Skaha Estates Improvement District Water System Assessment

Regional District of Okanagan-Similkameen

TRUE

ENGINEERING ■ PLANNING ■ URBAN DESIGN ■ LAND SURVEYING

February 2025

Project: 308-261

Agenda

- Project Background
- Regulatory Overview and Assessment Criteria
- Water System Assessment
- Asset Management
- Infrastructure Upgrades and Improvements

PROJECT BACKGROUND

Introduction

- TRUE Consulting: Water System Assessment
  - Site visit and mechanical assessment
  - Water System Assessment Desktop Study
- Larratt Aquatics Ltd. : Water Chemistry and Intake Extension Study
- MPE: Reservoirs and Pump Stations Electrical and control systems assessment
- Riding Engineering: Reservoirs and Pump Station Buildings Structural Assessment

System Background

- 3 km north of Okanagan Falls and 15.4 km south of Penticton
- Service area: 95 Hectares
- 1962-1967:
  - Privately owned by Skaha Lake Properties Ltd.
  - Lake intake, pump station and asbestos cement supply mains
- 1977: Incorporation of Skaha Estates Improvement District.
- Phased development: 1980s, 2007-2009, present
  - Single detached housing
  - System and infrastructure Upgrades:
  - 1981 Lower Reservoir
  - 2000 an additional water license
  - 2007-2008 Upper PZ
    - Upper pump station
    - PVC distribution network
    - Upper Reservoir
- 199 legal lots
  - 185 are serviced
  - 159 properties estimated to be active

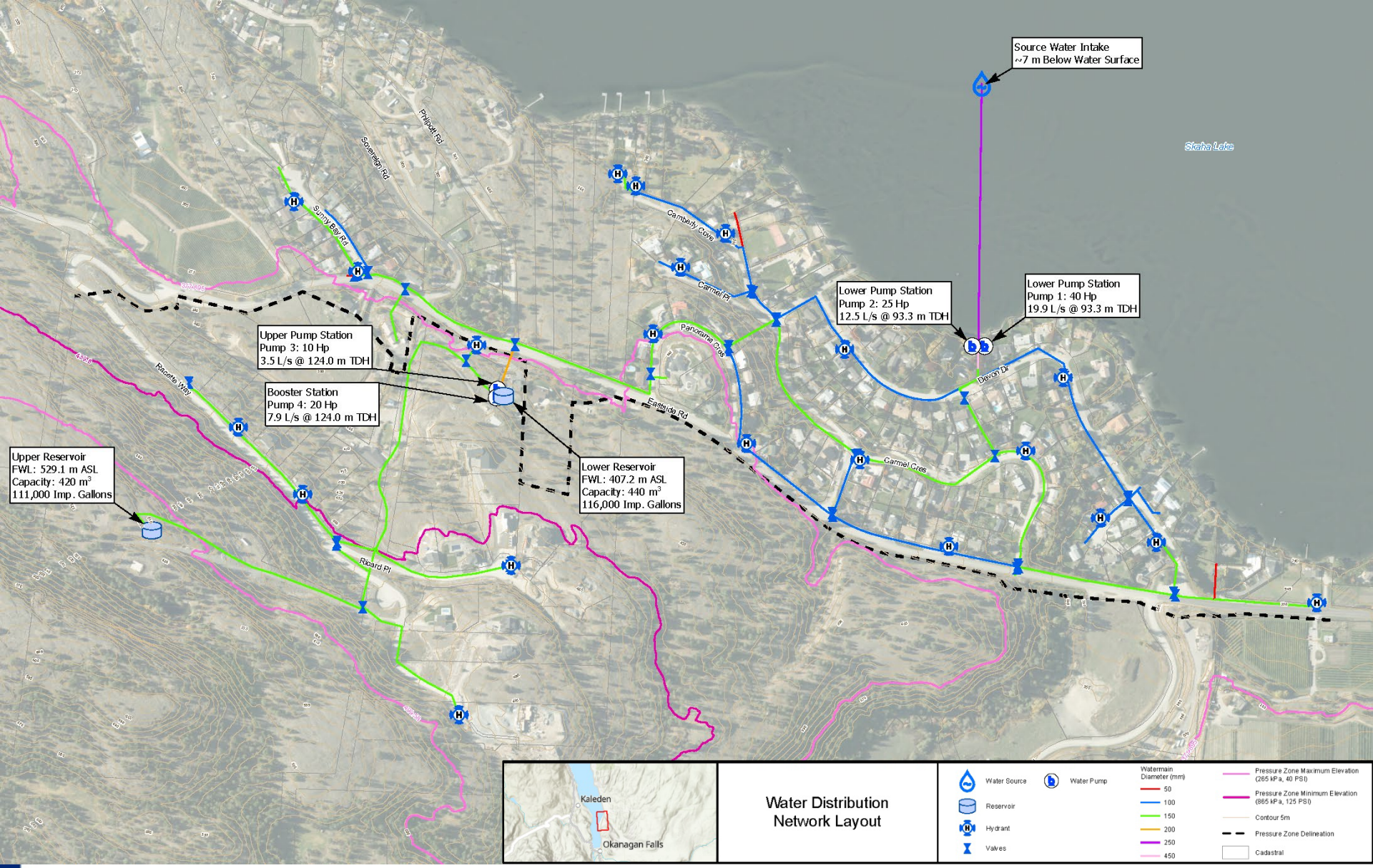


REGULATORY OVERVIEW AND ASSESSMENT CRITERIA

Regulatory Overview and Assessment Criteria

- Improvement Districts are local authorities governed by a board of trustees as defined in their Letters of Patent.
  - SEID Bylaws
- RDOS Subdivision Servicing Bylaw No. 2900, 2024.
  - MMCD 2022 Design Guidelines and provides supplementary design guidelines.
  - RDOS Bylaw criteria are used for analysis

WATER SYSTEM ASSESSMENT


Source Water Intake
~7 m Below Water Surface
Skaha Lake
Lower Pump Station
Pump 2: 25 Hp
12.5 L/s @ 93.3 m TDH
Lower Pump Station
Pump 1: 40 Hp
19.9 L/s @ 93.3 m TDH
Upper Pump Station
Pump 3: 10 Hp
3.5 L/s @ 124.0 m TDH
Booster Station
Pump 4: 20 Hp
7.9 L/s @ 124.0 m TDH
Upper Reservoir
FWL: 529.1 m ASL
Capacity: 420 m³
111,000 Imp. Gallons
Lower Reservoir
FWL: 407.2 m ASL
Capacity: 440 m³
116,000 Imp. Gallons
Sovereign Rd
Phippsett Rd
Sunny Bay Rd
Campbell Cove
Carmel Pl
Panorama Cres
Deron Dr
Eastside Rd
Carmel Cres
Ricard Pl
Kaleden
Okanagan Falls
Water Distribution
Network Layout
Water Source
Water Pump
Reservoir
Hydrant
Valves
Watermain Diameter (mm)
50
100
150
200
250
450
Pressure Zone Maximum Elevation (265 kPa, 40 PSI)
Pressure Zone Minimum Elevation (865 kPa, 125 PSI)
Contour 5m
Pressure Zone Delineation
Cadastral

Water Quality and Treatment

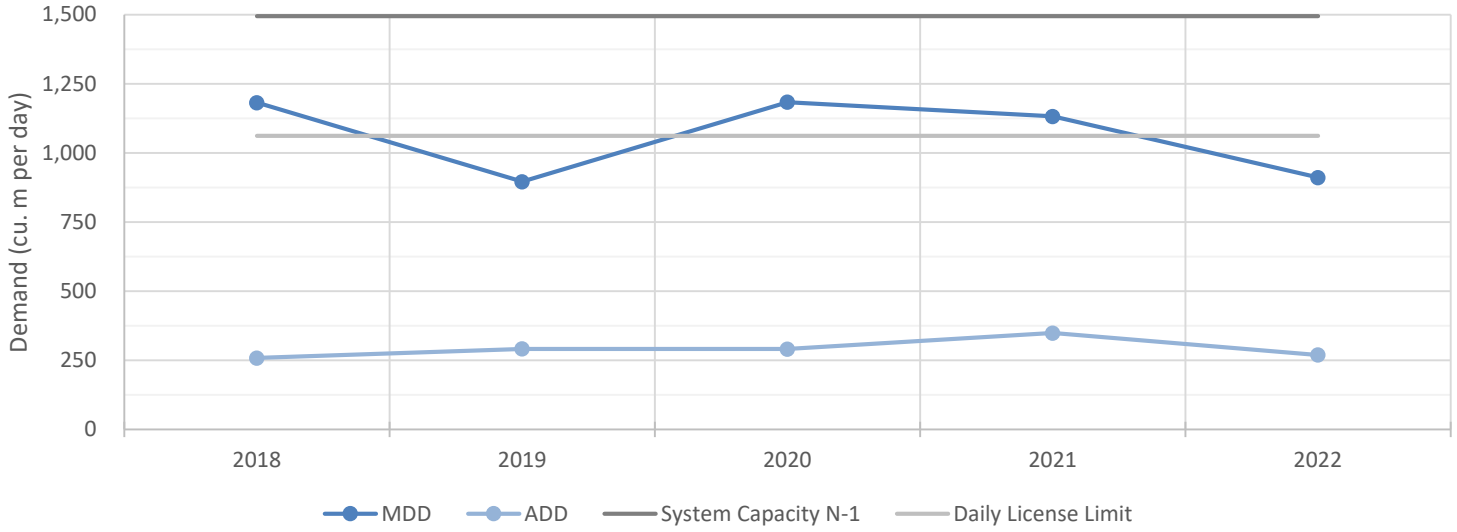
Objective	Description	SEID Context
4	4 log removal of viruses	Not currently achieved. Install works to ensure a minimum free chlorine concentration of 1 mg/L following chlorine contactor works.
3	3 log removal of *Cryptosporidium* and *Giardia*	Not achieved. Possible upgrading options include: chemically assisted mixed media filtration, slow sand filtration, membrane filtration, reverse osmosis.
2	2 treatment processes	Not achieved. Any two of the technologies combined to meet both objectives, one of which should be filtration for surface water sources*. *Filtration exemption may be pursued as per Section 6.11 of the Drinking Water Officers' Guide 2022 – Part B: Section 15 Guidelines for Pathogen Log Reduction Credit Assignment
1	Less than 1 NTU	Less than 1 NTU as per the Larratt SEID Intake Assessment. Bacteriological presence causes a filtration deferral to be highly unlikely.
0	No detectable E. coli, total coliform, and fecal coliform	Total coliforms and E.coli detected at existing intake (7 m) as per the Larratt SEID Intake Assessment. Only total coliforms were detected at deeper locations (20 m)

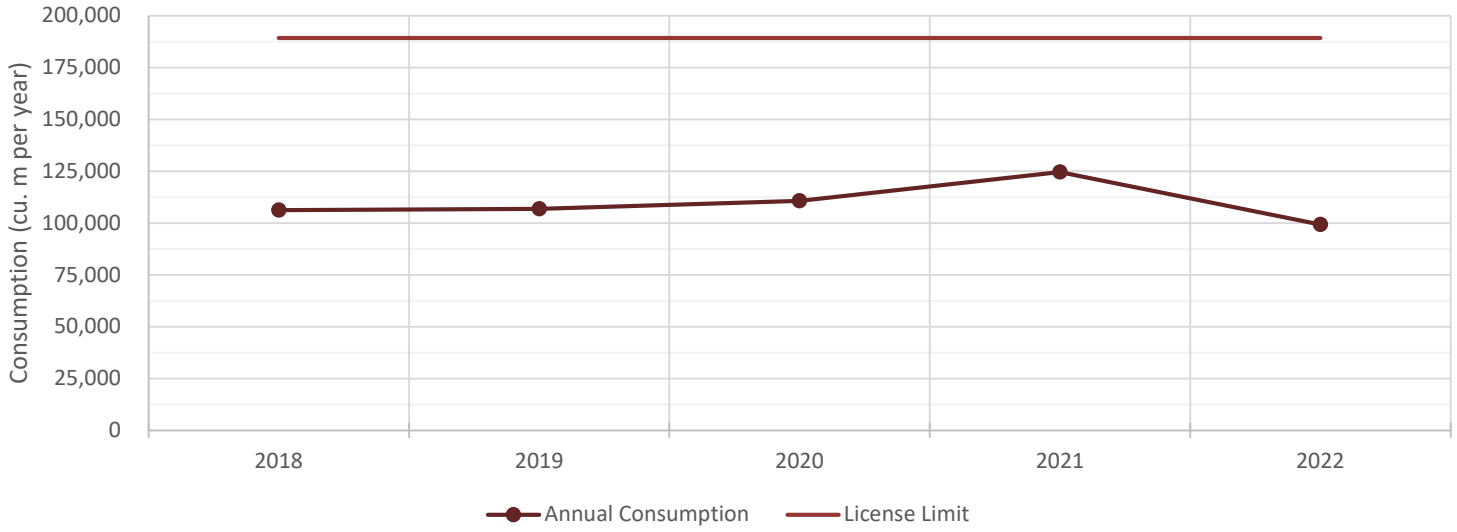
Population Projections and Service Connections

	0.5% per Annum		1.0% per Annum		1.5% per Annum	
	Capita	Units	Capita	Units	Capita	Units
2024	366	159	366	159	366	159
2029	375	163	384	167	394	171
2034	384	167	404	176	424	185
2039	394	171	425	185	457	199
2044	404	176	446	194	493	214

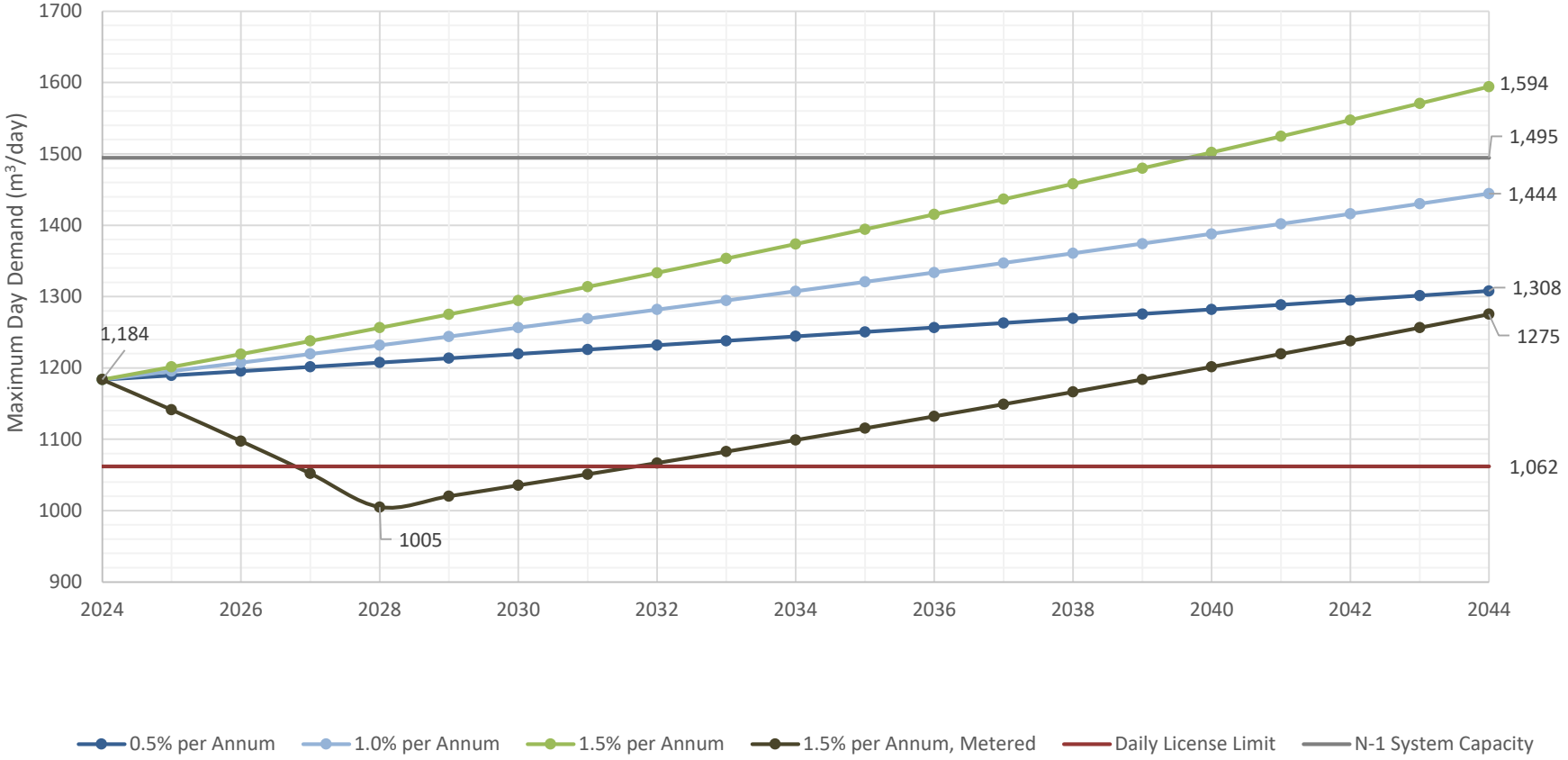
Pressure Zone	2024		2044	
	Active Service connections	Stand-by Service connections	Additional Service connections	Total Service connections
Lower	145	11	9	165
Upper	14	15	20	49
Totals	**159**	**26**	**29**	**214**

Historic Water Demand





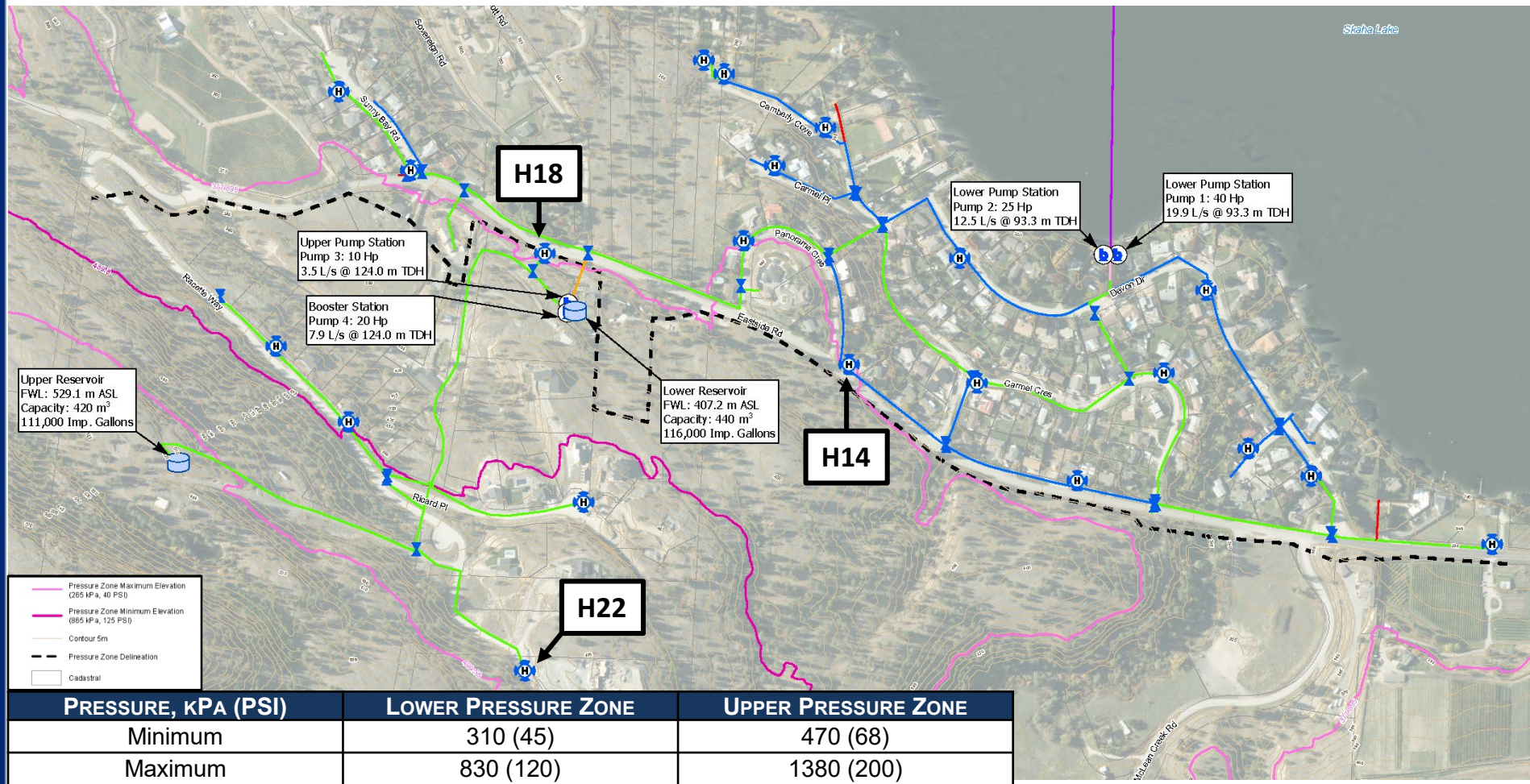
Project Water Demand



Existing Water System Capacity and Performance

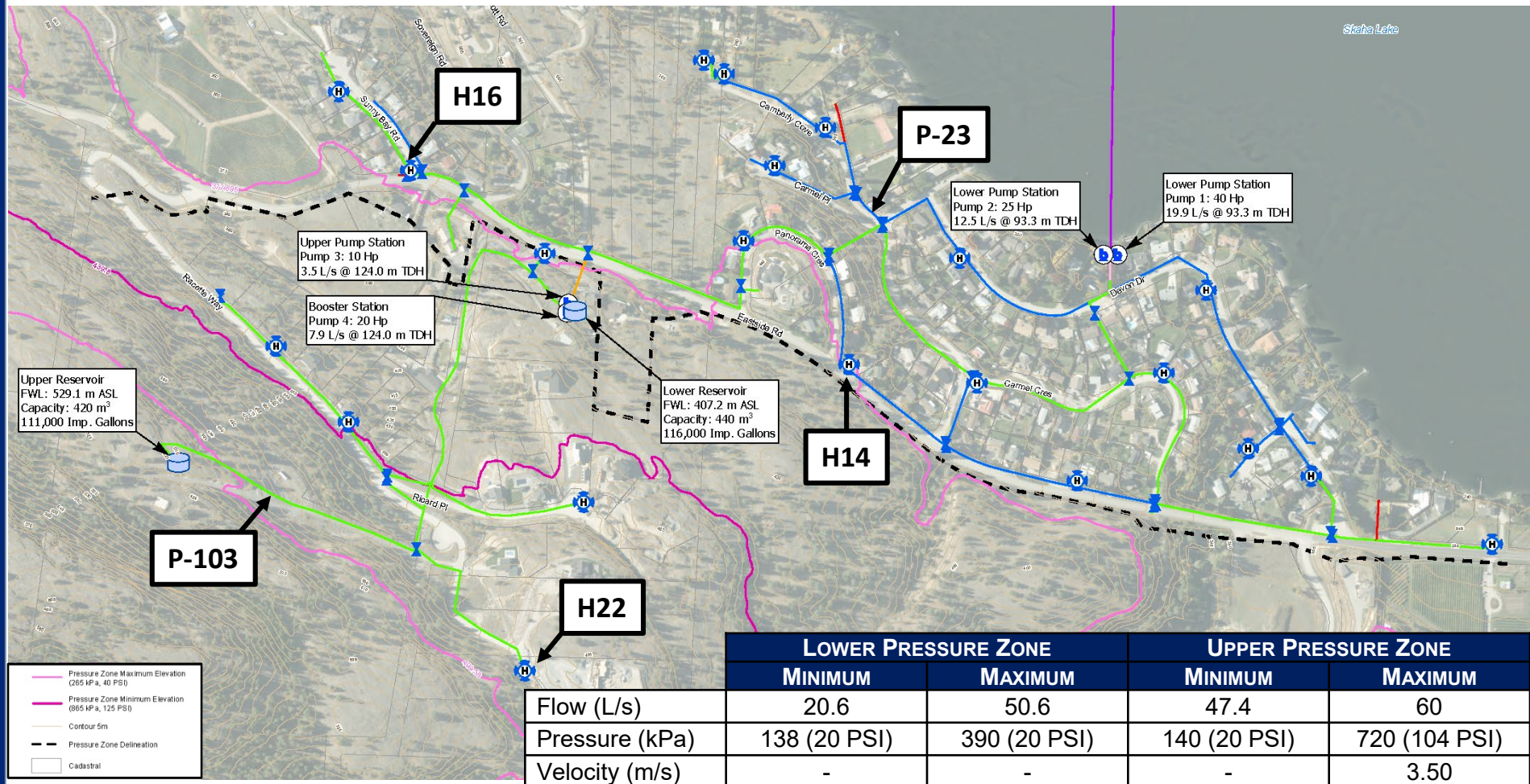
- 43210 IHA Water Treatment Objectives not achieved
- Maximum Daily Diversion: 1,062 m^3/day
  - MDD exceedances
- Available Fire Flow not compliant
  - Reservoir storage deficient
  - Fire flow deficiency due undersized mains and available pressure
- Upper Pump Station n-1 noncompliance
  - The 10 hp pump capacity is less than the 2044 unmetered and metered MDD
- No interconnection between pressure zones

Distribution System Performance – System Pressure



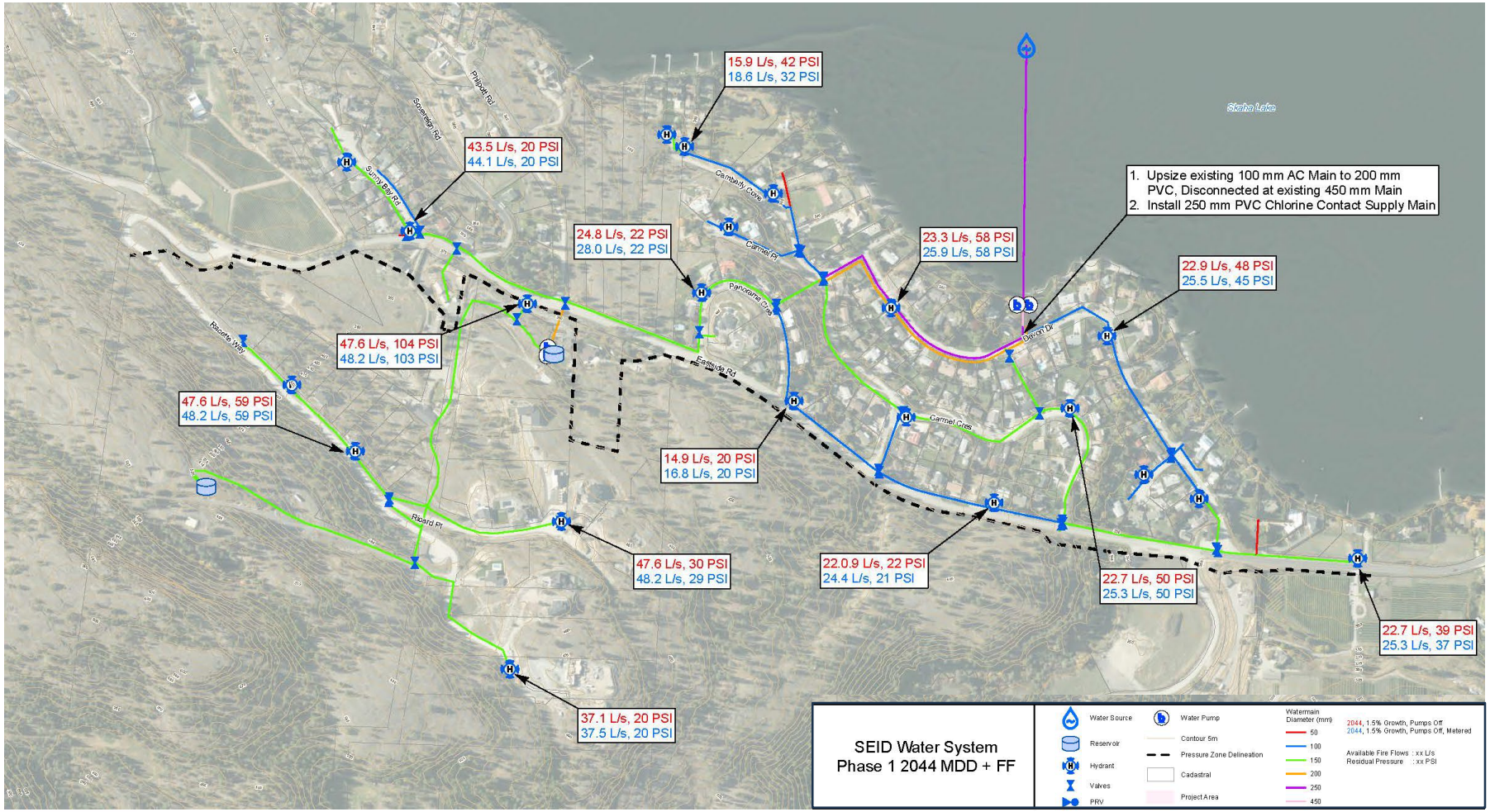
Pressure, kPa (PSI)	Lower Pressure Zone	Upper Pressure Zone
Minimum	310 (45)	470 (68)
Maximum	830 (120)	1380 (200)

Distribution System Performance – Fire Flows

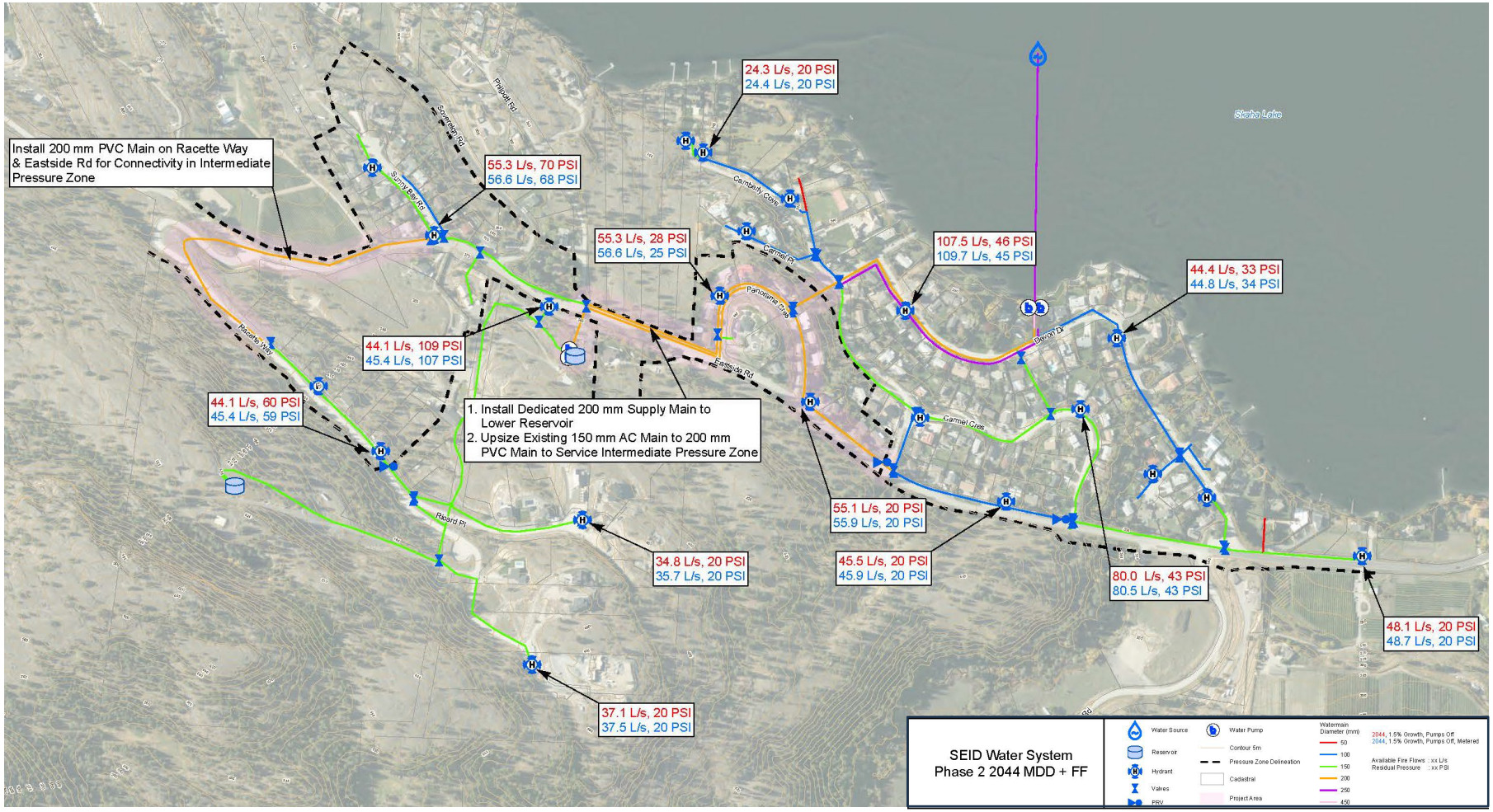


	Lower Pressure Zone		Upper Pressure Zone	
	Minimum	Maximum	Minimum	Maximum
Flow (L/s)	20.6	50.6	47.4	60
Pressure (kPa)	138 (20 PSI)	390 (20 PSI)	140 (20 PSI)	720 (104 PSI)
Velocity (m/s)	-	-	-	3.50

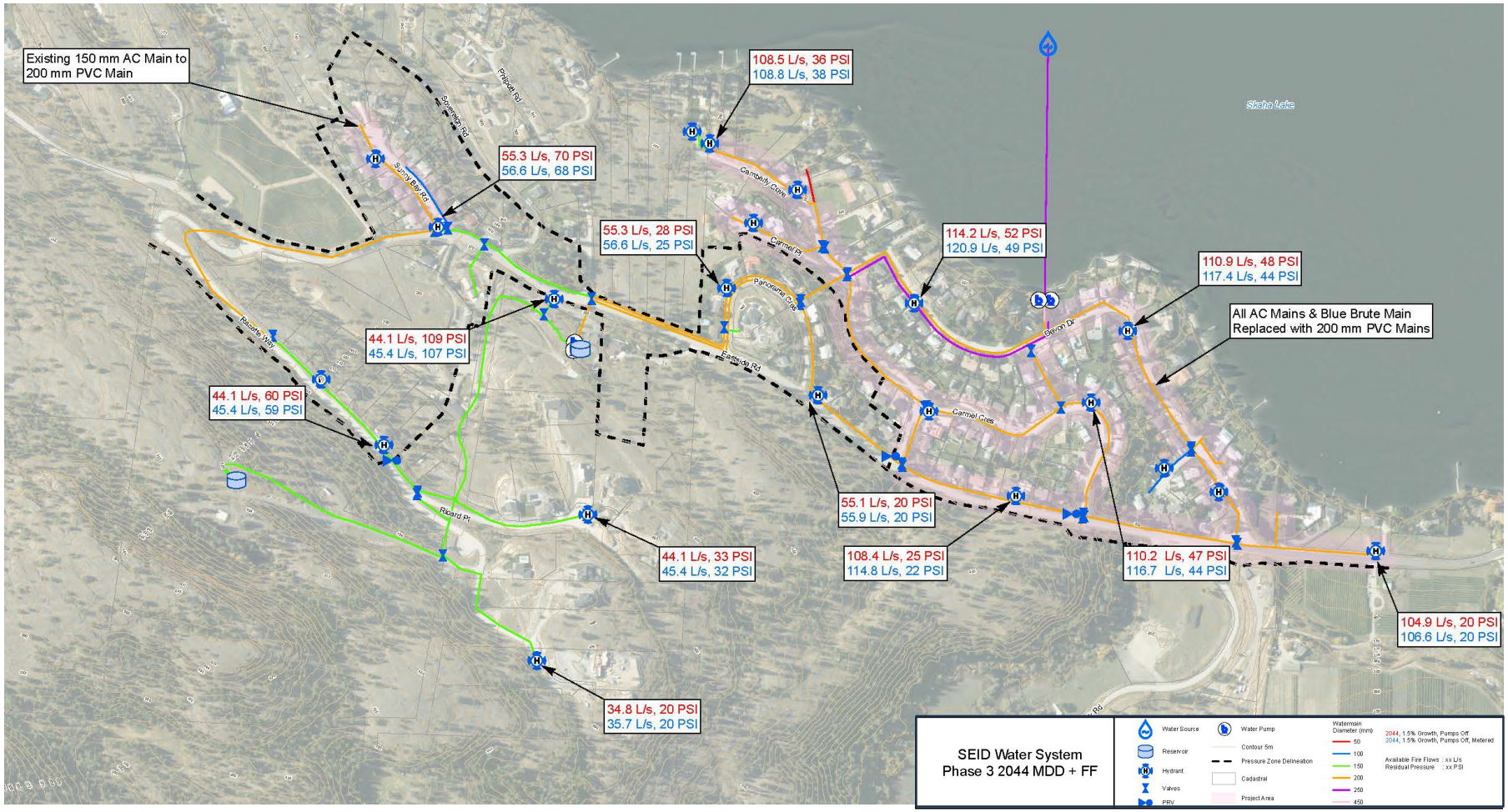
Distribution System Upgrades – Phase 1



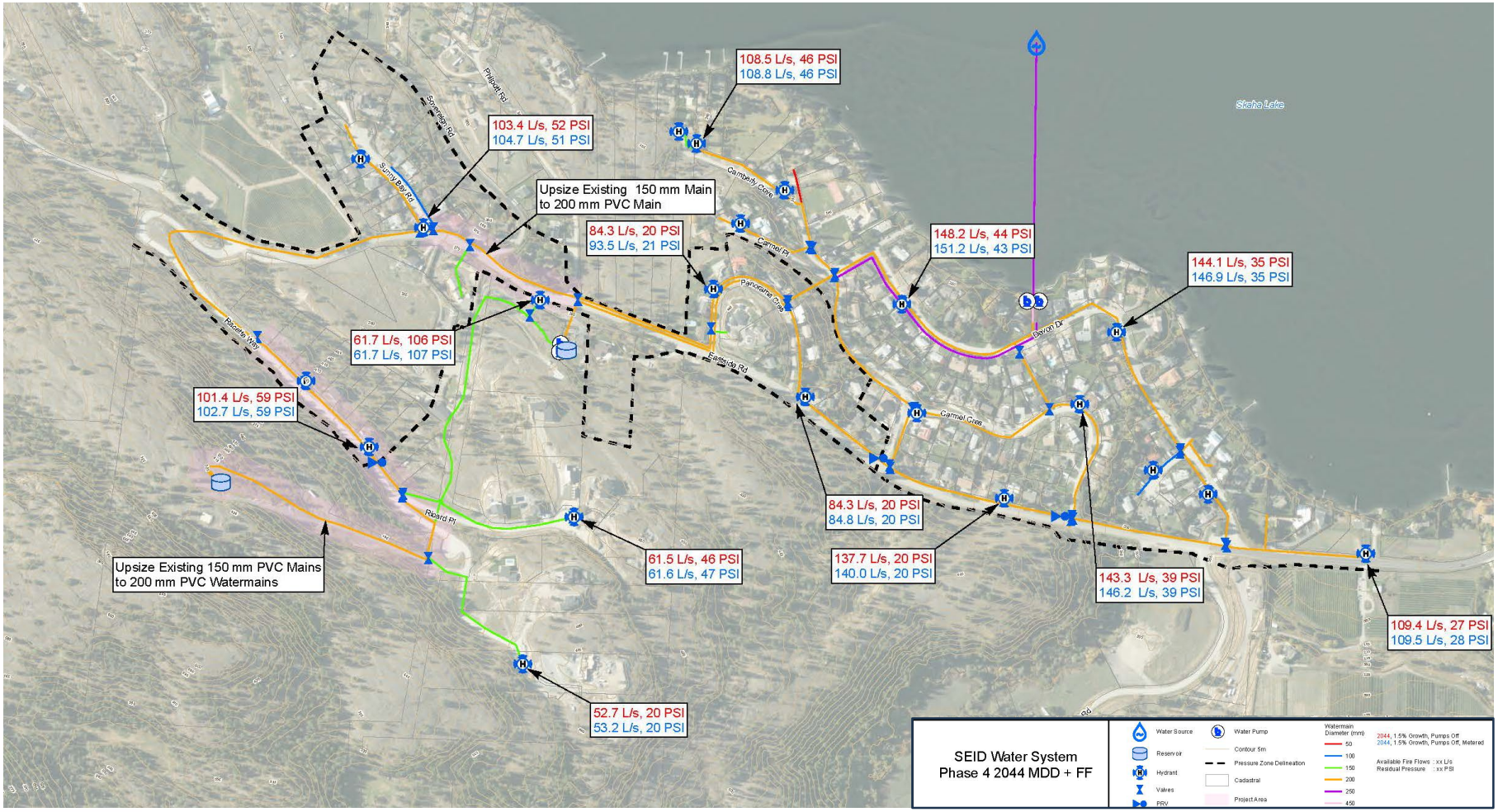
Distribution System Upgrades – Phase 2



Distribution System Upgrades – Phase 3



Distribution System Upgrades – Phase 4



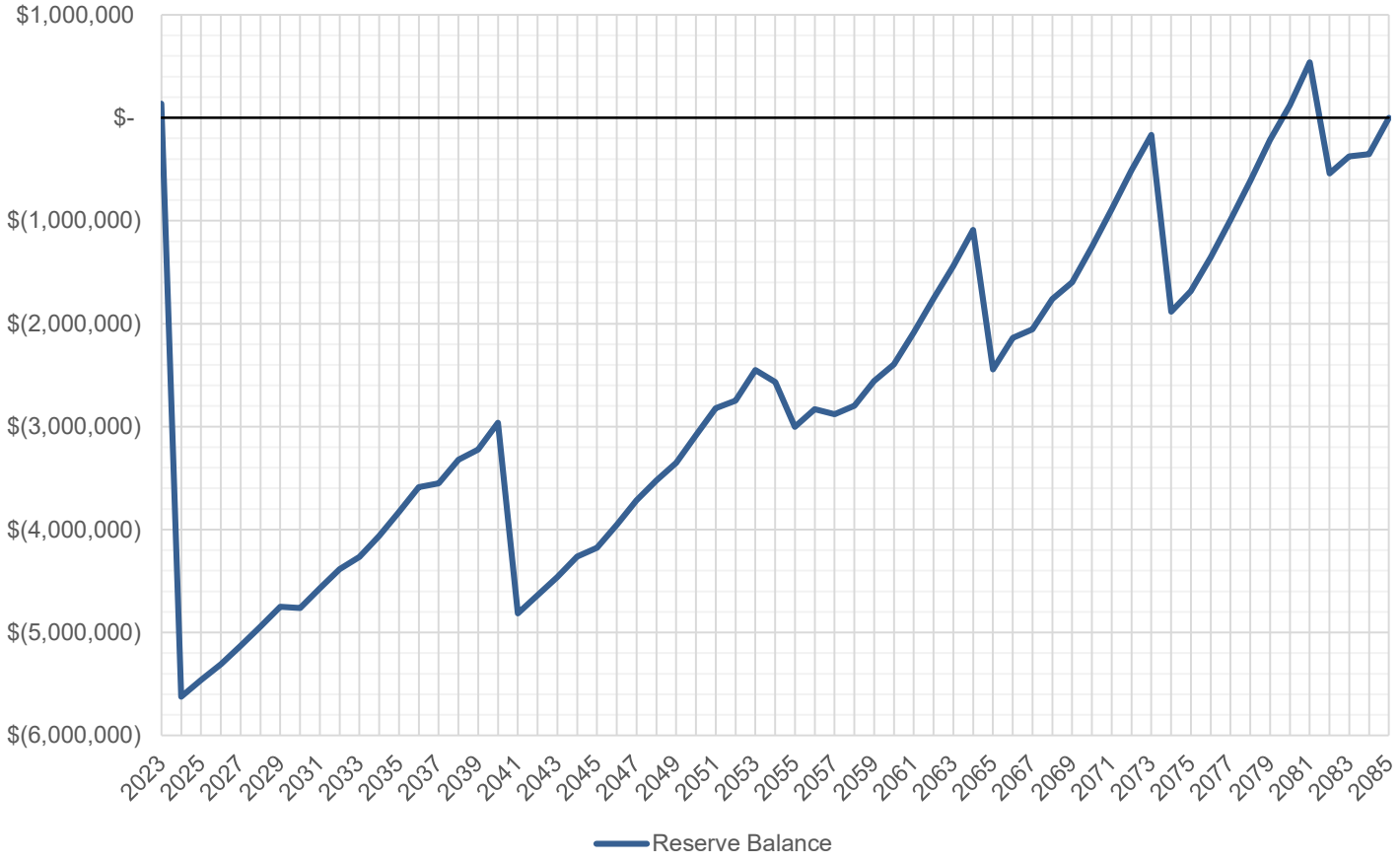
ASSET MANAGEMENT

Summary of System Components

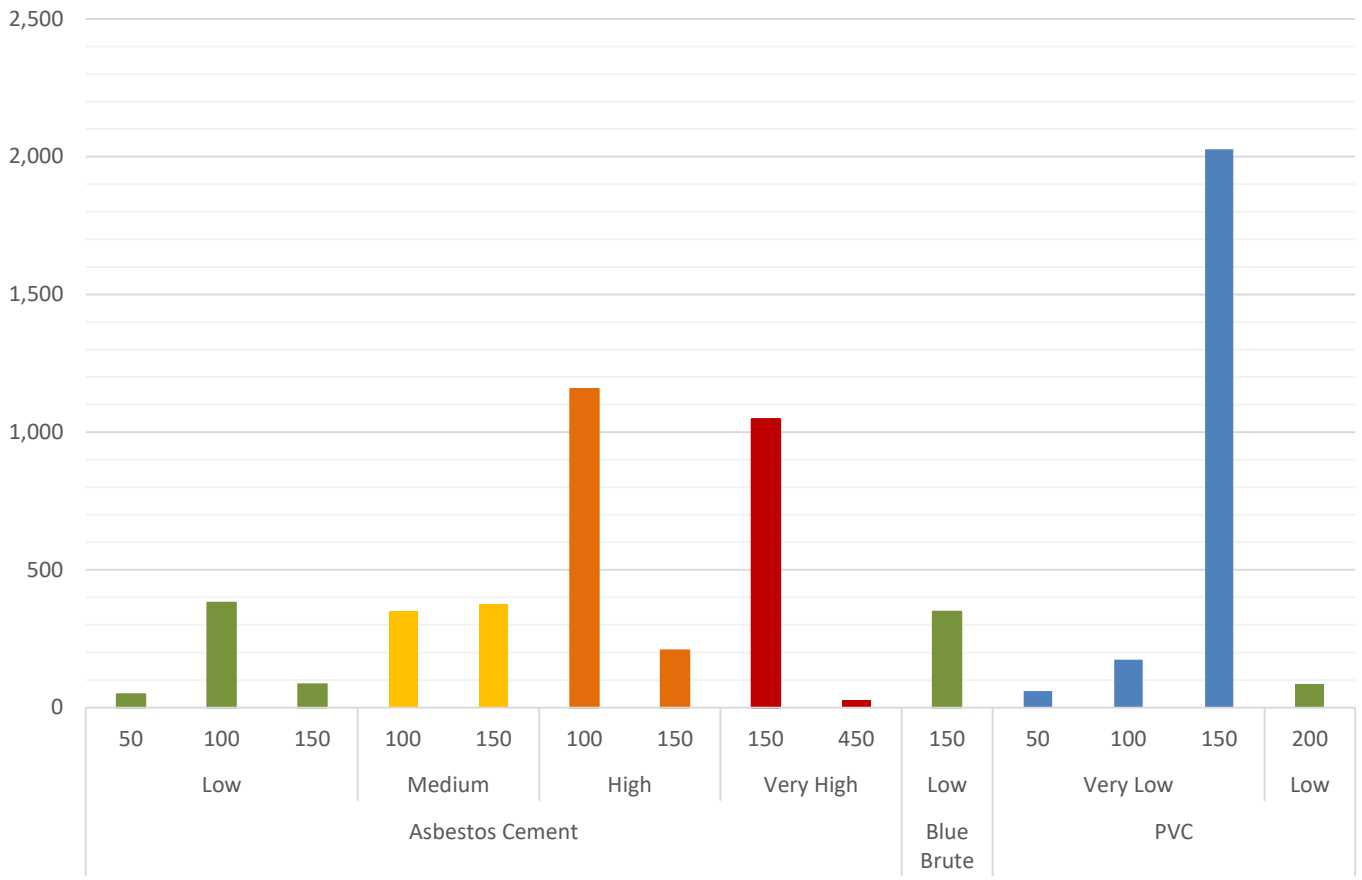
System Component	Service Life	Depreciation Rate	Anticipated Replacement Year(s)	Estimated Replacement Cost (2024 CAD$)	Annual Depreciation (2024 CAD$)
Pipe Network[1]					
Asbestos Cement	50	2.0%	2024	$2,489,900	$49,798
Blue Brute	75	1.3%	2041	$234,900	$3,132
PVC	75	1.3%	2041 - 2085	$1,322,030	$17,627
Hydrants	50	2.0%	2024 - 2059	$357,000	$7,140
Valves[2]	25	4.0%	2024 - 2084	$83,250	$3,330
Services	50	2.0%	2024 - 2059	$925,000	$18,500
Meters	25	4.0%	2032-2047	$144,000	$5,760
Pumps	25	4.0%	2032 - 2048	$185,000	$6,800
Water Supply	50 - 75	1.3% - 2.0%	2024 - 2041	$658,000	$9,220
Reservoir	60	1.7%	2041 - 2067	$2,650,000	$44,167
Water Treatment	15	6.7%	2037	$168,000	$11,200
Electrical	25	4.0%	2024 - 2032	$230,000	$9,200
Buildings	40 - 50	2.0% - 2.5%	2024 - 2057	$1,100,000	$25,000
			Subtotal	**$9,217,080**	**$176,674**
			20% Contingency and 12% Engineering[3]	$2,949,466	$56,536
			Grand Total	**$12,166,546**	**$233,209**

1. Replacement costs include surface restoration.
2. Hydrant isolation valve included in hydrant cost.
3. Contingency and Engineering cost percentages as per CPCN Schedule A.

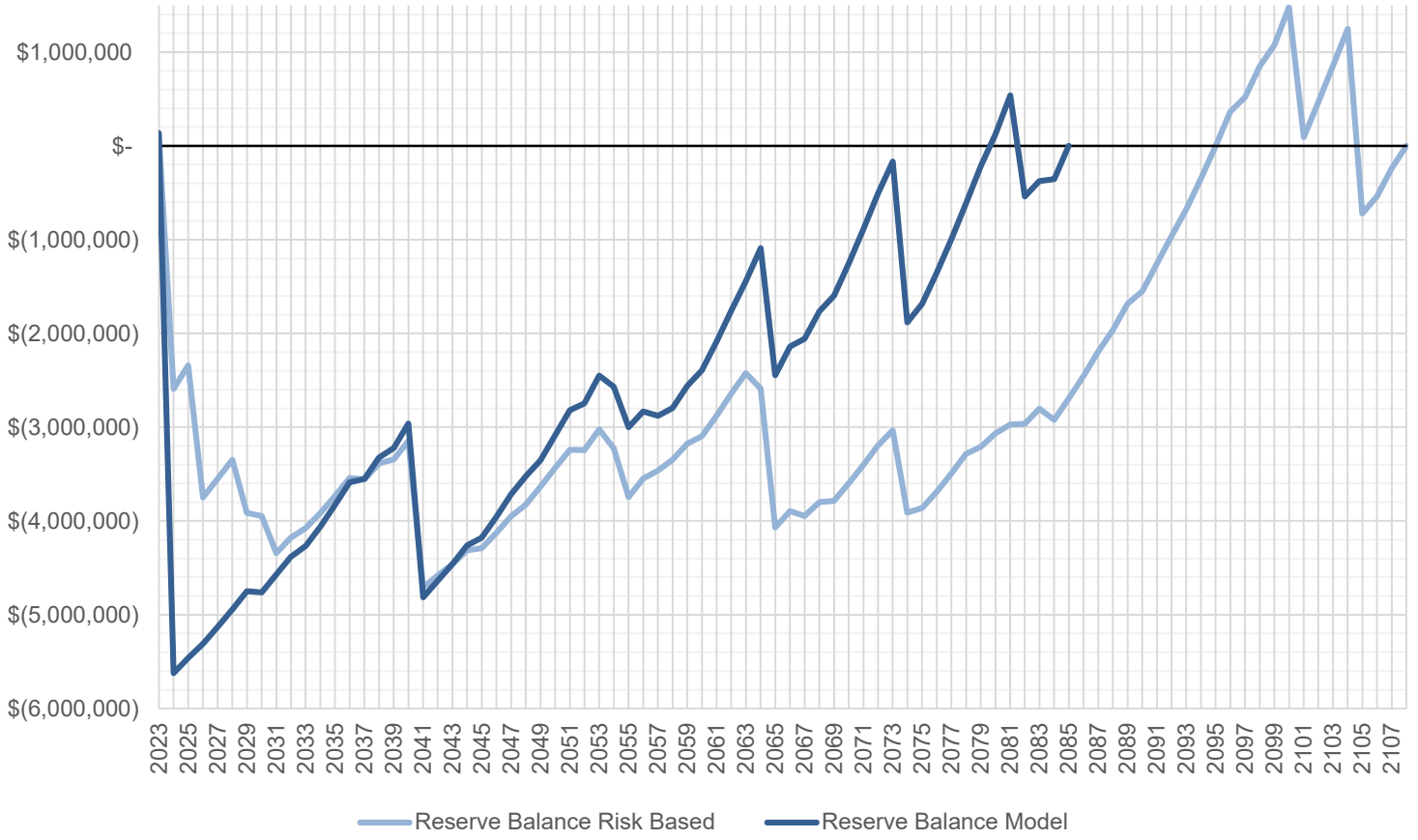
Reserve Balance Model



Pipe Risk Based – Reserve Balance



Risk Based - Reserve Balance Model



INFRASTRUCTURE UPGRADES AND IMPROVEMENTS

Capital Projects

	Projects	Cost Plus Engineering (15%) and contingency (30%)	Replacement Cost Portion	Upgrading Cost Portion	Implementation Timeframe
P1	*Water Meter Implementation Program*[1]	**$640,000**	-	$0	2026 -2029
P2	*Lake Intake and Lower Pumpstation Wet Well*	**$1,454,000**	$1,055,000	$399,000	2027
P3	*Lower Pump Station Chlorine Disinfection*	**$160,000**	$160,000	$0	2027
P4	*Lower Pump Station Electrical and Fencing*	**$174,000**	$131,000	$43,000	2027
P5	*Distribution Upgrades Phase 1: Chlorine Contact Pipe and Devon Road Upsizing*	**$1,041,000**	$673,000	$368,000	2028
P6	*Upper Reservoir Electrical*	**$30,000**	$26,000	$4,000	2029
P7	*Upper Pumpstation Upgrades and Electrical*	**$156,000**	$102,000	$54,000	2029
P8	*Distribution Upgrades Phase 2: Intermediate Pressure Zone Upgrades*	**$3,989,000**	$842,000	$3,147,000	2030
P9	*Reservoir Rehabilitation*	**$290,000**	-	$0	2030
P10	*Building Rehabilitation*	**$116,000**	-	$0	2030
P11	*Water Treatment Plant (likely Filtration) TBD*	**Capital Budget: $7,000,000 to $8,000,000**			

1. 1. Total project cost to be implemented over 4 years.