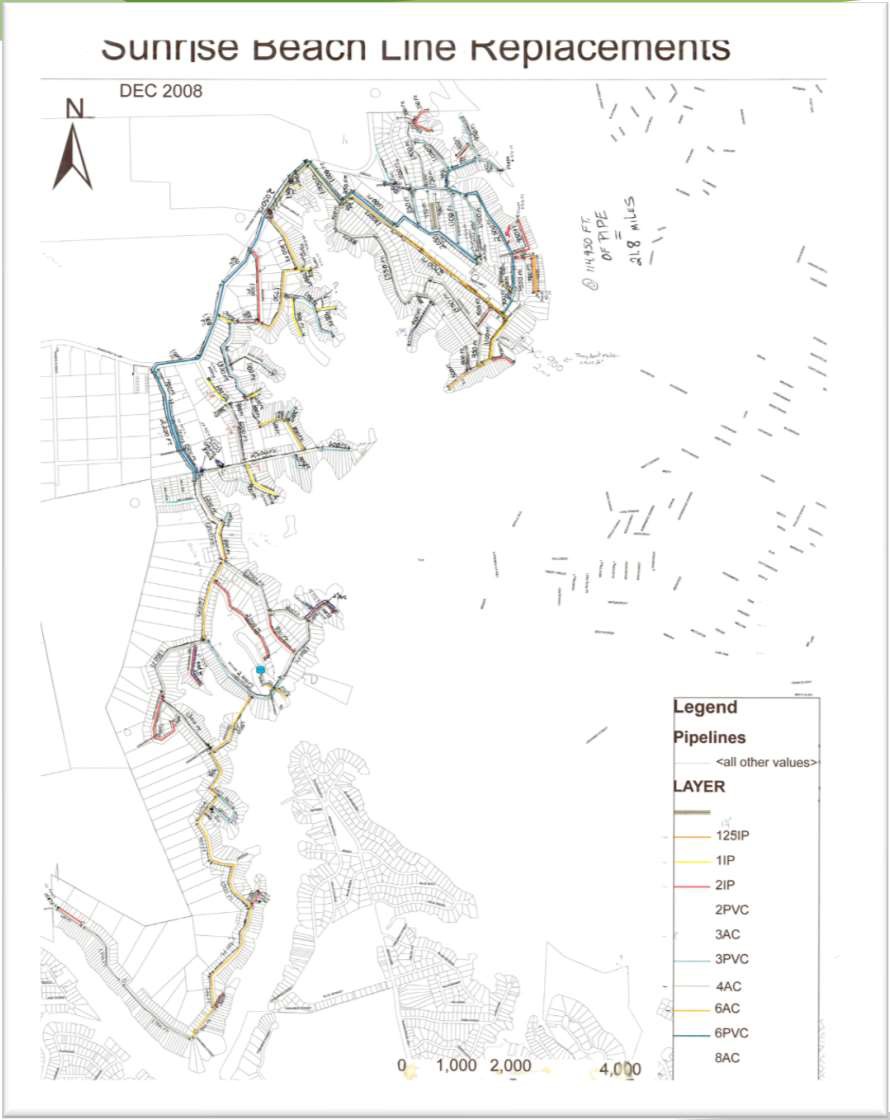
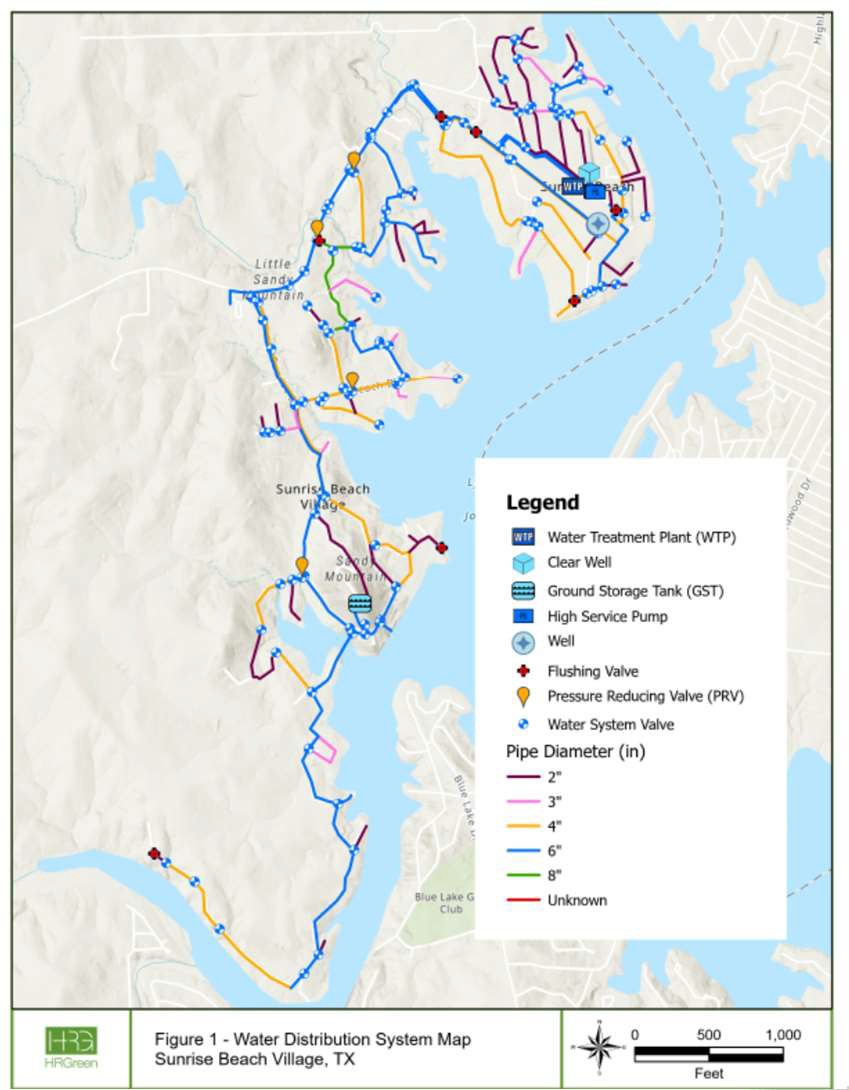
Project Focus and Goals

* + Developing Map of Water System
  + Modeling Existing Water System
  + Evaluating Future Water System Demands
  + Developing a Prioritized Plan for Water System Improvements

### Phase 1 Goals:

* + Water System Map Data (ArcGIS) for Current & Future Applications
  + Modeled Simulation of Water System Operations
  + Identification and Prioritization of Water System Needs
  + Phased Plan for Design & Construction of Water System Needs

## Mapping Process



**Scanned in Map**

**Electronic Map**



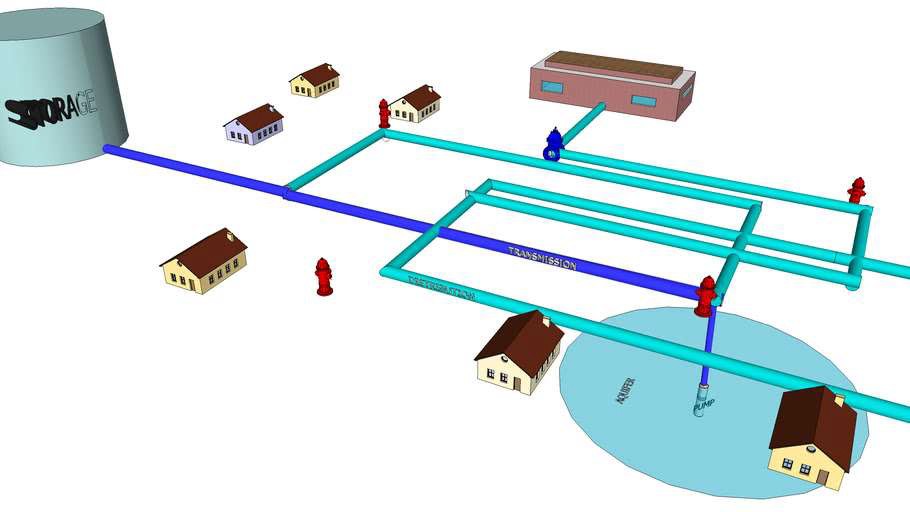
Existing System Characteristics

|  |  |  |
| --- | --- | --- |
| **System Component** | **Characteristics** | **Size & Capacity** |
| Water Transmission and Distribution Pipe | 2-inch pipe | 25,936.3 LF |
| 3-inch pipe | 8,130 LF |
| 4-inch pipe | 31,869.7 LF |
| 6-inch pipe | 41,174.8 LF |
| 8-inch pipe | 2,708.6 LF |
| Unknown pipe size | 27.4 LF |
| Total Pipe Length | 109,846.8 LF |
| Water Transmission and  Distribution Pressure Maintenance | Four (4) Pressure Reducing Valves | Three (3) 4” diameter |
| One (1) 6” diameter |
| Storage Capacity | One (1) 113,358 gallons GST | * Diameter: 32 feet (ft) * Height: 18 ft * Operating Range: 16.5 ft – 13 ft (high service pump on level) * Overflow Level: 17 ft |
| One (1) 19,000 gallons Clear Well | * Diameter: 14 ft * Height: 17 ft * Overflow Level: 16.5 ft |
| Well Production Capacity | Two (2) Operating Groundwater Wells | Well 4b: 250 – 300 gpm2 |
| Well 4c: 380 gpm (max) |
| Pumping Capacity | Three (3) High Service Pumps3 | High Service Pump 1: 250 gpm |
| High Service Pump 2: 280 gpm |
| High Service Pump 3: 260-270 gpm |

## Modeling Process



#### Water System Operations Simulation



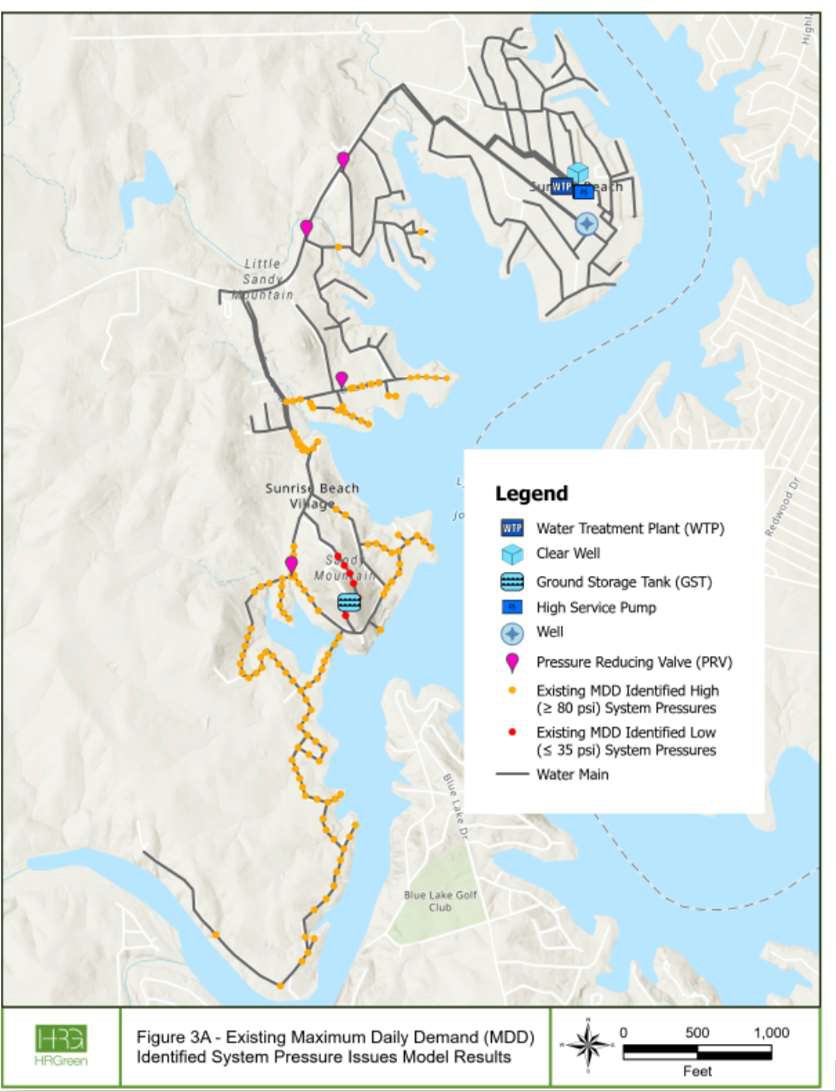
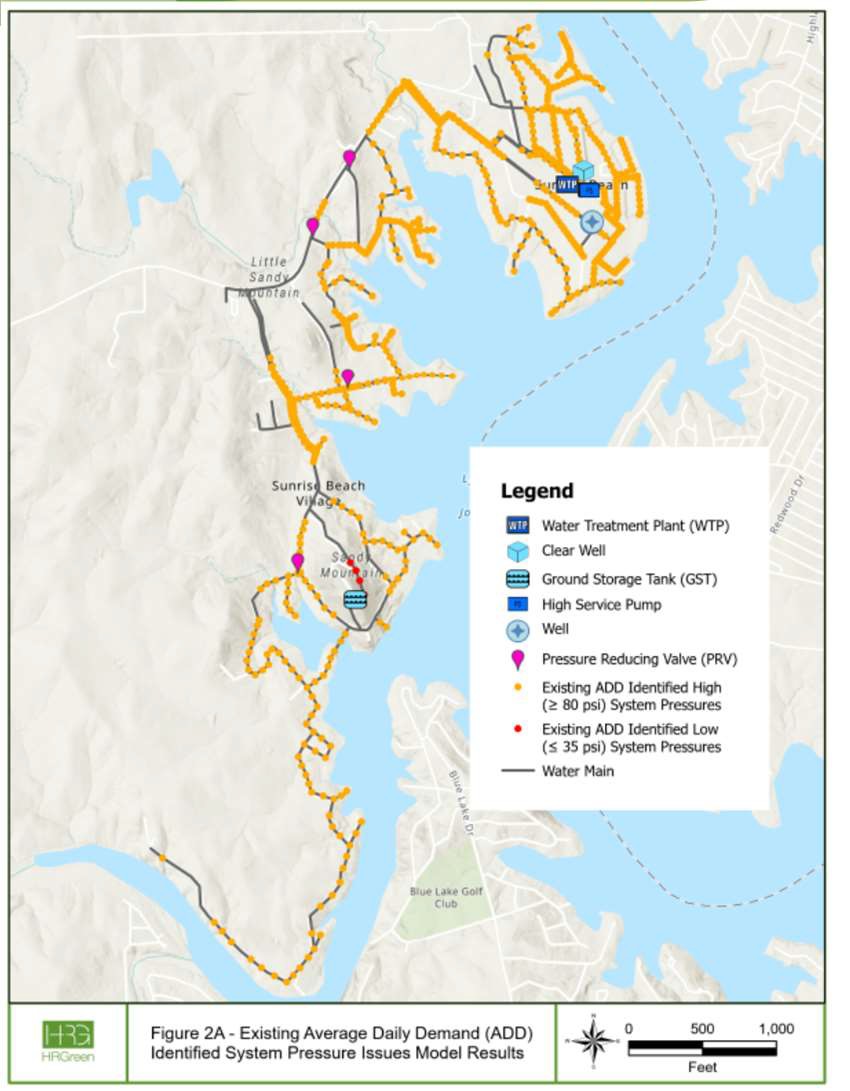
**Steady State Model Simulation**

* Three High Service Pumps modeled as source

supply from clear well to GST.

* Hydraulic calculations to determine system flows and resultant system pressures.
* No operating system pumps in static model.
* Operating range of GST and HGL (Hydraulic Grade Line) of 1,054 ft (low operating point)
* PRVs disabled to avoid impact on model pressure results

## Modeled Scenarios – Current



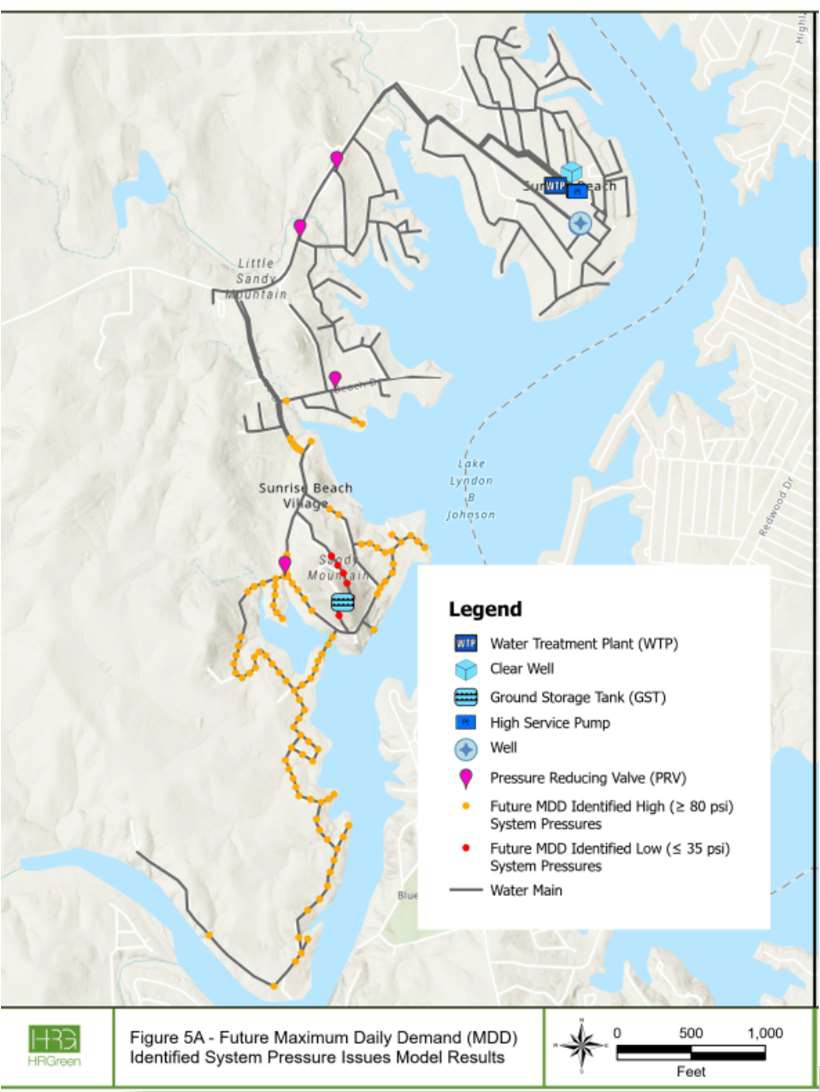
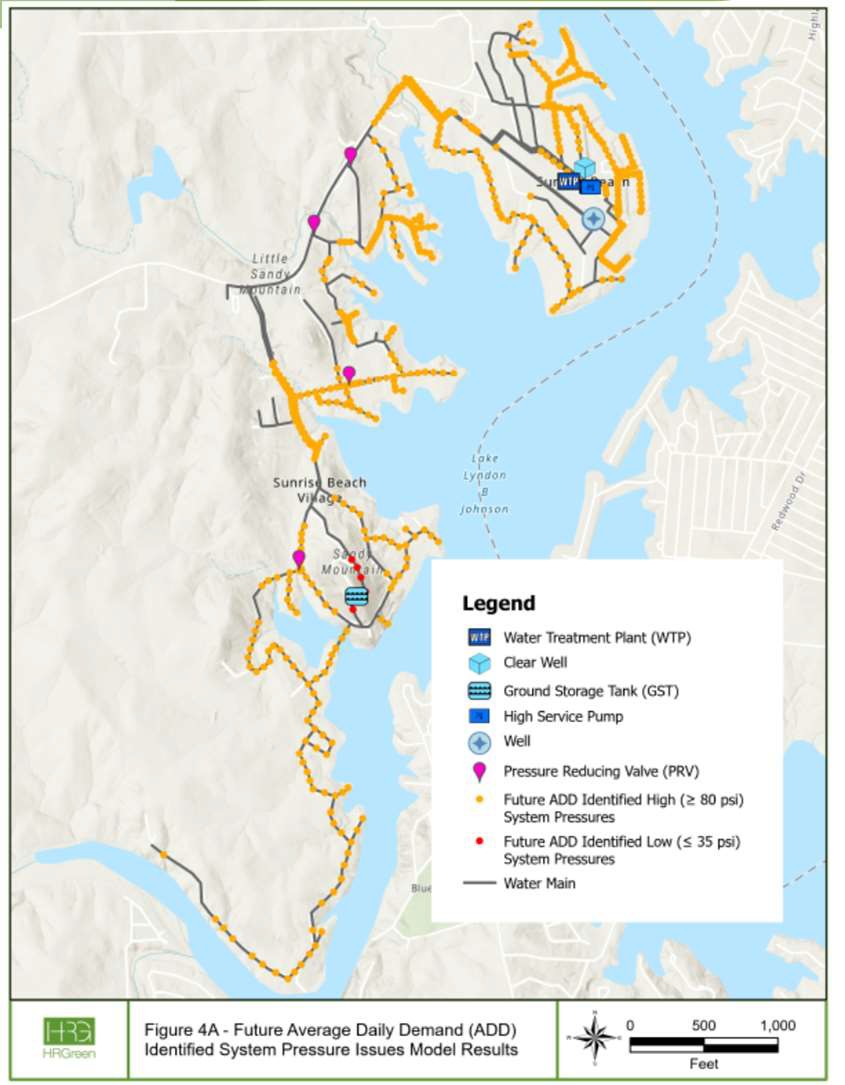
**Average Daily Demand**

**Max Daily Demand**

**1,030**

**System Connections Applied**

Modeled Scenarios – Future



#### Max Daily Demand

**Average Daily Demand**

**1,200**

**System Connections Applied**

**WATER SYSTEM CAPACITY PER CONNECTION BASED ON 30 TAC §290.45(B)(1)(D)**



TCEQ Requirements

|  |  |  |  |
| --- | --- | --- | --- |
| **TCEQ Minimum Existing System Projected 2034 System System Parameters System Capacity (1,030 Capacity (1,200 connections)**  **Requirements1 connections) with Existing System** | | | |
| Water Supply | 0.60 gpm/conn | 0.66 gpm/conn2 | 0.57 gpm/conn2 |
| Storage Capacity | 200 gal/conn | 129 gal/conn3 | 110 gal/conn3 |
| Pumping Capacity | 2.00 gpm/conn | 0.78 gpm/conn4 | 0.67 gpm/conn4 |
| Pressure Maintenance | 100 gal/con | 110 gal/conn5 | 94.5 gal/conn5 |

**EXISTING SYSTEM DEMAND AND STORAGE VS. 30 TAC §290.45(B)(1)(D)**



TCEQ Requirements

|  |  |  |  |
| --- | --- | --- | --- |
| **System Parameters** | **TCEQ Minimum System Requirements** | **Existing (2023) System Capacity** | **Existing System Difference1** |
| Average Daily Demand | N/A | 192,412 gpd2 | N/A |
| Maximum Daily Demand | N/A | 393,916 gpd2 | N/A |
| Water Supply (Well 4b + 4c) | 618 gpm | 680 gpm3 | +62 gpm |
| Storage Capacity (GST + Clear Well) | 206,000 gal | 132,358 gal | (73,642 gal) |
| Pumping Capacity | 2,060 gpm | 800 gpm4 | (1,260 gpm) |
| Pressure Maintenance (GST) | 103,000 | 113,358 gal5 | +10,358 gal |

**PROJECTED 2034 SYSTEM DEMAND AND STORAGE VS. 30 TAC §290.45(B)(1)(D)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameters** | **TCEQ Minimum Requirement** | **2034 Projected System Capacity1** | **2034 System Projected Difference1** |
| Average Daily Demand | N/A | 224,169 gpd2 | N/A |
| Maximum Daily Demand | N/A | 458,931 gpd2 | N/A |
| Water Supply (Well 4b + 4c) | 720 gpm | 680 gpm3 | (40 gpm) |
| Storage Capacity (GST + Clear Well) | 240,000 gal | 132,358 gal | (107,642 gal) |
| Pumping Capacity | 2,400 gpm | 800 gpm4 | (1,600 gpm) |
| Pressure Maintenance (GST) | 120,000 | 113,358 gal5 | (6,642 gal) |



Recommended Improvements

**Priority 1 Water System Improvements Summary**

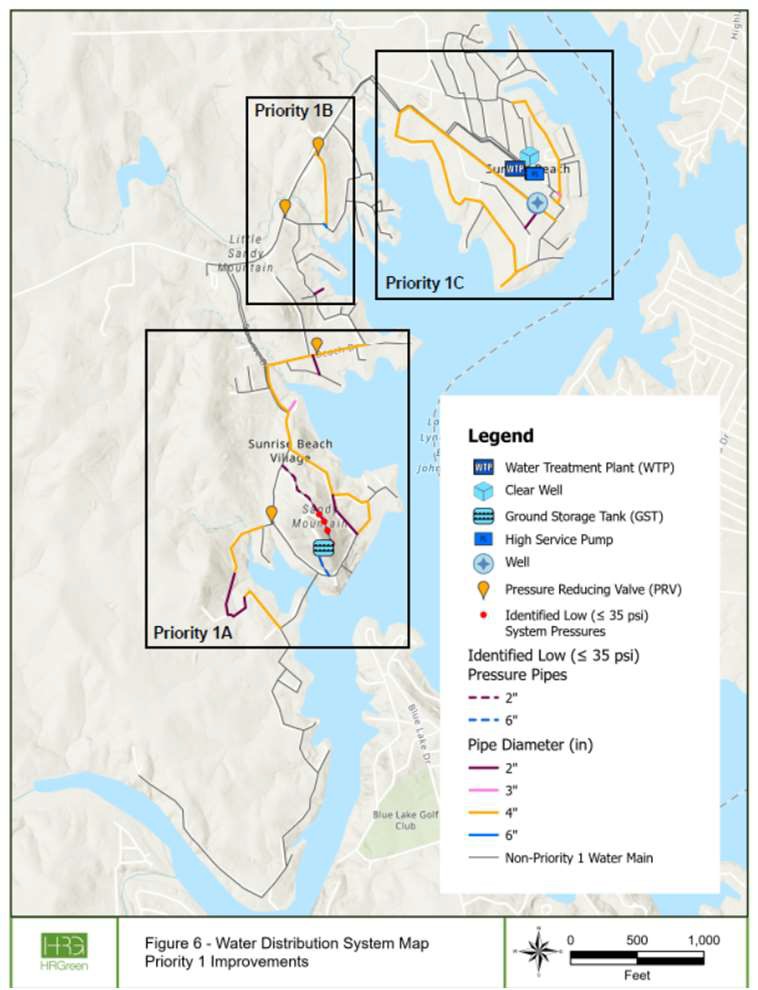
|  |  |  |  |
| --- | --- | --- | --- |
| **Category** | **Improvements Description** | **Quantity** | **Unit** |
| P | Pipeline improvements for pressure deficiencies1 | 22,991.80 | feet |
| SD | Small diameter pipeline replacement for pipelines with a diameter 4 - inches and smaller2 | 5,737.90 | feet |
| S | Storage Improvements | 75,000 – 110,0003 | gal |
| PC | Pumping Capacity Improvements | 1,260 – 1,6003 | gpm |

**Priority 2 Water System Improvements Summary**

|  |  |  |  |
| --- | --- | --- | --- |
| **Category Improvements Description Quantity Unit** | | | |
| P | Pipeline improvements for pressure deficiencies1 | 90,928.80 | feet |
| SD | Small diameter pipeline replacement for pipelines with a diameter 4 - inches and smaller2 | 28,355.70 | feet |
| PC | Pumping Capacity Improvements3 | TBD | gpm |

**Priority 3 Water System Improvements Summary**

|  |  |  |  |
| --- | --- | --- | --- |
| **Category Improvements Description Quantity Unit** | | | |
| P | Pipeline improvements for system resiliency1 | 15,828.90 | feet |
| S | Storage Improvements | 35,0002 | gal |
| PC | Pumping Capacity Improvements | 3403 | gpm |
| WP | Water Production Capacity | 404 | gpm |
| PM | Pressure Maintenance Capacity | 17,0005 | gal |



Recommended Improvements

**Priority 1A, 1B, 1C**

**Priority 2**

**Priority 3**

Priority 1A



Next Steps



Priority 1B

Priority 1C

Design ‘24 to ‘26

Design ‘26 to ‘27

Design ‘27 to ‘28

Construction ’25 - ‘28

Construction ‘27 to ‘28

Achieve TCEQ

Compliance

Construction ‘28 to ‘30



Future Steps



Priority 2

Design ‘31 to ‘33

Construction ’32 - ‘36

Meet Current Max Demand



Priority 3

Design ‘’36 to ‘38

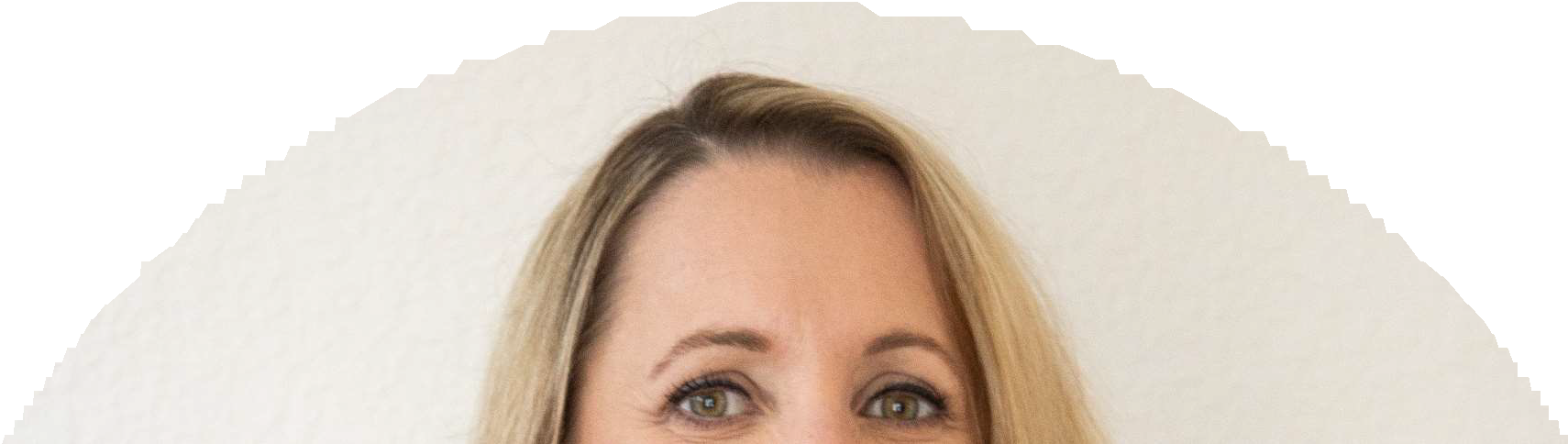
Construction ‘37 to ‘40

Meet Future Demand

# Discussion



Thank You!



**Leigh Thomas, P.E. Regional Manager - Water HR Green, Inc.**