

## Appendix D – Water, Sanitary, and Sewer

# Technical Memorandum



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**To:** Julia Hajduk—City of Sherwood

**From:** Jerry Markesino, PE  
Ian Fabik, PE

**Copies:** Project File

**Date:** May 15, 2009

**Subject:** Brookman Addition Concept Plan—Water  
Supply and Sanitary Sewer Infrastructure

**Project No.:** 14156

## Introduction

Otak has reviewed the existing and proposed water and sanitary sewer infrastructure projects for the Brookman Addition Concept Plan area. The primary source of this information is the City's *Water System Master Plan* (August 2005) and the *Sanitary Sewer Master Plan* (Draft, May 2007). From these documents we have identified the costs related to providing water supply and sanitary sewer facilities to the concept plan area.

Otak has developed a preliminary infrastructure plan for the draft hybrid alternative. We have also created cost estimates to build the infrastructure needed to serve the draft hybrid alternative of the Brookman Addition Concept Plan area at full build-out. The cost estimates are based on unit cost factors provided in the appropriate master plan. When the final hybrid plan is selected, we will update the infrastructure cost estimates in our final report.

## Water System

The existing water system currently provides potable water to the area immediately north of the Brookman Addition Concept Plan area. It is part of the 380-foot pressure zone, the largest pressure zone in Sherwood, and it serves all customers below an approximate ground elevation of 250 feet above mean sea level. The zone includes residential, commercial, and industrial land uses. It is served by the Main Reservoir at SW Division Street east of South Pine Street. All four of the City's groundwater wells and the City's Tualatin Supply Connection provide water to this pressure zone.



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**Programmed Capital Improvement Projects – Water System**

The Water System Master Plan identifies the need for several major improvements to extend water service to the concept plan area. These projects include: the seismic upgrade to the existing reservoirs; construction of new reservoirs; installation of a pressure reducing valve; and the addition of several pipeline segments. These improvements are required to provide a “backbone” network that will serve the concept plan area.

The City’s Water System Master Plan has programmed the existing Main Reservoir for a seismic upgrade in year 2009/2010, in order to extend the reservoir’s service life until additional storage facilities are constructed. It also identifies the need for a new reservoir to be located adjacent to the current main reservoir. This new reservoir will be constructed with a 4.0 million gallon capacity. This project is programmed for year 2012/2013.

The Southwest Sherwood Pressure Reduction Valve (PRV) station and associated piping will be constructed in the right-of-way of Old Highway 99 at the border of the 455-foot pressure zone. This connection will provide service to the western portion of the concept plan area, located in the 380-foot pressure zone. The PRV reduces the water pressure in the piping as it moves from the 455-foot pressure zone to the lower pressure, 380-foot pressure zone. This project is programmed for 2024/2025.

**Programmed Capital Improvement Projects – Pipeline Segments**

The master plan has programmed the construction of approximately 17,000-feet of 12-inch water main that would bring service into the concept plan area. The connections to the existing system will occur at designated locations along the northern edge of the Brookman Addition Concept Plan area. These connections to the existing system are planned to occur at the 12-inch stub located in S.W. Ladd Hill Road, the existing 8” stubs located in S.W. Redfern Drive and Swordfern Lane, and at the proposed Southwest Sherwood PRV.

In the development of the hybrid plan for the Brookman Addition Concept Plan area, Otak developed a system layout that would provide the backbone pipeline system that is envisioned in the Master Plan. The 12-inch water main system will be approximately 12,675-feet long with an expected cost of \$1,648,000. However, according to the Master Plan, the construction of these pipe segments is not expected to occur until year 2023/2024.

**Non-Programmed Capital Improvement Projects – Pipeline Segments**

The 12-inch water main will provide direct service to many of the fronting properties in the hybrid plan, but most importantly, it will provide water to a network of 8-inch mains that will serve the

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remainder of the properties identified in the concept plan area. The 8-inch system will include 35,922-feet of connected pipe lines with an expected cost of \$3,521,000.

The water mains will be installed within the proposed public rights-of-way of the hybrid plan. The estimated costs for the improvements required to provide water services to the Brookman Addition Concept Plan Area will be approximately \$10.5 million, based on the Master Plan data and our recent estimates. The costs have been broken down in the following table:

Capital Improvement Project	Project Description	Project Cost
Main Reservoir Upgrade	Seismic upgrades to the existing Main reservoir	\$400,000
Reservoir No. 2	Construction of new 4.0 million gallon reservoir	\$4,700,000
SW Sherwood PRV	New Pressure reducing valve	\$190,000
12-inch Water Main pipes	New piping system to provide water supply to the Brookman area	\$1,648,000
	<b>Subtotal</b>	<b>\$ 6,938,000</b>
8-inch Water Main pipes (not in Master Plan)	New piping system to provide full service within the Brookman area	\$3,521,000
	<b>Total Cost</b>	<b>\$10,459,000</b>

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## **Sanitary Sewer System**

The sanitary sewer system infrastructure to serve the Brookman Addition Concept Plan area is assumed to be a traditional gravity flow municipal system. It will be an extension of the existing system that is documented in the *Sanitary System Master Plan* (Draft, May 2007). Design, construction, and operation of the proposed infrastructure will follow current city and state standards.

The master plan anticipated the expansion of the Urban Growth Boundary (UGB) to include the Brookman Addition Concept Plan area. The concept plan area is served by the Cedar Creek Basin. The Cedar Creek sanitary sewer basin drains to the Sherwood Trunk Interceptor Sewer, operated and maintained by Clean Water Services (CWS). The Sherwood Trunk Interceptor extends to the Sherwood Pump Station, also owned and operated by CWS. Wastewater is then pumped to the Durham Advanced Wastewater Treatment Plant for final treatment and disposal.

### **Programmed Capital Improvement Projects – Sanitary Sewer System**

Like the Water System, basic system extensions are needed to bring the sewer pipes to the concept plan area. There are three projects identified in the Sanitary System Master Plan that are needed to serve the area. Two of these projects upgrade a small portion of the existing 12-inch collector sewer. One of the projects extends the 12-inch collector sewer along Cedar Creek and into the Urban Growth Boundary Areas 54 & 55, which comprise the Brookman Addition Concept Plan area.

In order for the Cedar Creek basin to accept the additional flows from the Brookman area, two capacity upgrades are needed. A 537-foot section of the existing 12-inch pipe near SW Sunset Boulevard needs to be upsized to an 18-inch pipe. Further, an adjacent 533-foot section also needs to be upsized to a 15-inch pipe. These two projects are identified as projects # 2 and # 3 in the Recommended Capital Improvements section of the master plan.

To bring sanitary sewer service to the concept plan area, a 12-inch gravity sewer collector pipe line extension (project # 4 in the master plan) will need to be constructed. From Manhole 236NSan, which is located in the right-of-way of SW Sunset Boulevard just west of SW Redfern Place, a 12-inch pipe will be extended southerly and parallel to Cedar Creek. It will travel south and west along the Cedar Creek drainage and cross under SW Brookman Road. It will extend westerly to the vicinity of SW Brookman Road and SW Middleton Road.

The two system upgrades and the 6,430-foot extension project will provide the “backbone” sanitary sewer system for the Brookman Addition Concept Plan area. A local network of sanitary sewers will need to be constructed in order to completely serve the Brookman Addition.

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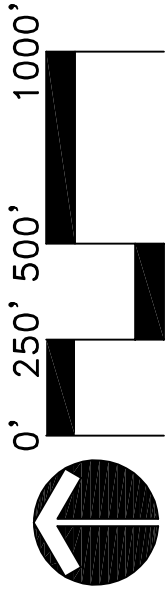
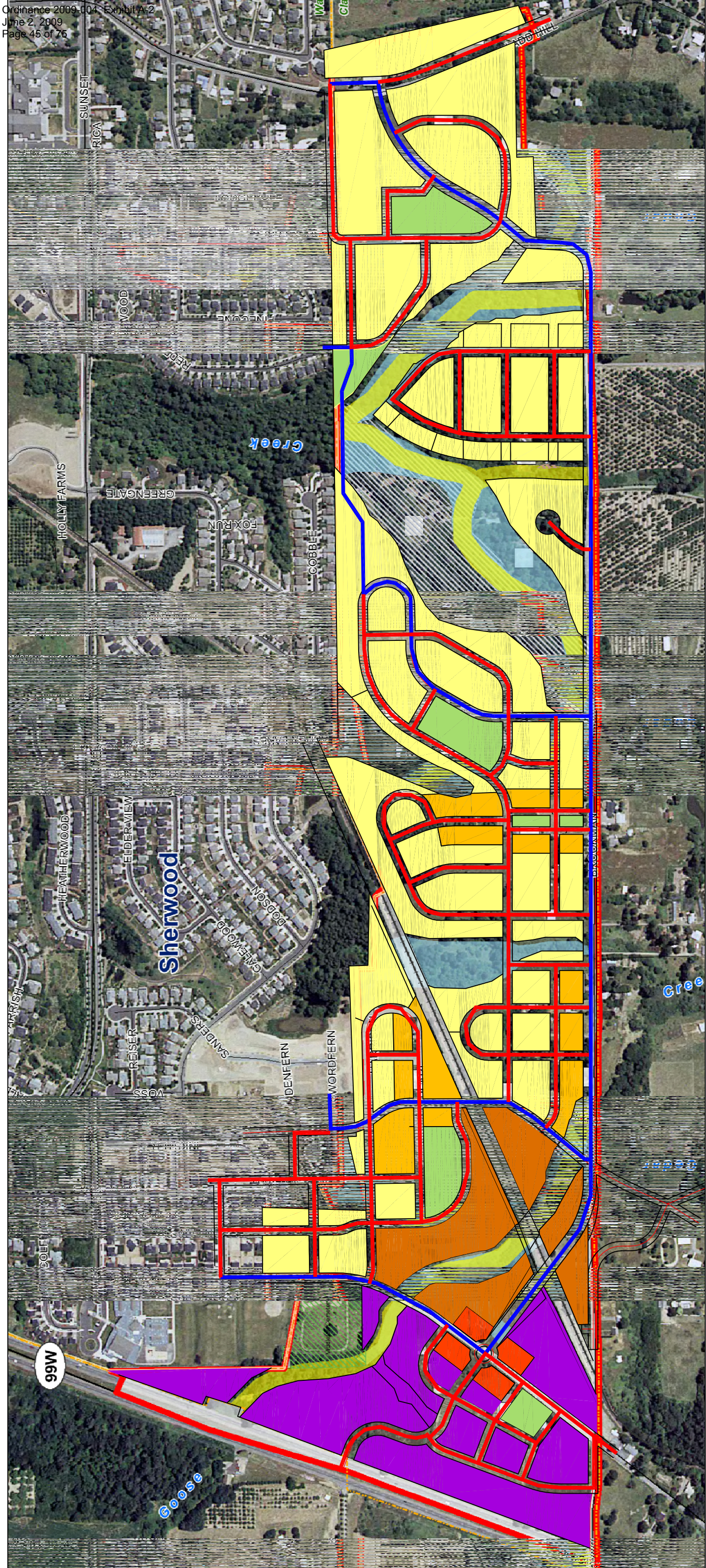
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**Non-Programmed Capital Improvement Projects – Sanitary Sewer System**

Otak has developed a preliminary sanitary sewer system design that will serve the properties in the hybrid alternative of the Brookman Addition Concept Plan area. It will be composed of six sub-basins and consist of about 45,000-feet of 8-inch diameter sanitary sewer pipes. The approximate cost for this sewer system is \$8,465,000 in 2007 dollars.

Project No.	Capital Improvement Project	Project Description	Project Cost
4	Collection System Extension Area 54/55	6,430-feet of new piping for the system expansion	\$1,292,430
3	Capacity Upgrade Area 54/55	533-feet of new 15-inch pipe, capacity upgrade from 12-inch to 15-inch	\$113,176
2	Capacity Upgrade Area 54/55	537-feet of new 18-inch pipe, capacity upgrade from 12-inch to 18-inch	\$133,176
		<b>Subtotal</b>	<b>\$1,538,602</b>
NEW	Local sewer network	44,900 feet of 8-inch sanitary sewers	\$8,465,000
		<b>Total</b>	<b>\$10,003,602</b>



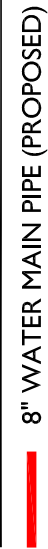


## Brookman Addition: Water System Concept Plan

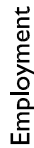
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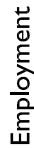
### LEGEND



Commercial / Mixed Use



Employment



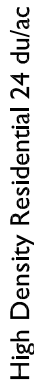
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Medium Density Residential - High 11 du/ac



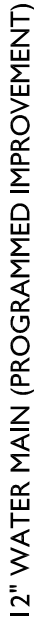
High Density Residential 24 du/ac



Park



8" WATER MAIN PIPE (PROPOSED)

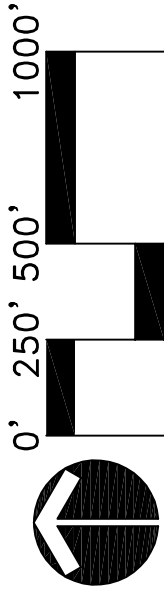
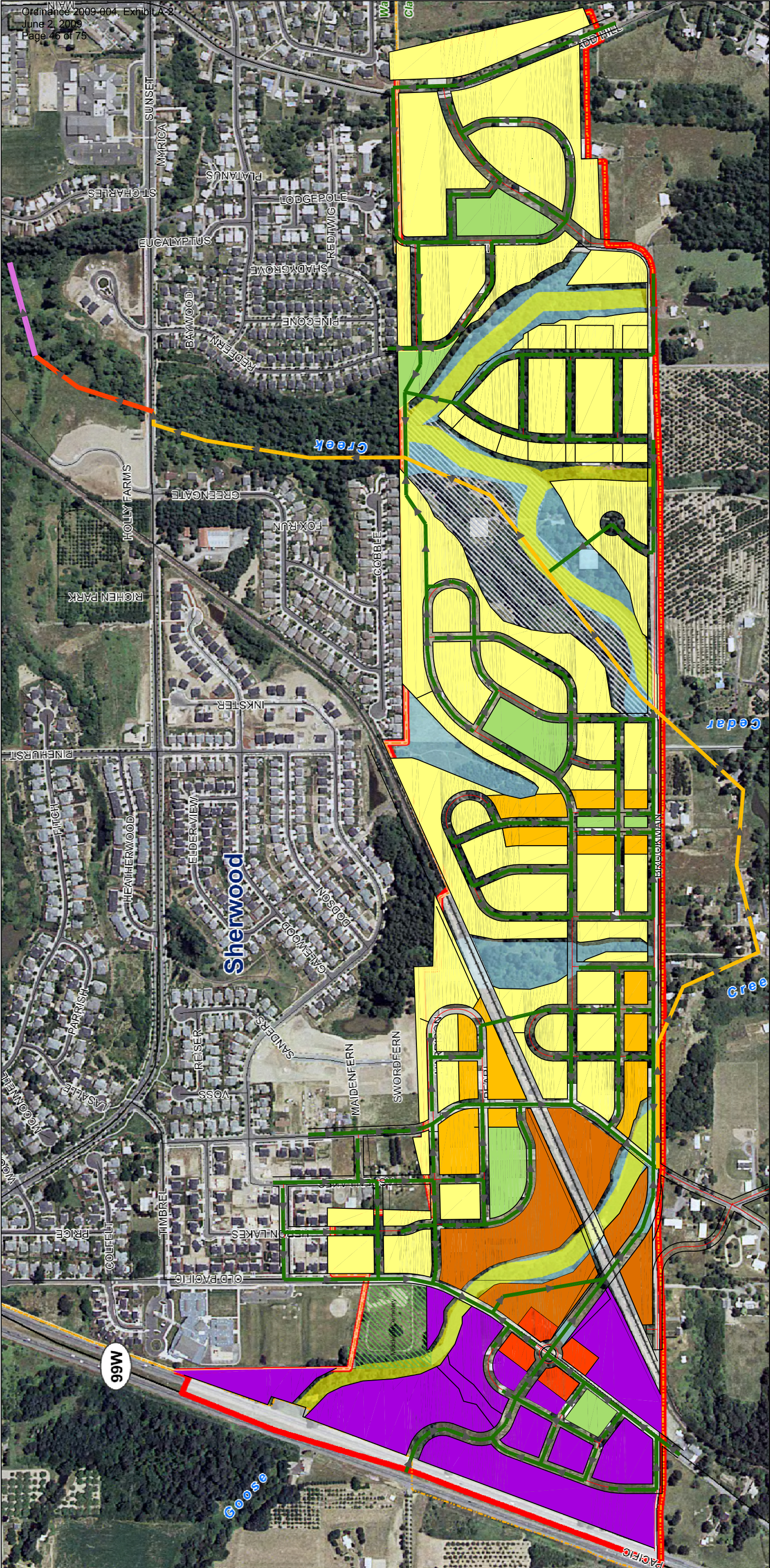


12" WATER MAIN (PROGRAMMED IMPROVEMENT)



14 May 2009





# Brookman Addition: Sanitary Sewer System Concept Plan

## LAND USE

	Commercial/Mixed Use
	Employment
	Medium Density Residential - Low 8 du/ac
	Medium Density Residential - High 11 du/ac
	High Density Residential 24 du/ac
	Park

## LEGEND

	8" SANITARY SEWER PIPE (PROPOSED)
	12" SANITARY SEWER MAIN (COLLECTION SYSTEM EXTENSION)
	15" SANITARY SEWER MAIN (CAPACITY UPGRADE)
	18" SANITARY SEWER MAIN (CAPACITY UPGRADE)

