

APPENDIX J

WATER SYSTEM CAPITAL IMPROVEMENT PROGRAM

Introduction

This appendix presents proposed improvements to the City of Poulsbo's water system that are necessary to resolve existing system deficiencies and accommodate the projected growth associated with the delivery of services. The water system improvements were identified from an evaluation of the results of the water system analyses. The water system improvements were designed to meet both the existing and future demand conditions of the system.

A Capital Improvement Program number, herein referred to as a CIP number, has been assigned to each improvement as set forth in the Water System Comprehensive Plan. The improvements are organized and presented in this chapter according to the following categories:

- Water Main Improvements
- Pressure Zone Improvements
- Facility Improvements
- Pressure Reducing Station Improvements
- Miscellaneous Improvements
- Developer Funded Improvements

The remainder of this appendix presents a brief description of each group of improvements, the criteria for prioritizing, the basis for the cost estimates and the implementation schedule.

DESCRIPTION OF IMPROVEMENTS

This section provides a general description of each group of improvements and an overview of the deficiencies that they will resolve. Most of the improvements are necessary to resolve existing system deficiencies. Additionally, improvements have been identified in the undeveloped areas in the northwest section of the City that will be necessary to properly serve that area. The locations of improvements in these areas and other undeveloped areas will most likely be altered to fit the layout of the future developments. The CIP numbers for these improvements have a "D" prefix (example: DI, DFI). The costs associated with these improvements shall be borne by the developers, rather than the existing water customers.

WATER MAIN IMPROVEMENTS

Most of the water main improvements are required to resolve existing system fire flow deficiencies. Several of the water main improvements are replacements of old, undersized 4-inch cast iron pipe that is located in the City's Low Zone. The remaining asbestos cement (AC) water main in the system, which is located in Caldart Avenue

between the Raab Park Tank and Lincoln Avenue, has also been identified for replacement (CIP 31). A proposed 16-inch transmission main has been identified to replace the existing 8-inch cast iron transmission main between the Big Valley wells and the County Pump Station, and in Bond Road from the County Pump Station to Lindvig Way. This improvement will replace pipe that is more than 50 years old and provide supplemental capacity for future water supplies in the Big Valley area. In addition, the larger pipe size, in conjunction with upgrades to the Big Valley wells, will enable the wells to pump directly to the Low Zone reservoirs without the need for the County Pump Station. The proposed abandonment of the County Pump Station and proposed improvements to the Big Valley wells are described in more detail in upcoming sections.

Future Water Main Extensions and Replacements

All new water main extensions and replacements shall be completed in accordance with the City's Water System Standards. All new water mains shall be ductile iron pipe and sized by hydraulic analysis to ensure that all pressure, flow and velocity requirements are met. In general, new water mains that will carry fire flow in residential areas shall be a minimum of 8-inches in diameter and looped for multi-family residential developments. New water mains in commercial, business park, industrial and school areas shall be a minimum of 12-inches in diameter and looped.

PRESSURE ZONE IMPROVEMENTS

The following pressure zone improvements will resolve the low-pressure areas around the Finn Hill Tank in the Low Zone and the Raab Park Tank in the Middle Zone.

CIP PZ-1: Finn Hill Middle Zone Expansion

Deficiency: A portion of the Low Zone in the higher elevations near the Finn Hill Tank area contains low pressures that do not meet the minimum pressure requirements.

Improvement: The water services located along Staffordshire Lane and the adjoining cul-de-sac will be converted to the Middle Zone upon completion of the proposed water main extension from the uphill side of the existing Finn Hill pressure reducing station to the intersection of Finn Hill Road and Staffordshire Lane. In addition, the portion of water main in Terasse Drive, located north of Gurley Court, and the water main in Gurley Court should also be converted to the Middle Zone from a connection to the future Middle Zone when development occurs to the north.

CIP PZ-2: Raab Park High Zone Expansion

Deficiency: A portion of the Middle Zone in the higher elevations in the vicinity of the Raab Park Tank contains low pressures that do not meet the minimum pressure requirements.

Improvement: A portion of the Middle Zone piping between Swanson Way and Hostmark Street will be converted to the High Zone. Two additional extensions of High Zone piping along Swanson Way (8-inch diameter water main) and Hostmark Street (12-inch diameter water main), together with a separation of water main in Odin Street and 13th Avenue, will complete the conversion of the Middle Zone low-pressure area to the High Zone. The 12-inch High Zone water main extension in Hostmark Street will also serve as a portion of the transmission main that is planned between the proposed Wilderness Park Pump Station and the High Zone water system.

FACILITY IMPROVEMENTS

The following water system facility improvements were identified from the results of the water system analyses. The improvements, with the exception of the proposed additional wells, are primarily necessary to resolve existing system deficiencies; but have also been sized to accommodate projected growth.

CIP F-1: Big Valley Wells #1 and #2 Improvements

Deficiency: The Big Valley well field has four different deficiencies that are intended to be resolved with this project. The Big Valley well site is not currently fenced and, therefore, vulnerable to potential vandalism. The wells are not equipped with an engine generator set receptacle to allow backup power supply in the event of a power outage. Big Valley Well #1, also known as the USGS Well, has experienced a decrease in production rates when operated in conjunction with the newer Big Valley Well #2. The Big Valley wells do not pump directly into the Low Zone, but depend on the County Pump Station to move the water from the pump station to the Low Zone. The pump, motor and electrical equipment of each well are not sized to enable supplying water from the wells directly to the Low Zone.

Improvement: Install fencing around the entire well site property and secure to allow entry by authorized City personnel only. Install receptacle and transfer switch to allow connection of a portable engine generator set for providing standby power supply in the event of a power outage. Evaluate the existing production problems of Well #1 and upgrade the pump, motor and electrical equipment for each well to enable pumping directly to the Low Zone. The improvements will allow both wells to pump together at their maximum production rates and enable pumping directly to the Low Zone without the need for the County Pump Station. These improvements must be done in conjunction with the Big Valley transmission main replacement and County Pump Station abandonment projects. The sizing of the new pumps and motors will consider the simultaneous operation of the existing wells with the planned future wells, all of which will utilize the proposed Big Valley transmission main.

Deficiency: The increasing water demand from growth of the City's water system will soon approach and exceed the capacity of the existing supply facilities (i.e., wells). Unless additional sources of water are provided, the amount of growth that can be allowed will be limited by the maximum supply capacity of the existing groundwater wells. However, discussions are underway to convert surface supplies to ground water supplies.

Improvement: Conduct an investigation of additional sources of water supply to meet the projected demands of the system for the next 20 years. The investigation will provide recommendations for locating the proposed well facilities that are discussed below. The investigation will also include an evaluation of the City's existing water rights and the pursuit of additional water rights.

CIP F-3: New Big Valley Well #3

Deficiency: The City will have an insufficient source of water supply in future years to meet the increasing demands of the system from new water customers, based on the water system growth projections.

Improvement: Develop a new groundwater well with a maximum production rate of approximately 650 gpm. Although it is anticipated that the new well will be located in the Big Valley area, the actual location will be determined from the results of the groundwater supply investigation. If the well is located in the Big Valley area, the well pump and motor should be sized to enable pumping water directly to the Low Zone, when the County Pump Station is abandoned and the Big Valley transmission main is replaced.

CIP F-4: New Big Valley Well #4

Deficiency: The City will have an insufficient source of water supply after the year 2010 to meet the increasing demands of the system from new water customers, based on the water system growth projections.

Improvement: Develop a new groundwater well with a maximum production rate of approximately 650 gpm. The capacity and timing of this improvement depends on the final service production rate of proposed well #3 and the future supply requirements of the system as the year 2010 approaches. Like proposed Well #3, it is anticipated that the new well will be located in the Big Valley area. However, the actual location will be determined from the results of the groundwater supply investigation. If the well is located in the Big Valley area, the well pump and motor should be sized to enable pumping water directly to the Low Zone, for when the County Pump Station is abandoned and the Big Valley transmission main is replaced.

CIP F-5: County Pump Station Abandonment

Deficiency: The pump station is currently a necessary facility for the purpose of conveying water supplied from the Big Valley wells to the Low Zone, because the existing wells are not capable of pumping the water directly to the Low Zone. The pump station will need significant improvements in the future to increase its capacity to match the higher production rates of the Big Valley well field, as new supply sources are brought on-line. The pump station currently does not have sufficient redundancy to ensure a high level of reliability.

Improvement: Abandon the pump station after completion of the Big Valley transmission main (CIP 1) and upgrade of the Big Valley wells (CIP F-1) that will enable the wells to pump water directly from Big Valley to the Low Zone reservoirs.

CIP F-6: Pugh Road Well Improvements

Deficiency: The Pugh Road Well has experienced a recurring problem with iron bacteria in the well that results in an accumulation of iron residue on the interior walls of the Pugh Road Tank. The existing well pump and motor are sized too small to fully utilize the well's maximum instantaneous water right of 650 gpm.

Improvement: Evaluate the iron bacteria problem and identify a solution to eliminate, or at least reduce, the impacts of the iron bacteria. Replace the existing well pump and motor equipment with a new submersible well pump and motor that is sized to pump water to the High Zone at the well's maximum instantaneous water right of 650 gpm. Electrical improvements may also be required to operate the larger well pump and motor.

CIP F-7: Lincoln Hill Well Improvements

Deficiency: The Lincoln Hill Well is approximately 31 years old, at the end of its service life, and equipped with an oil-lubricated line shaft turbine pump. Oil-lubricated pumps are no longer allowed in potable water system applications, due to the concern that oil leakage may potentially contaminate the potable water. The current production rate of the well is approximately 450 gpm, which is less than the well's maximum instantaneous water right of 475 gpm.

Improvement: Replace the existing well pump and motor equipment with a new submersible well pump and motor that is sized to pump water to the High Zone at the well's maximum instantaneous water right of 475 gpm. Improvements to the telemetry and supervisory control equipment shall also be made to enable automatic control of the Lincoln Hill Well, as well as the Pugh Road Well, for maintaining the water level in the Pugh Road Tank.

CIP F-8: Wilderness Park Pump Station Rehabilitation

Deficiency: The existing pump station is configured to pump water from the Low Zone to the Middle Zone during emergencies only. The capacity and reliability of the one small pump is unknown. The need to transfer water from the Low Zone to the Middle Zone is minimal, because of the limited storage capacity in the Middle Zone and the inability to transfer water from the Middle Zone to the High Zone. Most of the storage in the system is located in the Low and High Zones. System reliability would be improved if water storage from the Low Zone could be transferred to the High Zone during periods when one or both of the High Zone well are out of service.

Improvement: Rehabilitate the Wilderness Park Pump Station to enable transferring of water between the Low Zone tanks and the High Zone tank. Replace the existing pump with a new pump that would pump water from the Low Zone to the High Zone in the event that the Lincoln Hill Well, Pugh Road Well or Pugh Road Tank are out of service. The recommended pump arrangement is two identical 2,300 gpm pumps to meet the flow requirements of the pump station. Install an automatic control valve that would transfer water from the High Zone to the Low Zone in the event that one of the Big Valley wells is out of service. Install an automatic control valve that would transfer water from the High Zone to the Middle Zone in the event of an extreme drop in water level in the Middle Zone tanks. Install 12-inch High Zone transmission piping between the pump station and the west end of the proposed 12-inch water main improvements in Hostmark Street, which is planned as part of CIP PZ-2. Therefore, CIP PZ-2 must be completed prior to this project in order to complete the transmission main that is required for the pump station to function as planned.

CIP F-9: Wilderness Park 1.0 MG Tank Recoating

Deficiency: The interior and exterior of the tank will need to be recoated every 15 to 25 years, based on the typical life of coatings on steel reservoirs. The tank was last recoated in approximately 1987.

Improvement: Regularly inspect the condition of the interior and exterior coatings and recoat, as necessary. It is anticipated that the tank will need to be recoated sometime near the year 2007, unless the results of the coating inspection warrant recoating at an earlier date.

CIP F-10: Finn Hill 0.5 MG Tank Recoating

Deficiency: The interior and exterior of the tank will need to be recoated every 15 to 25 years, based on the typical life of coatings on steel reservoirs. The tank has not been recoated since it was installed in 1981.

Improvement: Regularly inspect the condition of the interior and exterior coating and recoat, as necessary. It is anticipated that the tank will need to be recoated sometime near the year 2001/2002, unless the results of the coating inspection warrant recoating at an earlier date.

CIP F-11: Seismic Evaluation of Water Tanks

Deficiency: The capability of the City's existing tanks to withstand a seismic event is unknown, except for the newer Pugh Road Tank.

Improvement: Conduct a seismic evaluation to determine the ability of the existing tanks to withstand a seismic event and identify proposed seismic related tank improvements.

CIP F-12: Telemetry and Supervisory Control Improvements

Deficiency: Some of the City's telemetry and supervisory control equipment is getting old and in need of improvements. The master telemetry unit at the Public Works Facility is at capacity and its capabilities are limited. Some, but not all of the facilities, are equipped with a remote telemetry unit to enable monitoring and control of the facilities. The existing remote telemetry units are linked to the master telemetry unit with leased telephone lines, which are less reliable than a radio-based telemetry system.

Improvement: Install radio equipment at all controlled facilities to convert the communication link from telephone lines to radio. Install a new master telemetry unit with expanded capacity and capabilities, and a computer-based data logger and user-friendly access screen.

CIP F-13: New Public Works Facility

Deficiency: The Public Works Department has outgrown the existing Public Works Facility, due to the continuous growth that has occurred in Poulsbo.

Improvement: Locate and build a new Public Works Facility for the Water Division and the other City-owned utilities. The search for a new site has begun and the relocation is planned to occur in approximately the year 2003 – 2005.

CIP F-14: Automatic Meter Reading Equipment

Deficiency: The Water Division staff is spending more time reading customer water meters every month and less time on other operations and maintenance tasks as a result of the continuous increase in population of the City.

Improvement: Install automatic meter reading equipment at each customer meter that will provide faster and more accurate reading of customer meters.

PRESSURE REDUCING STATION IMPROVEMENTS

The following pressure reducing station improvements were identified to resolve existing system deficiencies, but have also been sized to accommodate future demands of the system.

CIP PRV-1: 10th Avenue PRV Improvements

Deficiency: The existing pressure reducing station is inactive and has been isolated from the system by closing the isolation valves.

Improvement: Remove, clean, inspect and overhaul or replace the two existing pressure-reducing valves. Adjust the set point of the valves so they remain closed during normal system demands and open during a large drop in pressure in the Low Zone, as a result of a fire flow demand.

CIP PRV-2: Swanson Way PRV Replacement

Deficiency: The existing pressure reducing station is old, and the vault, control valve and equipment is in poor condition. The station is inactive and has been isolated from the system by closing its isolation valves.

Improvement: Replace the existing station with a new station that consists of a below-grade concrete vault, pressure reducing valves, isolation valves and appurtenances. The pressure reducing valves should be set to they remain closed during normal system demands and open during a large drop in pressure in the Low Zone, as a result of a fire flow demand.

CIP PRV-3: Mesford Street PRV Replacement

Deficiency: The existing pressure reducing station is undersized to provide adequate supply to the Middle Zone and maintain reservoir levels during a fire flow or other high demand event.

Improvement: Replace the existing station with a new larger station that consists of a below-grade concrete vault, solenoid controlled pressure reducing valves, isolation valves, telemetry and supervisory control equipment and appurtenances. The larger pressure-reducing valve should be an 8-inch valve and the small valve should be between a 2-inch and 4-inch valve. The new station should be installed near the same time the proposed 12-inch water main is installed in Mesford Street.

MISCELLANEOUS IMPROVEMENTS

The following miscellaneous improvements are planning efforts and program elements that are required to comply with various State water regulations.

CIP M-1: Conservation Program and Leak Detection

Deficiency: The existing billing system does not print a history of consumption on the water bills. The existing water system most likely has leaks, based on an average unaccounted-for water level of 14% from 1993 through 1997. The City has repaired minor leaks in the system, but this is an ongoing process. Several water conservation measures must be carried out on an ongoing basis to comply with the conservation requirements.

Improvement: Install a new billing system or upgrade the existing system to enable printing bills that show consumption history. Perform leak detection of the water system to locate and identify water main leaks. Perform other ongoing conservation measures as outlined in the Water Conservation Plan.

CIP M-2: Cross Connection Control Program

Deficiency: The City does not have an organized, comprehensive database of backflow prevention devices and will need to maintain the database on an ongoing basis.

Improvement: Install a database for backflow prevention devices and tracking annual inspection requirements. Perform other ongoing cross connection control tasks as outlined in the City's Cross Connection and Backflow Prevention Manual.

CIP M-3: Wellhead Protection Program

Deficiency: The City needs to perform several tasks to comply with the wellhead protection program requirements.

Improvement: Perform the recommended wellhead protection program tasks that are outlined in the City of Poulsbo Wellhead Protection Program document.

CIP M-4 Comprehensive Water System Plan Update

Deficiency: WAC 246-290-100 requires that the City's Comprehensive Water System Plan be updated every six years and submitted to the Department of Health for review and approval. Drinking water regulations are continuously changing and must be addressed in the City's Comprehensive Water System Plan.

Improvement: Update the Comprehensive Water System Plan every six years to meet the requirements that are in effect at the time of the update. The last update was in December 2000.

DEVELOPER FUNDED IMPROVEMENTS

The following water system facility improvements have been identified for the mostly undeveloped areas in the northwest section of the City's existing and future service areas to illustrate the major facilities that will be required to properly serve that area. The costs associated with these improvements should be borne by the developers, rather than the existing water customers, unless over-sizing of the improvements provides benefit to the existing customers.

CIP DF-1: New High Zone 1.5 MG Reservoir

Deficiency: The existing water system does not have a reservoir that can provide storage to future water customers in the Middle Zone and High Zone areas of the northwest section of the service area.

Improvement: Locate and install a new reservoir in the upper elevations of the northwest section of the service area to provide gravity storage to the future Middle Zone and High Zone areas. The new reservoir should have an overflow elevation of approximately 515 feet to enable gravity supply to the High Zone. The new reservoir shall be sized to provide approximately 1.5 MG of usable storage. If a site is not available with a ground elevation that is high enough to avoid an excess amount of dead storage, an elevated storage tank, similar to the City's Pugh Road Tank, should be pursued.

CIP DF-2: New Low to High Zone Pump Station

Deficiency: The proposed 1.5 MG reservoir, identified at CIP DFI, will require a pump station to fill it with water from the City's existing water system.

Improvement: Install a new pump station on the City-owned property that is currently occupied by the Low Zone Finn Hill Tank. The pump station will pump water from the existing Low Zone Finn Hill Tank to the future High Zone 1.5 MG tank. The pump station will also serve as a backup supply facility to the proposed storage tank, in the event that the tank is out of service for cleaning, repairs or maintenance. Therefore, the pump station will have a maximum capacity of approximately 4,500 gpm to satisfy the largest fire flow requirement and peak water demand of the area. The recommended pump arrangement is two smaller pumps for filling the reservoir, each rated at approximately 600 gpm and two larger pumps to provide fire flow and peak demand supply, each rated at approximately 2,225 gpm. The pump station shall also be equipped with a control valve to allow water to be transferred from the High Zone tank to the Low Zone tank, in the event that one or more of the Big Valley wells are out of service.

CIP DF-3: Intertie Chlorination/Fluoridation and Pressure Reducing Facility

Deficiency: Water supplied from the intertie with the Vinland Water System, which is owned and operated by the Public Utility District #1 of Kitsap County (PUD) is not currently chlorinated and fluoridated.

Improvement: Install a new facility on the City's side of the existing intertie that will include chlorination and fluoridation equipment. Install a tee in the mainline piping, after the chlorine and fluoride injection point, which will provide a connection to the future High Zone water main and reservoir. Install a pressure-reducing valve, after the tee, to reduce the pressure of the water to pressures acceptable to serve the Middle Zone from high pressures, in the event of a failure of the pressure-reducing valve. The completed facility will treat the water from the intertie to match the chlorine and fluoride levels of the water provided by the City's wells and supply it to both the future Middle Zone and High Zone in the northwest area of the system. Upon completion of the improvements, the existing pressure regulating valves in the intertie vault must be adjusted to supply water directly to the High Zone instead of the Middle Zone.

CIP DF-4: High Zone to Middle Zone PRV

Deficiency: The future Middle Zone in the northwest section of the City's service area will require supply redundancy to provide reliable water service and will need sufficient supply points to meet the fire flow requirements within the zone.

Improvement: Install a pressure reducing station with pressure relief between the High Zone and Middle Zone near the north portion of the system. The station will have at least two pressure reducing valves to function properly for a wide range of flows. It is anticipated that the largest pressure-reducing valve will be an 8-inch size, to allow sufficient fire flow to be conveyed to the Middle Zone.

INSERT TABLE J-1 WATER CAPITAL IMPROVEMENTS