Final

Sandpoint Water Facility Plan

Submitted to

City of Sandpoint, Idaho

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CHAPTER 1

Introduction and Executive Summary

1.1 Introduction

This Water Facility Plan (WFP) for the City of Sandpoint, Idaho, examines existing and future Sandpoint water system needs and regulatory requirements, and presents recommendations and costs for meeting water supply, treatment, and distribution system needs for the next 20 years.

The following technical topics are contained in the report:

- Chapter 2. Existing Water Supply and Treatment System
- Chapter 3. Existing Water Distribution System
- Chapter 4. Basic Planning Data and Water Demand Forecasting
- Chapter 5. Water Quality and Regulations
- Chapter 6. Water Supply and Treatment Recommendations
- Chapter 7. Water Distribution System Evaluation

Chapter 8 presents a Capital Improvement Program that summarizes recommendations contained in Chapters 3, 6, and 7.

1.2 Existing Water Supply and Treatment System

1.2.1 Water Rights

Table 1-1 summarizes the City's existing water rights, which are discussed in detail in Chapter 2. Based on the demand projections in this report, the existing water rights are adequate to meet build-out water demands projections for the assumed planning area.

1.2.2 Existing Treatment Facilities

As discussed in Chapter 2, the City owns and operates two water treatment plants (WTPs)—a conventional WTP with a nominal capacity of 3.2 million gallons per day (mgd) on Little Sand Creek (Sand Creek WTP), and a direct filtration (DF) WTP with a nominal capacity of 3.5 mgd drawing from Lake Pend Oreille (Lake WTP). Both sources of supply are considered high quality.

For this report, *nominal* WTP capacity means the capacity to meet the City's established treatment goals. Nominal capacity is not necessarily the same as design or rated capacity, because the City's treatment goals may differ from the WTP design criteria. For this report, *reliable* WTP capacity takes into account seasonal limits on water supply and/or the possibility that a treatment unit could be out of service.

TABLE 1-1 (BASED ON TABLE 2-1)
Sandpoint, Idaho, Water Rights Summary

Water Right #								
Basin	**Seq.**	**Basis**	**Status**	**Priority Date**	**Diversion Rate (ft^3/s)**	**Source List**	**Water Uses**	**Current Owner List**
96	0009	Decreed	Active	9/26/1903	10.0	Little Sand Creek	Municipal	Sandpoint Water and Light Co.
96	9189	Permit	Active	6/30/2004	0.3	Sand Creek	Irrigation	City of Sandpoint
					10.3 ft^3/s = 6.6 mgd	**Total Sand Creek**		
96	4180	Statutory Claim	Active	6/1/1908	5.89	Lake Pend Oreille	Municipal	City of Sandpoint
96	7505	License	Active	3/22/1977	4.8	Lake Pend Oreille	Municipal	City of Sandpoint
96	7691	License	Active	1/18/1978	3.73	Lake Pend Oreille	Municipal	City of Sandpoint
96	7863	License	Active	4/16/1980	12.87	Lake Pend Oreille	Municipal	City of Sandpoint
					27.3 ft^3/s = 17.6 mgd	**Total Lake Pend Oreille**		
					37.6 ft^3/s = 24.3 mgd	**TOTAL WATER RIGHTS**		

The City participates in the Idaho Department of Environmental Quality (IDEQ) Area Wide Optimization Program (AWOP), and has established treatment goals for both WTPs that exceed current Safe Drinking Water Act standards. These stringent treatment goals have a direct bearing on the nominal WTP capacities listed in Table 1-2.

The combined 6.7-mgd nominal capacity exceeds the current maximum day demand (MDD) of approximately 5.3 mgd. The reliable 4.0-mgd capacity is substantially lower than the current MDD because the potential for low flow in Little Sand Creek limits the reliable capacity of the Sand Creek WTP to 0.5 mgd. To date, the MDD has not coincided with the lowest recorded creek flow. Because the City's treatment goals are more stringent than current regulations, City treatment goals could be relaxed somewhat to increase Lake WTP capacity during periods when the Sand Creek WTP capacity is limited by its source. Relaxing the treatment goals could result in an increase in capacity of the Lake WTP to approximately 4.5 to 5.0 mgd, which, if added to the 0.5 mgd reliable capacity of the Sand Creek WTP, could meet the current MDD. It is preferable, however, to conserve water and reduce demand to the point where treatment goals could be met.

TABLE 1-2 (BASED ON TABLE 2-3)
Water Treatment Plant Capacity Summary

Parameter	Lake WTP	Sand Creek WTP	Combined
Design Capacity	7.5 mgd (5,200 gpm)	4.6 mgd (3,200 gpm)	12.1 mgd (8,400 gpm)
Nominal Capacity	3.5 mgd (2,431 gpm)	3.2 mgd (2,222 gpm)	6.7 mgd (4,653 gpm)
Reliable Treatment Capacity	3.5 mgd (2,431 gpm)	0.5 mgd (347 gpm)	4.0 mgd (2,778 gpm)

Sand Creek WTP

The Sand Creek WTP, at a higher elevation than the City, uses gravity conveyance systems for treatment and transmission of water. Constructed in 1965, this conventional WTP underwent a major upgrade in 1997. Because of the relatively low cost of production and the high water quality, the Sand Creek WTP is operated as the City's baseline WTP, producing approximately 90 percent of the water used annually. The Sand Creek WTP is typically source limited in late summer. During normal years, the reliable summer production capacity from the WTP is approximately 2 mgd. During exceptionally dry years, the creek supply can drop to as low as 0.5 mgd.

Major upgrades to the Sand Creek WTP either are not required or are lower priority because (1) the Little Sand Creek source is limited, thus the Sand Creek WTP cannot be expanded to meet projected future demand, and (2) the Sand Creek WTP was recently upgraded and performs exceptionally well, meeting the optimization goals of IDEQ's AWOP program.

Lake WTP

The Lake WTP, a DF plant, was constructed in 1981. It is operated as a peaking plant when the demand at the Sand Creek WTP exceeds the production capacity. During a typical year, the Lake WTP operates intermittently from mid-July to mid-September. During exceptionally dry years, such as 2003, the Lake WTP can operate into November. The Lake WTP DF treatment process includes the major unit processes of coagulation/rapid mixing, flocculation, filtration, and disinfection. The Lake WTP cannot produce the 7.5-mgd WTP design capacity because of more stringent filter effluent turbidity regulations and inherent limitations associated with the DF process. The reliable summertime treatment capacity reportedly is closer to 3.5 mgd.

1.3 Existing Water Distribution System

Chapter 3 discusses the existing water distribution system, and Figure 3-1 is a map of the existing water distribution system. The City of Sandpoint operates and maintains the entire system, with the exception of piping in the water association service areas. The water associations buy water through metered connections with the City of Sandpoint Water System and distribute it through their own distribution system piping.

1.3.1 Pressure Zones

The City of Sandpoint Water System has one main pressure zone and one small pressure zone. The main pressure zone, established by the Woodland Reservoir overflow, provides water to the cities of Sandpoint, Kootenai, and Ponderay, to the unincorporated areas adjacent to Sandpoint, and to the Northside Water Users Association and the Syringa Heights Water Association. A small pressure zone, served by the Woodland Drive Booster Pump Station, supplies water to the customers in the Edelweiss Village area. As the Sandpoint Water Service Area grows, it is anticipated that additional pressure zones will be created to serve the higher elevation areas to the north and west of the existing City of Sandpoint Water System Service Area.

1.3.2 Existing Pump Stations

The Sandpoint Water System includes one supply pump station at the Lake WTP, and two booster pump stations. The Lake WTP supply pump station has three finish water pumps (supply pumps) that pump into the distribution system from the clear well at the Lake WTP.

The Woodland Drive Booster Pump Station consists of two pumps, one 3 hp and one 5 hp, that provide domestic supply, plus a 25-hp pump that provides fire flows and supplies water with good pressure and adequate contact time to the customers in the Edelweiss Village area.

The Pine Street Booster Pump Station, which maintains the water level in the Syringa Reservoir for the Syringa Heights Water Association's supply pump station, consists of two 15-hp pumps. As discussed in Section 7.4.2, the hydraulic model prepared for this WFP indicates that the Pine Street Booster Pump Station can be replaced by an altitude valve on the supply line to the Woodland Drive Reservoir.

1.3.3 Existing Storage Facilities

The City of Sandpoint Water System has two steel water storage reservoirs. The Woodland Reservoir is north of the City, just west of Woodland Drive near Sand Creek. The Syringa Reservoir is west of the City of Sandpoint on a hill about ¼ mile south of Pine Street and 1 mile west of the Burlington Northern Railroad.

1.3.4 Existing Distribution Pipe System

The Sandpoint Water System includes over 70 miles of distribution pipe, ranging from 4 inches to 18 inches in diameter. Pipe materials include cast iron (CI), ductile iron (DI), PVC, and coal tar coated steel (ST). A map of the existing water distribution pipe materials is provided in Figure 3-3 in Chapter 3.

1.4 Basic Planning Data and Water Demand Forecasting

1.4.1 Minimum Planning Area Demand Projections

Sandpoint and the other communities served by the Sandpoint Water System have a customer base composed of residential users and commercial users along Highway 95 and Highway 2 and in downtown Sandpoint. This WFP defines a minimum planning area (MPA), shown in Figure 4-1 in Chapter 4, which provides an estimate of future area to be served. As discussed in detail in Chapter 4, the future population of the MPA is projected based on current planning documents. Estimates of future equivalent residential units (ERUs) within the future MPA, along with estimated future per ERU demands, are used to estimate future demands.

Estimated Future Demand Per ERU

For planning, it is assumed that future average day demand (ADD) per ERU will remain at 430 gpd/ERU. The per ERU MDD, however, is anticipated to decrease from 890 gpd/ERU over time, as a result of water conservation along with development that is more dense with less area dedicated to lawns. Thus, a per ERU demand of 800 gpd/ERU is used to project

2025 water demands, and a per ERU demand of 650 gpd/ERU is used to project build-out water demands.

The following demands per ERU and peaking factors are used in this report for future demands:

- Per ERU ADD = 430 gpd/ERU
- Per ERU MDD = 800 gpd/ERU for 2025 demands
- Per ERU MDD = 650 gpd/ERU for build-out demands
- $PF_{MDD\ 2025}$ (MDD/ADD) = 1.9
- $PF_{MDD\ Build\text{-}out}$ (MDD/ADD) = 1.5
- $PF_{PHD\ 2025}$ (PHD/ADD) = 2.8 based on industry standard PHD/MDD = 1.5
- $PF_{PHD\ Build\text{-}out}$ (PHD/ADD) = 2.3 on industry standard PHD/MDD = 1.5

Sandpoint Water System ERU Projections

Total Sandpoint Water System ERU projections are developed in Chapter 4 and summarized in Table 1-3.

TABLE 1-3 (BASED ON TABLE 4-4)
Sandpoint Water System ERU Projections

Year	2005	2025	Build-Out
City of Sandpoint Area of City Impact Total ERUs within MPA	6,200	9,200	18,250[1]
Expanded Kootenai-Ponderay Sewer District Boundary ERUs	1,200	3,650	8,350[2]
Dover and Unincorporated Areas ERUs	150[3]	200[4]	1,100[5]
Total ERUs	7,550	13,050	27,700

[1] Build-out occurs in 2080 per the Sandpoint Wastewater Facilities Plan.
[2] Build-out occurs in 2041 per the Kootenai-Ponderay Wastewater Facilities Master Plan.
[3] Approximately 125 to 150 connections through Syringa Heights Water District per City staff
[4] Estimate based on 2005 and build-out
[5] Based on the Bonner County Comprehensive Plan Land Use Map

1.4.2 Year 2025 and Build-out Demand Projections

Total 2025 and build-out projected water demands, based on ERU projections and estimated demand per ERU, are summarized as follows:

- 2025
  - ADD in 2025 = 13,050 ERUs × 430 gpd/ERU = 5.6 mgd
  - MDD in 2025 = 13,050 ERUs × 800 gpd/ERU = 10.4 mgd
  - PHD in 2025 = 2.8 × 5.6 mgd = 15.7 mgd
- Build-out
  - ADD at build-out = 27,700 ERUs × 430 gpd/ERU = 11.9 mgd
  - MDD at build-out = 27,700 ERUs × 650 gpd/ERU = 18.0 mgd
  - PHD at build-out = 2.3 × 11.9 mgd = 27.4 mgd

1.5 Water Supply and Treatment Requirements

1.5.1 Water Supply

The current MDD is approximately 5.3 mgd, which exceeds the 4.0 mgd reliable capacity of both Sandpoint WTPs combined. As mentioned previously, the reliable capacity could be increased by relaxing the City's treatment goals. However, even with this increased production, the reliable capacity would equal only the current MDD. Comparing projected water demands with reliable treatment capacity provides the treatment capacity shortfall summarized in Table 1-4.

TABLE 1-4 (BASED ON TABLE 6-1)
Projected Treatment Shortfall for Sandpoint, Idaho

Year	Required Treatment Capacity – Maximum Day Demand (MDD)	Existing Reliable Treatment Capacity[1]	Current or Projected Shortfall
2005	5.3 mgd	4.0 mgd	1.3 mgd
2025	10.4 mgd	4.0 mgd	6.4 mgd
Build-out	18.0 mgd	4.0 mgd	14.0 mgd

[1] See Section 2.2.5 for the definition of reliable treatment capacity.

The year 2025 MDD is estimated at 10.4 mgd, which is more than double the current reliable treatment capacity of both WTPs combined. Because the reliable capacity of the source limited Sand Creek WTP is 0.5-mgd, it is not a candidate for expansion. Thus, the Lake WTP should be expanded to at least 9.9 mgd to make up the 2025 shortfall.

1.5.2 Treatment Requirements

Table 1-5 summarizes key Lake Pend Oreille water quality parameters. Table 1-6 presents treatment goals for the Lake WTP.

TABLE 1-5 (BASED ON TABLE 6-2)
Lake Pend Oreille Water Quality

Parameter	Lake Pend Oreille
pH	7.64
Average turbidity, NTU	2.4
Turbidity range, NTU	1.4 – 5.1
Hardness @ $CaCO_3$	76.2
Alkalinity @ $CaCO_3$	75.6
TOC	1.5

NTU = nephelometric turbidity unit; $CaCO_3$ = calcium carbonate; TOC = total organic carbon

TABLE 1-6
City of Sandpoint Lake WTP Treatment Goals (BASED ON TABLE 6-3)

Parameter	State/Federal Standard	City of Sandpoint Treatment Goal	Comments
Filtered water turbidity	< 0.3 NTU 95% of the time; never to exceed 1.0 NTU	< 0.1 NTU at all times	Consistent with Partnership for Safe Water goals
Chlorine residual entrance to system	Not < 0.2 mg/L for > 4 hours	0.4 – 0.5 mg/L free chlorine residual[1]	Established to maintain residual
pH	6.5 to 8.5	7.5 pH units leaving plant[1]	Established for corrosion control

[1] Assumed from plant records

1.5.3 Lake WTP Process Evaluation

A process workshop was held in Sandpoint, Idaho, on October 5, 2005, to select a process for the expanded Lake WTP. The workshop, discussed in detail in Chapter 6 of this report, was intended to provide the City with a forum for providing input into the treatment process evaluation and future treatment process selection. A key activity during the workshop was development and weighting of the evaluation criteria used in the process selection model.

The workshop evaluation steps include the following:

- Establish treatment goals and objectives
- Establish evaluation criteria
- Develop initial list of viable alternative treatment process trains
- Use process selection model to compare alternative processes based on a cost/benefit analysis
- Conduct a fatal flaw analysis of alternatives and make a shortlist of the most promising alternatives
- Perform conceptual design of the most promising alternatives to establish the Lake WTP site constraints and capacity limitations
- Select the preferred alternative process
- Perform budget-level cost estimating for inclusion in the Capital Improvement Program

Treatment Goals

The following specific treatment goals and objectives for the Lake WTP were presented and reaffirmed at the workshop:

- Provide supply and treatment capacity to meet the 20-year projected MDD. Consider build-out capacity for the future Service Area and the existing plant site.
- Evaluate and select treatment processes that meet or exceed current and foreseeable future drinking water regulations. The City anticipates continued participation in the Idaho Department of Environmental Quality Area Wide Optimization Program, which establishes treatment goals that exceed current drinking water standards.
- Select treatment processes that can effectively treat low-level summer tastes and odors (T&Os) that affect the aesthetic quality and customer acceptance of the water.
- Consider system reliability, ease of operations and maintenance (O&M), and so-called non-cost factors in the evaluation process. The goal is a robust water treatment process with the appropriate level of redundancy.
- To the extent practical, maximize the previous investment and incorporate and upgrade existing facilities to meet the foregoing goals and objectives.

Process Selection Model

A process selection model was used to evaluate alternative process trains for the Lake WTP. Forty-eight alternative process trains were developed for the future Lake WTP, combining various clarification and filtration technologies. Based on previous experience with evaluating and screening alternatives, the following evaluation criteria were established for this project:

- Pathogens
- Particles
- Disinfection byproducts
- Organics
- Aesthetics
- Inorganics
- Operations and Maintenance
- Environmental

Weighting factors for each category and for individual criteria established during the workshop reflect the relative importance for the Lake Pend Oreille source treatment. The process selection model considers the weighting factors presented, along with benefits scores assigned to each unit process to estimate the relative benefit of each process alternative. The process selection model also considers life-cycle costs for each process combination by applying a cost curve to each unit process, based on plant capacity, and summing the costs of the various unit processes comprising a given alternative treatment train.

In addition to upgrading the process train based on the process selection model, the following additional upgrades are assumed for the conceptual design of the expanded Lake WTP:

- Replace low- and high-service pumps as required for reliable Phase 1 plant capacity.
- Replace the chlorine gas system with a sodium hypochlorite system. This upgrade is driven by capacity and safety.

- Upgrade the plant residuals handling facilities to meet future capacity and reduce the volume of wastewater requiring disposal.
- The membrane alternatives come with a PLC-based, centralized control system that could be expanded to accommodate other process and water system monitoring, control, and reporting functions. The conventional process alternatives would include a major upgrade to the existing controls systems at the Lake WTP.

Future Lake WTP Process Recommendations

Based on the results of the process selection model evaluation at the workshop, an immersed membrane system is recommended for the future Lake WTP process. The main advantages of the immersed membrane system are as follows.

Reliable treatment: Because pathogens and turbidity are removed by a size-exclusion mechanism (straining), membranes produce a consistent, high-quality filtrate over a wide range of source water quality.

Position for future regulations: Membranes provide a positive barrier against the passage of pathogens larger than 0.1 to 1 micron, which can lower the cost of a future UV disinfection system required to satisfy the new cryptosporidium regulations.

Modular construction: The modular, pre-engineered membrane system designs are readily expandable. To some extent, the system can be custom sized by adding only the number of membrane modules needed for the near-term design capacity.

Small footprint: Membrane systems are relatively compact and typically require less land area than does a conventional treatment plant, particularly if pre-treatment is not required.

Operational simplicity: Although mechanically complex, membrane plants are generally simpler and easier to operate than conventional treatment plants that rely on chemical coagulation and other chemical systems to destabilize and remove particles in a coarse media bed.

Full automation: The membrane technology is well-suited for unattended operation.

Inert plant residuals with fewer solids requiring disposal: The membrane process could substantially reduce solids quantities and disposal costs—significant cost savings issues for many plants.

Retrofit potential: Though not assumed for this study, the immersed membrane technology can be retrofitted into the existing plant filter basins. This alternative to new basin construction can be further evaluated during design.

1.6 Water Supply and Treatment Capital Improvements Program

Capital improvements anticipated for the Sandpoint water supply and treatment systems during the 20-year planning period are summarized in Tables 8-1 and 8-2 in Chapter 8.

1.6.1 Sand Creek WTP

The capital improvements in Table 8-1 cover the improvements to the Little Sand Creek water supply and treatment system. The Sand Creek WTP improvements total approximately $754,000, including contingency, engineering, administrative, and legal costs.

The following prioritized Sand Creek WTP system improvements are recommended:

- Reconstruct the upper diversion structure on Little Sand Creek.
- Anchor and otherwise stabilize the bypass pipeline between the upper diversion and the connection to the raw water transmission pipeline below the main diversion dam.
- Install a screen or trap on the WTP influent line upstream of the flow control valve to reduce cleaning and valve maintenance.
- Repair and upgrade diversion structure.
- Cover the sedimentation basins to keep out leaves and other debris and reduce maintenance.
- Stabilize the south canyon bank. This situation needs monitoring and should be included as a future upgrade.
- Add sludge removal mechanisms in sedimentation basins.

1.6.2 Lake WTP

Table 8-2 provides a breakdown of the Lake WTP water supply and treatment improvements. The Lake WTP improvements total approximately $20.5 million, including contingency, engineering, administrative and legal costs.

As discussed in Section 1.2.6, the Lake WTP expansion and upgrade includes replacing the existing filters with a 10-mgd immersed membrane filtration process sized to meet 2025 demand. The recommended upgrades also include increasing the raw and finished water pumping capacity, rehabilitating the existing Chemical and Operations buildings to accommodate some of the ancillary membrane systems, upgrading the surge basin pumping, and adding gravity thickeners and recycle pumping. Accommodation of future dewatering with vacuum-assisted drying beds or alternative mechanical dewatering is planned for the site.

1.7 Water Distribution System Evaluation

Preparation of this WFP included evaluation of the water distribution system under near-term and longer term conditions. The near-term evaluation uses existing (2005) demands to identify supply and storage improvements required during the next 5 years. The longer term evaluation uses future (2025) demand estimates for the MPA established in Chapter 4.

1.7.1 Design Criteria for Water Distribution System Evaluation

Design criteria for evaluating the City of Sandpoint water distribution system were established in a technical memorandum dated October 6, 2005 (Appendix D). Significant design criteria are as follows:

- Distribution piping and the supply system shall be designed and installed to provide a minimum pressure of 20 psi during MDD and fire flow conditions.
- Storage within the system shall be adequate to meet fire flow, emergency, and PHD.

1.7.2 Distribution System Hydraulic Model

A new EPAnet-based hydraulic model, discussed in Chapter 7 of this report, was used for analyzing flow and pressure within the Sandpoint Water System distribution piping, based on supply and demand. The hydraulic model was initially developed from CAD-based drawings of the existing water distribution system provided by the City. Interviews with City staff were conducted to correct apparent discrepancies relating to location, connectivity, size, age, and material of the piping.

Existing and future demands were loaded into the hydraulic model. Existing demands were allocated within the distribution system model, based on meter route records. In addition, the top seven water usage accounts were assigned directly to nodes within the model. Future demands were allocated within the distribution system based on estimates of the distribution of ERUs within the MPA.

With assistance from City staff, the hydraulic model was calibrated by conducting field testing throughout the City during a site visit in mid-August 2005. With the calibrated hydraulic model, the distribution system was evaluated for the existing (2005) and future (2025) MDD and PHD conditions established in Chapter 4. MDD plus fire flow was also evaluated.

1.7.3 Storage Requirements

A storage analysis was performed based on the design criteria developed in the technical memorandum dated October 6, 2005 (Appendix D). The technical memorandum develops the following storage requirements for a water distribution system:

- Fire flow
- Emergency conditions
- Equalizing to allow the system to handle peak hour conditions

According to the design criteria established in the design criteria technical memorandum, the current storage requirement is 5.75 MG. The current storage within the system is 3.77 MG. Thus an additional 2.0 MG of storage is needed in the near term to meet design criteria for current demand conditions. It is recommended that this storage deficit be met by constructing a 2.0-MG ground-level tank located on higher ground to the north of Kootenai Point in the eastern part of the distribution system. Storage in the eastern part of the system will allow the City to address anticipated growth.

In addition to the 2.0 MG of storage needed to meet current conditions, the system will need an additional 7.9 MG of storage to meet future demand conditions. Locations for additional storage volume to meet future conditions will depend on how the system expands. One possible strategy for this future storage is to construct a new storage facility on the western part of the system along Baldy Mountain Road. New storage facilities will also be required within the new pressure zone to the west and possibly on the north side of the system. Because of the uncertainty associated with future development, it is recommended that storage needs be reviewed every 5 to 10 years to assess requirements and possible locations of additional storage facilities.

1.8 Distribution System Capital Improvements Program

Capital improvements anticipated for the Sandpoint water distribution system during the 20-year planning period are summarized in Table 8-3 in Chapter 8, which provides a breakdown of the distribution system capital improvements needed to meet current and future (2025) demands.

The cost estimates for the reservoirs are based on welded steel tanks. Both 2.0-MG reservoirs (current and future) are assumed to be ground level type tanks. The reservoir cost estimates include site work and landscaping, foundations, piping, controls, and miscellaneous appurtenances. The reservoir costs do not include permitting and land acquisition costs.

1.8.1 Distribution System Improvements Recommended for Current (2005) Conditions

Based on the results of the hydraulic model and storage analysis for current conditions, the established design criteria are not met in a number of areas. Proposed improvements that would enable the system to meet the design criteria under current conditions are identified in Tables 7-3 and 8-3 and Figures 7-6 and 8-1 in Chapters 7 and 8. These improvements to meet current conditions include the 2.0 MG of storage located on higher ground to the north of Kootenai Point in the eastern part of the distribution system, as described in Section 1.6.3, Storage Requirements. The recommendations also include a number of pipeline improvements.

The capital costs for improvements needed to provide for current conditions total approximately $9.5 million including contingency, engineering, administrative, and legal costs. Land/right-of-way acquisition and permitting costs are not included.

It is assumed that the altitude valve proposed at the Woodland Drive Reservoir (to replace the Pine Street Booster Pump Station) will be installed on the existing supply line to the reservoir. The cost for the altitude valve includes an 8-inch altitude valve, 18-inch bypass, and vault.

1.8.2 Distribution System Improvements Recommended for Future (2025) Conditions

Proposed improvements to meet future conditions are identified in Tables 7-4 and 8-3 and Figures 7-6 and 8-1 in Chapters 7 and 8. These improvements include the 7.9 MG of storage discussed in Section 1.6.3, Storage Requirements. The improvements also include several pipeline improvements and replacement of coal tar lined pipe to address taste and odor issues.

It is assumed that three storage facilities will make up the additional 5.9 MG of storage required for the 20-year planning period. The capital costs for these three future storage facilities have been grouped in one line item in Table 8-3 in Chapter 8 because the size and location of each facility is unknown at this time.

The capital costs for improvements needed to provide for future conditions total approximately $26.7 million, including contingency, engineering, administrative and legal costs. Land/right-of-way acquisition and permitting costs are not included.

The overall future supply and transmission strategy recommended in this WFP relies on a new storage reservoir being sited in the northeast part of the system. With provision of adequate system distribution capacity (12-inch loops), the additional supply and storage recommended in this chapter will be adequate beyond 2025, if future development is not scattered and separated from the core of the City's existing distribution system.

Additional sources of supply and/or storage beyond those identified in this WFP might be required if future development is fragmented and/or scattered. Future development to the west will require creation of a higher pressure zone. The elevation of this proposed pressure zone would be between 2,140 and 2,255 feet (NAVD 88). The location of future development is not now known, so the exact location of the new pressure zone cannot be determined at this time.

1.8.3 Other Distribution System Recommendations

The hydraulic model should be used to reevaluate the system as development continues, particularly in the next 5 to 10 years. As future booster pump stations and storage facilities are constructed to serve the new pressure zone in the western part of the system, and potentially elsewhere, additional hydraulic evaluations will be required to ensure that water can be adequately conveyed under peak and fire flow conditions.

It is recommended that the existing pipeline grid system be maintained and improved to satisfy future demands. Continued use of 12-inch waterlines for the main line grid is recommended for serving future development outside the current water system infrastructure. The 12-inch waterlines allow for supplying large multi-family units, which require higher fire flows than typical residential construction.

1.8.4 O&M Related Improvements

Table 8-4 in Chapter 4 summarizes the O&M improvements recommended in Chapter 3. These improvements focus on general maintenance of the distribution system.