JULY 2007

COLLECTION SYSTEM MASTER PLAN

EXECUTIVE SUMMARY

Preserving Bend's Water Environment

MWH

The City of Bend is the provider of wastewater collection and treatment service within the City of Bend Urban Growth Boundary (UGB). The 2006 Collection System Master Plan was developed in cooperation with the City of Bend Public Works Department to develop the roadmap for providing service to all existing users; capacity for existing developed areas that have not yet been connected to the system; and for new development. This includes areas outside of the UGB, but within the Urban Area Reserve (UAR). The key principles that the plan is based on are:

- Protect the public health and maintain the quality of the water environment within and around the City of Bend
- Provide ongoing system capacity and reliability to minimize the risk of Sanitary Sewer Overflows (SSOs)
- Provide planning based on the approved General Plan
- Expand existing system using a phased approach as capacity and/or service is needed
- Provide infrastructure capacity for existing developed areas that currently are not provided with sanitary service
- Provide a gravity-based collection system, reducing operational risk and long term life-cycle operations costs for the City wastewater collection system
- Develop a long-term plan for sanitary service within the existing UGB and UAR service areas

The results and recommendations of the Master Plan are summarized in the 2006 Collection System Master Plan Report. As part of the Master Plan Report, nine Study Area Plans were developed to provide a detailed summary of the plans for providing sanitary service to each parcel. This includes a plan for local gravity sewers, recommendations on the long-term operation of each pump station and the correction of current and long-term system capacity deficiencies.

WASTEWATER MANAGEMENT IN BEND

The City has grown from a population of 17,300 in 1980 to 70,330 in 2005. Over this period of time, the wastewater collection system has been expanded as areas have been developed. These expansions have connected to the original core system. Much of this expansion has utilized pump stations to avoid deep sewer construction. All new sewers have been oriented to discharge to the core area and ultimately flow through the plant interceptor to the Water Reclamation Facility (WRF). Due to the extraordinary growth the City has experienced, major upgrades to the existing system must be made. Primary among these is the construction of a network of interceptors that will accommodate growth and relieve the capacity deficiencies in the core area system. The major system elements that need to be addressed include:

- The plant interceptor is reaching capacity and will not be able to meet the future wastewater flows that will be generated by the growing system

- Many of the sewers in the existing core system are already at capacity
- Many of the service areas that are being served by pump stations have caused a barrier to system development on the expanding periphery of the City
- Numerous key pressure sewers in the south and southeast Bend are currently at capacity; Murphy Pump Station is also currently at capacity
- The Westside pump station and collection system is limited in its capacity to serve the developing areas on the west side of the City
- The large number of pump stations have become an Operations and Maintenance (O&M) burden on City staff resulting in increased O&M costs

These issues are the primary focus of the 2006 Collection System Master Plan.

EXISTING COLLECTION SYSTEM

The existing collection system consists of a combination of gravity sewers, pressure sewers and pump stations. A gravity sewer is a line that flows by gravity in an open line. The segment of the gravity sewer is interconnected by a manhole to provide access to the sewer line for inspection and maintenance. Local sewers range in size from 6 to 8-inches in diameter. As these sewers combine, they become larger trunk sewers ranging in size from 10-inches up to 42-inches. There is a small section of 72-inch gravity sewer that is used for system storage. Pressure sewers (or force mains) are lines that transport pumped flows and operate under pressure. These are either small local pressure lines providing service to local home sumps ranging in size from 2-inches to 3-inches in diameter or large pressure sewers used as pump station force mains transporting flow between service basins or out to a gravity trunk sewer. These pressure sewers range in size from 3-inches to 16-inches depending on the size of the pump station. A summary of the gravity and pressure sewers by size is shown in ***Table ES-1***.

Table ES-1
City of Bend
Collection System Components

Line Size (in)	Gravity Sewers		Pressure Sewers	
	(feet)	(miles)	(feet)	(miles)
Juniper Utilities[2]	0	0	116,502	22.06
2	0	0	9,378	1.78
3	0	0	94,823	17.96
4	0	0	111,121	21.05
6	60,810	11.52	111,468	21.11
8	1,430,429	270.91	13,522	2.56
10	61,812	11.71	0	0.00
12	48,374	9.16	487	0.09
15	33,102	6.27	0	0
16	3,930	0.74	3,573	0.68
18	20,008	3.79	0	0
20	3,815	0.72	0	0
21	18,568	3.52	0	0
24	11,649	2.21	0	0
27	12,168	2.30	0	0
30	4,930	0.93	0	0
36	21,135	4.00	0	0
42	8,841	1.67	0	0
72	253	0.05	0	0
Total	1,739,824	329.51	460,874	87.29

Notes:
1. Statistics as of September 27, 2006
2. Juniper Utilities contains various line sizes ranging from 2-inch to 4-inch

COLLECTION SYSTEM VALUE

An estimate of the value of the existing collection system was developed. This estimate was developed by assuming no collection system exists today and the system that is currently in place would be constructed. The total estimated value of the

The cost to construct the existing sanitary sewer system today is greater than $355 Million

collection system is at a minimum $355M (million). This includes $296M for the gravity system, $36M for the pressure sewers and $23M for the pump stations.

RESIDENTS SERVED

There are currently many areas within the City that do not receive sewer service. The planning team gathered GIS data, financial data and sewer service data on the system in May 2005. This information was combined to determine the developed tax lots within the City that are currently served or not served by the wastewater collection system. As shown in the statistical summary in ***Table ES-2***, 25.1% of the developed parcels (on an acreage basis) within the City are not receiving sanitary service.

Table ES-2
Statistics on Area Served in Acres

UAR	UGB	Area of Parcels Served	Area of Parcels Not Served	Area of Developed Parcels Not Served
29,971	21,241[1]	8,353	9,488	2,802

Note:
1. Area of Parcels served and unserved were taken from the billing database, which is based on the taxlot level and does not include some areas, such as roads and streets. Therefore, the areas served and unserved add up to slightly less than the total UGB area.

THE MASTER PLAN

The Master Plan consists of seven specific elements. These are:

- Upgrade for Existing System Deficiencies
- Plant Interceptor
- North Interceptor
- Westside Interceptor
- Southeast Interceptor
- Pump Station Master Plan
- Required Capacity Improvements for existing deficiencies and capacity through buildout

The four new gravity interceptors are the key elements of the Master Plan. These new interceptors will provide the following basic functions:

- Provide sanitary service to the Juniper Ridge and north & northwest Bend areas.
- Provide system capacity and sanitary service to the southeast Bend areas
- Reroute flows away from the downtown core area of Bend relieving current and future capacity deficiencies
- Provide system capacity necessary to allow the growth of sanitary service to portions of Bend west of the Deschutes River
- Provide additional capacity and critical system redundancy with a second interceptor to the treatment plant
- Provide a means to remove up to 19 pump stations from service
- Provide a plan to expand the collection system to buildout while minimizing pump stations and pressure sewers

The Master Plan outlines projects to provide service through build-out of the planned urban area

The cost to construct these interceptors will be a considerable investment for the residents of the City. For this reason, each interceptor has been divided into multiple capital projects to provide the City with an opportunity to construct each interceptor using a phased construction approach. The four interceptors are shown on ***Figure ES-1 – Master Plan at build-out***.

PROJECT COSTS

Project costs have been developed for each of the capital improvements that will be required to provide sanitary service to the planning area between now and system build-out. These costs will be distributed over the period of time that it takes the City to reach its planned build-out condition. The Master Plan project costs are summarized in ***Table ES-3*** for the pump stations upgrades and decommissioning, capacity improvements in the existing system and four new gravity interceptors**.** The total program cost through build-out is estimated to be $96,776,300 in 2006 dollars.

The estimated program cost through system build-out is $97 Million

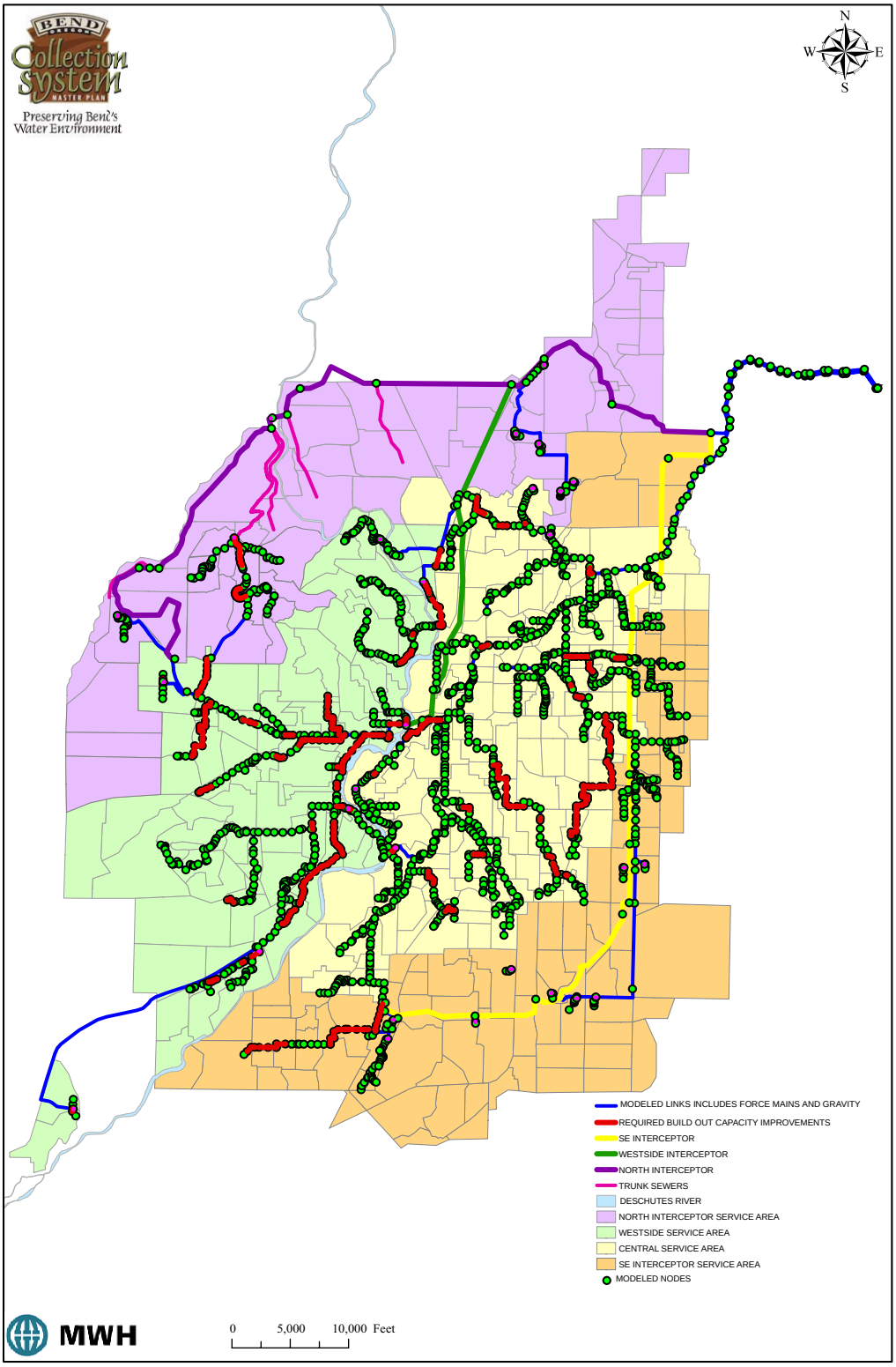

Figure ES-1 Four new interceptors provide the backbone of the Collection System Master Plan at build-out

Table ES-3
City of Bend Collection System Master Plan
Capital Improvements Cost Summary

Pump Station Projects			Project Cost ($)
Stations Requiring Capacity Upgrades			8,001,000
Stations to be Removed from Service			3,526,000
Total Pump Station Cost			**11,527,000**
Study Area			**Project Cost ($)**
Study Area 1			0
Study Area 2			5,799,400
Study Area 3			2,547,800
Study Area 4			0
Study Area 5			2,186,000
Study Area 6			1,236,500
Study Area 7			0
Study Area 8			2,266,200
Study Area 9			3,834,700
Total System Capacity Improvement Cost			**17,870,600**
Interceptor Segment	**Diameter (inches)**	**Length (feet)**	**Project Cost ($)**
Plant Interceptor			
Plant Interceptor	48	13,094	**9,448,000**
North Interceptor			
Plant Interceptor to Hwy 97	42 & 48	15,010	10,353,400
Hwy 97 to the Deschutes River	30	14,340	6,552,900
Deschutes River to Shevlin Park	8, 10, 15 & 27	23,810	5,058,000
Deschutes River Force Main	15	1610	277,800
North Interceptor Pump Station	10,800-gpm		1,226,400
Trunk 1	12	4865	835,000
Trunk 2	12	4920	844,000
Trunk 3	12	6430	1,103,000
Trunk 4	12	8350	1,434,000
Trunk 5	12	3430	588,000
Canal Crossings (3)			394,900
Traffic Control/Management			87,800
Erosion Control			373,200
Hwy 97 and Hwy 20 Bores			438,800
Railroad Undercrossing			263,300
Total			**29,830,500**
SE Interceptor			
Plant Interceptor to Hwy 20	24 & 36	23,664	8,610,800
Hwy 20 to Reed Market Road	24	6324	2,089,100
Reed- Market Road to SE 15th Street	24	8554	2,279,600
SE 15th to Murphy Road Pump Station	24	4278	1,301,600
Murphy Road PS to Hwy 97	18	5980	1,811,700
Canal Crossings (2)			263,300
Railroad Undercrossing			403,700
Intertie Structures			702,000
Traffic Control/Management			789,800
Erosion Control			342,600
US Hwy 20 Undercrossing			438,800
Total			**19,033,000**

Table ES-3 (contd..)
City of Bend Collection System Master Plan
Capital Improvements Cost Summary

Westside Interceptor			
Force Main	18	2998	539,800
Gravity Interceptor	27	18,916	6,964,700
US Hwy 97 Undercrossing			702,000
Railroad Undercrossing			403,700
Traffic Control/Management			309,600
Erosion Control			147,400
Total			**9,067,200**
Total Project Cost			**96,776,300**