

Table VI-4 provides anticipated costs for Phase I and future recommended improvements for Pump Stations Nos. 3, and 4 and for replacing the pumps in Pump Station Nos. 1, 5, 6, 7, and 10

Table VI-4. Cost Estimates for New Pumps and Pump Station Upgrades.	
Item	Anticipated Capital Cost
Phase I Improvements	
Pump Station No. 4 Upgrade	\$241,706
Force Main No. 3 Valve Vault Intertie	\$44,457
<i>Total</i>	\$286,163
Future Recommended Improvements	
New Pumps for Pump Station No. 1	\$16,000
New Pumps for Pump Station No. 5	\$9,000
New Pumps for Pump Station No. 6	\$15,500
New Pumps for Pump Station No. 7	\$12,500
New Pumps for Pump Station No. 10	\$11,500
Pump Station No. 3 Future Upgrade	\$170,775
Force Main No. 3 Reroute	\$278,933
<i>Total</i>	\$514,208

INFILTRATION/INFLOW (I/I) REDUCTION PROGRAM

I/I is a common problem for wastewater collection systems in Western Washington. Several factors contribute to the amount of I/I in a collection system. These factors include: age of pipe, type of pipe, condition of pipe, whether or not storm drainage devices (such as catch basins or down spouts) are connected to the system, and the ground water table elevation. Gibbs & Olson has evaluated, designed and provided construction phase engineering services on numerous I/I removal projects in Cities such as Chehalis, Longview, Kelso, Winlock, Castle Rock, Pe Ell, Centralia, and Olympia. Our experience, including flow monitoring studies, show that age and type of pipe are very good indicators for prioritization of I/I removal projects. Previous studies have shown I/I from collection system basins constructed since the 1970's using PVC pipe with rubber gasketed joints can range from 600 gallons per day per inch-mile (gpd/in-mi) to 2,000 gpd/in-mi of main line pipe. The I/I generated from older non-gasketed pipe (i.e. pipe installed prior to about 1960) is frequently in the range of 25,000-50,000 gpd/in-mi, and can exceed flows of 100,000 gpd/in-mi.

Although the City of Woodland currently does experience some I/I in their wastewater collection system, it has not been to the extent that it causes the treatment plant problems in meeting NPDES Permit conditions. Because of the City has been able to consistently meet NPDES Permit requirements and because the City is facing significant costs to upgrade their treatment system to provide additional capacity, it is recommended that the City initiate a long-term I/I reduction program to ensure that the level of I/I in the system remains low. It is recommended that the City begin by identifying areas in need of I/I rehabilitation. To identify areas needing I/I work, flow monitoring, smoke testing, and TV inspection in sewer lines may need to be conducted. Based on Gibbs & Olson's past experience with I/I removal projects, the sewer lines and interceptors in Basins W-1, W-2, and W-3 are prime candidates for I/I removal work due to the pipe's age (built in the 1950's) and the type of pipe (concrete without rubber gasketed joints). The total amount of concrete pipe built in the 1950's in these basins are: 5,540 ft in Basin W-1; 8,165 ft in Basin W-2; and 8,203 ft in Basin W-3.

Following further evaluations that may be needed to document the areas where I/I removal work should be accomplished, it will be important to ensure all lateral sewer piping from the sewer main to buildings are replaced. Experience has shown that this is required to ensure I/I removal is achieved. Typically, funding for long-term I/I rehabilitation programs are included as a component in the monthly sewer rates charged by the City.

Although expensive and disruptive to the community, experience again shows that dig and replace is, in most cases, the most efficient and cost effective method of rehabilitation. However, specific site conditions may dictate that one of the many other types of rehabilitation is preferred. Therefore, as the work progresses, each line should be evaluated on a case-by-case basis. For this report, cost estimates for I/I removal will be based on dig and replace rehabilitation. Dig and replace rehabilitation typically costs about \$150/foot, which includes all contingencies and the cost of replacing side sewers from the sewer main to the property line (this does not include the replacement of side sewers on private lands which is a property owner's expense). Based on this cost, the total replacement costs for all the old sewer lines in

Basins W-1, W-2, and W-3 is about \$3.29 million plus the cost to private property owners for replacing the side sewers on their property.

If the City begins a long-term I/I removal program in which 2% of the old lines are replaced each year with new PVC pipe, it will take 50 years to complete the program. If in the future, I/I begins to impact treatment, the program will need to be accomplished sooner. Funding to conduct this long-term program may be available through loans from DOE or PWTF. The program can also be expanded in 20 years after the loans for the WWTP upgrades have been paid. Based on replacing 2% of the old lines per year, about 440 feet of pipe and associated side sewers would be replaced. At a cost of \$150/foot of sewer main pipe, the total I/I removal cost amounts to about \$66,000/year. Using an existing customer base of 1,600, this results in a continuous I/I program which would cost, in 1999 dollars, about \$3.50/month per customer.