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**CITY OF WOODBURN
PUBLIC FACILITIES PLAN**

**(City of Woodburn,
October 2005)**

CITY OF WOODBURN
2005 PUBLIC FACILITIES PLAN

Prepared by
City of Woodburn
October 2005

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APPENDICES

Appendices are located at the end of this document.

Appendix A: Capital Improvements Plan

Appendix B: Public Facility Maps for UGB Expansion Areas

Appendix C: Planning Level Analysis of Public Facilities to Serve UGB Study Areas

FIGURES

The figures listed below are referenced in this document and can be found in the relevant facilities master plan.

Water Plan

Figure 10-11 Wellhead Treatment Alternative

Sanitary Sewer Plan

Figure 7-2 Layout of WWTP Facilities

Figure 2 Sewerage Collection System

Figure 3 Sewerage Service Area

Figure 1 Woodburn Wastewater Facilities Plan Sewerage Service Area

Storm Water Plan

Figure 1 Senecal & Mill Creek, Drainage Basin Boundaries

Figure 4 Senecal Creek Drainage Subbasins

Figure 5 Mill Creek Drainage Subbasins

Appendix Woodburn Storm Drain Inventory, June 1999

WOODBURN PUBLIC FACILITIES PLAN (2005)

INTRODUCTION

The Public Facilities Plan (PFP) identifies major infrastructure projects necessary to serve the Year 2020 projected population of 34,919¹ and examines the effect on utility and transportation infrastructure resulting from 2005 expansion of the Urban Growth Boundary (UGB) of the City of Woodburn. As required by state statute, four elements have been studied: Domestic Water, Sanitary Sewer, Storm Drainage, and Transportation. Information for projects within the pre-2005 UGB was derived from existing Facilities Plans, updating where necessary.

In order to assess relative service costs and efficiency for alternative UGB expansion areas, the City's initial effort involved characterization of improvements and extensions that would be necessary to serve eight Study Areas surrounding the existing (pre-2005) UGB. These investigations were conceptual and the data used in comparisons between the Study Areas were preliminary in nature. The results of the initial work are contained in Appendix C.

A more comprehensive analysis was performed on four expansion areas recommended by the Planning Commission, identified as the North, South, Southwest, and West Expansion Areas. Tables summarizing project timing and costs for each area have been included in the body of the Public Facilities Plan. Maps showing the locations of infrastructure elements (Water, Sanitary Sewer, and Storm Drainage) for Southwest and North Areas (areas with high value farmland) are included in Appendix B. Transportation projects and maps were derived from the Woodburn Transportation Systems Plan (TSP), which also was updated in 2005.

Service Area Characteristics

Woodburn is located in Oregon's Willamette Valley approximately 17 miles north of Salem and 30 miles south of Portland in the Pudding River basin. The topography of the service area slopes slightly to the northeast. The area is relatively flat with an elevation differential of only 50 feet, ranging 150 to 200 feet above sea level.

The main drainage through the City is Mill Creek, which drains to the Pudding River. Senecal Creek drains a small portion of the City's UGB area west of I-5. A very small portion of the east part of the City (east of highway 99E) naturally drains directly to the Pudding River.

¹ In an exercise of caution, Woodburn's facility master plans are designed to serve somewhat higher population growth than adopted in the 2005 Woodburn Comprehensive Plan. The City has incorporated a margin of error: if actual population growth exceeds the coordinated population projection of 34,919 before 2020, the City will be able to accommodate this increased growth without further amendment to projects identified in facility master plans.

The climate is mild with wet winters and dry summers. Rainfall averages about 41 inches per year and one year in ten will exceed 51 inches. The wettest months are usually November, December and January with almost 20 inches of rainfall occurring during that time.

The soils in the area are of two associations, Amity silt loam and Woodburn silt loam. Both of these formations are found throughout the City in all areas except drainage channels. The Amity series consists of poorly drained soils formed in mixed alluvial silts. The layer is general 17 inches thick overlaying a 7-inch silt loam subsurface layer and a 13-inch silty clay loam subsoil. The Woodburn series consists of moderately well drained soils formed in silty alluvium and loess. The 17-inch surface layer overlays 37 inches of subsoil and a silt loam substratum to a depth of 68 inches. The course of Mill Creek is etched in Bashaw clay and Dayton soils and terrace escarpment are also found in the service area.

The geology of the area consists of Troutdale formation materials and Willamette silts overlaying Columbia River basalt. Depth to basalt is unknown but thought to be approximately 600 feet. The Troutdale formation consists of alternate layers of clay, silt, sand and gravel. The Willamette silt formation consists of stratified silt, sandy silt, clayey silt and silty clay and has poor drainage characteristics. The City is located in a Seismic Zone 3.

Two major highways traverse the City; Interstate 5 along the west side of the City and 99E along the east side of the City. Both routes run generally north-south through Woodburn. Oregon Highway 214 is an east-west route through the City; Highway 211 connects Woodburn to Molalla.

Woodburn is bisected by the Union Pacific Railroad main line. The railroad extends north-south through Woodburn and parallels Front Street through the City. Willamette Valley Railroad uses spur tracks that parallel Front Street and a line that proceeds east from Front Street along Cleveland Street.

WATER PLAN

HDR Engineering, Inc. prepared a water master plan for the City of Woodburn. It was first prepared in 1997 and updated in 2001. The 2001 update provides a 20-year plan for the water system through the year 2020. The plan was based on a projected permanent population potential of 38,586, which exceeds the coordinated Year 2020 population projection of 34,919. The City has 5,380 single family, multi-family, commercial, industrial, and public connections. The current service area of the water system is inside the City limits, although the service area will expand as annexations to the City occur.

The Water Master Plan assumed that all growth would occur within the current UGB (4050 acres). The PFP identifies additional projects necessary to serve the expanded UGB. Some projects identified during preparation of the Water Master Plan have been listed and entered into the Capital Improvement Plan (CIP). The CIP is a six-year plan

that focuses on improvements within the existing City Limits. As land is annexed to the City, the CIP will be amended to incorporate and set priorities among additional projects. For example, the City anticipates that industrial land will be annexed to the City *in the short term*. Although most improvements necessary to serve expansion areas will be paid for by the developer, the CIP will be amended on an annual basis to include sanitary, sewer, water, storm drainage and transportation projects necessary to serve recently annexed areas.

Projected Population

When the Water plan was prepared, it was based on a projected year 2020 permanent population of 38,586. Also considered in the water plan were 4,099 projected seasonal workers.

Water Source

Water Rights

The City of Woodburn obtains water entirely from groundwater. Woodburn has existing water rights within its certified service area of up to 13.25 mgd (20.45 cfs). Table 1 shows a water rights summary from the Water Master Plan.

Table 1 City of Woodburn Water Rights Summary Certificates of Water Rights (Supply)			
WRD Designation	Amount (GPM)	Well Name	Well No.
Permit No. G-10931	1000	Centennial	Well 10
Permit No. G-11921	1400	Donner	Well 9
Permit No. G-11922	2100	Nazarene	Well 7
Permit No G-12029	600	Astor Way	Well 11
Cert. No. 36537	500	Senior Estate	
Cert. No. 36538	750	King Way	Well A
Cert. No. 56379	750	Legion Park	Well 8
Regis. GR 2267	750	Shop No. 1	Well 1
Regis. GR 2268	300	Shop No. 2	Well 2
Regis. GR 2269	500	Library	Well 3
Regis. GR 2270	500	Settlemier	Well 4
Regis. GR 3815	300	Old SPRR	Well 5
TOTAL	9,200 gpm (13.25 mgd)		

The Water Master Plan found that Woodburn has sufficient water rights to meet the projected water demands through the year 2020.

Wells

The City's seven active wells tap the Troutdale aquifer, a large semi-confined aquifer. It is anticipated that the City will continue to utilize this aquifer as the sole source of water. Active wells are listed in Table 2.

No.	Description	Capacity	Function
3	Library	500 gpm Depth = 198'	Provides water to the central part of Woodburn
4	Settlemier Well located at the intersection of West Hayes St. and Settlemier Avenue. Drilled in 1952	600 gpm Depth = 183'	Provides water to the central part of Woodburn
7	Nazarene Well located on Woodland Avenue. Drilled in 1967	1,000 gpm Depth = 333'	Provides water to the northwest part of Woodburn
8	Legion Park Well located on Alexandra Avenue. Drilled in 1974	868 gpm Depth = 194'	Provides water to the southern area of Woodburn
9	Warren Donner Well located on Country Club Road	1,000 gpm Depth = 280'	Provides water to the north central area of Woodburn
10	Centennial Well located 2205 National Way. Drilled in 1988	1,000 gpm Depth + 279'	Provides water to the north central area of Woodburn
11	Astor Way located at 1200 Astor Way. Drilled in 1989	1000 gpm Depth = 288'	Provides water to the north central area of Woodburn

The 2001 Water Master Plan found that the City needed to install six new wells in the west and southwest area of the City to increase the total well capacity to approximately 12 mgd. To stay ahead of growth in water demands, these wells were programmed to be installed at an approximate rate of one well every five years. The proposed well projects from the Master Plan are listed in Table 3 as follows (estimated in year 2000 dollars):

Project Description	Year of Improvement	Estimated Costs (2000 Dollars)
Drill 2 wells at South Woodburn site	2002	\$680,000
Drill 2 wells at S. Woodburn site	2015	\$425,000
Drill 2 wells at West Woodburn site	2022	\$335,000
	Totals (2000 Dollars)	\$1,440,000

Following the recommendations of the Water Master Plan, Woodburn developed two new wells in 2003 at south Woodburn sites as follows:

- Well 12 at 828 Parr Road
- Well 13 at 515 Settlemier Avenue

During the facility planning process for the water treatment facilities, it was determined that the cost of connection of well 8 to the National Way Treatment Plant

were excessive and there were further concerns regarding the construction and future water production capability of Well 8. The decision was made to construct a new well in the northern area of the City that would allow simplified transmission line connection and be constructed in a manner to provide for a more reliable long-term water source. Subsequently, Well 14 was constructed at 3015 National Way, and a raw water transmission line connects this well to the National Way Treatment Plant. The locations of the treatment facilities within the system are shown on Figure 10-11.

Source Water Protection Plan

Oregon Department of Human Services and Department of Environmental Quality have developed a Source Water Protection Plan for the City. The plan inventories potential sources of contamination, establishes best management practices for industries within the influence zone of the City's wells, allows the City to develop ordinances to provide protection of the aquifer, and maps the flow patterns of the aquifers. The Troutdale aquifer, from which the City's wells obtain the City's drinking water supply, is not a critical or restrictively classified groundwater area. The City does not at this time plan to request certification of the delineations in the Source Water Protection Plan for Statewide Planning Goal 5 purposes.

Water Demand

Existing Demand

Table 4 contains information from 1992 to 1995 from metering records of the average daily water demand (ADD) and the maximum daily water demand (MDD).

Table 4 Woodburn Yearly Water Demand ⁽¹⁾			
	Average Daily Demand	Maximum Daily Demand⁽²⁾	
Year	MGD	MGD	Month in which MDD Occurred
1992	1.89	4.36	June
1993	1.73	3.88	August
1994	1.91	4.45	July
1995	1.88	4.57	July
1996	1.88	4.21	July
1997	1.89	4.26	August
1998	2.01	4.41	July
1999	2.13	4.46	July
2000	2.18	5.30	August
2001	2.19	4.27	July
2002	2.31	4.86	August
2003	2.28	5.25	July
2004	2.38	5.43	July
⁽¹⁾ Based on metering records			
⁽²⁾ Based on ratio of MDD/ADD from pumping records			

The following table shows the total water demand by land use category, the total number of connections (in 1996) by land use category, the water demand by each

connection by land use category and the percent of total water demand by land use category.

Demand Category	Total Demand (gpd)	No. of Connections (1)	Unit demand (2) (gpd/connection)	Percent of Total Demand (%)
Single Family Residential	1,098,000	4,176	266	62.00
Multi-Family Residential	310,400	127	2,440	17.00
Commercial	315,800	386	820	18.00
Industrial	520	3	173	0.03
City Owned	38,300	56	697	2.00
Fire Service	1,300	53	26	0.07
Other (Flushing)*	13,800			0.90
TOTAL	1,778,000	4,800		100.00
(1) As of April 1996				
(2) Based on number of connections in June 1995 and demand from June 1994				
(3) gpd = gallon per day				

* Does not include "Unaccounted for" water.

Single-family residences used approximately 266 gpd per connection. Multiple family residential uses have from 2 to 192 dwelling units per connection, with a median of 12. Records show that the water demand per multi-family connection is higher than for single-family uses. The 2001 Water Master Plan estimated that water demand per capita was 97 gallons per capita.

As the table indicates, about 80 percent of the total water demand is from residential uses. Commercial uses account for 18 percent, City connections for 2 percent and less than one percent comes from industrial uses and fire service.

All water systems have a certain amount of water that is produced by the system that cannot be accounted for by billing records. This is termed "unaccounted-for water" and it results from un-metered demands, meter inaccuracies, leakage, hydrant and line flushing and testing, and authorized or unauthorized hydrant use. Typical water systems, nationwide, average from 5 to 10 percent unaccounted-for water.

Woodburn conducts annual audits of pumping and water consumption records. Data from 1986 through 2004 were summarized in Table 6 as follows:

Table 6		
Woodburn Unaccounted For Water		
Year	Unaccounted for Water	
	MG	Percent
1986 – 87	31.0	5
1987 - 88	30.9	5
1988 - 89	50.1	8
1989 - 90	67.0	11
1990 - 91	50.4	8
1991 - 92	86.3	11
1992 - 93	64.4	10
1993 - 94	55.3	8
1994 - 95	56.6	9
1995-96	48.1	7
1996-97	41.2	6
1997-98	55.2	8
1998-99	58.7	8
1999-00	46.6	6
2000-01	71.8	9
2001-02	50.1	6
2002-03	58.9	7
2003-04	43.5	5
Average	54.7	8

The unaccounted-for water in Woodburn ranges from 5 to 11 percent of production with a median and average of 8 percent. Woodburn gives leaking pipelines priority for replacement in its distribution system maintenance budget.

Projected Year 2020 Demand

The 2001 Water Master Plan was based on moderate measures to conserve water. The plan expects to reduce demand between 5 and 8 percent, including the following:

- Leak detection and water line repair and upgrading.
- Annual water audit to calculate the amount of unaccounted-for water.
- Metering of all service connections.
- A public education program, using bill inserts to publicize the need for water conservation.
- Technical assistance measures including a bill showing the consumption history and customer assistance for questions related to water conservation.
- Promotion of conservation for nurseries and park department facilities and low water demand landscaping in all retail customer classes.
- Increasing Block Structure for water rates.

The Water Master Plan estimated that by the year 2020 average day demands (ADD) may increase to 4.47 million gallons per day and maximum day demand (MDD) may increase to 10.28 million gallons per day.

Table 7 Water Demand Projections				
	No Conservation Impact		Moderate Conservation Impact	
Year	ADD (mgd)	MDD (mgd)	ADD (mgd)	MDD (mgd)
2010	2.96	6.81	2.73	6.28
2015	3.51	8.07	3.23	7.43
2020	4.14	9.52	3.82	8.79
2025	4.70	10.82	4.36	10.02
2030	5.25	12.08	4.86	11.18
2035	5.74	13.20	5.32	12.23
2040	6.17	14.19	5.71	13.14

Table 8 Water Production Capability Projections				
	No Conservation Impact		Moderate Conservation Impact	
Year	ADD (mgd)	MDD (mgd)	ADD (mgd)	MDD (mgd)
2010	3.20	7.35	2.95	6.78
2015	3.79	8.72	3.49	8.03
2020	4.47	10.28	4.130	9.50
2025	5.08	11.68	4.70	10.82
2030	5.67	13.05	5.25	12.08
2035	6.20	14.26	5.74	13.20
2040	6.66	15.32	6.17	14.19

Treatment

Historically, the City of Woodburn provided no water treatment or disinfection because the quality of water derived from City wells has proven not to require disinfection and neither state nor federal water regulations require treatment or disinfection for wells. Increasing concerns with the odor, taste and staining problems generated by iron and manganese in the groundwater, a potential decrease in the federal arsenic standard and potential regulation of radon led the City to update its master plan and develop a treatment plan for the City’s water supply. Woodburn complies with the parts of the Safe Drinking Act that are currently in force and apply to the City.

Iron and manganese levels in the City's water source have caused numerous complaints about the aesthetic quality of the water. To eliminate the iron and manganese problems, the Water Master Plan recommended that the City construct neighborhood treatment plants.

Table 9 shows necessary improvements to the water treatment system, their timing and their costs.

Table 9 Woodburn Water Master Plan Treatment System Summary of Budgetary Cost Estimates		
Treatment Component	Year of Improvement	Estimated Costs (2000 Dollars)
Raw Water Transmission Pipelines	2003	\$1,079,000
Raw Water Transmission Pipelines	2015	\$413,000
Raw Water Transmission Pipelines	2022	\$195,000
Reservoir Improvements	2004	\$4,127,000
Drill 2 Wells at S. Woodburn Site	2002	\$680,000
Drill 2 Wells at S. Woodburn site	2015	\$425,000
Drill 2 Wells at W. Woodburn Site	2022	\$335,000
Construct three 2.7 MGD Treatment Plants	2005	\$10,288,000
S. Woodburn Treatment Plant Expansion	2015	\$1,500,000
Construct W. Woodburn Treatment Plant	2022	\$1,720,000
Totals (2000 Dollars)		\$20,762,000

The City is nearing completion of three neighborhood treatment plants as recommended in the Water Master Plan. The three treatment plants are located at well sites on National Way, Country Club Road, and Parr Road. These treatment facilities treat water from wells at their sites and water transmitted from nearby wells through raw water transmission lines constructed when the treatment plants were constructed in 2003-2004. The locations of the treatment facilities are shown on Figure 10-11.

Storage

Water system storage is considered to be comprised of three elements: equalizing, fire flow, and emergency. "Equalizing storage" provides water supply when customer demand exceeds the capacity of the wells and pumps to produce water flow. "Fire flow reserves" provides the volume of water needed to provide the demand for fire flow for a fire having a finite duration. "Emergency storage" supplies water when a portion of the water production system is out of commission. The same volume of storage can serve all three purposes. The Water Master Plan projects that in the year 2020 these storage requirements will be as follows:

- Emergency standby 1,400,000 Gal
- Fire Flow Reserves 1,500,000 Gal
- Equalizing Storage 2,230,000 Gal

The City has an elevated reservoir located near Broadway and Front Street. It is 130-feet high, was built in 1965 and has a capacity of 750,000 gallons. This reservoir is in good condition and is planned to continue in service without substantial repair during the

planning period. An older, smaller tank located next to this tank is scheduled for demolition.

In normal operating conditions, pressure within the water system is established by the elevated reservoirs. When demand in the system draws down the reservoir level, pumps at the wells are turned on to pump into the system and to replenish the reservoir supply. If the level in the reservoir continues to drop after the first well pump has turned on, more pumps receive signals to turn on and pump into the system until the tank water level reaches pre-determined shutoff level.

When the treatment plant becomes operational, the pressure within the water system will be established by the larger elevated reservoir. Backup pressure, which had been from the smaller elevated reservoir, will now be established from booster pumps at each of the treatment plant sites and pressure sensors located at various locations in the City. The booster plant pumps will operate to maintain water levels in the elevated reservoir and to supply demands placed upon the system by users. If the elevated reservoir is out of service for maintenance or other reasons, the treatment plant booster pumps and pressure sensor system will maintain desired system pressure.

The 2001 Water Master Plan found that there was a significant deficiency in water storage capacity. The existing storage was sufficient to equalize demand within the system and to provide minimal fire flow reserves, but does not provide emergency standby storage nor satisfy ISO fire flow standards. The plan recommends that the City construct 4.4 million gallons of new storage capacity, to increase the total storage volume to 5.15 million gallons, comprised of 2.25 million gallons equalizing and 2.9 million gallons of emergency-standby/fire flow reserve storage. The plan recommends that the storage be provided in two reservoirs, each providing 2.2 million gallons and that the reservoirs be located at the proposed treatment plant sites. These reservoirs were recommended to be grade-level facilities.

In the design review process for treatment facility construction, the decision was made to place reservoirs at all three treatment plant locations. The decision was made to allow the reservoirs to reduce levels of radon in the City groundwater supply. Although not finalized, the proposed federal limit on radon in drinking water is exceeded in some City wells. The City decided to place radon reduction systems in reservoirs. To fully treat all water supplies for radon required a reservoir at each treatment site. Reservoir sizes were 2.7 million gallons at Parr Road, 0.3 million gallons at Country Club Road and 1.7 million gallons at National Way. With the 0.75 million gallons at the existing reservoir, the City has a total of 5.45 million gallons, which exceeds the projected 2020 master plan requirement of 5.13 million gallons of storage. The location of these reservoirs is shown on Figure 10-11.

Grade level storage utilizes pumps to move water into the distribution system and work with the elevated storage reservoir to maintain water pressure. The pumps need to be large enough to satisfy anticipated peak demand flow rates. They also need to have an automated auxiliary power supply to assure water is available during power failure. All three of the treatment plants have emergency generators capable of plant operation as

well as operation of the wells located at each of the treatment plant sites. The City has portable generators that can be used to provide emergency power to other wells.

In 2003-2005 the City is constructing a new storage facility at each of the three new treatment plants. The locations of the storage facilities within the system are shown on Figure 10-11.

Water Distribution System

There are approximately 66 miles of transmission and distribution piping, ranging from 1-inch to 18-inches in diameter. Approximately four miles are piping with sizes of 4-inches or less. Substandard pipe of 1-inch and 2-inch diameter is routinely being replaced. The majority of the pipe within the service area is 6-inch or 8-inch diameter service piping. (The City is not required to address these segments of the distribution system in the public facilities plan.)

A summary of the quantity of pipe by diameter is illustrated in Table 10 as follows:

Pipe Size	Total Length of Pipe (feet)
4"	14,034
6"	153,201
8"	188,483
10"	17,670
12"	65,958
14"	8,419
16"	1,425
18"	2,336

The majority of the pipe in the system is ductile or cast iron. There is a significant amount of asbestos-cement pipe in the Senior Estates area. This asbestos-cement pipe has not caused any water quality problems. The City routinely repairs and replaces older leaking or undersized pipes as part of an annual maintenance program. These pipe repairs and replacements are performed by water division personnel or through contracts for projects listed in the City's capital improvement program.

Pressure within the distribution system is generally between 50 and 60 psi. The water master plan did not identify significant pressure deficiencies during maximum day flows. When water is pumped from the distribution system to fight a fire, water pressure within the system can be reduced. State administrative rules require the system maintain a minimum pressure of 20 psi. Pumping systems installed as a part of the water treatment project (at each of three treatment plants) will allow this requirement to be met during a fire event.

The City requires the maximum day demand plus fire flow for a proposed development to be calculated. Demand must not exceed available supply. Calculated available fire flow is compared to the standards in Table 11, which includes the Insurance Services Office (ISO) standards for fire flow.

Table 11 Fire Flow Demands by Zoning Classification (All flows are calculated on the Maximum Day)		
Zoning Classification	Minimum Required Fire Flow (gpm)	Duration (Hours)
Residential (<12 units/acre)	1,000	2
Residential (>12 units/acre)	3,000	3
Commercial	3,000	4
Public Use	4,000	4
Industrial	5,000	5

If the available fire flow is less than the required value, the developer may be required to either modify the proposed method of construction to reduce the required fire flow or make system improvements to increase the available fire flow in the water system to the development.

The 2001 Water Master Plan recommended replacing inadequate segments of the water distribution system before emergency situations occur or before capacity problems arise. The City will annually fund an ongoing substandard main replacement program. The Water Master Plan established priorities for replacing pipes as follows:

- Pipes in areas of related frequent customer complaints.
- Leaking pipes.
- Pipes identified by either maintenance or operations as problem pipes.
- Pipes four inches or less in diameter, and in areas that have the potential for growth.
- Undersized transmission mains.
- Aged Asbestos cement pipe.
- Aged steel or cast iron pipe.
- Lead joint pipes.

As areas within the UGB develop, the City will require developers to extend the transmission mains into these areas and make any improvements necessary to the distribution system. Although the 2001 Water Master Plan did not include project costs for distribution improvements in areas to be developed in the future, Table 13 describes water system improvements, costs and timing necessary to serve the expanded Woodburn UGB. As areas annex to the City and develop, the City will determine the exact configuration of the transmission pipe system.

Telemetry and Controls

The existing pumping system has an antiquated control system based on mercury switch technology. The treatment plants will utilize a modern Supervisory Control and Data Acquisition (SCADA) system. The SCADA system will automate operation of each individual facility, enable monitoring and control from a central location, and provide reliable communication between sites. The SCADA system will optimize water production and control and alarm notification. An operations center at the water division shop will be the central base for the computer SCADA

system. Existing water wells will be incorporated into the SCADA system. Communication between sites and the operations center will be through a radio telemetry system.

Short Term Water Projects

Table 12 shows the water distribution system projects in the Capital Improvement Program for the next six years. Note that:

- 1.) CIP projects occur within the existing (2005) utility service area. Utility service areas are coincident with City Limits.
- 2.) Service areas change as annexations occur, because the City must demonstrate that adequate services are available to serve potential annexation.
- 3.) Projects typically are added to the CIP when land is annexed to the City. Thus, projects not identified on the CIP are possible within the short-term (next five years).
- 4.) Projects not listed on CIP may be developer-sponsored, grant-funded, or financed by other means, as City may approve.
- 5.) See Table 13 for projects required to serve land within the expanded Urban Growth Boundary.

<p align="center">Table 12 Planned Water Improvement Projects Woodburn Capital Improvements Program Fiscal Years 2003 – 2009</p>							
Project Number	Project	2003-04	2004-05	2005-06	2006-07	2006-08	2008-09
1	Hwy 214 widening			\$44,000			
2	Laurel Avenue (replace line)		\$46,000				
3	Hwy 99E: Tomlin to Laurel		\$22,000				
4	Hwy 99E: Laurel to Aztec		\$16,500				
5	99 E at Silverton Road (bore)				\$110,000		
6	N First Street/N. Second (loop)			\$18,700			
7	N. Fifth Street (replace line)		\$44,000				
8	Hwy 214 A Mill creek						
A	Bore	\$55,000					
B	Loop line installation	\$132,000					
9	Hwy 99E: Blaine to Aztec			\$44,000			
10	Hwy 99 E: Blaine to Lincoln			\$66,000			
11	Ogle/Parr/S. Boones Ferry			\$96,000			
12	McKinley St. Line Capacity Imp.	\$22,000					

Project Number	Project	2003-04	2004-05	2005-06	2006-07	2006-08	2008-09
13	Lincoln to Hardcastle (loop)				\$132,000		
14	99 E South (New Line)				\$132,000		
15	Silverton Road (Loop)				\$44,000		
16	Water System Rehabilitation						
17	Water Treatment	\$9 million	\$6.8 million	\$1m illion			
18	Hwy 214/99E Loop Line					\$100,000	
19	Hazelnut Dr. -n Replace Bridge Line					\$55,000	
20	Brown street - Line Rehab (materials only)	\$27,500					
21	Parr Road to Evergreen Loop						
22	Woodburn Village Line Replacement		\$61,600				

UGB Expansion Area Projects

Table 13 identifies short- and intermediate-term projects necessary to serve 2005 UGB expansion areas.

**Table 13
Project List - Water Plan**

Minor distribution lines within expansion areas are not included
Refer to Maps for generalized locations of Trunk Lines

0-5 Year Projects

Expansion Area	Location	Description	LF	Unit \$	Estimated Cost	Funding
<u>Southwest Industrial</u>						
	Looped Line - NW of I-5 to SE of I-5	12-inch Water Main	12,500	75	\$937,500	SDC/Developer /CIP
	Woodburn Town Center	12-inch Water Main (Offsite)	8,200	75	\$615,000	Developer
	Parr Road and Other	12-inch Water Main	9,700	75	\$727,500	SDC/Developer /CIP

North Area

East of Boone Ferry	12-inch Water Main	8,900	75	\$667,500	SDC/Developer /CIP
6-15 Year Projects					
<u>Southwest Industrial</u>					
Looped Line	12-inch Water Main	5,900	75	\$442,500	SDC/Developer /CIP
<u>Western Exception Area</u>					
Arney Rd to Butteville Rd.	12-inch Water Main	4,500	75	\$337,500	SDC/Developer /CIP
Butteville Road to POC on Hwy 214 West of Willow Lane	12-inch Water Main	4,800	75	\$360,000	SDC/Developer /CIP
<u>North Area</u>					
South of Crosby	12-inch Water Main	8,950	75	\$671,250	SDC/Developer /CIP
<u>South Area</u>					
Looped (99E to Settlemier)	12-inch Water Main	10,800	75	\$810,000	SDC/Developer /CIP

Funding

The City allocates its water budget into five funds: Water fund, Water Well Construction Fund, Water Equipment Replacement Reserve Fund, and the Water System Development Trust Fund. The available sources of revenues come from water user fees, service fees, interest revenues, system development charges and miscellaneous revenues.

The City last completed a rate study in 1999. The purpose of the study was to determine the rates and system development charges that would be necessary to fund needed capital improvements and to ensure the ongoing fiscal health of the water system. The study also ensured that required increases were equitable in terms of what each class of user pays. The rates and charges determined were to provide revenue for capital improvements and for operation of the water supply, treatment, and distribution system.

Water rates were determined utilizing a cost-of-service or functional allocation of costs. The intent of this allocation is to recover revenue from classes of customers according to the demands that they place on the system. Customer classifications included single-family residential, multi-family residential, commercial, industrial, and fire service in recognition of the different demands placed by each of the classifications. Single-family residential, the largest water user, includes a fixed rate meter charge and a three tier increasing block volume rate. The volume block rate increased at quantities equal to

average winter and summer water use. Other classifications of users were charged a fixed meter charge and a single volume rate.

Service fees are evaluated annually and are based primarily on the cost to provide the service. The system development charge is the sum of a calculated reimbursement fee and improvement fee. The reimbursement fee recovers costs associated with capital improvements already constructed or under construction. The improvement fee recovers costs associated with capital improvements to be constructed in the future. The basis for the fee is peak daily water demand.

SANITARY SEWER PLAN

In November 1993, the City of Woodburn was notified by the U.S. Environmental Protection Agency (EPA) and the Oregon Department of Environmental Quality (DEQ) to develop a plan to meet the more stringent Publicly Owned Treatment Works (POTW) effluent limits developed for the Pudding River. The volume of water in the Pudding River, during the summer months (July and August), is so low the river cannot dilute the treatment plant effluent sufficiently. Low flows result in oxygen levels, needed by certain aquatic life, to be below acceptable limits. The inability to maintain sufficient oxygen levels is the main reason the Pudding River has been classified as a water-quality-limited stream. Total maximum daily loads were established for the Pudding River and waste load allocations set for the Woodburn POTW.

In response to DEQ notification, the City prepared and adopted the 1995 Wastewater Facilities Plan for its wastewater treatment and collection system. This plan is designed to guide operations and improvements to the City's treatment system through the year 2020. In addition to providing upgrade guidelines for the existing system, to meet regulatory requirements, the facilities plan provides for increasing the system's capacity to accommodate planned residential, commercial and industrial growth.

Additional efficiency is built into the plan by providing for phased construction of the improvements. The estimated cost of treatment facilities is divided into two phases. Phase 1 estimated costs (in 1998 dollars) are \$38.3 million; Phase 2 estimated costs (in 1998 dollars) are \$11.9 million. The plan will enable the City to look ahead to long-term needs through the year 2020, while implementing the improvements only as they are needed.

The 1995 Wastewater Facilities Plan was designed to 43,672 persons, and thus can readily accommodate the coordinated Year 2020 population project approved by Marion County (34,919). This projection was based on an average annual growth rate of 2.8%, whereas the Wastewater Facilities Plan utilized a growth rate of 3.4 percent. Based on this information, the existing Wastewater Facilities Plan will provide sufficient capacity for the 2005 UGB amendments and projected population growth through 2020. Table 13 identifies projects to serve the UGB as expanded in 2005. In fact, the master plan study area encompassed the area within the pre-2005 Woodburn UGB and potential UGB expansion areas that are now included within the 2005 UGB. Areas outside the UGB

were also included in the study for public health reasons. The potential also existed that other uses, such as trailer parks, outside the UGB could be served in the interest of public health.

On December 28, 2004, the U.S. Environmental Quality Protection Agency (EPA) and Oregon Department of Environmental Quality (DEQ) issued the City a National Pollutant Discharge Elimination System (NPDES) Permit. The compliance schedule with this permit requires the City to develop a plan and construct facilities for meeting the more stringent POTW effluent limits developed for the Pudding River. The treatment plant's wastewater effluent temperature/winter ammonia discharge is higher than can be directly discharged to the Pudding River during parts of the year. Increased river temperatures/winter ammonia levels have an adverse affect upon aquatic life. DEQ has established temporary temperature and winter ammonia limits until the establishment of total maximum daily loads for the Pudding River and waste load allocations are set for the Woodburn POTW. In response to the NPDES compliance schedule, the City will prepare a Wastewater Facilities Plan update for its wastewater treatment plant and collection system.

Treatment

Phase 1 of planned improvements to the wastewater treatment facility was completed in 2003. A diagram showing the physical layout of the treatment facility is shown in Figure 7-2 of the Wastewater Facilities Plan. Detailed descriptions and maps of the existing and proposed system also are included in the Wastewater Facilities Plan.

The hydraulic design capacity of the treatment plant is 3.3 mgd average dry weather flow, and 16 mgd peak hourly flow. The average total biochemical oxygen demand (BOD5) capacity is 6,500 lb/day BOD5. Currently, the plant has an average daily dry weather flow of 2.10 mgd, with average for the peak month being 2.9 mgd, and a wet weather peak hourly flow of 13 mgd. The plant average daily load of BOD5 is 4,500 lb/day and a maximum daily load of 10,575 lb/day.

No major improvements to the facility have been necessary since Phase 1 construction. Phase 2 improvements will be constructed when Phase 1 facilities near capacity which is anticipated to occur by 2008. As discussed above, Phase 1 and 2 improvements provide sufficient capacity for the 2005 urban growth boundary amendments and projected population growth through 2020.

Primary Collection System

The wastewater collection system conveys wastewater from residential, commercial, and industrial facilities to the treatment facility. A diagram showing the layout of the existing sewer trunk and interceptor lines and pump stations is shown in Figure 2 of the Wastewater Facilities Plan. Figure 3 shows the pre-2005 sewerage service area. The Woodburn sanitary sewerage collection system is composed of approximately 14.4 miles of trunk and interceptor line and 10 pump stations. Figure 1 shows the sewerage service area analyzed in the Wastewater Facilities Plan and shows areas considered for service expansion outside of the current UGB.

The Wastewater Facilities Plan provides a description of potential needed improvements to the collection system. The results of the hydraulic analysis showed that the Mill Creek Pump Station and Pump Station Numbers 2, 3, and 9 might require capacity upgrades. Construction of a replacement is currently nearing completion at Pump Station 9. In addition, the Front Street Interceptor through the downtown area to Lincoln Street and the trunkline along Highway 214 and Astor Way serving the northern portion of town will require improvement to increase capacity. Additional problems are not expected, but the problems listed above are expected to get worse. Further analysis of the condition of wastewater collection facilities is included in Volume II of the Wastewater Facilities Plan. The CIP shows projects that will be needed through the Year 2006 within the City Limits. (See Appendix A.)

UGB Expansion Area Projects

The 1995 Wastewater Facilities Plan which applied only to the pre-2005 UGB. In 2004-05, the Woodburn Public Works Department analyzed the ability of the City to provide wastewater facilities to eight potential UGB expansion areas. (See Appendix C.) The City used this analysis to rank alternative study areas to determine the relative cost-per-acre of providing sanitary sewer service. Generally, areas included within the UGB are less costly to serve than areas that were not included.

Table 1 analyzes the wastewater collection system improvements needed to serve adopted (2005) UGB expansion areas (i.e., portions of some study areas) and estimates the cost of constructing the improvements. In all cases, the City determined that the existing wastewater collection system would have sufficient capacity to efficiently serve the adopted expansion areas. Table 1 below identifies sanitary sewer projects necessary to serve 2005 UGB expansion areas.

**Table 1
Project List - Sanitary Sewer Plan**

Minor collection lines within expansion areas are not included
Refer to Maps for generalized locations of Trunk Lines

0-5 Year Projects

Expansion Area	Location	Description	Quantity	Unit \$	Estimated Cost	Funding
<u>Southwest Industrial</u>						
Cost Share (60%)	East of I-5	1200 LF 18-inch Line Upgrade	720	100	\$72,000	SDC/Developer /CIP
	NW of I-5	18-inch Trunk	1,500	100	\$150,000	SDC/Developer /CIP
	NW of I-5	12-inch Trunk	3,000	75	\$225,000	SDC/Developer /CIP
	NW of I-5	10-inch Trunk	1,200	55	\$66,000	SDC/Developer /CIP
	NW of I-5	8-inch	900	45	\$40,500	SDC/Developer /CIP
	SE of I-5	18-inch Trunk	3,000	100	\$300,000	SDC/Developer /CIP
	SE of I-5	12-inch Trunk	3,200	75	\$240,000	SDC/Developer /CIP

	SE of I-5	8-inch	1,000	45	\$45,000	SDC/Developer /CIP
	Woodburn Town Ctr.	24-inch	3,600	150	\$540,000	SDC/Developer /CIP
	I-5 Pump Station	Minor Upgrade	1	50,000	\$50,000	SDC/Developer /CIP
<hr/>						
<u>North Area</u>						
	East of Boones Ferry	8-inch gravity trunk sewer	1,325	45	\$59,625	SDC/Developer /CIP
	East of Boones Ferry	12-inch gravity trunk sewer	4,160	65	\$270,400	SDC/Developer /CIP
	N. Trunk/Hazelnut	Listed on CIP			\$210,000	Funded
<hr/>						
6-15 Year Projects						
<hr/>						
<u>Southwest Industrial</u>						
	North of South Arterial	12-inch Trunk	3,200	75	\$240,000	SDC/Developer /CIP
<hr/>						
<u>Western Exception Area</u>						
Cost Share (40%)	East of I-5	1200 LF 18-inch Line Upgrade	480	100	\$48,000	SDC/Developer /CIP
Cost Share (40%)	SW Industrial Area	3240 LF 12-inch Line Extension	1,296	75	\$97,200	SDC/Developer /CIP
	Butteville Road	8-inch Gravity	2,800	45	\$126,000	SDC/Developer /CIP
	I-5 Pump Station	Pump Station Upgrade	1	300,000	\$300,000	SDC/Developer /CIP
	Butteville Road	8-inch gravity trunk sewer	3,000	45	\$135,000	SDC/Developer /CIP
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<u>North Area</u>						
	South of Crosby	8-inch gravity trunk sewer	4,110	45	\$184,950	SDC/Developer /CIP
	South of Crosby	10-inch gravity trunk sewer	4,470	55	\$245,850	SDC/Developer /CIP
<hr/>						
<u>South Area</u>						
	West of Hwy 99E	8-inch gravity trunk sewer	1,800	45	\$81,000	SDC/Developer /CIP
	West of Hwy 99E	10-inch gravity trunk sewer	1,350	65	\$87,750	SDC/Developer /CIP
	TBD	Pump Station	1	300,000	\$300,000	SDC/Developer /CIP
	Brown Rd to Cleveland	Force Main	3,000	60	\$180,000	SDC/Developer /CIP
<hr/>						

Funding

To assure that the impact of providing and maintaining new sewer collection facilities is not a burden to the community, new development will be required to pay for the cost of collection facilities needed to serve such development. Extra capacity facilities required to meet the standards of the Master Sewer Plan will be paid from accumulated revenue of the System Development Charge Fund.

The City will continue paying the cost of maintaining and improving the existing collection system with funds derived from user fees. Treatment plant upgrades will be financed through a combination of system development charge funds, loans, and grants.

STORM WATER PLAN

The Woodburn Storm Drainage Master Plan was prepared by Crane and Merseth Engineering/Surveying in 1995, and was updated in 2002. The study area of the Storm Drainage Master Plan included the area within the UGB as it existed before the 2005 amendments and areas immediately surrounding the City that contribute runoff to Mill Creek and Senecal Creek upstream of the City. The study area comprised approximately 9,447 acres.

The Storm Drainage Master Plan is based on identifying the impervious area that existed in the base year, 1994. The study then calculated impervious areas for future land uses based on an assumption that every parcel within the UGB fully developed at the maximum density allowed by the 2001 Woodburn Comprehensive Plan Land Use Map.

As noted, there are two major drainage basins within Woodburn - Senecal Creek and Mill Creek. See Figure 1, Senecal & Mill Creek drainage basin boundaries. The small basin, Senecal Creek, is divided into 13 sub-basins (see Figure 4) and the larger basin, Mill Creek, is divided into 51 sub-basins (see Figure 5). These drainage basins will continue to serve planned development in 2005 UGB expansion areas.

Existing Inventory – Major Drainageways

Appendix A to the Storm Drainage Master Plan contains a June 1999 inventory of the existing public storm water system's facilities 12-inches and larger in diameter in the Mill Creek and Senecal Creek basins in the City of Woodburn.

- Table 1 contains a summary listing (by basin) of pipe sizes, materials, and conditions.
- Table 2 includes data for culverts.

Table 1 Mill Creek Tributary and Sub-basin Storm Drain Capacity Inventory						
Pipe/Channel Segment Description	Flow Node/ subbasin	Size/ Diameter (Inches)	Type	Approx Length (FT)	Adequacy Design Event Carried (YR)	
					1996 Conditions	Full Build
SUB-BASIN M-6A2						
Hardcastle Ave. 30th Outfall Line	M-6A2	30"	CSP	2800	100	25
TRIBUTARY M-7 (Includes M-11-C2 SETTLEMIEIR TO FRONT ST.						
Front St. Crossing & Leaping Weir	#7	30	CMP	230	100 (Ponded)	2 (Ponded)
Open Channel, 1st to Front	#7		DITCH	250	25, Storage Area	Maintain as storage or Convey 100 cfs
1st Street Crossing	#7	30	CMP	150	2	<2
Open Channel, 2nd to 1st	#7		DITCH	200	100, out of bank	Convey 100 CFS
2nd St. Crossing	#7	36	CMP	70	5	2
36", 3rd to 2nd St. Crossing	#7	36	CMP	350	100	100
42" Lincoln to 3r4d St	#7b	42	CMP	1390	100	25
25" Settlemier to Lincoln	#7b	24	RCP	280	25	<2
*HAYES ST. LINE	M- 7B1.B2	18	RCP	390	10	(no add capacity)
**AUSTIN CT./HAYES ST. LINE	M-7B1	18	RCP	750	10	(No add capacity)
*	M-7B1	15	RCP	440	10	(No add capacity)
*	M-7B1	18	RCP	520	10	(no add capacity)
TRIBUTARY M-9a, MCKINLEY/99e						
HWY 99e TO OUTFALL						
48" CMP Gatch St. Crossing	#9A	48	CMP	375	100	100
Open Channel, Gatch to Bryant	#9a		DITCH	800	100, ponded	Convey 75 CFS
48" Outfall @ Bryant	#9a		CMP	150	25	25
48" CMP, Bryant to McKinley	#9a	48	CMP	550	50	50
McKinley St. 24", Conf. 48" to 99E	M-9A3	24	CMP	600	<2	<2
SUB-BASIN M-10						
12" Collector, Outfall to Jana Ave.	M-10	12	CMP	470	2 \	(No add capacity)
12" Collector, Jana Ave. to Hawley	M-10	12	CMP	650	2	(No add capacity)
TRIBUTARY M-11						
CLEVELAND ST. OUTFALL TO SETTLEMIEIR						
Outfall Culvert, Brown to Cleveland	#11	(2) 42"	RCP		100	5 (Undetained)
Open Channel, Front St. to Brown St.	#11		DITCH		50	5 (Undetained)
Front St. Crossing	#11a	48"	RCP	200	50	5 (Undetained)
Park pipe, Settlemier to Front	#11b	48"	RCP	1160	50	5 (Undetained)
Settlemier Crossing	#11b	54"	CMP	50	50	5 (Undetained)
18" A Street Collector	M-11	18"	1	1300	5	<2
SPUR M-11B/PARR ST. TO CONF.						
Open Channel, Brown St. to Conf. Main Tributary	M- 11B1/B2		DITCH		100, Backwater Ponding	Convey 30 CFS

* A new storm drain, in the Hayes/Hall vicinity was constructed in 2001. The line diverts flow from the indicated lines to an existing 48-inch trunk situated in Highway 214. This line ultimately discharges to

Goose Creek, east of Nuevo Amanecer apartments. Calculations show that lines downstream from the diversion are now operating without potential for backwater during design storm.

** A slip-lining or pipe-bursting project will be completed spring 2006. The project will correct problems that have contributed to diminished capacity of this line.

Crossing Description	Flow Node	1995 Survey Data Size/ Diameter	Type	Length (FT)	Top of Road Overflow Elevation	Target Flood Elevation (FT)	APPROXIMATE CAPACITY		
							Flow (CFS)	Event (YR)	Buildout
								1996	Buildout
Crosby Road Arch Culvert	M-1	7'x10"	CMP Arch	69	148.4	148.0	340	5	2
Private Drive	M-2	8.3'x7.8' (96")	CMP	26	149.1	149.0	280	2	<2
Hazelnut Ave. Bridge	M-4	Natural Section	NA	80	157.1	152.0	>500	100	100
High School Entrance Drive	M-4	9.1'x14.0'	CMP Arch	66.8	158.9	153.4	490	100	100
Hwy 214 - Box Culvert	M-5/6	12'x7.7'	Con. Box	73	154.4	154.0	500	100 (Backwater Flooding)	
Front St and SPRR Culverts	M-6	96"	CMP	285	180/6(RR)	156.0	430	100	100
Hardcastle Avenue - &2" CMP	M-8	72" (deformed outlet)	CMP	182	163.6	161.5	250	50	25
Lincoln Street Culvert	M-9	84" (deformed)	CMP	130	169.3	163.5	290	100	100
Young Street Box Culvert	M-10/11	8'x6'	Con. Box	100	174.0	164.3	290	100	100
Cleveland Street Arch Culvert	M-10	9.3x16.4'	CMP Arch	150	168 (street)	164.4	210	100	100
Marshall Street Culvert	M-10	48"	RCP	57	165.5	165.5	82	10	5
Stark Street Culverts	M-10	(2) 48"	RCP	62	167.9	167.0	200	100	100
Wilson Street Culverts	M-12	(2) 52"	RCP	74	169.0	169.0	200	100	100

Indicates approximate length only, no field survey data.

Needed Drainage Improvements to Support Growth

Recommendations for needed storm drainage projects are found in Chapter 9 of the Storm Drainage Master Plan. The CIP shows projects that will be needed through the Year 2006 within the City Limits. (See Appendix A.)

Detention Policy Implementation

The Storm Drainage Master Plan includes a Stormwater Flow Management Program, including policies regarding detention. This policy requires on-site detention for new developments and identifies several locations in the City where a public detention facility may be sited.

Portions of the existing drainageways function as detention sites where East Lincoln Street and Hardcastle Street (and others) are crossed. These sites, four located in the Mill Creek drainage and one located in the Senecal Creek drainage basin will continue to function as detention areas. Programs directed at improving public safeguards during periods of high flow and incorporation of storm water treatment will be continued whenever possible.

Detention facilities are sized based on the Council adopted guide presented in Table 3, "Volumes for Different Intensity storms for 10-Acre Site."

Table 3 Volumes For Different Intensity Storms For 10 Acre Site							
Storms	Results	I (Intensities)	A = 435,600 or 10 acres	Developed C=0.71 (Un)developed C+0.25	ft ³ Sec (cfs)	Volumes ft ³ 3600sec	
						hrs storm	sec hrs storm
100 yr.	<u>1.26"</u> 1.7 hrs	0.467 <u>in</u> <u>hr</u>	435,600 ft ² or 10 acres	0.1 0.25	3.313 1.167	32,205 ft ³ 11,240 ft ³	32,205 ft ³ <u>--11,340 ft³</u> 20,865 ft ³ storage volume
50 yr.	<u>1.20"</u> 1.76 hrs	0.435 <u>in</u> <u>hr</u>	435,600 ft ² or 10 acres	0.1 0.25	3.087 1.087	32,672 ft ³ 10,800 ft ³	32,672 ft ³ <u>--10,800 ft³</u> 19,872 ft ³ storage volume
25 yr.	<u>1.14"</u> 2.86 hrs	0.399 <u>in</u> <u>hr</u>	435,600 ft ² or 10 acres	0.1 0.25	2.830 0.996	29,138 ft ³ 10,255 ft ³	29,138 ft ³ <u>--10,255 ft³</u> 18,883 ft ³ storage volume
10 yr.	<u>1.08"</u> 2.97 hrs	0.364 <u>in</u> <u>hr</u>	435,600 ft ² or 10 acres	0.1 0.25	2.582 0.909	27,605 ft ³ 9,720 ft ³	27,605 ft ³ <u>-- 9,720 ft³</u> 17,885 ft ³ storage volume
5 yr.	<u>0.935"</u> 3.28 hrs	0.285 <u>in</u> <u>hr</u>	435,600 ft ² or 10 acres	0.1 0.25	2.024 0.713	23,899 ft ³ 8,415 ft ³	23,899 ft ³ <u>-- 8,415 ft³</u> 15,484 ft ³ storage volume
2 yr.	<u>0.800"</u> 3.64 hrs	0.220 <u>in</u> <u>hr</u>	435,600 ft ² or 10 acres	0.1 0.25	1.560 0.549	20,448 ft ³ 7,200 ft ³	20,448 ft ³ <u>-- 7,200 ft³</u> 13,248 ft ³ storage volume

Short and Long-Term Capital Improvements Projects

Table 4 summarizes needed drainage improvements projects and is derived from the Woodburn Storm Drainage Master Plan. Table 4 is based on the following assumptions and methods:

CITY OF WOODBURN RUN OFF DETENTION REQUIREMENT

- 1) Construct a device that has capacity for detaining difference in run off volume received by undeveloped and developed land for a 25-year storm.
- 2) Construct a discharge orifice of a size that the quantity of run off through the orifice is equal to run off flow from a storm of 5-year or less, undeveloped land.
- 3) Construct a detention facility to have a post-development 25-year capacity with a discharge orifice (or structure) sized to limit outflow to no more than the undeveloped site peak run off for the existing (undeveloped) 5 year frequency storm. Detention volumes calculated by the following methods are acceptable:
 - A. Santa Barbara Urban Hydrograph routing model (as prescribed by the King County Surface Water Design Manual) for the post development 25-year runoff hydrograph detained back to the existing 5-year peak site discharge.
 - B. 18,883 CF/ 10 Acre drainage area as per City of Woodburn standard table, above, based on the rational method

SAFETY REQUIREMENTS

- 1) Depth of storm water within 30 feet from the edge of detention ponds, if open to public, shall be limited to 3 feet, then gradual slope (3%) to higher depth shall be allowed. Maximum pond side slopes shall be 3' horizontal to 1' vertical, however, gentler slope is desirable.

TABLE 4 Needed Storm Improvement Project Summary Woodburn Drainage Master Plan					
Project ID	Project Name	Drainage Basin	Subbasin ID	Priority	Estimated Cost (\$)
P1	Hardcastle Crossing	Mill Ck	M-8	High	\$ 191,729
P2	Front Street Detention & Crossing	Mill Ck	M-7	High	\$ 151,436
P3	Marshall Street	Mill Ck	M-10	High	\$ 78,560
P4	Crosby Road Crossing	Mill Ck	M-1	N/A (county)	\$ 587,159
P5	Boones Ferry Crossing	Mill Ck	M-1a	High	\$ 53,157
P6	Old town - 2nd street	Mill Ck	M-7	Medium	\$ 188,965
*P7	East McKinley	Mill Ck	M-9a	High	\$ 953,101
P8	Stubb Rd Detention	Mill Ck	M-11a	Medium	\$ 359,571
P9	Connect 48" at I-5 & Hwy 214	Senecal Ck	ES-2	High	N/A
P10	Goose Creek Re-alignment	Mill Ck	M-5	High	\$ 224,577
					\$2,788,255

* This project was completed in 2004.

The Storm Drainage Master Plan recommended that the City implement several storm drainage improvement projects. Five proposed projects within the Study area were given high priority for improvement. These are the Mill Creek/Hardcastle Road crossing; development of a detention facility at the Front Street park, addition of a 42-inch line across Front street and the railroad; adding capacity at Marshall street; increasing capacity at East McKinley near Bryan Street; and consolidation of storm flows into the existing 48-inch line crossing I-5 immediately north of Hwy 214.

- On Hardcastle Road, addition of a box culvert auxiliary (overflow) line in the embankment of the fill crossing Mill Creek is recommended.
- On Front Street, flow from an open ditch in the park enters an 18" diameter pipe before it goes under Front Street. Flows beyond the capacity of the 18" pipe are diverted to an open ditch and routed northerly to an existing 30" diameter pipe, which crosses under Front Street and the Railroad. The new system would create a detention facility at the park and increase capacity of the line under Front Street and the railroad by constructing a 42-inch line in place of the existing 30" pipe.
- At the Marshall Street crossing of Mill Creek, addition of a second conduit (tentatively 54-inch diameter) to increase capacity of the crossing and reduce flows that overtop the street is recommended for immediate development.
- In the area of Blaine and East McKinley Streets, the existing storm system has inadequate capacity the Storm Drainage Master Plan recommends that the City abandon the sub-standard pipes and construct new larger diameter pipes within the public right-of-way. (This project was completed in 2004.)
- The study identified problems at the Crosby Road Crossing, owned by Marion County, and recommended that the City work with the County to improve this facility.
- A dry-line 48-inch storm sewer was constructed as part of the ODOT I-5 construction. This system can be utilized to relieve hydraulic loading to the storm system crossing under I-5 to the south of Hwy 214, when placed in service.
- The study identified two locations along the main stem of Mill Creek that appear to be overtopped during very high flow periods. These are the Goose Creek confluence at Highway 214 near the Mill Creek Pump Station and the private road crossing just south of Crosby Road.
- At Mill Creek at the confluence of Goose Creek just south of Highway 214 at the Mill Creek Pump Station, there is significant probability of backwater build up during the 25-year event and overtopping at the highway embankment appears to be possible during the 100-year storm event. To alleviate this potential problem, the Storm Drainage Master Plan recommends that the City realign the Goose Creek Tributary to cross Hwy 214 and intersect Mill Creek to the north of Hwy 214. This would include the installation of a 60" diameter culvert.

- The private drive south of Crosby Road is within the City limits, but it is not a publicly-owned facility nor located within a public right-of-way. Therefore, the City does not have authority or responsibility for it. The capacity of the existing culver is inadequate to pass a 25-year event. The type, configuration and slope of the culvert, limits the capacity to less than 250 cfs. The full build-out, 100-year event flow at this location is estimated at 500 cfs. The Storm Drainage Master Plan recommends that it should be replaced with a 90" or 96" pipe.

Table 5 describes storm drainage projects that appear on the 6-year capital improvements program. As with the Water CIP, please note that projects change as annexation occurs, and that projects that do not appear on the CIP may be funded and constructed in the short-term. This is especially true of projects needed to support industrial development within the SWIR.

Table 5 summarizes storm drainage projects identified in the 6-year Capital Improvements Program. Note that projects may be added to this list based on Council priorities as land is annexed to the City.

Project #	Project	2004-05	2005-06	2006-07	2007-08	2008-09
1	Bryan Street Outfall	\$39,000	\$48,000			
2	Brown/Wilson Storm		\$130,000			
3	W. Lincoln: Leasure to Cascade		\$45,000			
4	Landau/Laurel Storm (to Pudding)		\$50,000	\$500,000	\$200,000	
5	Marshal Street Culvert		\$80,000			
6	North 1st & 2nd (north of Church St.)	\$62,000				
7	N Front Det. -culvert to Commerce		\$151,000			
8	Hardcastle Culvert Replacement		\$192,000			
9	Settlemier Regional Detention	\$194,000	\$295,000			
10	Misc. Wetland Mitigation	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
11	Reline Settlemier Crossing N. of Hayes		\$20,000			
12	Reclaim Channel N. of Progress Way	\$7,000	\$25,000			
13	Garfield-Workman-Hayes SD	\$59,200				
14	3 rd St. @ Nuevo Amanecer to Hwy 214	\$26,000	\$70,000			
15	Oak Street – 1 st to 2 nd	\$25,000				

UGB Expansion Area Projects

Table 6 identifies stormwater projects that will be needed to support planned development in UGB expansion areas. Note that minor collection lines within expansion areas are not including and that storm water detention facility area requirements are calculated without identifying specific locations. Please refer to Appendix B maps for generalized locations of storm water trunk lines.

**Table 6
Project List - Storm Drainage Plan**

Expansion Area	Location	Description	Quantity	Unit \$	Estimated Cost	Funding
Southwest Industrial						
	<u>NW of I-5</u>					
	North end	42-inch Storm Drain	2,200	200	\$440,000	SDC/Developer /CIP
	South end	36-inch Storm Drain	2,100	175	\$367,500	SDC/Developer /CIP
	TDB	Detention Area	1.9	375,000	\$712,500	SDC/Developer /CIP
	<u>SE of I-5</u>					
	Evergreen Extn to Settlemier Park	42-inch Storm Drain	6500	200	\$1,300,000	SDC/Developer /CIP
	Parr Road	36-inch Storm Drain	3,800	175	\$665,000	SDC/Developer /CIP
	Near Stacey Allison	30-inch Storm Drain	2,200	155	\$341,000	SDC/Developer /CIP
	Near Stacey Allison	24-inch Storm Drain	2,700	120	\$324,000	SDC/Developer /CIP
	TBD	Detention Area*	2.2	375,000	\$825,000	SDC/Developer /CIP
		* If detention is used, final design may indicate a smaller size for 42-inch Storm Drain shown above.				
North Area						
	East of Boones Ferry	18-inch Storm Drain	900	85	\$76,500	SDC/Developer /CIP
	East of Boones Ferry	24-inch Storm Drain	930	120	\$111,600	SDC/Developer /CIP
	To Mill Creek	48-inch Storm Drain	3,040	220	\$668,800	SDC/Developer /CIP
	TBD	3.1 Acre Detention Area	3.1	80,000	\$248,000	SDC/Developer /CIP

6-15 Year Projects

Southwest Industrial

Near South Arterial	24-inch Storm Drain	2,600	120	\$312,000	SDC/Developer /CIP
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Western Exception Area

South Collection Lines

Butteville Road / RR	30-inch Storm Lines	3,000	145	\$435,000	SDC/Developer /CIP
TBD	1.5 Acre Detention Area	1.5	80,000	\$120,000	SDC/Developer /CIP

North Collection Lines

Butteville / Senecal Cr	24-inch Storm Lines	3,400	120	\$408,000	SDC/Developer /CIP
TBD	3/4 Acre Detention Area	0.8	80,000	\$60,000	SDC/Developer /CIP

North Area

South of Crosby Rd. (western area near I-5)	18-inch Storm Drain	3,500	85	\$297,500	SDC/Developer /CIP
South of Crosby Rd. (central area)	24-inch Storm Drain	850	120	\$102,000	SDC/Developer /CIP
South of Crosby Rd. (west of Boones Ferry)	36-inch Storm Drain	2,025	175	\$354,375	SDC/Developer /CIP

South Area

East of Hwy 99E	18-inch Storm Drain	900	85	\$76,500	SDC/Developer /CIP
East of Hwy 99E	21-inch Storm Drain	800	100	\$80,000	SDC/Developer /CIP
TBD	Detention Area	1	80,000	\$80,000	SDC/Developer /CIP

Funding

To assure that the impact of providing and maintaining new storm drainage facilities is not a burden to the community, new development will be required to pay for the cost of storm drainage facilities needed to serve such development. Extra capacity facilities

required to meet the standards of the Master Storm Drainage Plan may be paid from accumulated revenue of the System Development Charge Fund.

The City will continue paying the cost of maintaining and improving the existing storm drainage system with funds derived from a combination of system development charges, Local Improvement Districts, and street maintenance and construction funds.

TRANSPORTATION PLAN

The Transportation System Plan contains information related to transportation project descriptions, location, timing and costs necessary to serve land within the 2005 Woodburn Urban Growth Boundary. The TSP is incorporated into this PFP by this reference.

APPENDIX A

CITY OF WOODBURN

**2005-2006 CAPITAL IMPROVEMENT
PROGRAM**

2005-2006 Capital Improvement Program

DRAFT 4-15-05

No	Project	Revenue	2005	2006	2007	2008	2009	2010	Total
		Source	-6	-7	-8	-9	10	-11	
Public Works Capital Improvement Program									
Street Resurfacing: State Roadway Systems			(Total Project Cost Shown)						
1	Boones Ferry/Settlemier/Hwy 214 Intersection*	TIF/ODOT/SpAsmt	612,000						612,000
2	Highway 214 Sidewalk - Phase 2 (Local Share \$25,000)	ODOT Grant/SRS	107,000	200,000	198,550				505,550
	Total State Roadway System		612,000	200,000	198,550	0	0	0	1,117,550
* Project bid to be let by ODOT.									
Street Improvements: Major Upgrades									
1	Country Club Rd	TIF/SpAsmt/CIP	326,700						326,700
2	Hwy 214 to Front St. Conn. (study)	St. Storm CIP	75,000						75,000
3	<u>Front St Undergrounding/Streetscape</u>								
	A. Front St.: Cleveland to Hardcastle	UrbRen	640,000						640,000
	B. N. Front: Hardcastle-N UR bound.	UrbRen		442,606					442,606
4	<u>Front Street Improvements</u>								
	A. S. Front St: Settlemier- Cleveland	UrbRen/TIF/CIP/EcDev	611,000						611,000
	B. N. Front St.: Hardcastle - WHS	UrbRen/ODOT/CIP			585,000				585,000
	C. N. Front St: WHS to UGB	St. CIP/TIF/Sp Asmt				200,000	500,000		700,000
5	Hardcastle/Railroad Realignment	St. CIP/TIF/Other		200,000					200,000
6	Parr Rd.: School to Centennial Park	WaterConst/ParksSDC	297,600						297,600
7	W. Hayes: Settlemier to Cascade	St. CIP/TIF				100,000	364,000		464,000
8	Evergreen Rd: connect to Parr Rd	Developer/TIF			475,000	475,000			950,000
9	Alley: Garfield - Cleveland	Street CIP/SpAsmt	169,900						169,900
10	Cleveland: Front to First	St. Storm CIP	117,800						117,800
11	Cleveland -- widen First to Second	State Rev. Sharing		25,000	150,000				175,000
12	N. Woodland: Camas - Stevens	St. CIP/Sp Asmt		50,000					50,000

2005-2006 Capital Improvement Program

DRAFT
4-15-05

No	Project	Revenue Source	2005	2006	2007	2008	2009	2010	Total
			-6	-7	-8	-9	10	-11	
Public Works Capital Improvement Program									
Street Improvements: Major Upgrades									
13	Fifth St: north of Harrison	St. CIP/Sp Asmt				300,000			300,000
14	Harrison; Front to Settlemier	St. CIP/TIF/Sp Asmt		120,000					120,000
15	Hayes: Front to 2nd	SRS/Other		80,000					80,000
16	Ogle Street/Settlemier Intersection	St. Storm CIP	35,000	20,000					55,000
17	<u>Miscellaneous Modifications</u>								
	A. Pedestrian Movements								
	1. Brown St Walkway 0.5 City/0.5 Developer	Str CIP	20,000						20,000
	2. Safety Sidewalk Construction	St. CIP	15,000						15,000
	3. Safety signal	St. CIP							
	N. Boones Ferry @ Henrys Farm	SRS	26,400						26,400
	Hayses @ Cozy Lane	SRS	26,400						26,400
	Hardcastle @ Park Ave.	SRS		27,700					27,700
	B. Intersections								
	1. Hayes/Bottle/Settlemier	St.CIP/Water Const.	150,000	30,000					180,000
	2. Settlemier/W. Lincoln	St. CIP	25,000						25,000
	3. Lawson/Highway 214	SRS			50,000				50,000
	C. Misc. Capacity Improvements								
		TIF/CIP	35,000	35,000					70,000
	Major Upgrades Total		2,570,800	1,030,306	1,260,000	1,075,000	864,000		6,800,106
	<i>* Project Bid to be let by ODOT</i>								
Street Resurfacing: Gravel Streets*									
1	No Name Street	SRS, GF, SpAsmt	60,000						60,000
2	Tout Street	SRS,CIP, GF, SpAsmt		106,000					106,000
3	Carol Street	SRS,CIP, GF, SpAsmt			117,046				117,046
4	Wilson Street	SRS,CIP, GF, SpAsmt				82,277			82,277

2005-2006 Capital Improvement Program

DRAFT
4-15-05

No	Project	Revenue Source	2005	2006	2007	2008	2009-	2010
			-6	-7	-8	-9	10	-11
Public Works Capital Improvement Program								
5	Alexandra Street	SRS,CIP, GF, SpAsmt				78,000		78,000
6	Elm Street	SRS,CIP, GF, SpAsmt					50,000	50,000
7	Church Street, 1st to 2nd	SRS,CIP, GF, SpAsmt					TBD	
8	Yew Street, 2nd to 3rd	SRS,CIP, GF, SpAsmt					TBD	
	Total Gravel Streets		60,000	106,000	117,046	82,277	78,000	443,323

*List is not complete. Paving of all gravel streets will require expenditure of about \$2.0 Million more than "total" indicated at right.

Street Maintenance & Restoration: Poor Streets - 1-1/2" Lift "C" Mix*

1	Bryan St:McKinley to Lincoln, 650'	Gas Tax/SRS/St Fund	34,000					34,000
2	McKinley St: Bryan to Hwy. 99E	Gas Tax/SRS/St Fund	55,000					
3	Rainier Rd: Astor to Delmoor, 1275'	Gas Tax/SRS/St Fund	70,000					70,000
4	Broughton Way, All	Gas Tax/SRS/St Fund	25,000					25,000
5	Vanderbeck:Princeton to Upmqua	Gas Tax/SRS/St Fund	39,115					39,115
6	Cahill, All, 440 ft.	Gas Tax/SRS/St Fund	25,880					25,880
7	Hampton Way	Gas Tax/SRS/St Fund	45,000					45,000
8	Garfield St: Alley to 2nd, 500 ft.	Gas Tax/SRS/St Fund	15,000					
9	Arthur St: Front to First	Gas Tax/SRS/St Fund	20,000					
10	Arthur St: Third to Settlemier	Gas Tax/SRS/St Fund	15,000					
11	Grant, Front to First	Gas Tax/SRS/St Fund	30,000					
11	Oak St: Front to Settlemier	Gas Tax/SRS/St Fund	48,000					48,000
12	Micellaneous Repair	Gas Tax/SRS/St Fund	50,000					50,000
13	Thompson, All	Gas Tax/SRS/St Fund	160,000					160,000
14	Ecola Way	Gas Tax/SRS/St Fund	23,422					23,422
15	Elana Dr. (North)	Gas Tax/SRS/St Fund	46,884					46,884
16	Quinn Road	Gas Tax/SRS/St Fund		112,000				112,000
17	Walton Way	Gas Tax/SRS/St Fund		65,000				65,000

2005-2006 Capital Improvement Program

No	Project	Revenue Source	2005	2006	2007	2008	2009	2010	Total
			-6	-7	-8	-9	10	-11	
Public Works Capital Improvement Program									
Street Maintenance & Restoration: Poor Streets - 1-1/2" Lift "C" Mix*									
18	Dellmoor Way	Gas Tax/SRS/St Fund			71,000				71,000
19	Brown Street, Pvmt Rest (1/2 cost)	Gas Tax/SRS/St Fund				50,000			50,000
20	Miscellaneous Street Resurfacing	Gas Tax/SRS/St Fund				150,000	150,000		300,000
	Street Maintenance & Restoration Total		471,995	230,306	248,000	200,000	150,000		1,300,301
<i>* Listed Projects may move to Major Upgrade category at time of construction.</i>									
Street Preventative Maintenance: Fair Streets - 3/4" to 1" Lift "D" Mix*									
1	Blaine St: Gatch to Hwy. 99E	Gas Tax/SRS/St Fund	44,000						44,000
2	Rainier/Delmoor/Country Club	Gas Tax/SRS/St Fund	40,000						40,000
3	Tomlin Avenue	Gas Tax/SRS/St Fund	40,300						40,300
4	George St./Landau	Gas Tax/SRS/St Fund	30,000						30,000
5	First St. - Cleveland to Harrison	Gas Tax/SRS/St Fund		50,000					50,000
6	Second Street - Oak to Harrison	Gas Tax/SRS/St Fund		45,000					45,000
7	Elana Dr. (South)	Gas Tax/SRS/St Fund		13,175					13,175
8	Brandywine Ct.	Gas Tax/SRS/St Fund		14,639					14,639
7	Kelwona Ct.	Gas Tax/SRS/St Fund		16,103					16,103
8	Kelwona St.	Gas Tax/SRS/St Fund		21,958					21,958
9	Miscellaneous Street Resurfacing	Gas Tax/SRS/St Fund		21,958	100,000	100,000	100,000		321,958
	Street Preventative Maintenance Total		154,300	160,875	100,000	100,000	100,000		615,175
<i>*Listed Projects may move to Poor Streets category at time of construction.</i>									
Water: Water System Reconstruction									
1	Hwy. 214 widening	Water Fund		44,000					44,000
2	Laurel Avenue (replace line)	Water Fund/SDC 474	35,000						35,000
3	Hwy. 99E: Tomlin to Laurel	Water Fund/SDC 474	52,000						52,000

2005-2006 Capital Improvement Program

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No	Project	Revenue Source	2005	2006	2007	2008	2009	2010	Total
			-6	-7	-8	-9	10	-11	
Public Works Capital Improvement Program									
Water: Water System Reconstruction									
4	Hwy. 99E: Laurel to Aztec	Water Fund/SDC 474	16,500						16,500
5	99E at Silverton Road (bore)	Water Fund/SDC 474			110,000				110,000
6	N. First Street/N. Second (loop)	Water Fund/SDC 474		18,700					18,700
7	N. Fifth Street (replace line)	Water Fund		44,000					44,000
8	<u>Hwy. 214 @ Mill Creek</u>								
	A. Bore	Water SDC 474	68,200						68,200
	B. Loop Line installation	Water SDC 474		132,000					132,000
9	Hwy. 99E: Blaine to Aztec	Water Fund/SDC 474			44,000				44,000
10	Hwy. 99E: Blaine to Lincoln	Water Fund/SDC 474			66,000				66,000
11	99E South (New Line)	Water Fund/SDC 474			132,000				132,000
12	Water Treatment	Wtr Const/SDC	500,000						500,000
13	Hazelnut Dr. - Replace Bridge Line	Water Fund			55,000				55,000
14	Parr Road to Evergreen Loop	Developer/Wtr/Wtr Const						TBD	0
15	Hawthorne Circle Line Extension	Water Fund/SDC 474	35,000						35,000
16	Remove Small Water Tank	Water Const		75,000					75,000
17	Misc. Capacity Improvements	Water SDC 474	40,000						40,000
18	Water System Reconstruction Total		746,700	313,700	407,000	0	0		1,467,400
Wastewater: Treatment Plant									
1	Storm Water Treatment Impvts	Sewer Const 465			120,000				120,000
2	Effluent Storage Pond	Sewer Fund/SDC			80,000				80,000
3	Pilot Poplar Harvest & Replant	Sewer Fund/SDC			5,000	25,000			30,000
4	UV System Expansion	Sewer Fund/SDC		75,000	75,000				150,000
5	Chemical & Generator Roof Replacement	Sewer Fund/SDC			12,000				12,000
6	FSL Dredge Installation	Sewer Fund			160,000				160,000

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2005-2006 Capital Improvement Program

No	Project	Revenue Source	2005	2006	2007	2008	2009	2010	Total
			-6	-7	-8	-9	10	-11	
Public Works Capital Improvement Program									
Wastewater: Treatment Plant									
7	Bypass Aeration @ Outfall	Sewer Const 465		15,000	20,000				35,000
8	Reuse System Phase 1.5	Sewer Fund		25,000	450,000	2,500,000			2,975,000
9	Excess Thermal Load-Compliance	Sewer Fund		25,000	500,000	175,000	30,000		730,000
10	Winter Ammonia-Compliance	Sewer Fund		10,000	100,000				110,000
11	Facility Plan Update -- Phase II	Sewer Const			25,000	100,000			125,000
12	Second MCPS Design & Construction	Sewer Const			25,000	200,000	1,500,000	1,500,000	3,225,000
13	MCPS Pump Replacement & Monorail Const	Sewer Const 465			62,000	75,000			137,000
14	Rainier LS Base Repair	Sewer Fund 472			35,000				35,000
15	LS Electrical Upgrade Compliance & Monitoring	Sewer Fund 472			45,000				45,000
16	Industrial Ave Pump Station Rehab	Sewer Const/Eq Repl	310,900						310,900
17	Greenview Pump Station Upgrade	Sewer Const/Eq Repl	334,000						334,000
18	Rainier, Force main Extension	Sewer Fd/SwrConst		125,000	125,000				250,000
19	SW Pump Station (City Share)	Sewer Fund				100,000			100,000
20	Treatment Plant Construction Total		644,900	275,000	1,839,000	3,175,000	1,530,000		7,463,900
Wastewater: Collections System Construction									
1	Santiam Lift Sta/Line Installation	Sewer Const 465		210,000					210,000
2	N. Trunk Rehab/Hazelnut Br Xing	Sewer Const 465				25,000	75,000	350,000	450,000
3	<u>Mill Creek Trunk</u>								
	A. Extension to Shalimar	Sewer Const 465					125,000	150,000	275,000
	B. Rehab Cleveland-Wilson	Sewer Const 465				325,000			325,000
4	N. 1st Harrison to Noname	Sewer Const 465			30,000	30,000			60,000
5	Smith Addn to New Well at Settlemier	Sewer CIP 461		16,000					16,000
6	Arthur - Third to Settlemier	Sewer Const 465		52,700					52,700
7	Alley - Hayes to Garfield (East of Plaza)	Sewer Const 465/I&I	40,000						40,000

2005-2006 Capital Improvement Program

DRAFT
4-15-05

No	Project	Revenue Source	2005	2006	2007	2008	2009	2010	Total
			-6	-7	-8	-9	10	-11	
Public Works Capital Improvement Program									
Wastewater: Collections System Construction									
9	Rehab/I & I Removal	Sewer Fund 472	10,000	20,000	20,000	20,000	20,000	20,000	
	Collections System Construction Total		50,000	298,700	50,000	400,000	220,000	520,000	1,428,700
Wastewater: Storm Drain Construction									
1	Bryan St Outfall Upgrade	Storm SDC/CIP	48,000						48,000
2	Brown Storm: Wilson - Cleveland	Storm SDC/CIP	150,000						150,000
3	Garfield-Workman-Hayes SD	Storm CIP	59,200						
4	W. Lincoln: East of Cascade (500')	Storm SDC/CIP		45,000					45,000
5	Landau/Laurel Storm (to Pudding)	Storm SDC/CIP	50,000	500,000	200,000				750,000
6	Marshall Street Culvert (P3)	Storm SDC/CIP			80,000				80,000
7	North 1st & 2nd - North of Church St. (P6)	Storm SDC/CIP				95,000	95,000		190,000
8	N. Front Det. -culvert to Commerce (P2)	Storm SDC/CIP	51,000	100,000					151,000
9	Hardcastle Culvert Replacement (P1)	Storm SDC/CIP		192,000					192,000
10	Settlemier Detention & Outlet Works (P8) Ph. 1	Storm SDC	194,400						194,400
11	Settlemier Detention & Outlet Works (P8) Ph. 2	Storm SDC	200,000	200,000					400,000
12	Misc. Wetland Mitigation	Storm SDC/CIP	25,000	25,000	25,000	25,000			100,000
13	Reline Settlemier Crossing N. of Hayes	Storm SDC/CIP	20,000						20,000
14	Reclaim Channel N. of Progress Way	Storm SDC/CIP	7,000						7,000
15	3rd St @ Nuevo Amanecer - to Hwy 214	Storm SDC/CIP		26,000					26,000
16	Senecal Creek 48" Connection (P9)	Storm SDC/CIP							
	Storm Drain Construction Total		804,600	1,088,000	305,000	120,000	95,000	0	2,353,400
Public Works Facilities Expansion									
Total Public Works CIP			6,115,295	3,702,887	4,524,596	5,152,277	3,037,000	520,000	22,989,855

APPENDIX B

CITY OF WOODBURN

**MAPS OF PUBLIC FACILITIES PROJECTS
TO SERVE UGB EXPANSION AREAS**

Methodology for Calculations - Urban Growth Boundary Expansion

City of Woodburn – Public Works Department

April 2005

1. Public Works provided assistance to Community Development (Comm. Dev) in preparation of estimated costs for infrastructure related to proposed expansion of Urban Growth Boundary.
2. Comm. Dev determined 8 subareas for expansion. Public Works was provided mapped limits for the subareas and proposed land use designation within each of the areas.
3. Land use categories were as Residential, Commercial, and Industrial. Combinations were devised by application of formulas, without describing the location within a mapped area where any particular land use might occur.
4. Public Works was charged with estimating costs for water, storm sewer, and sanitary sewer within the boundary of each of the 8 subareas.
5. The physical size (in acres), of each land use for each subarea was calculated using CAD.
6. Master Plan criteria for water consumption, sanitary sewer flow rates and storm water runoff were used to determine values for each land use. Sizes of conveyance facilities were calculated for all areas by uniformly applying derived flow rates. Conceptual grid patterns for distribution pipes, sewer collection lines, and storm water collection lines were devised. The conceptual patterns were extrapolated and reduced to formulas for costs to serve on an acreage basis. Generally, the delivery of service to each sub area was considered to occur at one Point of Connection. This simplification did not consider market-driven development factors that would likely produce need for a greater number of connection points in the future, depending on the geographical extent and location of demand.
7. Based on CIP cost records (maintained by Engineering staff) and System Development Charges from Comm. Dev Planning staff, a cost per acre for each land use type was derived and are as follows;

Water Systems:	Residential = \$9.0K/AC	Comm./Industrial =
\$5.1K/AC		
Sanitary Sewer:	Residential = \$10.8K/AC	Comm./Industrial =
\$5.0K/AC		
Storm Sewer:	Residential = \$7.8K/AC	Comm./Industrial =
\$3.6K/AC		

8. Flow rates for these three infrastructure systems are as follows;

Water System

Residential = 1,315 gpd/AC (Avg.), 5,130 gpd/AC (Max.), 120,000 g/2hr.
Commercial/Industrial = 382 gpd/AC (Avg.), 1,490 gpd/AC (Max.), 600,000 g/2hr.

Sanitary Sewer

Residential = 1,420 gpd/AC
Commercial/Industrial = 700 gpd/AC

Storm Sewer

All areas: 0.5 cubic feet per second (cfs) per acre This empirical value was applied uniformly, regardless of projected land use, because little difference was discernable between runoff factors in conditions of a design storm.

Discharge from subareas larger than 150 acres were analyzed as Primary Drainage ways, in accordance with definitions from the Storm Drainage Master Plan (SDMP). Areas greater than 50, but less than 150 acres were described as Secondary Drainage ways. The SDMP instructs that conveyance systems for Primary Drainage ways accommodate runoff from 100-year event. Secondary Drainage ways are designed for 50-year events. The sizes of pipes were determined based upon their estimated slope and approximate design runoff for the tributary subarea.

9. The estimates considered that planning has already been made for some major infrastructure projects (mostly within the current Service Areas, and shown in a five-year plan called Capital Improvement Program, or "CIP"). Calculations were performed assuming that water, sanitary sewer, and storm drainage Capital Improvement Projects shown in the budget for fiscal year 2004-20005 were accomplished before any of these expansion projects were under taken.
10. Some infrastructure elements within the existing UGB would need upgrading to serve individual expansion subareas. Some of these improvements were not included in the CIP. Where additional improvements were necessary to existing systems situated within the existing service limits, the cost of improvements was estimated by application of historic construction cost records. These costs were added to other cost elements related to provision of service within each subarea. Included were water booster stations and sanitary sewer pump stations whose locations and sizes are shown on work maps that were prepared in course of the work.

REGION No. 1

GENERAL:

- Approximately 655 AC total areas. For evaluation purposes, this region was divided into 360 AC of Residential and 240 AC of Commercial/Industrial, 55 acres have been excluded from the total for flood plain riparian areas.
- Flow rates for water; sewer and storm distribution and collection systems are based on zoning densities appropriate to the assigned land use and Master Plan consumption/contribution rates.
- When and where practical topographic geography was considered in gravity systems.
- This region was analyzed independent of other proposed regions.
- The analysis is based on all CIP projects, identified in the current Master Plan Documents, have been completed.

WATER DISTRIBUTION SYSTEM:

- A new distribution system can be looped to the adjacent existing system without requiring any additional distribution line between systems.
- Flow rates were based upon Master Plan use rates per capita and 2-hour fire durations (2.93 MGD).
- Estimated cost of construction of distribution infrastructure is \$4.48 million.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

SANITARY SEWER SYSTEM:

- This region would be expected to require construction of a new lift station in the Northern most point at an estimated cost of \$600,000.
- The new lift station would then require a new *gravity line to Boones Ferry Road* at an estimated cost of \$400,000.
- Estimated new collections systems cost is \$5.10 million and will generate an approximate load of 1.05 cfs.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

STORM SEWER SYSTEM:

- Natural drainage appears adequate to handle outfall(s) to both fingers of Senecal Cr. to service this area, approximate 300 cfs.
- Estimated new collections systems cost is \$4.17 million.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

COST ESTIMATE SUMMARY:

Water Improvements	\$4,480,000
Sanitary Sewer	\$6,100,000
Storm Sewer	<u>\$4,170,000</u>
Total	\$14,750,000

REGION No. 2

Revisions, July 01, 2005

GENERAL:

- Approximately 675 AC total area. For evaluation purposes this region was divided into 440 AC of Residential and 210 AC of Commercial/Industrial. *25 acres have been excluded from the total for flood plain riparian areas.*
- Flow rates for water; sewer and storm distribution and collection systems are based on zoning densities appropriate to the assigned land use and Master Plan consumption/contribution rates.
- When and where practical topographic geography was considered in gravity systems.
- This region was analyzed independent of other proposed regions.
- The analysis is based on all CIP projects, identified in the current Master Plan Documents, have been completed.

WATER DISTRIBUTION SYSTEM:

- A new distribution system will require extension of the existing distribution system by approximately 1300LF of 12-inch dia. main looped to the adjacent existing system at a cost of \$180,000.
- Flow rates were based upon Master Plan use rates per capita and 2-hour fire durations (3.3 MGD).
- Estimated cost of construction of distribution infrastructure is \$5.02 million.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

SANITARY SEWER SYSTEM:

- This region would require construction of a new gravity system to connect to the existing system at the North end of Boones Ferry Rd *and/or the Mill Creek Interceptor.*
- From the Boones Ferry Rd. connection point, approximately 4000 LF of collector will have to be upsized to the Goose Cr. connection of the parallel westerly reliever at a cost of \$500,000.
- Estimated new collections systems cost is \$5.78 million and will generate an approximate load of 1.19 cfs
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

STORM SEWER SYSTEM:

- Natural drainage appears adequate to handle outfall(s) to upper Mill Cr. to service this area, approximately 325 cfs.
- Estimated new collections systems cost is \$4.17 million.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

COST ESTIMATE SUMMARY:

Water Improvements	\$ 5,200,000
Sanitary Sewer	\$ 6,280,000
Storm Sewer	<u>\$ 4,170,000</u>
Total	\$15,650,000

REGION No. 3

GENERAL:

- Approximately 330 AC total area. For evaluation purposes this region was divided into 100 AC of Residential and 230 AC of Commercial/Industrial.
- Flow rates for water; sewer and storm distribution and collection systems are based on zoning densities appropriate to the assigned land use and Master Plan consumption/contribution rates.
- When and where practical topographic geography was considered in gravity systems.
- This region was analyzed independent of other proposed regions.
- The analysis is based on all CIP projects, identified in the current Master Plan Documents, have been completed.

WATER DISTRIBUTION SYSTEM:

- A new distribution system will require extension of the existing distribution system by approximately 400LF of 12-inch dia. main looped to the adjacent existing system at a cost of \$60,000.
- Flow rates were based upon Master Plan use rates per capita and 2-hour fire durations (1.6 MGD).
- Estimated cost of construction of distribution infrastructure is \$2.09 million.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

SANITARY SEWER SYSTEM:

- This region would require construction of a new gravity system to connect to the existing system at Industrial Pump Station on Industrial Way.
- From the connection point, approximately 1200 LF of collector will have to upsized to the Industrial Way Pump Station at a cost of \$265,000.
- Estimated new collections systems cost is \$2.25 million and will generate an approximate load of 0.5 cfs.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

STORM SEWER SYSTEM:

- Natural drainage is adequate to handle outfall of only a small portion to upper Mill Cr. The bulk of the region would require construction of approximately 1400 LF of 78-inch dia. pipeline Easterly to *natural tributary* to the Pudding River at a cost of \$521,000, approximately 167 cfs.
- Estimated new collections systems cost is \$1.62 million.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

COST ESTIMATE SUMMARY:

Water Improvements	\$ 2,150,000
Sanitary Sewer	\$ 2,515,000
Storm Sewer	<u>\$ 2,141,000</u>
Total	<u>\$ 6,806,000</u>

REGION No. 4

GENERAL:

- Approximately 343 AC total area. For evaluation purposes this region was determined to be all Residential and no Commercial/Industrial.
- Flow rates for water; sewer and storm distribution and collection systems are based on zoning densities appropriate to the assigned land use and Master Plan consumption/contribution rates.
- When and where practical topographic geography was considered in gravity systems.
- This region was analyzed independent of other proposed regions.
- The analysis is based on all CIP projects, identified in the current Master Plan Documents, have been completed.

WATER DISTRIBUTION SYSTEM:

- A new distribution system will require extension of the existing distribution system by approximately 1100LF of 12-inch dia. main looped to the adjacent existing system at a cost of \$154,000.
- Flow rates were based upon Master Plan use rates per capita and 2-hour fire durations (1.88 MGD).
- Estimated cost of construction of distribution infrastructure is \$3.1 million.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

SANITARY SEWER SYSTEM:

- This region would require construction of a new lift station, off Hwy. 211 then a 5000 LF of force main to the WWTP at a cost of \$1.5 million.
- Estimated new collections systems cost is \$3.70 million and will generate an approximate load of 0.75 cfs.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

STORM SEWER SYSTEM:

- Natural drainage is inadequate to handle outfall. Runoff would, therefore, require construction of approximately 2000 LF of 78-inch dia. pipeline Easterly to the Pudding River at a cost of \$745,000, approximately 170 cfs.
- Estimated new collections systems cost is \$2.68 million.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

COST ESTIMATE SUMMARY:

Water Improvements	\$ 3,254,000
Sanitary Sewer	\$ 5,200,000
Storm Sewer	<u>\$ 3,425,000</u>
Total	\$11,879,000

REGION No. 5

GENERAL:

- Approximately 431 AC total area. For evaluation purposes this region was assigned into 431 AC of Commercial/Industrial and no Residential.
- Flow rates for water; sewer and storm distribution and collection systems are based on zoning densities appropriate to the assigned land use and Master Plan consumption/contribution rates.
- When and where practical topographic geography was considered in gravity systems.
- This region was analyzed independent of other proposed regions.
- The analysis is based on all CIP projects, identified in the current Master Plan Documents, have been completed.

WATER DISTRIBUTION SYSTEM:

- A new distribution system will require extension of the existing distribution system by approximately 3600LF of 12-inch dia. main looped at a cost of \$500,000.
- Flow rates were based upon Master Plan use rates per capita and 2-hour fire durations (1.24 MGD).
- Estimated cost of construction of distribution infrastructure is \$2.20 million.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

SANITARY SEWER SYSTEM:

- This region will require construction of a new lift station in the Northwest corner of the region at an estimated cost of \$350,000.
- The new lift station would then require a new force main of approximately 4800 LF to connect to the existing gravity collection system at the Mill Cr. trunk line off of Cleveland St. at an estimated cost of \$750,000.
- Estimated new collections systems cost is \$2.16 million and will generate an approximate load of 0.50 cfs.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

STORM SEWER SYSTEM:

- Natural drainage is inadequate to handle outfall. Runoff, therefore, requires construction of approximately 4500 LF of 84-inch dia. pipeline Easterly to the Pudding River at a cost of \$2.0 million, approximately 216 cfs.
- Estimated new collections systems cost is \$1.55 million.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

Cost Estimate Summary:

Water Improvements	\$ 2,700,000
Sanitary Sewer	\$ 3,260,000
Storm Sewer	\$ 3,150,000
Total	\$ 9,110,000

REGION No. 6

GENERAL:

- Approximately 191AC total area. For evaluation purposes this region was assigned into 189 AC of Residential and no Commercial/Industrial, *2 acres have been excluded from the total for flood plain riparian areas.*
- Flow rates for water; sewer and storm distribution and collection systems are based on zoning densities appropriate to the assigned land use and Master Plan consumption/contribution rates.
- When and where practical topographic geography was considered in gravity systems.
- This region was analyzed independent of other proposed regions.
- The analysis is based on all CIP projects, identified in the current Master Plan Documents, have been completed.

WATER DISTRIBUTION SYSTEM:

- A new distribution system will require extension of the existing distribution system by approximately 5000LF of 12-inch dia. main looped at a cost of \$600,000.
- Flow rates were based upon Master Plan use rates per capita and 2-hour fire durations (1.09 MGD).
- Estimated cost of construction of distribution infrastructure is \$1.7 million.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

SANITARY SEWER SYSTEM:

- This region will require construction of a new lift station along the Southerly finger of Mill Cr. and behind Shalimar trailer park at a cost of \$350,000.
- The new lift station would then require a new force main of approximately 1800 LF to connect to the existing gravity collection system at Bridlewood Ln. and Brown St. at an estimated cost of \$250,000.
- Estimated new collections systems cost is \$2.04 million and will generate an approximate load of 0.40 cfs.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

STORM SEWER SYSTEM:

- Natural drainage appears adequate to handle outfall(s) to South Mill Cr. to service this area, approximately 95 cfs.
- Estimated new collections systems cost is \$1.47 million.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

COST ESTIMATE SUMMARY:

Water Improvements	\$ 2,300,000
Sanitary Sewer	\$ 2,640,000
Storm Sewer	<u>\$ 1,470,000</u>
Total	\$ 6,410,000

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REGION No. 7

GENERAL:

- Approximately 510 AC total area. For evaluation purposes this region was divided into 380 AC of Residential and 130 AC of Commercial/Industrial.
- Flow rates for water; sewer and storm distribution and collection systems are based on zoning densities appropriate to the assigned land use and Master Plan consumption/contribution rates.
- When and where practical topographic geography was considered in gravity systems.
- This region was analyzed independent of other proposed regions.
- The analysis is based on all CIP projects, identified in the current Master Plan Documents, have been completed.

WATER DISTRIBUTION SYSTEM:

- A new distribution system will require extension of the existing distribution system by approximately 6100 LF of 12-inch dia. main looped at a cost of \$700,000.
- Flow rates were based upon Master Plan use rates per capita and 2-hour fire durations (2.87 MGD).
- Estimated cost of construction of distribution infrastructure is \$4.1 million.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

SANITARY SEWER SYSTEM:

- This region will require construction of 1000 LF of new gravity sewer line to connect to the existing system at the South end of Harvard St. at a cost of \$80,000.
- The existing gravity collection system at Harvard St. would require being upsized for approximately 3300 LF to I-5 pump station at an estimated cost of \$250,000.
- Estimated new collections systems cost is \$4.77 million and will generate an approximate load of 1.0 cfs.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

STORM SEWER SYSTEM:

- A new collection system would connect to the existing system on the West end of Parr Rd. and require upsizing the existing collector to a 84-inch dia. line at a cost of \$1.7 Million, approximately 255 cfs.
- Estimated new collections systems cost is \$3.44 million.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

COST ESTIMATE SUMMARY:

Water Improvements	\$ 4,790,000
Sanitary Sewer	\$ 5,100,000
Storm Sewer	<u>\$ 5,140,000</u>
Total	<u>\$15,030,000</u>

Revisions, July 01, 2005

REGION No. 8

GENERAL:

- Approximately 755 AC total area. For evaluation purposes this region was divided into 457 AC of Residential and 298 AC of Commercial/Industrial.
- Flow rates for water; sewer and storm distribution and collection systems are based on zoning densities appropriate to the assigned land use and Master Plan consumption/contribution rates.
- When and where practical topographic geography was considered in gravity systems.
- This region was analyzed independent of other proposed regions.
- The analysis is based on all CIP projects, identified in the current Master Plan Documents, have been completed.

WATER DISTRIBUTION SYSTEM:

- A new distribution system can be looped to the adjacent existing system without requiring any additional distribution line between systems.
- Flow rates were based upon Master Plan use rates per capita and 2-hour fire durations (3.5 MGD).
- Estimated cost of construction of distribution infrastructure is \$5.62 million.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

SANITARY SEWER SYSTEM:

- A new collection system would connect to the existing system on the West end of S. Woodland Ave. flowing to I-5 pump station.
- Existing collector would require upsizing to a 24-inch dia. line at a cost of \$250,000.
- Estimated new collections systems cost is \$6.42 million and will generate an approximate load of 1.32 cfs.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

STORM SEWER SYSTEM:

- Natural drainage appears adequate to handle outfall(s) to both fingers of Senecal Cr. to service this area. Approximately 375 cfs.
- Estimated new collections systems cost is \$4.63 million.
- Analysis indicates the existing system (i.e. current 2004 service area) will support the improvements, estimated costs are shown below in the summary.

COST ESTIMATE SUMMARY:

Water Improvements	\$5,620,000
Sanitary Sewer	\$6,670,000
Storm Sewer	<u>\$4,630,000</u>
Total	\$16,920,000

**S.A.P.
EVALUATION OF WATER REQUIREMENTS FOR UGB INCREASE**

PROP ZONE	RES AC	COMM/IND ACREAGE	RESIDENTIAL		COMMERCIAL/INDUSTRIAL		TOTAL RES FIRE FLOW (2 HRS)	TOTAL COM/IND FIRE FLOW (2 HRS)	TOTAL MDD W/FF
			AVERAGE DD	MAXIMUM DD	AVERAGE DD	MAXIMUM DD			
			1315.4GPD/AC	5130.2gpd/AC	381.9gpd/AC	1489.4gpd/AC			
1	362	239	476,175	1,857,132	92,995	355,967	1,977,132	955,967	2,933,099
2	436	214	573,514	2,236,767	83,267	318,732	2,356,767	918,732	3,275,499
3	100	234	131,540	513,020	91,049	348,520	633,020	948,520	1,581,540
4	343	0	451,182	1,759,659	0	0	1,879,659	0	1,879,659
5	0	431	0	0	167,702	641,931	0	1,241,931	1,241,931
6	189	0	248,611	969,608	0	0	1,089,608	0	1,089,608
7	382	128	502,483	1,959,736	49,805	190,643	2,079,736	790,643	2,870,380
8	457	296	601,138	2,344,501	115,174	440,862	2,464,501	1,040,862	3,505,364
SUB-TOTAL	2,269	1,542	2,984,643	11,640,424	599,992	2,296,655	12,480,424	5,896,655	18,377,079

NOTE: Phase III of WTP build out will have producible product of 10.8 MGD and 6.1 MG storage.

STORM DRAIN COST ANALYSIS OF EXTENDED BOUNDARIES BY REGION

PROP ZONE	RES AC	COMM/IND ACREAGE	RESIDENTIAL SD COST PER AC	COM/IND SD COST PER AC	TOTAL RESIDENTIAL COST	TOTAL COM/IND COST	TOTAL	Q (cfs) BASED ON 0.5 CFS/AC
1	362	239	\$7,800.00	\$3,600.00	\$2,823,600.00	\$860,400.00	\$3,684,000.00	300.5
2	436	214	\$7,800.00	\$3,600.00	\$3,400,800.00	\$770,400.00	\$4,171,200.00	325
3	100	234	\$7,800.00	\$3,600.00	\$780,000.00	\$842,400.00	\$1,622,400.00	167
4	343	0	\$7,800.00	\$3,600.00	\$2,675,400.00	\$0.00	\$2,675,400.00	171.5
5	0	431	\$7,800.00	\$3,600.00	\$0.00	\$1,551,600.00	\$1,551,600.00	215.5
6	189	0	\$7,800.00	\$3,600.00	\$1,474,200.00	\$0.00	\$1,474,200.00	94.5
7	382	128	\$7,800.00	\$3,600.00	\$2,979,600.00	\$460,800.00	\$3,440,400.00	255
8	457	296	\$7,800.00	\$3,600.00	\$3,564,600.00	\$1,065,600.00	\$4,630,200.00	376.5
SUB-TOTAL	2,269	1,542			\$17,698,200.00	\$5,551,200.00	\$23,249,400.00	

NOTE: Cost per acre are based upon SDC Receipt history.

SANITARY SEWER COST ANALYSIS OF EXTENDED BOUNDARIES BY REGION

PROP ZONE	RES AC	COMM/IND ACREAGE	RESIDENTIAL SD COST PER AC	COM/IND SD COST PER AC	TOTAL RESIDENTIAL COST	TOTAL COM/IND COST	TOTAL
1	362	239	\$10,800.00	\$5,000.00	\$3,909,600.00	\$1,195,000.00	\$5,104,600.00
2	436	214	\$10,800.00	\$5,000.00	\$4,708,800.00	\$1,070,000.00	\$5,778,800.00
3	100	234	\$10,800.00	\$5,000.00	\$1,080,000.00	\$1,170,000.00	\$2,250,000.00
4	343	0	\$10,800.00	\$5,000.00	\$3,704,400.00	\$0.00	\$3,704,400.00
5	0	431	\$10,800.00	\$5,000.00	\$0.00	\$2,155,000.00	\$2,155,000.00
6	189	0	\$10,800.00	\$5,000.00	\$2,041,200.00	\$0.00	\$2,041,200.00
7	382	128	\$10,800.00	\$5,000.00	\$4,125,600.00	\$640,000.00	\$4,765,600.00
8	457	296	\$10,800.00	\$5,000.00	\$4,935,600.00	\$1,480,000.00	\$6,415,600.00
SUB-TOTAL	2,269	1,542			\$24,505,200.00	\$7,710,000.00	\$32,215,200.00

NOTE: Cost per acre are based upon SDC Receipt history.

SANITARY SEWER FLOW RATES BY REGION

PROP ZONE	RES AC	COMM/IND ACREAGE	RESIDENTIAL FLOW Rate 1420 GPD/AC	COMM/IND FLOW Rate 700 GPD/AC	TOTAL FLOW TO POC PER DAY	CFS
1	362	239	514,040	167,300	681,340	1.05
2	436	214	619,120	149,800	768,920	1.19
3	100	234	142,000	163,800	305,800	0.47
4	343	0	487,060	0	487,060	0.75
5	0	431	0	301,700	301,700	0.47
6	189	0	268,380	0	268,380	0.42
7	382	128	542,440	89,600	632,040	0.98
8	457	296	648,940	207,200	856,140	1.32
SUB-TOTAL	2,269	1,542	3,221,980	1,079,400	4,301,380	6.66

WATER SUPPLY COST ANALYSIS OF EXTENDED BOUNDARIES BY REGION

PROP ZONE	RES AC	COMM/IND ACREAGE	RESIDENTIAL SD COST PER AC	COM/IND SD COST PER AC	TOTAL RESIDENTIAL COST	TOTAL COM/IND COST	TOTAL
1	362	239	\$9,000.00	\$5,100.00	\$3,258,000.00	\$1,218,900.00	\$4,476,900.00
2	436	214	\$9,000.00	\$5,100.00	\$3,924,000.00	\$1,091,400.00	\$5,015,400.00
3	100	234	\$9,000.00	\$5,100.00	\$900,000.00	\$1,193,400.00	\$2,093,400.00
4	343	0	\$9,000.00	\$5,100.00	\$3,087,000.00	\$0.00	\$3,087,000.00
5	0	431	\$9,000.00	\$5,100.00	\$0.00	\$2,198,100.00	\$2,198,100.00
6	189	0	\$9,000.00	\$5,100.00	\$1,701,000.00	\$0.00	\$1,701,000.00
7	382	128	\$9,000.00	\$5,100.00	\$3,438,000.00	\$652,800.00	\$4,090,800.00
8	457	296	\$9,000.00	\$5,100.00	\$4,113,000.00	\$1,509,600.00	\$5,622,600.00
SUB-TOTAL	2,269	1,542			\$20,421,000.00	\$7,864,200.00	\$28,285,200.00

NOTE: Cost per acre are based upon SDC Receipt history.