Water Distribution System Master Plan

City of Fort Bragg

December 8th, 2025

Agenda

- Introductions
- Treated Water Distribution System
- Purpose and Goals
- Master Planning Process
- Key Accomplishments
- Current Performance& Future Considerations
- Capital Plan
- Conclusion & Summary of Recommendations

Introduction

Speakers

Alex Johnson
Senior Project Manager

Philip Tiewater
Principle-in-Charge

City Team

Chantell O'Neal	Project Manager - Assistant Director - Engineering
John Smith	Director of Public Works
Heath Daniels	Operations & Maintenance Supervisor
Diane O'Connor	Assistant City Engineer

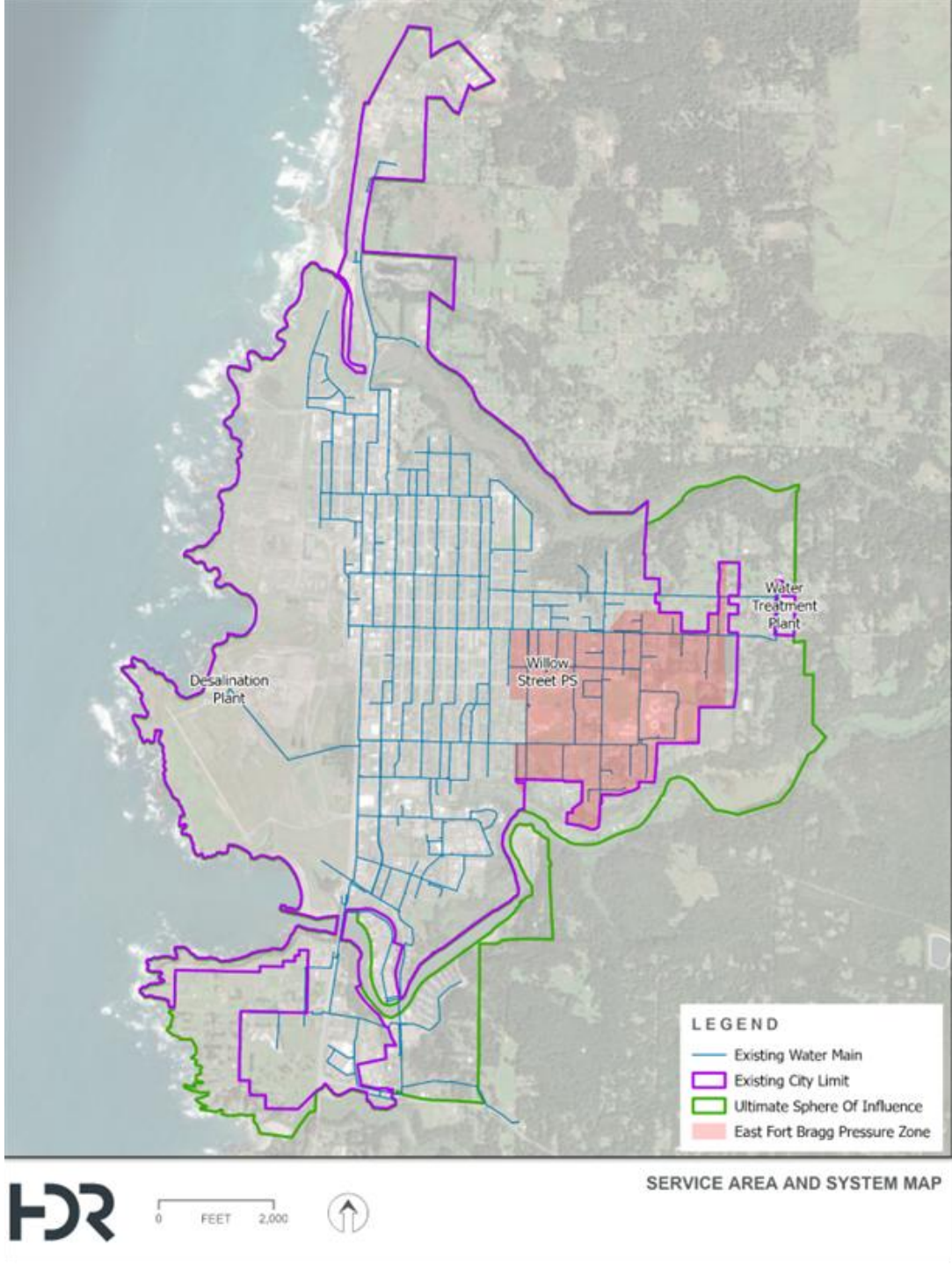
HDR Team

Scott Humphrey	Technical Lead
Allan Scott	Technical Advisor
Roger Null	Technical Advisor
Joel Griffin	Mapping/GIS
Mark Stanley	Geotechnical Assessment
Nathalie Beauvais	Climate Impact Assessment
Linda Fisher	Environmental/Programmatic EIR
Morgan DeAngelis	Risk Analysis/Risk Model

Treated Water Distribution System

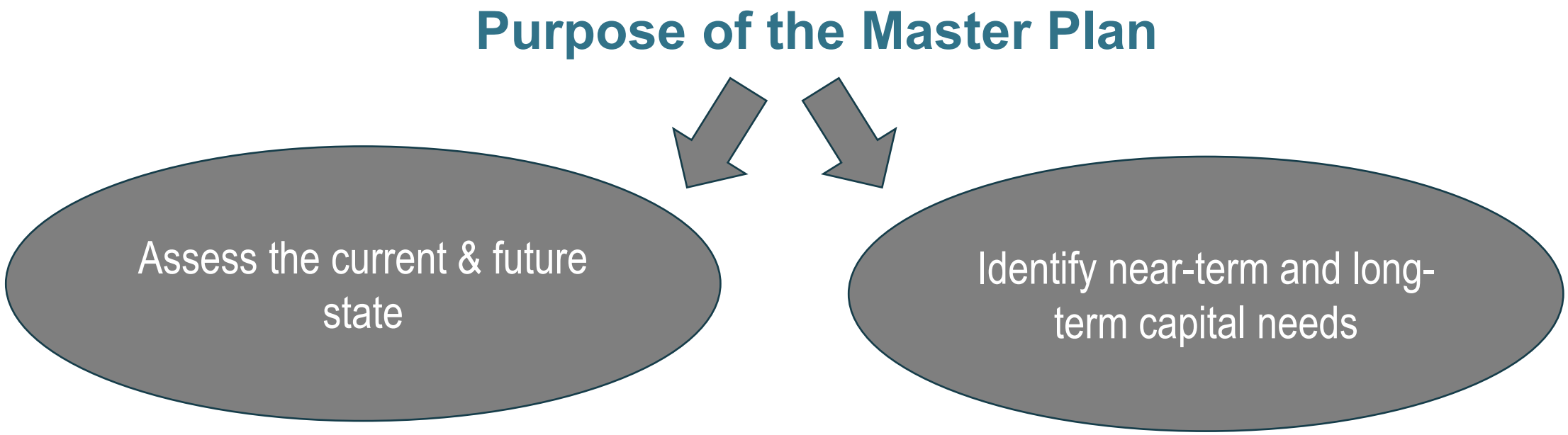
This master plan assesses treated water distribution infrastructure starting at the treatment plant outlet and includes evaluation the following infrastructure:

- **41 miles of pipeline**
  - System Built (1960-2000s)
  - 6 to 20 inches in diameter
  - AC, PVC, DIP
- **4 Storage Tanks**
  - 1.5 to 1.6 MG
- **1 Pump Station and Pressure Zone (EFBPZ)**



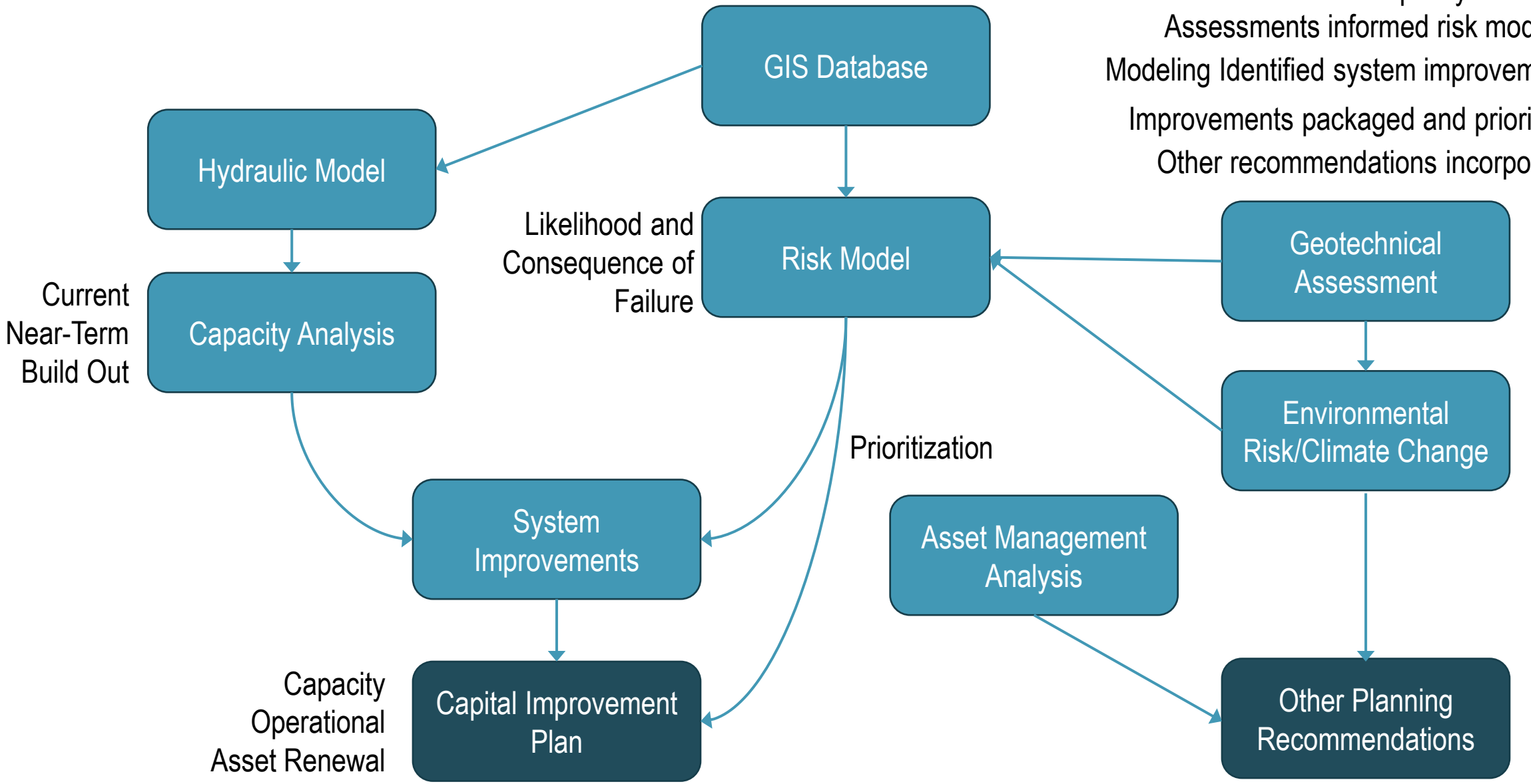
SERVICE AREA AND SYSTEM MAP

Purpose and Goals



Considerations: **aging infrastructure**, **technological advances**, **community growth**, and **seismic**, **environmental**, and **climate risk.**

Master Planning Process



Developed new GIS Data Set

GIS foundation for Modeling

Modeled 3 capacity scenarios

Assessments informed risk modeling

Modeling Identified system improvements

Improvements packaged and prioritized

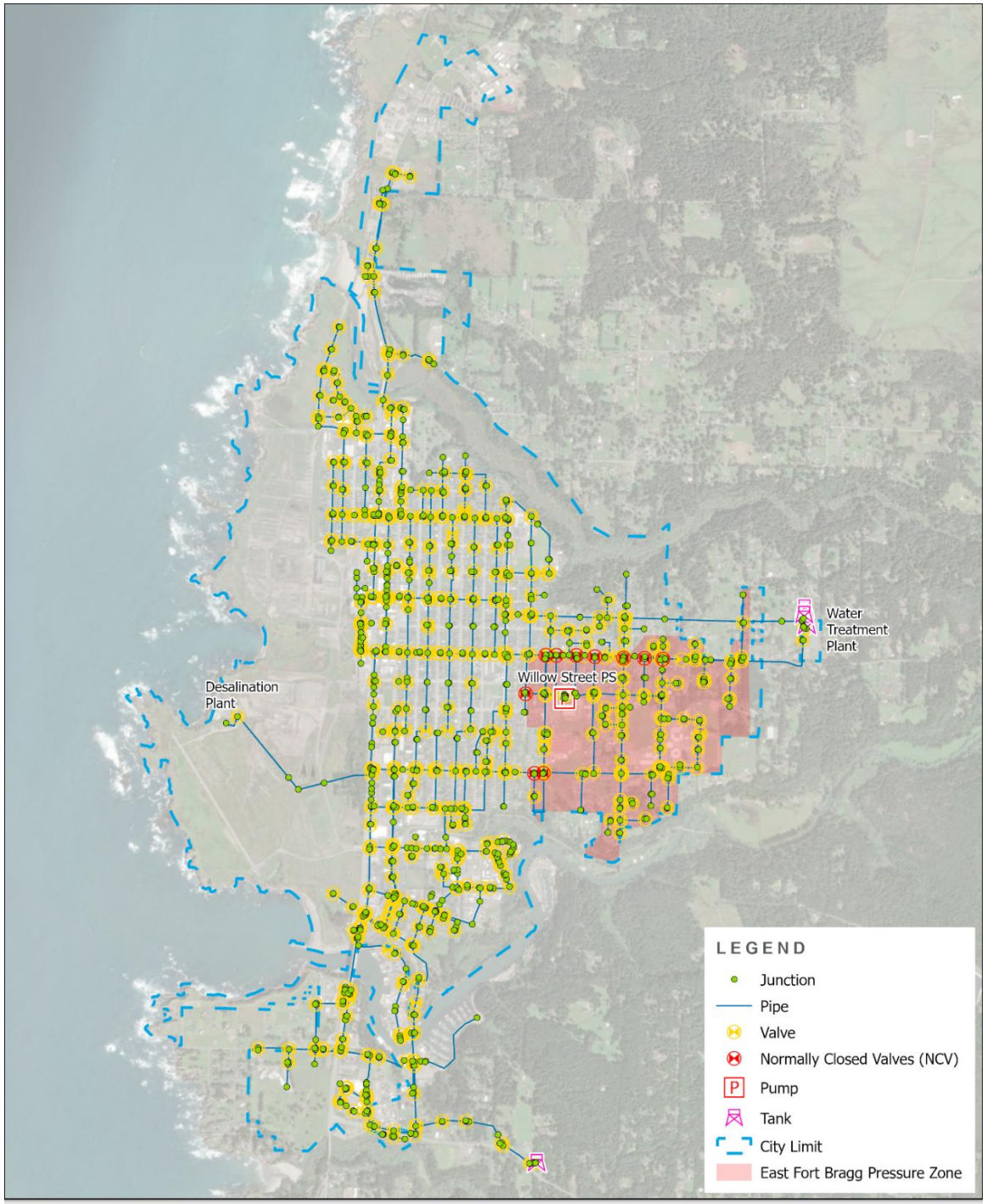
Other recommendations incorporated

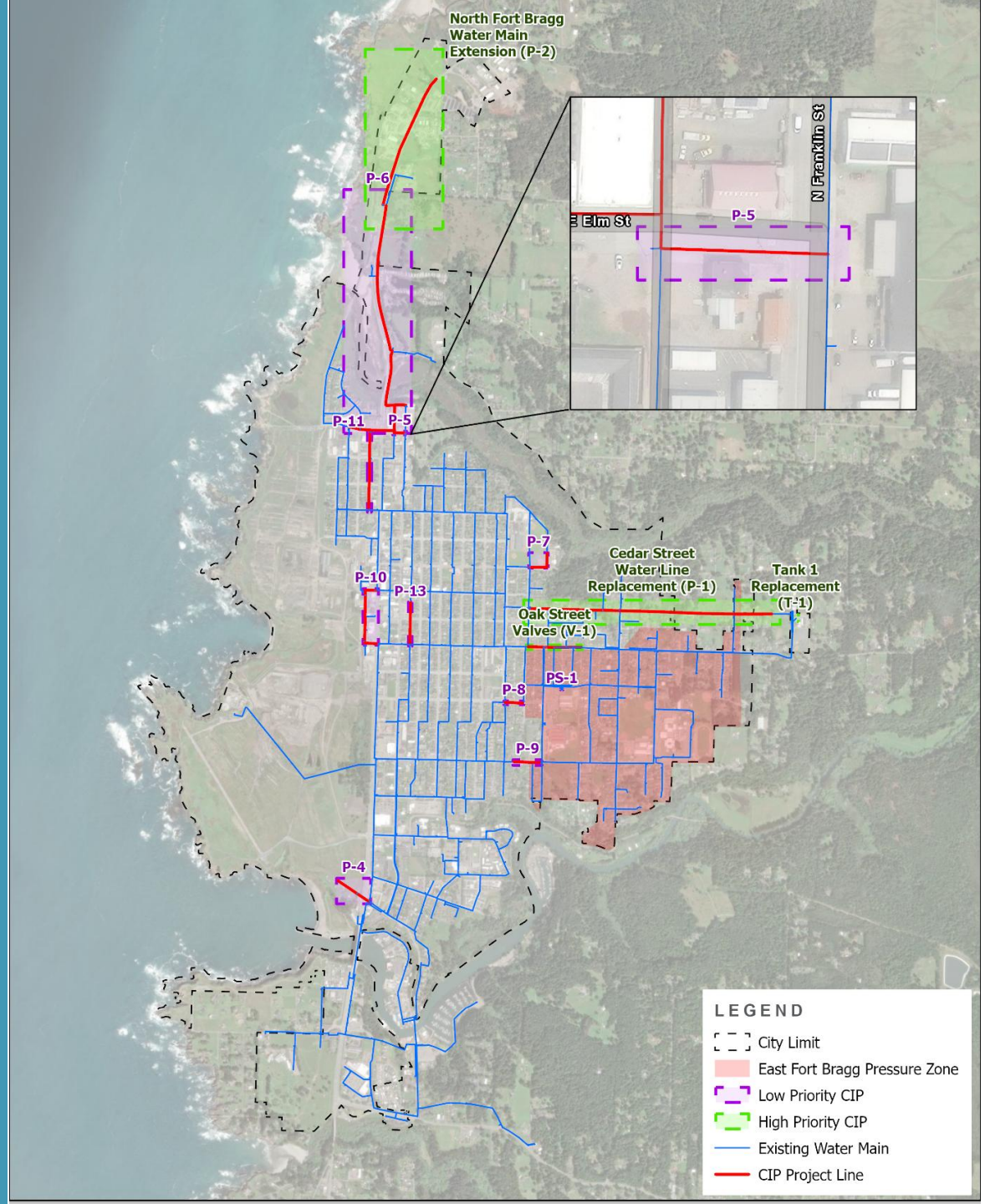
Key Accomplishments

1. **GIS database** to support hydraulic modeling, risk analysis, and current and future capital planning
2. System **hydraulic model**
3. Current and future **demand analysis**
4. Build-out **capacity analysis**
5. **Geotechnical & environmental risk analysis**
6. **Climate risk analysis**
7. **Risk assessment model**
8. **CIP plan**, including pipeline replacement strategy
9. Analysis of potential **funding opportunities**
10. **CEQA compliance strategy**
11. **Asset management strategy** and recommendations for implementation

Today - Existing Water Distribution System

- Adequately satisfies current needs
- Performs well & in good condition
  - Well-maintained
  - Low break rates compared to other utilities
- Needs improvements to supply fire flows
- Reaching end of design life (next ~10 years)
  - Can expect problems to become more frequent
  - Plan now for system renewal





Planning for the Future

Treatment Capacity, Fire Flows, Expansion

- Sufficient water treatment capacity for current and likely future water demands
- Improvements to current fire flow capacity
  - Willow Creek Pump Station fire pump upgrade
  - Targeted pipeline improvements to address existing deficiencies
- Operational Improvements
  - Oak Street Isolation Valves
- Noyo Center water line

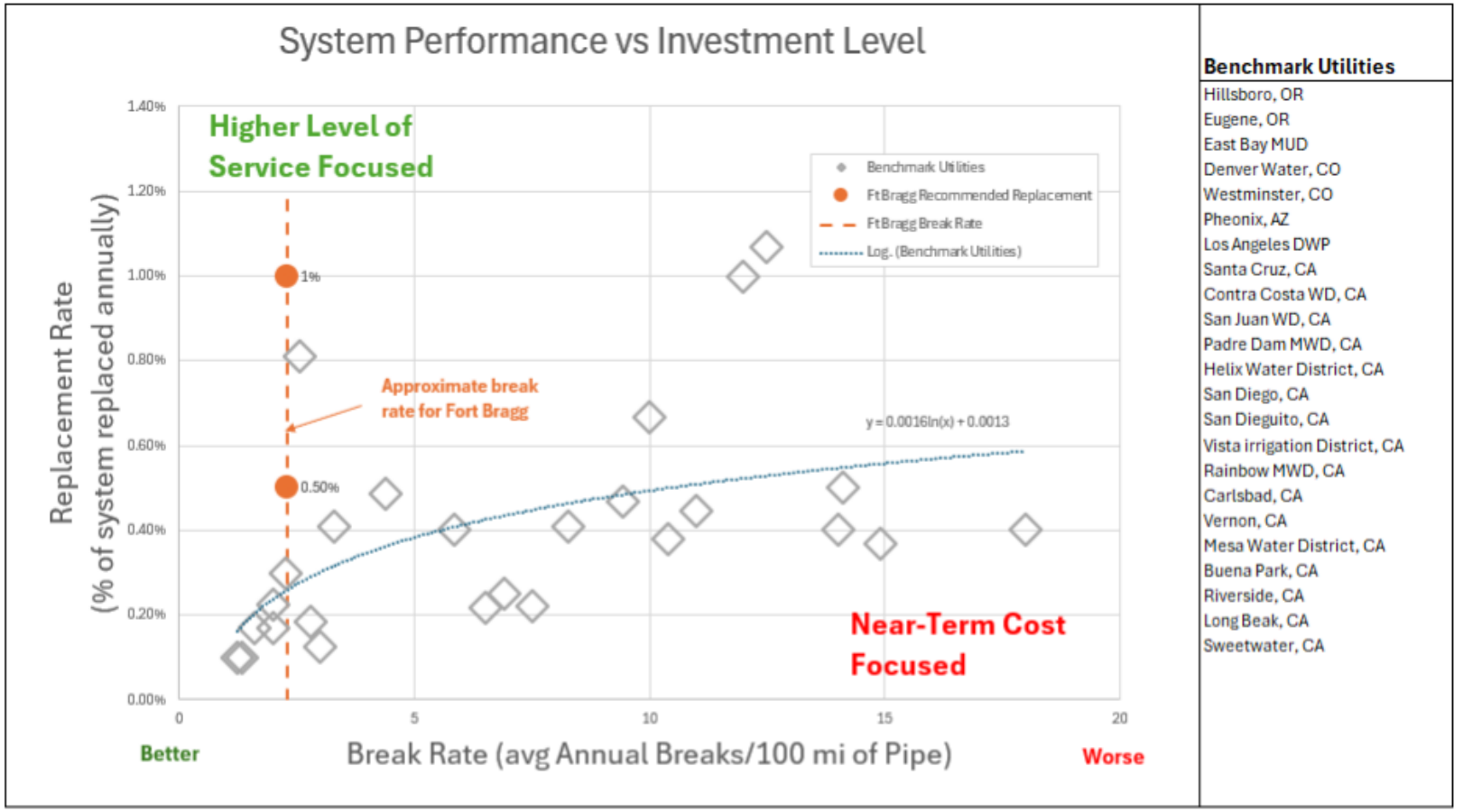
Planning for the Future

System Renewal

1% annual replacement rate recommended

Targeted pipe replacement:

- **Current information & Conditions**
- **Hydraulic Model**
- **Risk Model**
- **Opportunistic pipe sampling**



Planning for the Future: Risks

Seismic activity, drought, wildfire, sea-level rise

1. **Seismic Risk** – Bridge crossings vulnerable to movement; consider ERDIP or articulating joints for critical lines
2. **Densification** – Soil spreading or groundwater shifts may cause settlement damage
3. **Landslides & Bluff Erosion** – Differential settlement or pipe stretching from slope failures
4. **Soil Corrosivity** – Coastal soils more acidic, increased pipe corrosion risk
5. **Water Supply Resiliency Challenges**
    1. Increasing drought frequency and declining spring water availability
    2. Rising salinity and sea-level impacts at surface water intakes
    3. Continued evaluation of supply options is recommended

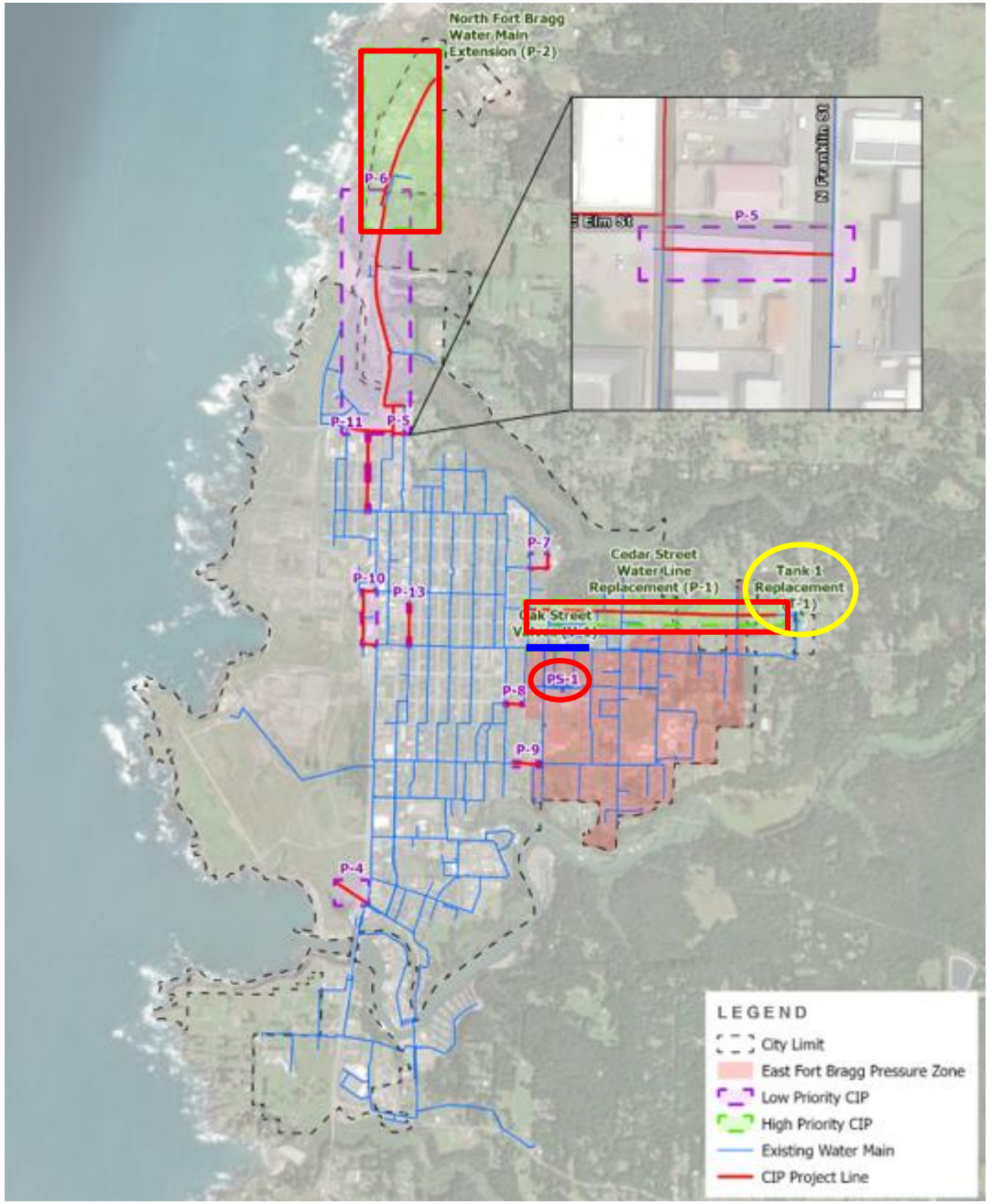
Capital Plan – Next 5 Years

Priority	CIP ID	Project Name	Driver	Cost[a]
1	PS-1	Pump Station Upsize	Capacity or Fire Flow Deficiency	$8,141,000
2	V-1	Oak Street Valves	Operational Improvements	$93,000
3	P-1	Cedar Street Water Line Replacement	Capacity or Fire Flow Deficiency	$3,357,000
4	T-1	Tank 1 Upgrade	Asset Renewal	$8,955,000
5	P-2	North Fort Bragg Water Main Extension	Capacity or Fire Flow Deficiency	$1,384,000
6	PL-1	System Renewal- Pipe Replacement	Asset Renewal [b]	$2,830,000
7	O-1	Opportunistic Pipe Sampling	Other	$69,000
8	O-2	CIP Update	Other	$110,000
9	O-3	CMMS Needs Analysis	Other	$39,000

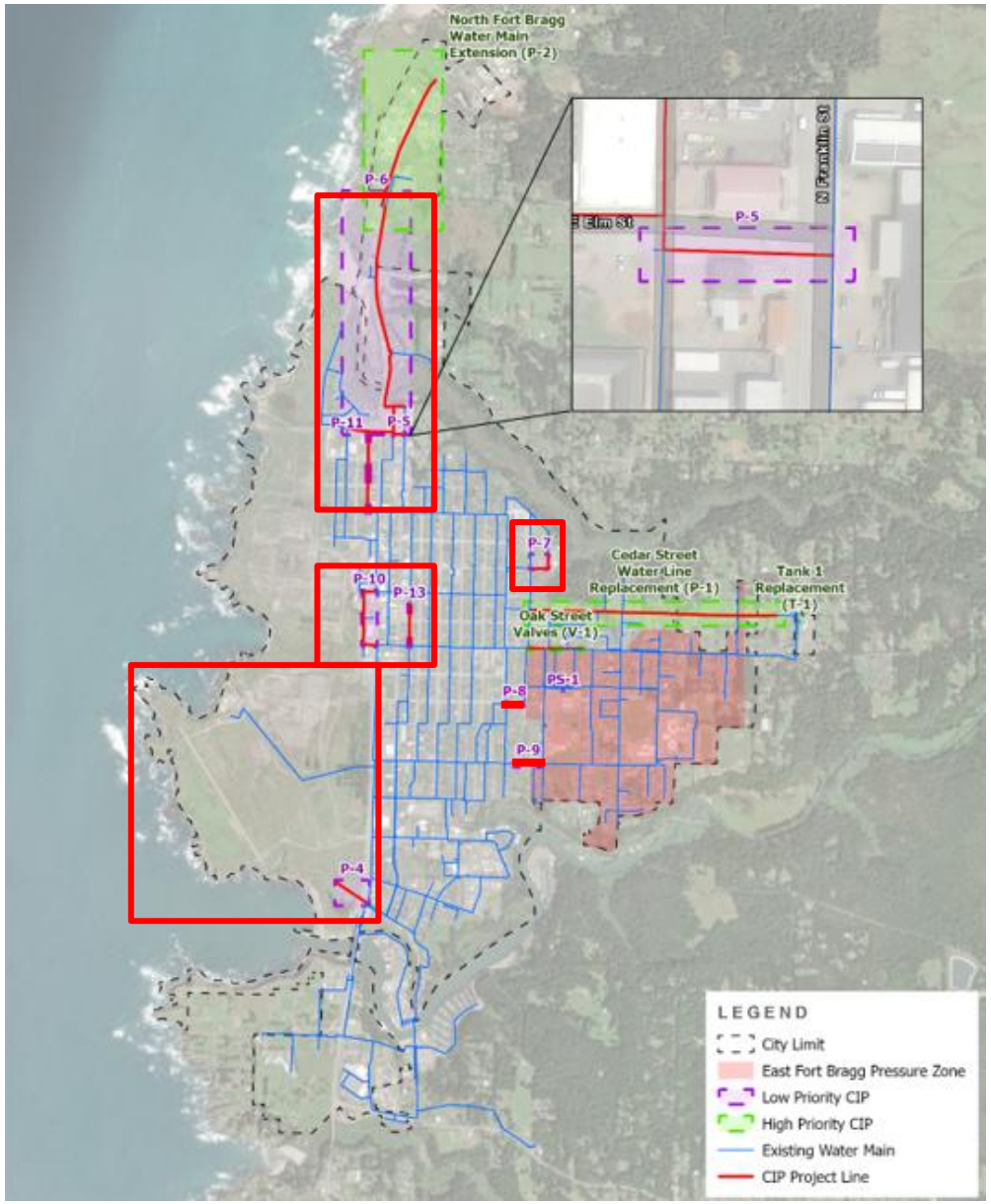
Next 5 Year Sub-Total : ***$24,978,000***

[a] Project Costs Escalated for Inflation

[b] Budget reserved to meet system renewal goal. Projects to be identified based on condition and risk, or emergent issues



Capital Plan – 5 to 10 Years



Priority	CIP ID	Project Name	Driver	Cost [a]
10	P-7	East Laurel Street Water Main Replacement	Capacity or Fire Flow Deficiency	$354,000
11	P-3	Noyo Center Water Line[b]	Capacity or Fire Flow Deficiency	$2,985,000
12	P-6	North Main Street Water Main Replacement	Capacity or Fire Flow Deficiency	$4,016,000
13	P-14	East Alder Street Water Main Replacement	Capacity or Fire Flow Deficiency	$470,000
14	P-10	Chief Celeri Dr Water Main Replacement	Capacity or Fire Flow Deficiency	$951,000
15	P-4	Noyo Point Road Water Main Replacement	Capacity or Fire Flow Deficiency	$455,000
16	P-8	Maple Street Water Main Loop	Capacity or Fire Flow Deficiency	$206,000
17	P-5	East Elm Street Water Main Loop	Capacity or Fire Flow Deficiency	$145,000
18	P-9	East Chestnut Street Water Main Replacement	Capacity or Fire Flow Deficiency	$330,000
19	P-11	Spruce Street Water Main Replacement	Capacity or Fire Flow Deficiency	$873,000
20	PL-2	System Renewal- Pipe Replacement	Asset Renewal [c]	$3,280,000
21	O-4	Opportunistic Pipe Sampling	Other	$80,000
22	O-5	CMMS Acquisition & Implementation[c]	Other	$191,000
23	O-6	CIP Update	Other	$127,000

[a] Project Costs Escalated for Inflation

[b] P-3 is dependent on development at the GP Mill site

[c] Budget reserved to meet system renewal goal. Projects to be identified based on condition and risk, or emergent issues

5-10 Year Sub-Total : ***$14,463,000***

Conclusion & Summary of Recommendations

- Purpose
  - **Assess the current & future state**
  - Identify **near-term and long-term capital needs**

- Infrastructure – **good condition**, **well maintained**, **reaching the end of useful life**.
  - Expect efforts to replace or renew aging infrastructure

- **$39M** of capital projects over the **next 10 years** addressing **aging infrastructure**, **fire flow**, and **City growth**
  - Identified and prioritized to mitigate risk and to maintain current levels of service.

Questions

Treated Water Capacity, Expansion, & Fire Flow

Average & Maximum Daily Water Demand Projections for Existing, Near-Term, and Buildout

Description	Residential	Non-residential	Water Loss	Total ADD	Total MDD
	ADD (mgd)	ADD (mgd)	(mgd) [2]	(mgd)	(mgd)
Existing Usage	0.428	0.156	0.11	0.58	1.01
Existing + Near Term Usage	0.440	0.165	0.11	0.61	1.05
Existing + Near Term + Buildout Usage	0.717	0.641	0.24	1.36	2.35

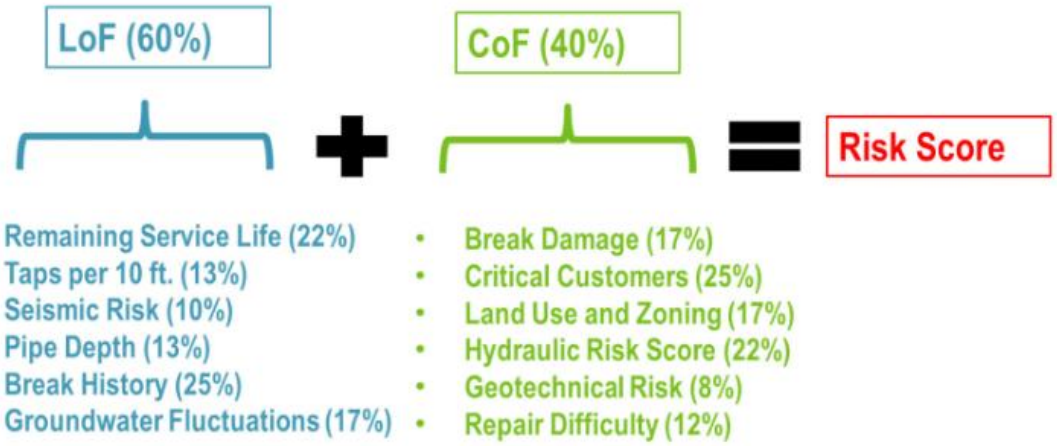
- **Existing Demand: 1.01 MGD**
- **Near-Term Demand** (next 10 years): **1.05 MGD**
- **Buildout Demand** (> 10 years): **2.35 MGD**
  - GP Mill Site, and Annexation areas

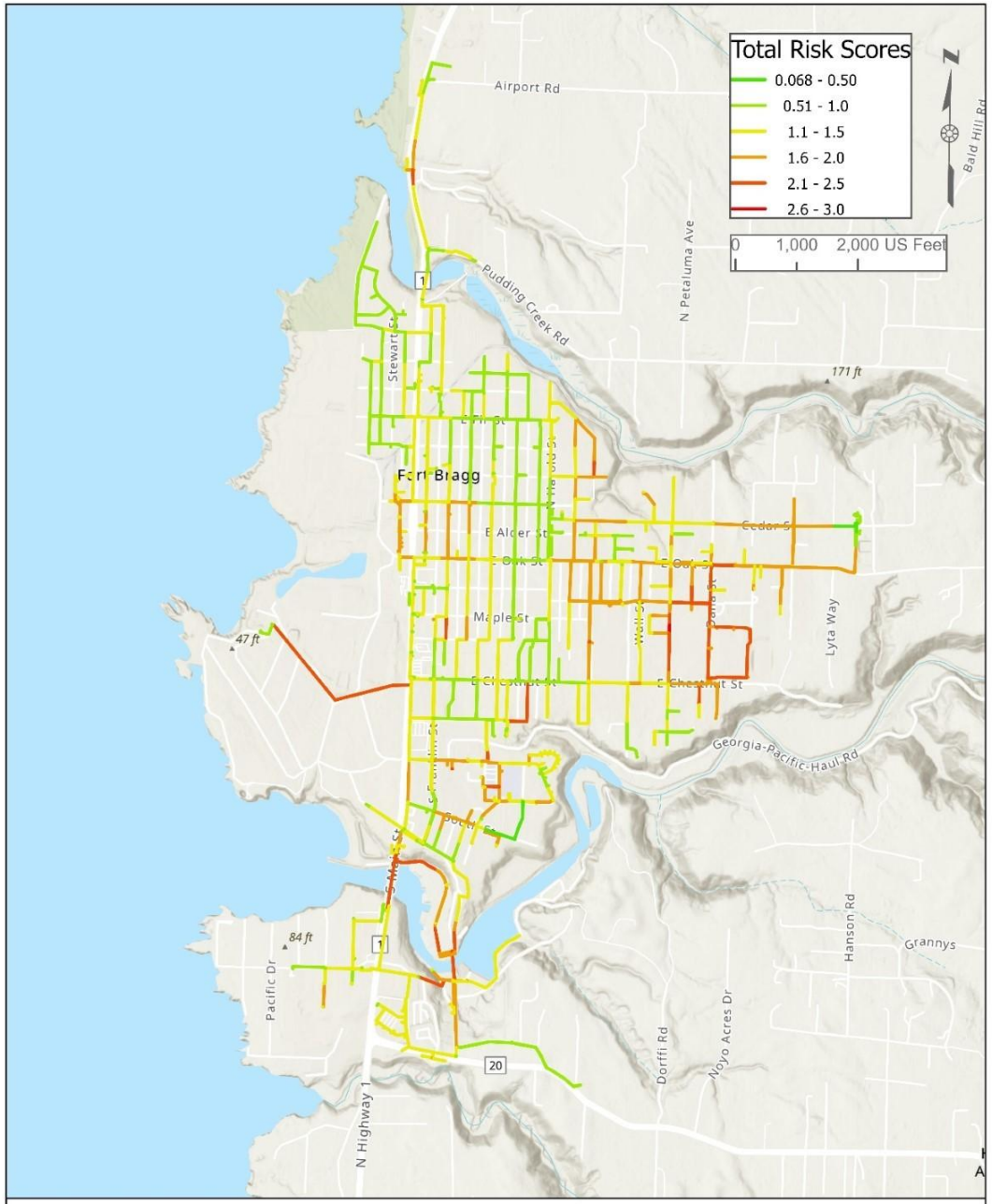
Notes on Demand Analysis:

- Assessed water usage data from June 2018 to May 2021
- The city averages 0.59MGD with low density residential using the most (41%)
- Water loss for the City (23%) are above the national target (9-10%) but declining trend shows progress

Risk Assessment

- Risk assessment done to prioritize capital improvement decisions in the Master Plan
- Risk model developed to assign relative risk score based on:
  - Likelihood of Failure (LoF)
  - Consequence of Failure (CoF)





Total Risk Score Map

Funding

Table 26 – Potential Funding and Project Eligibility Matrix

CIP ID	Project Name	WIFIA	HUD CDBG	EDA Public Works	USDA Loans and Grants	EPA SRF
P-1	Cedar Street Line Replacement	X		X		X
V-1	Oak Street Valves	X		X		X
P-2	North Fort Bragg Water Main Extension	X		X		X
T-1	Tank 1 Replacement	X		X		X

Table 27 – Available Funding Summary

Source	Funding Type	Available $	Notes
WIFIA	Long-Term Loan	49% of eligible projects over $20M and $5M for small communities	• Interest rate based on U.S. Treasury Securities • Maturity up to 35 years • Sculpted debt • Letters of Interest on a rolling basis
DWSRF	Loan/Some Grant Funding Available	$391M	• Low interest for 20-year maturity • Available $ = CA FY25 funding allocation • Amount of funding likely to decline after 2026 • Broad eligibility
HUD Community Development Block Grants	Grant	2025 Allocation not announced	• Funds allocated to state, city, and county • Project must resolve a problem that will help revitalize the community • Short project completion window, 24 months
EDA Public Works and Economic Adjustment	Grant	$30 million	• Must promote economic development in disadvantaged areas • Percent match requirements depending on disadvantaged status
USDA Water and Wastewater Loans and Grants	Predominately loans and some grants	Varies based on annual funding allocations	• Projects must serve rural communities (population less than 10,000) • Interest rates vary based on communities' disadvantaged status • Up to 40-year payback period

Raw Water Supply Planning

- The City of Fort Bragg does not currently meet the supplier criteria that would require development of an Urban Water Management Plan (UWMP)
  - Does not serve more than 3,000 customers
  - Or supply more than 3,000 acre-ft of treated water annually

- In the absence of a formal UWMP the City has taken measures to assess and address the adequacy and reliability of their raw water supply.
  - 2015 - Water-Supply Model – To evaluate water-supply scenarios
  - 2016 – Construction of the 45 acre-ft Summers Lane Reservoir
  - 2023 – Pipeline improvements, including pressurized pipe and pump station force main at Newman Gulch.
  - 2025 – Preliminary Engineering Reports Established for three new 45-acre-foot reservoirs, building off existing water rights

Environmental Compliance

CIP ID's	Expected LOE for CEQA Compliance
V-1	Exemption: Class 1
T-1	Exemption: Class 2
P-1, P-3, P-4, P-5, P-6, P-7, P-8, P-9, P-10, P-11, P-12, P-13, PS-1, P-2, P-14	Initial Study / Mitigated Negative Declaration
P-15, P-16	Environmental Impact Report

- **Class 1 Exemption**: Existing facilities
- **Class 2 Exemption:** Replacement or reconstruction.
- **Initial studies (IS):**
  - May result in either a negative declaration or mitigated negative declaration
- **Environmental impact reports (EIR):**
  - Required when significant impacts are found that cannot be mitigated to less than significant levels. Involve more evidence, process, time, and include a period of public review.

Capacity and Expansion

Table 10 – ADD and MDD Water Demand Projections for Existing, Near-Term, and Buildout

Description	Residential	Non-residential	Water Loss	Total ADD	Total MDD
	ADD (mgd)	ADD (mgd)	(mgd) [2]	(mgd)	(mgd) [3]
Existing Usage [1]	0.428	0.160	0.106	0.694	1.20
Existing + Near Term Usage	0.440	0.170	0.110	0.720	1.24
Existing + Near Term + Buildout Usage	0.710	0.644	0.244	1.60	2.76

[1] GP Mill site area not included in the existing and near-term projections since it will only have water demand during buildout.
[2] Water loss calculated assuming that water loss remains the same as 2021 average (i.e., 18%).
[3] MDD water demand projection calculated based on the selected MDD:ADD peaking factor of 1.73.

- **Existing Demand: 0.70 MGD**
- **Near-Term Demand** (next 10 years): **0.72 MGD**
  - Recent developments including housing, retail, and hotels. Annexation areas.
- **Buildout Demand** (> 10 years): **1.6 MGD**
  - GP Mill Site, and Annexation areas

Notes on Demand Analysis:

- Assessed water usage data from June 2018 to May 2021
- The city averages 0.59MGD with low density residential using the most (41%)
- Water loss for the City (23%) are above the national target (9-10%) but declining trend shows progress

Geotechnical Evaluation & Risk

- City is located on a seismically active, uplifted coastal terrace

- **Seismic risk**
  - Not within a fault line.
  - Differential movement especially at bridge crossings may pose risk to distribution
    - **Mitigation strategies may include:**
      - Use of articulating joints
      - Earthquake Resistant Ductile Iron Pipes (ERDIP) for critical infrastructure

- **Densification/Liquification**
  - Significant settlement due to soil spreading or groundwater fluctuation could damage system
- **Land Slides & Bluff Erosion**
  - Differential settlement or pipe lengthening due to landslides pose risk to the system
- **Corrosivity**
  - Terrace deposits are acidic (corrosive) and become more so gradually closer to the ocean.

Environmental Evaluation & Risk

- **Flooding -** The City is susceptible to flooding and severe winter storms.
- **Fire -** significant fires have occurred in Northern California in the last few years and the City's fire hydrant system is critical infrastructure for public safety
- **Chemically impacted sites -** Many of these sites are identified as having been remediated to meet standards set forward by regulatory agencies.
  - It should be noted that there may be residual chemically impacted soils that may require special testing and handling to determine material reuse or disposal.
  - The DTSC GeoTracker website should be referenced during future system upgrade or rehabilitation projects.

Environmental Evaluations

Climate Change Impacts

- **Hotter temperatures**
  - Adds demand and stress to the water system and exacerbates wildfire threat to infrastructure
- **Variability in precipitation**
  - May cause floods or droughts
- **Sea level rise**
  - Increase risks of landslides and erosion
  - Increase in salt-water intrusion to freshwater supply areas

Climate Change Mitigation

- Require varied and more adaptable water management
- Water distribution assets which may benefit the most from implementing resilience strategies include:
  - Pump station
  - Mains
  - Storage tanks
  - Water treatment plant

Environmental Practices

- **Water efficiency**:
  - Raw Water Line Replacement Project (Dewberry 2022) is upgrading critical infrastructure to improve reliability and efficiency of 2 mile section of aging raw water deliver pipeline
  - Oneka Seawater Desalination Buoy Pilot Study designed to enhance resilience and efficiency of the water supply system of Fort Bragg
  - Increasing reservoir storage to improve long-term water supply reliability and enhance drought resilience
  - Regulating new and retrofitted landscapes for better water efficiency through new standards
- **Conservation**:
  - Identified priority species
  - Removal of fish passage barrier in 2016 from Newman Gulch
  - City plans to continue considering ways to protect these populations

T-1 Tank 1 Replacement

CIP Year: ??

Description: Replace existing Tank 1 at the Water Treatment Plant.

Project Driver: Aging Infrastructure – repairs necessary

Expected Env. Compliance: Exemption: Class 2 for Replacement or Reconstruction

Projected Project Cost: $8,955,000

Funding Opportunities: WIFIA, EDA Public Works, EPA SRF