SOUTH DESCHUTES COUNTY SEWAGE COLLECTION, TREATMENT, AND DISPOSAL FEASIBILTY STUDY

Prepared for:

Oregon Department of Environmental Quality
Deschutes County
Sunriver Environmental, LLC

March 2, 2010

Project No.: 1053-104

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Prepared by:

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Vision Engineering

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EXECUTIVE SUMMARY
SOUTH COUNTY FEASIBILITY

The genesis of this feasibility study is the nexus of two unrelated events:

1. A US EPA-funded, ODEQ/USGS-conducted ground water study has raised concerns that effluent from septic systems in southern Deschutes County will cause elevated concentrations of nitrates in the shallow groundwater that provides drinking water to most of the residents in the area. Computer modeling indicates that use of conventional septic systems to serve existing and future development will cause nitrate concentrations to exceed federal and state drinking water standards.
2. Sunriver Environmental LLC (SELLC) is a private company and subsidiary of the Sunriver Resort Limited Partnership (SRLP). SELLC owns and operates the existing sewer system that serves Sunriver, Sunriver Business Park, Crosswater, a portion of Vandevert Ranch and Caldera Springs. This treatment plant operates under a permit from the Oregon Department of Environmental Quality (ODEQ). A portion of the treated effluent from the Sunriver wastewater treatment plant is used to irrigate the Sunriver Woodlands golf course. In order to meet ODEQ's criteria for golf course irrigation of wastewater, SELLC must upgrade its existing treatment plant.

In 2008 during the process of SELLC planning for the required upgrade to the Sunriver sewerage treatment plant, ODEQ and Deschutes County asked SELLC to consider the possibility of extending sewer service outside of the current area served by SELLC to add a portion of the South County. Without committing to or agreeing to provide such expanded service, SELLC has agreed to participate in a study to develop information that would be used to make informed decisions on this subject. The purpose of this study is thus to provide information to examine the feasibility of providing such sewer service from both a financial aspect as well as its compatibility with current land use restrictions and allow all parties involved to come to decisions regarding this possibility.

The study area considered by this report is all of the existing platted lots between Sunriver and State Recreation Road. There are 3,975 existing lots in this area that are not currently served by sewer systems. This study does not consider any new, additional lots being created through subdivision or partition. The study also does not include the lots in Oregon Water Wonderland 2 that are currently served by a municipally-owned collection, treatment, and irrigation system. In the study area, there are 1819 lots that have existing, individual septic systems that are already contributing to potential groundwater contamination. The remaining lots are not yet developed and, for the purposes of this study, were considered to be served by sewer under consideration in this report. The study area is divided into two basic zones with roughly equal number of lots: the relatively dense area north and west of the Deschutes River, that includes Deschutes River Recreation Homesites; and the area east and south of the Deschutes River that has much bigger lots and thus a less dense development population. The area north and west of the Deschutes River has 2087 lots and the area east and south of the river has 1888 lots, the sum of which is 3975 lots.

To provide sewer service to these areas requires a treatment plant of sufficient size to serve the potential 5400 customers currently in the SELLC service area plus the potential customers that may be added from one or both of the areas under consideration. Because capacity of existing trunk line sewers within Sunriver that would deliver raw sewage to the sewer plant is limited, a new plant at Lake Penhollow on Cottonwood Road must be built if the South County area is to be served. In addition, existing pond storage must be expanded to store treated effluent during the winter months; additional disposal areas must be created for summer irrigation of the stored effluent; and additional capacity must be created to handle composting of solids. The total capital cost to create such a new facility (including an assumed current value of the existing sewer company) and the capital cost to provide sewers to transport sewage to the new treatment works is estimated in the following table:

South County Customers:	2,087		3,975	
Project Component	New Plant Plus 2087 So. Co.		New Plant Plus 3975 So. Co.	
	Sunriver Cost	South County Cost (Plant and Sewers)	Sunriver Cost	South County Cost (Plant and Sewers)
Total Capital Costs	$40,738,000	$39,088,000	$36,240,000	$75,767,000
Total Capital Costs/Lot		$18,729		$19,061

The following table estimates the monthly fees for a typical resident of the South County under full development using various financing scenarios for capital expenditures above, as well as including monthly operation and maintenance costs for each scenario:

Project Component	2087 Lot Service Area	3975 Lot Service Area
	Capital Cost for Plant and Sewers plus O&M	Capital Cost for Plant and Sewers plus O&M
Public/Private Funding	**$179.50**	**$176.90**
Public Funding	**$122.89**	**$122.65**
Public Funding with Grant	**$84.68**	**$84.68**

For the Public/Private Funding scenario, private portions of the facilities (i.e. - the privately owned sewage treatment plant) were analyzed as being financed at higher private interest rates with private return on investment. SELLC, as a private company, has financial limitations and it is not expected their financing capacity will provide adequate funding for the entire plant and will require additional funding from other sources. The public funding scenario assumes full financing of all improvements (including the sewage treatment plant) using public funds. This scenario may also not be fully achievable due to SELLC being a private company and not eligible for public money.

The Public Funding with Grant scenario assumes that the Rural Utilities Services (RUS) would provide a grant to reduce monthly costs to a maximum level generally imposed on other similar communities. Currently, this monthly rate is $54.00/month. It is currently limited to areas with a median income not exceeding $41,230. RUS apparently will not fund the house connection (that portion of the collection system from the property line to the house). This financing scenario assumes that the house connection would be financed by the DEQ state revolving fund at a rate of 3.27%. Therefore, the monthly cost for the south county area would be $54.00 plus the cost of financing the house connection.

Construction and operation of a community sewerage facility to serve the South County Study area is therefore concluded to be feasible based upon the following findings:

1. A suitable community sewage treatment, collection and transmission system can be reasonably achieved from an engineering standpoint and the cost is not unreasonable.
2. A community sewerage facility will provide centrally monitored and verifiable assurance that the groundwater in the areas served will be protected from groundwater pollution due to nitrate nitrogen and other pollutants that occur now and in the future.
3. Funding sources and availability of funding will be a key focus in the viability of a community system.

CHAPTER 1.0 INTRODUCTION

1.1 PURPOSE

The Department of Environmental Quality (ODEQ), U.S. Geological Survey (USGS), and Deschutes County have been jointly studying the impact of sewage disposal from septic systems relative to groundwater pollution in southern Deschutes County. Results of these studies have indicated that continued use of these systems would pose a significant risk to groundwater quality from nitrate contamination. Most South Deschutes County residents obtain their drinking water from the groundwater aquifer that is threatened by this pollution of nitrate.

Excessive levels of nitrate in drinking water have caused serious illness and sometimes death. The serious illness in infants is due to the conversion of nitrate to nitrite by the body. The nitrite, in turn, will interfere with the oxygen-carrying capacity of the child's blood. This creates an acute condition in which health deteriorates rapidly over a period of days. Symptoms include shortness of breath and blueness of the skin. The state and federal drinking water standards were set to prevent this potential problem. Long term ingestion of drinking water with elevated nitrate may also cause health problems for adults.

In addition to the drinking water concern, the groundwater in this area is connected to the Deschutes River and elevated nitrate- levels may promote aquatic plants and algal blooms in the river that if developed, in turn, would affect dissolved oxygen concentrations and pH levels. The algal blooms and aquatic plants would also adversely affect the aesthetic value of the river. The associated problems with dissolved oxygen and pH would be adverse to fish.

To address this problem, Deschutes County enacted an ordinance that would have required existing septic systems to be replaced by technologically-advanced (hereinafter referred to as ATT) systems, producing effluent with significantly reduced total nitrogen concentrations. New development would also have been required to install these advanced systems. The ordinance, however, was repealed by Deschutes County voters.

With the repeal of the ordinance, Deschutes County, with encouragement from the ODEQ, has contracted with Sunriver Environmental, LLC (SELLC) to prepare a study to determine the feasibility of extending sewers into south Deschutes County from Sunriver. The study would determine costs and the practicability of extending sewers and treating and reusing the treated effluent by SELLC.

Specifically, the feasibility study will analyze and determine:

1. The feasibility of extending sewers based upon both costs and land use considerations;

2. The capital costs and the operation and maintenance costs of extending sewers and providing sewerage facility to accommodate the sewage from those areas determined to be feasible;

3. Potential municipal governments that could govern and administer to the construction and operation of a sewer system in south Deschutes County;

4. The potential mechanism for financing the construction of both the sewer system and the expanded and upgraded sewerage facilities at Sunriver; and

5. Mechanisms for allocating costs between the areas served by extended sewers and the providers of sewage treatment, storage and irrigation.

To be clear, the purpose is to determine the feasibility of extending sewers into south Deschutes County. It is not to create a facilities plan which would look at all possible alternatives for addressing the groundwater problem in south Deschutes County. This feasibility study will only consider a community sewerage facility.

1.2 BACKGROUND

Sewage Treatment, Storage and Irrigation

SELLC currently owns and operates a sewerage facility that serves Sunriver, Crosswater and Caldera Springs Resorts. Treated effluent is stored during the winter and applied to Sunriver's Woodlands golf course and on a separate, isolated irrigation site (called Cottonwood 1) during the growing season. The sewerage facility operates under authorization of a Water Pollution Control Facility (WPCF) permit issued by ODEQ.

Reuse of treated sewage for beneficial use (such as irrigation of golf courses) is regulated by ODEQ pursuant to Oregon Administrative Rule (OAR) Chapter 340, Division 055 (Rules). Because Sunriver was reusing its treated sewage prior to the first adoption of the regulations in 1990, application of the Rules has been deferred by ODEQ until June 1, 2010, unless the compliance date is otherwise extended in writing by ODEQ. These rules were revised in 2008, but the requirements for irrigating golf courses are essentially unchanged.

ODEQ has indicated that it would not enforce the June 1, 2010, compliance date if it is not met due to delays caused by the preparation of this feasibility study. This is because, if SELLC were required to meet the compliance date, it would have to construct the upgraded facilities at its current site. If SELLC were to do the upgrade at this site, it would no longer participate in an effort to extend sewers into South Deschutes County. The basis for this position is expanded on in the next paragraph.

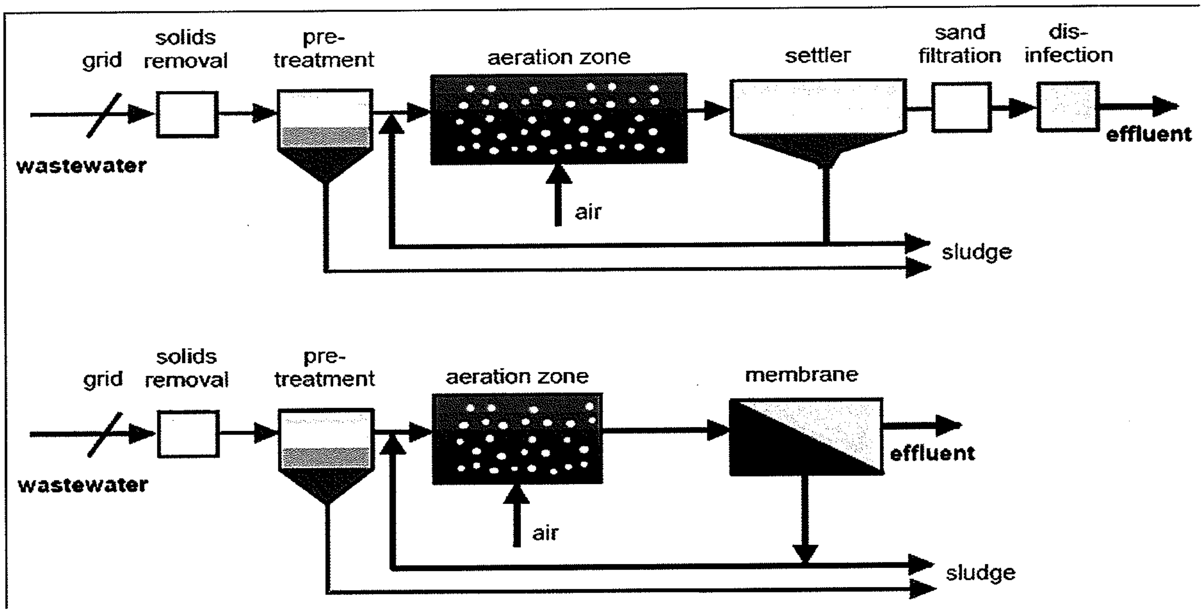
The sewerage facility currently operated by SELLC is not large enough to handle additional flow from South Deschutes County. The sewage collection system is not big enough to transport additional sewage through Sunriver Resort to the treatment plant; the treatment plant, effluent storage and reuse systems are not big enough to treat, store and dispose of the additional sewage. SELLC would not support the construction of a sewer interceptor pipeline through Sunriver Resort because of the inconvenience and disruption it would cause to resort owners and visitors. For this reason, if SELLC is to serve South Deschutes County, its treatment plant will need to be moved to property SELLC owns east of the resort. This property is already the site of SELLC's effluent storage pond and biosolids composting operations.

Regardless of whether or not SELLC extends sewers into South Deschutes County, a portion of the treated effluent will continue to be irrigated on the Woodlands Golf Course. Because the golf course abuts residential property, Sunriver must irrigate to the property lines. The ODEQ rules governing such irrigation with treated effluent will require that the effluent is treated to meet Class A recycled water.

Class A recycled water must be treated as follows:

> A) Before disinfection, unless otherwise approved in writing by the department (ODEQ), the wastewater must be treated with a filtration process, and the turbidity must not exceed an average of 2 nephelometric turbidity units (NTU) within a 24-hour period, 5 NTU more than five percent of the time within a 24-hour period, and 10 NTU at any time; and
>
> B) After disinfection, Class A recycled water must not exceed a median of 2.2 total coliform organisms per 100 milliliters, based on results of the last seven days that analyses have been completed, and 23 total coliform organisms per 100 milliliters in any single sample.

To meet the requirement that the wastewater be filtered, SELLC proposes to employ a membrane biological reactor (MBR) system. In simplistic terms, an MBR system utilizes a biological process to convert organic material in sewage to bacteria and a micro-filtration system to filter out the bacteria from the finished effluent. The following diagram, extracted from Wikipedia, displays the difference between conventional biological systems (top picture) and an MBR (bottom picture).



In addition to an expanded and upgraded wastewater treatment system, biosolids (aka sludge) and effluent disposal facilities will also need to be provide

Sewer Study Areas

This sewer feasibility study area includes approximately 6,500 acres of relatively low density rural development shown in Figure 1, Appendix B. The study area is generally south of Spring River Road, west of Highway 97, east of the Deschutes National Forest boundary, and north of the State Recreation road. ODEQ and USGS have identified this area as a risk for long term, increasing nitrate concentrations in the groundwater from septic systems. For the purposes of this study, the overall study area was broken into 21 sub-areas. Areas 1 through 9 are generally west of the Deschutes River and north of River Meadows subdivision, and the remaining areas are south and east of Areas 1 through 9. The study areas are generally along the Deschutes River and Little Deschutes River. This area has a very slight slope from the south down toward the north, following the river gradient. There is only approximately 13 feet of vertical drop from the south end of the collection system adjacent to the river to the north end of the collection system. The area is generally flat, with depth to groundwater varying from less than 1 foot to approximately 8 feet.

Area 2 contains Area 1 plus 1881 lots located south and east of the Deschutes River as far south as State Recreation Road.

Table 1.1 in Appendix A provides information relative to development, high groundwater, and historic failures in each of the separate areas.

CHAPTER 2.0 COST ESTIMATE FOR SEWAGE TREATMENT AND EFFLUENT STORAGE AND IRRIGATION FACILITIES

2.1 PURPOSE

The purpose of this chapter is to analyze the costs of constructing and the costs of operating and maintaining a community sewerage facility to treat and dispose of sewage in the south Deschutes County area. The analysis will be broken down into several scenarios. These scenarios are:

1. Relocating the SELLC sewerage facilities to a site east of the railroad tracks near the existing SELLC effluent storage and irrigation facilities. This scenario, however, would only serve those resorts to which SELLC is obligated to serve (Sunriver, Crosswater and Caldera Springs Resorts). The cost of this size facility was previously developed by SELLC in a prior study and will be used as the basis for the two following facilities.

2. Relocating the sewerage facilities to the site indicated in scenario 1, but sizing the plant to also accommodate up to 2,087 additional equivalent dwelling units (EDUs) from south Deschutes County.

3. Relocating the sewerage facilities to the site indicated in scenario 1, but sizing the plant to also accommodate up to 3,975 additional equivalent dwelling units (EDUs) from south Deschutes County.

2.2 CAPITAL COST ANALYSIS FOR THE SUNRIVER SCENARIOS

A summary of the estimated construction costs of the three Sunriver scenarios are displayed in Table 2.1 in Appendix A. Figure 2, Appendix B, is a tentative site plan for the new sewage treatment, storage, and irrigation system. A narrative description of each of the sewerage facility components for these scenarios is provided below. The narrative provides the basis for the preliminary cost estimate for constructing a new plant at the Lake Penhollow site to serve only the existing resorts. The cost estimate is largely been adapted from an earlier analysis conducted for SELLC in February 2008, but has been updated to reflect more recent economic conditions.

The costs for Sunriver scenarios 2 and 3 were developed from the cost estimates for scenarios 1 using a variety of estimating techniques. Key among these is the application of the "Power Rule[1]". Using this method allows costs for a certain capacity to be extrapolated to higher or lower capacities while factoring in the economy of scale for larger facilities. Where this method was applied, it is indicated in Table 2.1.

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[1] Economic Evaluations in Exploration, 2nd Ed., 2007, Wellmer, Dalheimer and Wagner.

In order to adjust the 2008 cost estimate to reflect current economic conditions, a general contractor was contacted who specializes in construction of wastewater treatment facilities (Mattson Environmental, Inc.). In their recent experience, bids for wastewater treatment construction projects have been coming in between 10 to 15 percent lower than in 2008 when the original estimate was prepared. For the purposes of this estimate, we have assumed a blanket 10 percent reduction from the 2008 estimate where appropriate.

The following sections describe the basic assumptions used in generating the various estimates for Sunriver scenarios 1 through 3.

Headworks

The screening facility consists of two self-cleaning automated screens with washer/compactors. It also includes grit removal and air handling systems to accommodate odors. Enclosed screening and grit storage is included to allow bulk load out to a truck or dumpster.

The proposed facility is two stories, each with a square footage of approximately 1,025 square feet. The cost of the facility was estimated on the basis of dollars per square foot of the recently bid City of Bend Water Reclamation Facility (WRF) Headworks Replacement Project. The cost of this facility was approximately $776 per square foot not including engineering. A 10 percent reduction was applied to the cost to reflect current economic conditions.

Relocate Flow Equalization Tank

This is a conservative estimate for disassembly of the recently constructed flow equalization tank (FET), transport by truck to the new plant site and reassembly. There may be opportunities for savings under this component if the tank could be moved relatively in tact to the new plant site by a heavy lift helicopter. Insufficient time was available to investigate this approach, but the empty tank weight is approximately 80,000 pounds. This is on the same order of magnitude of a loaded tractor/trailer rig. A 10 percent reduction was applied to the cost to reflect current economic conditions.

Flow Equalization Tank

In order to accommodate peak flows for the build-out condition, it is anticipated that an additional flow equalization tank (FET) similar to the recently constructed tank will be required. While formal quotes for the tank were not obtained, a rule of thumb of $1.90 per constructed gallon was used to estimate the cost. This analysis assumes a second 500,000-gallon tank, identical to the first. This unit cost reflects recent increases in steel prices and results in total overall cost of just under $1 million dollars. There may be opportunities to reduce this cost through an alternative approach of using concrete rather than steel. The costs for an additional FET at the new plant site are assumed to be identical. A 10 percent reduction was applied to the cost to reflect current economic conditions.

Membrane Bioreactor (MBR) Treatment

Previous studies have been performed for Sunriver indicating the most cost effective method to achieve Class A reclaimed water, which would be to utilize a relatively new technology incorporating membranes. A similar installation was recently constructed at Eagle Crest Resort near Redmond, Oregon. A 10 percent reduction was applied to the cost to reflect current economic conditions.

Ultraviolet Disinfection

Effluent produced by an MBR (membrane bioreactor) is very well suited to this technology and replacing the existing gaseous chlorine system with UV will significantly improve safety, both on and around the treatment plant site. The cost for this process was based on quotes previously received for Sunriver which were escalated by 4 percent annually to reflect current dollars. A 10 percent reduction was applied to the cost to reflect current economic conditions.

Plant Water Pump Station

An additional pump and a strainer in the existing irrigation pump station would be provided. The strainer is necessary to filter out any debris that may have collected in the lake. A 10 percent reduction was applied to the cost to reflect current economic conditions.

Dewatering

It is recommended that automation and monitoring be added to the belt press facility to enable the belt press to run automatically for 24 hours a day. This would include installation of a central programmable logic controller (PLC) to link the equipment control systems. This cost was based on previous estimates which were escalated to current dollars. These costs include the addition of a new 2,400 square foot building to house the equipment. A 10 percent reduction was applied to the cost to reflect current economic conditions.

Cake Storage

This component includes addition of an elevated cake storage silo and a new cake pump to enable the dewatering process to run 24/7 and goes hand-in-hand with the dewatering project. This cost was based on previous estimates which were escalated to current dollars and should be identical at both sites. A 10 percent reduction was applied to the cost to reflect current economic conditions.

Plant Air System

This component is a utility air system consisting of dual trains of rotary compressors and refrigerant air dryers. The past approach for operating automatic valves at the plant was to provide the valves with motor actuators. With significant additional new processes, the cost for automatic valves can add up to a substantial amount. Air operated automatic valves are significantly less costly than motor actuated valves and it is believed that the addition of a high quality air system was justified. This cost was based on previous estimates which were escalated to current dollars and should be identical at both sites. A 10 percent reduction was applied to the cost to reflect current economic conditions.

2.3 INFRASTRUCTURE MODIFICATIONS

Infrastructure modifications include any facilities required to transfer wastewater to the new plant site and/or expand the effluent storage and disposal and biosolids treatment and storage program. The component of the projects and pricing assumptions are described below.

Additional Lake Storage

Under all scenarios, additional lake storage will be required. Currently there are approximately 70 million gallons of storage at Lake Penhollow and 30 million gallons of storage at the Woodlands golf course for a total of 100 million gallons. From recent work performed by Newton Consultants, Inc. it was determined that one of the golf course lakes leaks at a rate of approximately 100,000 gallons per day. It is Newton's recommendation that this lake either be abandoned or lined, which would necessitate additional storage volume. Likewise, an additional storage volume of 12.5 million gallons is required to accommodate the recently constructed Caldera development for a total additional storage requirement of 27.5 million gallons for either upgrade of the existing site or the baseline new plant site.

To add an additional 2,087 South County users, an additional 50 million gallons of lake storage is required and 3,975 additional users will require 100 million gallons. Hard costs to construct the additional storage assuming a 20 foot average depth are summarized in Table 2.2, Appendix A. This estimate was compiled by W.H. Pacific.

Booster Pump and Force Main

Relocation of the wastewater treatment facilities from the existing location to the Lake Penhollow site will require conveyance of raw sewage from the existing lift station site to the Lake Penhollow site. There is an existing lift station that conveys all of the sewage from the Sunriver collection system to the existing sewage treatment plant. This lift station is located between Blue Grouse Lane and Virginia Rail, approximately 800 feet west of the sewage treatment plant.

This lift station currently conveys approximately 1,700 gallons per minute to the existing sewage treatment plant using two of the three pumps. The maximum flow observed into this station is approximately 1,500 gpm, so the station appears to have adequate capacity for build-out of Sunriver including Caldera Springs.

A new pump station will be needed to boost flows from the northeast corner of the existing sewage treatment plant property up to the potential treatment plant at the Lake Penhollow site. The proposed site is at an approximate elevation of 4300 feet and the proposed booster pump would be at an approximate elevation of 4160 feet. The distance from the proposed booster station to the potential treatment plant site at the Lake Penhollow area is 12,000 lineal feet (LF). The static head is 170 feet and the dynamic head in a 12,000 LF of 16" force main is 30 feet, for a total dynamic head of 200 feet. At 1,800 gpm and an assumed efficiency on the centrifugal booster pumps of 75%, 100 horsepower (Hp) would be needed to convey sewage from the booster pump location up to the Lake Penhollow site. For the purpose of this cost estimate, we will assume that three pumps will be used. Any two of the three pumps working together will convey 1,800 gpm, leaving one redundant pump.

The force main from existing lift station #1 to the booster pump station will lead to a 24" diameter manifold and each of the three pump's suction will come off of this manifold. The residual pressure from lift station #1 will result in a flooded suction-type situation for adequate reliability. The booster pump station will come on in response to pressure in the force main from lift station #1. The booster pump will also go off in response to pressure from lift station #1. We will include an automatic transfer standby generator to power the booster pump station in the event of a power outage. The generator will need to be approximately 80 KW to power two of the pumps. The three pumps and generator will be housed in a 20' x 30' building. Since the sewage will be completely enclosed, no odor control facilities are anticipated.

This estimate was prepared jointly by Vision and W.H. Pacific.

Biosolids Processing

The current biosolids processing area at the Lake Penhollow site consists of mostly exposed receiving, processing and storage areas along with one pole barn structure for equipment storage. In order to streamline the composting operation, several improvements are recommended.

- Addition of approximately 2,000 square feet of covered cake storage. This would consist of an open pole barn structure with a concrete floor and push walls.
- Addition of approximately 5 acres of asphalt pad for mixing and composting operations.
- Addition of approximately 4,000 square feet of covered finished product storage. This would include an open pole barn structure with four individual bays to store the various grades of finished compost.
- Addition of a plant drain pump station to collect runoff from the compost operation and convey it to the treatment plant or provide on-site treatment.

Effluent Disposal

Table 2.2, Appendix A also includes the summary of estimated costs for effluent disposal; costs for preparing additional irrigable land at the existing Lake Penhollow site; and costs for irrigation piping and additional pumping and equipment.

Non-Process Building and Facilities

Based on input from Sunriver staff, the existing facility currently has approximately 8,350 square feet of non-process related facilities.

For the new plant, it has been assumed that an additional 1,000 square feet of a variety of non-process space will be needed over the 8,350 square feet allowance that is currently provided at the existing site. Because the facilities will be new, they can be designed more efficiently at the new site, thus saving substantial cost. A 10 percent reduction was applied to the cost to reflect current economic conditions.

Odor Control

Due to the new plant site's location, odor control may not be warranted. This approach was used at the City of Bend's new headworks because of the large amount of buffer space surrounding the plant. Provisions were made to add odor control at the new plant site in the future if it becomes an issue. A 10 percent reduction was applied to the cost to reflect current economic conditions.

New Engine Generator

The new plant site has an allowance of $150,000 for a new structure and generator, but consideration could be given to using a self-contained unit with an integral enclosure. The costs for this improvement are estimated based on past experience and adjusted down to reflect current economic conditions.

Sludge Storage

Waste MBR sludge would be stored in concrete tanks adjacent to the MBR's. The mixing system would be similar that currently employed at the existing treatment plant. Costs were adjusted down 10 percent to reflect current economic conditions.

Site Demolition

A contractor was contacted who has familiarity with the existing treatment plant to provide an extremely rough estimate of the cost for demolition of the existing site. A 10 percent reduction was applied to the cost to reflect current economic conditions.

2.4 SUMMARY OF SUNRIVER TREATMENT AND DISPOSAL COSTS

Offsetting these costs are considerable intangible items including the following:

- Reduction of trucking related to biosolids and chemical hauling within Sunriver.
- Significantly lower exposure to odor related issues.
- Reduced liability from chemical spills.
- Reduced costs for biosolids handling by centralizing compost and treatment facilities.

To provide a reality check on these estimates, the MBR manufacturer was asked what their experience has been for overall treatment costs utilizing their technology. While individual projects vary, they indicated that they have seen a range between $8 and $15 per gallon of installed capacity. At 1.5 million gallons per day (MGD) of capacity this would result in a $12 to $22.5 million-dollar project, which our estimates for the remote plant fall within. It should be emphasized that these estimates are preliminary and should be used for general budgeting and comparison purposes only.

Allowances for Contingency and Engineering

All project costs have been estimated on an "order of magnitude" basis. Project hard costs represent components of the facility that are projected at this time and with available information. Because of the level of estimate, various levels of contingency have been assigned to the various scenarios as noted in Table 2.1.

The engineering allowance assigned to each project follows a similar logic. The engineering allowance assumes a high level of automation design to reliably produce Class A recycled water. These allowances are based on recent experience in similar projects in the area.

Existing Sewerage Company Value Cost

In addition to constructing new sewage treatment, storage and effluent facilities SELLC owns and operates an existing company that has a value from its initial investment in the company, subsequent capital improvement investments, and the management and operation of that business over the past 15 years. The value of this business is the basis of the return on investment that SELLC presently receives from its current customers for owning and operating this private business. That value and investment return must be recognized and ultimately shared between existing SELLC customers and new customers that would be added from south Deschutes County. For purposes of this study, the value of its company is taken to be $25,000,000. Thus a payment of the return on the value of the company would be proportionally split between current and future customers as an assessment. Similarly, should it be determined, and all parties agree, that the best solution would be a municipally-owned and operated facility, this value would be representative of a purchase price of SELLC (although such has not been accepted by SELLC and would be the subject of further discussion and negotiations were such to be considered further).

2.5 OPERATION AND MAINTENANCE COSTS

Projected Annual Maintenance Costs are listed in Table 2.3, Appendix A. The basis for these costs are set forth below the table.

Currently the SELLC treatment facilities are staffed with three full time operators and management staff. An operator is budgeted at $55,000 per year; the management cost is $80,000 per year. Estimated labor costs have been escalated as follows.

- Sunriver Buildout 3.25 operators plus management.
- South County with 2,087 additional connections – 3.5 operators plus management.
- South County with 3,975 additional connections – 4 operators plus management.

Building maintenance was estimated by escalation using the 0.6 rule due to larger structures for more treatment. The scaling basis is peak month flow.

For contract services, it was assumed that this is professional service and would remain constant for all scenarios.

Electrical/Mechanical O&M costs were escalated using the 0.6 rule. The scaling basis was peak month flow.

Estimated electricity costs were escalated from actual use in 2008 using a scaling factor of 0.9. The majority of the load is from the aeration blowers. The scaling basis was average day biochemical oxygen demand (BOD).

General maintenance costs were also escalated using the 0.6 rule. The scaling basis was peak month flow.

Estimated equipment purchase costs were escalated using the 0.6 rule. The scaling basis was peak month flow.

Natural gas costs assume this it is primarily used for heating occupied space and was escalated using a 0.3 scaling factor due to the much smaller increase in building space as flow increases. The scaling basis was peak month flow.

Estimated landscaping costs were assumed to remain similar in all scenarios.

Projected license and permit costs were assumed to remain similar in all scenarios. This cost does not include the costs for applying for new or renewed Department of Environmental Quality Water Pollution Control Facilities (WPCF) permits.

The cost of supplies was escalated using a 0.6 rule. The scaling basis was peak month flow.

Vehicles maintenance and replacement costs were assumed to remain similar in all scenarios.

The cost of waste removal was estimated assuming that these wastes represent primarily screenings and would escalate linearly with flow (Scaling factor (SF) of 1.0).

Estimated chlorine costs: Chlorine is used to clean the membranes semiannually. This analysis assumes 28 submerged membrane units with 400 plates each and a solution capacity of 0.8 gallons per plate. Cleaning solution is 0.5% bleach made up using 6% (Ultra) bleach at $1.50 per gallon. Escalation is linear (SF = 1.0) based on flow.

Estimated polymer costs: Polymer is based on a dose of 20 pounds per dry ton with a 0.6 yield (# solids/# BOD). Delivered polymer price is $4.50 per dry pound. Escalation is linear (SF = 1.0) with the mass loading of influent BOD.

Estimated membrane replacement: This analysis assumes that 10% of the membranes will be replaced annually starting at year 10 of operation based on input from the manufacturer. The present value of this 10-year annuity is brought back to year 0 and then amortized over a 20-year project life. Membrane replacement cost is assumed to be $60 per plate. Labor is assumed to be 16 hours per year at $25/hour. Escalation is linear (SF = 1.0) based on flow.

Revenue from the sale of compost has been added and adjusted based upon expected quantities of compost to be generated as a result of an expanded treatment process.

Administrative costs were escalated based upon the amount of additional flow and customers.

CHAPTER 3.0 COST ESTIMATE FOR SEWAGE COLLECTION FACILITIES

3.1 PURPOSE

The purpose of this chapter is to estimate the costs of constructing and the costs of operating and maintaining a sewage collection system for several scenarios. These scenarios are:

1. Collecting the sewage from approximately 2,087 properties in Areas 1 through 6 and Areas 8 and 9 in south Deschutes County as identified in Figure 1 in Appendix B. Area 7 contains Oregon Water Wonderland, Unit 2, which is already served by its own sewerage facility.

2. Collecting the sewage from approximately 3,975 properties in Areas 1 through 6 and Areas 8 through 21 in south Deschutes County as identified in Figure 1, Appendix B.

3.2 COMPONENTS OF THE SEWAGE COLLECTION SYSTEM

There are three components to the cost estimate for the sewage collection system. Each component is listed below.

1. On-site costs which are those pertaining to transporting the sewage from the house to the collector sewers in the street.

2. The collector and interceptor sewers that transport the sewage to a main pump station.

3. The main pump station and force main transports the collected sewage to the sewage treatment plant.

3.3 TYPES OF SEWAGE COLLECTION SYSTEMS CONSIDERED

The types of sewer collection systems typically used for this application would include:

- Septic tank effluent pumping system (STEP).

- Septic tank effluent gravity system (STEG).

- Conventional gravity sewer.

- Vacuum sewer collection.

- Low pressure collection.

Sunriver Environmental has requested that sewage be collected in a raw sewage form instead of septic tank effluent so that it is consistent and compatible with the raw sewage that they already receive. The pumping system maintenance cost for the STEP and STEG systems should be less than the raw sewer pumping system option because no solids are present to plug or jam the pump. This reduced maintenance cost is typically offset by the remaining cost to periodically pump the solids from the septic tanks. Nevertheless, this request by SELLC eliminates the septic tank effluent pump (STEP) collection system type and the septic tank effluent gravity (STEG) collection system type from consideration in this report.

SELLC also requires a sewage collection system that prevents intrusion of storm water and groundwater. The type of treatment process to be employed by SELLC to meet ODEQ requirements cannot accommodate large fluctuating flow rates that might occur from groundwater infiltration or storm water inflow.

Conventional gravity sewer collection requires the pipes to be installed at a minimum slope of 0.004 foot per foot, with at least one-tenth foot drop through manholes. The collection basin would need approximately 220 vertical feet of elevation drop from the high end to the low end for this type of system to work at the minimum slope. Since the study area has negligible slope, more than 30 sewer lift stations would be required within the study area due to undulating terrain and practical installation depths. In addition, thousands of lineal feet of force main would be needed to convey sewage from pump station to pump station. A large central pump station would then be needed to convey sewage to the treatment plant location. Gravity sewer mains would need to be 15 to 20 feet deep in many areas.

Considering the above information plus high ground water in the area, caving conditions of deep trench walls, groundwater infiltration into the pipe joints of the gravity sewer collection system and manholes, number of pump stations, and very high construction costs in these conditions, conventional gravity sewer collection will not be reviewed further by this study.

Sewer collection by vacuum system for the area may be feasible. Given the relatively large and flat nature of the collection basin, multiple vacuum collection systems with discharge pump stations to a common trunk line would be needed. Vacuum sewer collection systems in this type of topography are typically competitive with grinder pump sewer collection, but since vacuum sewer collection is not as commonly accepted as individual grinder pumps with low pressure sewer collection, vacuum sewer is not considered for this study.

Low pressure sewer collection is a proven technology, and is widely accepted across the United States. It is typically one of the least expensive and most reliable systems for large flat high groundwater or rocky areas. System costs can be readily and reliably obtained. Long term operation and maintenance costs for low pressure sewer collection are typically slightly higher than conventional gravity sewer collection, but overall costs including construction are typically lower than conventional gravity sewer collection for flat low density high groundwater collection basins. Further, low pressure sewers have sealed joints and no manholes, which prevent intrusion of groundwater and storm water. Since the low pressure sewer collection system with individual grinder pumps represents a relatively low cost system with relatively low long term operation and maintenance costs, this technology was selected for establishing feasibility of sewer collection on a cost and constructability basis.

It should be noted that, if the project under consideration in this report proves feasible, all of these types of collection systems will be reconsidered in a pre-design facilities plan.

3.4 ON-SITE SEWER COST ANALYSIS

House Connection

Each individual lot will require a raw sewer grinder pump station with electrical service and discharge force main to connect to the collection main. The pressure from each pump will provide the energy needed to convey flow to the central pump station. The most distant and lowest pump will see the highest head, and will drive the pump selection. For spare parts and interchangeability, only one pump style is proposed for all stations.

At the Right of Way

The raw sewer pump station can be located near the right of way for ease of maintenance access, or located near the point where the building sewer enters the existing septic tank to minimize disruption to each lot and minimize costs. If the station is located at the right of way, a 4 inch gravity line at a slope of two percent must be constructed at a specific grade from a point near the existing septic tank location out to the right of way. This deeper line will often conflict with electrical, waterlines, or other obstructions, and cannot be easily raised or lowered to avoid the obstructions. In addition, gravity lines may be more susceptible to groundwater infiltration due to their depth and to illicit connections of storm water and roof drains.

Location of the pump station near the right of way often conflicts with fences and driveways. Also, the electrical service would need to run from the home out to a point near the right of way, and the electrical panel for the pump station mounted at the front of the property line.

Near the Septic Tank

Installation of the wet well near the location of the existing, but to be abandoned, septic tank requires cutting into the line between the house and the septic tank, installing a 45 degree bend to the proposed wet well location near the septic tank, setting the wet well, and running a 1.25 inch diameter shallow bury line out to the check valve and gate valve located near the right of way. This 1.25 inch line does not need to be laid to grade, and it can be adjusted to avoid conflicts. The electrical panel can be located near the existing septic tank, which is less costly than location out near the right of way.

This type of project was recently completed in Tenino, Washington, and in the River Meadows subdivision south of Deschutes River Recreational Homesites. In both of these installations, the raw sewer pump station was located near the home, and not at the street right of way. The sewer pump station will typically need to be accessed approximately once every 10 years, which is considerably less than the average septic tank pumping frequency. Since the existing septic tank should have be placed so it could be accessed with a septage pumper truck, location of the wet well near the existing, but to be abandoned, septic tank should result in easy access to the wet well. The force main can follow this access route to the street. This feasibility study recommends that the pump station be located near the site of the existing septic tank (for existing development) and, in the case of new development, near the house.

Pump Station Type

For the purposes of this feasibility study, we assumed a single type of high head, low flow package grinder pump to be used at all stations. If only one pump type is allowed in the system, spare parts can be easily maintained for all stations, allowing a faulty pump to be quickly removed and a new pump to be placed. Given the long distance from individual pump stations to the central pump station, high head from friction loss caused by many pumps operating at once is expected to be experienced. The type of pump used in the cost estimate can handle high pressures.

Estimated Costs

The construction cost for an on-site pumping system will vary with the electrical requirements and the amount of landscaping in the yard. Assuming an average yard with the front of the home located approximately 60 feet from the right of way, the cost to furnish and install the pump, wet well, and panel; pump out and fill in the existing septic tank; and restore landscaping is estimated at $5,400. This cost does not include the cost for the homeowner to provide electrical service to the pump station panel. This service will require a 240V 30 amp breaker and wire service to the panel location.

The average individual cost for similar pump stations at projects in Central Oregon ranges from approximately $5,400 up to approximately $7,500, depending on distance to right of way, amount of shallow rock requiring excavation, and other related items. The $5,400 estimated cost reflects savings due to the number of individual pump stations to be included in the contract, and the relative ease of excavation in the silty soils.

The homes in the study area currently use septic tanks and drainfields. Some lots use gravity flow from the tank to the drainfield, some use pressure distribution with a pump to convey effluent to the drainfield, and some use a sand filter system to provide additional treatment of effluent prior to disposal in the drainfield. All of these systems utilize a small diameter gravity pipe from the home to the septic tank. For the purposes of this feasibility study, we are including costs to pump out and decommission the existing septic tank per ODEQ rules; construct a 4 inch diameter gravity sewer lateral from the home to the new pump station; construct an individual grinder pump station near the septic tank; and construct a small diameter pressure sewer lateral from the pump station to a collection main in the street. Each lateral would have a check valve and gate valve near the property line. Actual pump station locations may be behind or near some homes, depending on individual situations.

This study estimates costs assuming that individual pump systems are all installed during initial construction of the overall sewer collection system. This, of course, will not be the case. The cost for a system to serve a new home could be less than that used in this study because existing septic systems will not have to be properly abandoned and no landscaping will be damaged. In addition, the pumping system can be optimally located to reduce costs.

3.5 ANALYSIS OF COSTS FOR COLLECTOR AND INTERCEPTOR SEWERS

Typically, every street will have a collection main installed under the street with appropriately spaced cleanouts, air release valves and isolation valves. The smaller diameter 2 through 4 inch collection mains in the local streets would typically connect to larger diameter 6 through 12 inch collection mains in the higher use north/south streets. These larger diameter collection mains would generally convey sewage north to a main pump station to be located along Spring River Road near Harper Bridge. Sewage from this pump station would be conveyed in a dedicated force main east across the river to a point south and east of the Sunriver Business Park, then travel north along the east side of Sunriver to the potential future treatment plant location along Cottonwood Road.

The collection mains will generally have a minimum of 3 feet of cover, with granular backfill to prevent future road settlement along the trench line. Mains that are located in pavement will include asphalt patching along the trench line. The collection system for the second scenario will include at least three river crossings. Both scenarios include a boring underneath the railroad. This study anticipates that river crossings will be made at existing bridge locations.

Considering the very long dimension of the collection basin in the north/south direction, the study assumes that all lots will have a high head, low flow, progressive cavity type pump. To size the low pressure sewer collection mains, we used a widely accepted equation to estimate the design flow rate, which represents the required pump flow rate and peak flow in the collection system. The equation is peak flow (Q) in gallons per minute equals one half the number of equivalent dwelling units (N) plus 20 or $Q=0.5N+20$. With this estimated peak flow, we sized the collection mains for approximately 2 to 3 feet per second. Approximately 2 to 3 feet per second is the recommended minimum flow rate to re-suspend solids in force mains, and prevent solids accumulation. Since only about half of the total number of lots are currently developed within the study area, cleanout stations will be included throughout the low pressure sewer collection system and in the force mains to allow cleaning of the force mains as needed.

Cost estimates for the sewage collectors and interceptors are summarized in Table 3.1, Appendix A. Figure 3, Appendix B is a map showing the proposed sewage collection system.

3.6 COST ANALYSIS OF MAIN PUMP STATION AND FORCE MAIN TO SUNRIVER

The low pressure sewer collection system trunk mains will discharge into a wet well, which is assumed to be located just west of Harpers Bridge on the Deschutes River on the south side of Spring River Road. The wet well/pump station will then pump the sewage east along Spring River Road, then east along the northern boundary of Caldera Springs, under the railroad tracks, then generally following US Forest Service (USFS) roads north to the location of the proposed SELLC Wastewater Reclamation and Reuse property. The pump station design parameters are listed below.

- The proposed pipeline alignment is approximately 19,600 lineal feet (LF).
- The equivalent length incorporating minor losses from fittings is approximately 20,200 LF.
- The assumed elevations are 4,160 feet for the suction side free water surface and 4,266 feet for the discharge side. These are based on existing topography information from the Deschutes County GIS department. The overall elevation gain is 106 feet.
- There are four localized high spots along the proposed alignment that will require air release valves.
- The total number of lots pumping into the Spring River pump station is 3,975, based on future full build-out. Various methods were employed to estimate peak inflows at build-out that varied from 1,600 gallons per minute (gpm) to 2,500 gpm. WH Pacific determined that a build-out peak design flow 2,400gpm was appropriate.
- Design velocities should be between 3 and 7 feet per second (ft/s) to obtain required scour velocities and prevent excess pumping costs due to high head loss. 2,400 gpm meets these criteria in 14, 16 and 18 inch pipe diameters. To save on

pumping and material costs in 19,600 LF of force main, 16" pipe was selected. At 2,400 gpm, the velocity in a 16" diameter pipe is 4.1 ft/s

- Friction loss at 2,400 gpm through 20,200 LF equivalent length of 16 inch PVC force main is approximately 70 ft. The total dynamic head (TDH) is approximately 176 feet.
- Assuming a pump efficiency of 75 %, the required horsepower (Hp) at 2,400 gpm and 176 feet TDH is 142 Hp. The next standard available horsepower is 150 Hp.

The pump station will consist of a fiberglass or concrete wet well, two 150 Hp pumps, a valve vault and control panel. Due to phased construction of low pressure sewers in the collection area in addition to the fact that the collection area is currently only about 50% built, the pump station and force main will see low flows at startup. To account for this, initial float configurations or pressure transducer settings can be adjusted to prevent long cycle times and the pumps can operate on variable frequency drives (VFD) to allow for minimum 10 minute pump cycles to avoid damaging the pumps. There will be time periods during this initial startup stage that adequate scour velocities will not be accomplished in the 16 inch force main during normal VFD pump operation. The station can be programmed to operate at high flow rate at station startup to achieve scour velocity. Then the flow rate can be dropped to match inflow. The station shuts off at a predetermined low speed, such as 1,000 rpm, to prevent "ragging" at low speeds. The wet well will include an odor filter to minimize odors at the wet well. Likewise, the headworks at the Treatment Facility will include odor control and be designed to accept septic sewage. The station will be equipped with an automatic transfer switch and backup generator to power the pump station in the event of a power outage. The station will be designed to have all openings be at least one foot above the 100-year flood elevation based on FEMA Flood Insurance Rate Maps. There will be approximately 300 yards of wetlands between the pump station and the river. Costs are summarized in Table 3.1 as shown in Appendix A.

The distance from area 17 to the central pump station on Spring River road is approximately 10 miles. The most remote individual onsite pumps within the south study area will not have adequate pressure to reliably convey sewer flows and maintain appropriate scour velocity, so an intermediate pump station will be needed near South Century Drive and Huntington Road. The intermediate pump station will accept flows from the homes generally south of South Century Drive, and convey the flows north and west to the central pump station. The central station will send flows from the entire study area to the Lake Penhollow Wastewater Reclamation Site.

3.7 CONTINGENCY AND ENGINEERING COSTS

A percentage of the estimated construction hard costs, ranging from 15 to 20 percent, is added to account for contingencies.

3.8 OPERATION AND MAINTENANCE COST ANALYSIS

There are two components to the Operation and Maintenance (O&M) cost estimates.

1. Initial capital costs including the land and building for a shop, trucks, and other vehicles and equipment.

2. Annual operating and maintenance costs including salaries for O&M staff, supplies, electricity, etc.

The costs for these two components are summarized in Tables 3.2, Appendix A.

The cost estimate assumes that a separate (from SELLC), independent utility company will operate and maintain the South County sewer collection system. The cost estimates assume operation and maintenance for both 2,087 lots, and 3,975 lots.

Initial O&M Capital Costs

1. **Land for shop.** Estimated $80,000 for the 2,087 lots, and the same for the 3,975 lots.

2. **Shop building.** Estimate 2,000 square feet at $100 per square foot for the shop building, which would include a 12’ x 12’ office room with computer and phone. We estimate 3,000 square feet at $100 per square foot or $300,000 for the shop to serve the 3,975 lots.

3. **One-ton dump truck.** We estimate $35,000 for a one-ton dump truck capable of towing the mini-excavator to serve the 2,087 lots, and two one-ton dump trucks to serve the 3,975 lots ($70,000).

4. **Pickup.** We estimate one pickup to serve the 2,087 lots, and two pickups to serve the 3,975 lots, at $20,000 per pickup.

5. **Mini-excavator.** Estimate one mini-excavator with trailer and connection for the one-ton dump truck at $75,000 to serve the 2,087 lots and the 3,975 lots.

6. **Trailer mounted vactor unit.** We estimate $100,000 to purchase one trailer mounted vactor unit for either of the options.

7. **Purchase of tools and purchase of a utility locator.** We estimate $5,000 for either of the options for this item.

Annual Operating and Maintenance Costs

1. **Full Time Employees at Buildout.** An estimated two employees would operate and maintain the 2,087 lots at a cost of $55,000 per employee. It is estimated that

it would take three full time employees at $55,000 per employee to operate and maintain the collection system for 3,975 lots.

2. **Backhoe and Pickup Maintenance.** The estimate includes approximately 4% of the value of the one-ton dump truck, pickup and mini-excavator for the maintenance for both options, the 2,087 lots and the 3,975 lots.

3. **Shop Maintenance and Tool Replacement.** The estimate includes approximately $1,000 for both options for miscellaneous shop maintenance and tool replacement. This assumes the initial capital expenditure for major tool purchasing.

4. **Pump and Parts Replacement.** This estimate is for $12,000 for the 2,087 lots and $22,000 for the 3,975 lots. This assumes that approximately 4 pumps will need to be replaced per year with the 2,087 lots, and 7 pumps will need to be replaced per year with the 3,975 lots.

5. **Collection Piping Parts.** Estimated budget of $2,000 for the 2,087 lots for miscellaneous piping, valve repair, and related expenses. We assumed approximately $3,000 for this item for the 3,975 lots.

6. **Main Pump Station Maintenance.** An estimated average cost of approximately $2,000 per year for main pump station maintenance for the 2,087 lots, and $3,000 for the 3,975 lots was used. We anticipate the costs will be for wear items such as impellor, seals, building maintenance, and similar costs.

7. **Main Pump Station Electrical Cost at Buildout.** Using a 65 Hp pump and 11,000 gallons per minute, we estimated the number of minutes per day the pump station will be on at buildout. We used $0.05 per kilowatt hour to establish the $4,000 cost for the 2,087 lots. We used a 150 Hp pump at 2400 gallons per minute, and $0.05 per kilowatt hour to establish the $8,000 electrical cost for the 3,975 lots.

8. **Fuel.** We estimated $350 per month for the 2,087 lot project, and $550 per month for the 3,975 lot project. This cost was based on review of fuel costs for Sunriver Utility Company, and adjusted for the smaller number of staff people.

9. **Phone, Pager, Computer.** The estimate includes $2,400 for the 2,087 lots for a yearly cost to purchase and bills on cell phones, pagers, and cover computer use. We estimated $4,000 due to increased staff and equipment usage for the 3,975 lots.

10. **Bookeeping and Billings.** An estimated quarter-time bookkeeper for the 2,087 lots at a cost of $30,000, and a half-time bookkeeper for the 3,975 lots at $40,000 per year was used. We estimate it will be more expensive for the quarter-time

than the half-time employee because it will be more difficult to find someone to cover only quarter time.

11. **Utilities (phone, electric).** We estimated approximately $100 per month for utilities for the shop serving 2,087 lots and $2,000 a year or $167 per month for the shop to serve the 3,975 lots.

12. **Legal Expenses, Audits.** Estimate $4,000 for the 2,087 lots, and $6,000 for the 3,975 lots as an average yearly cost to hire these services to be completed.

13. **Insurance.** Estimate $500 per month for insurance, or $6,000 per year for the 2,087 lots, and $750 per month or $6,000 per year for the 3,975 lots.

CHAPTER 4.0 ALTERNATIVE FINANCING MECHANISMS

4.1 PURPOSE

This chapter will summarize the various mechanisms for financing the design and construction of sewerage facilities in the State of Oregon.

4.2 BACKGROUND

If the findings and conclusions of this feasibility study are accepted by Oregon DEQ and Deschutes County and the affected community, financing will need to be procured to prepare a facilities plan, and to design and construct the necessary facilities. Financing in this report are considered under two different scenarios: private loans and public loans/grants. Generally, public financing is sought because grants may be available and, in the case of loans, the interest rates are more favorable than those that are available from the private sector.

Subsidized financing from public institutions is only available to public entities such as cities, or municipal districts; it probably is not available to private companies such as SELLC. Because the ownership of the sewerage facility under consideration in this feasibility study may be split between privately-owned and publicly owned, both public and private financing may be needed. In order for public financing to be secured, a special district of some type will need to be formed to serve the service area under consideration in this feasibility study. In addition, a formal facilities plan will need to be prepared.

4.3 PRIVATE FINANCING

Private financing can be acquired through the sale of bonds or other financial instruments to banks or other private institutions. Available interest rates depend on a number of factors. One factor is risk. Risk can be mitigated by the amount and type of collateral used to back the loan, resulting in lower interest rates. The collateral could be in the form of real property (the sewage treatment plant, for instance) or a guarantee that sewer rates will be assessed as needed to pay back the bonds or loan. The other factor is the number of institutions competing for the loan or to buy the bonds. The more institutions that are in competition, the lower the interest rate. It should be clearly noted that under today's very difficult and stressed financial markets, it may be very difficult for SELLC to obtain private financing at reasonable rates or even at all. Moreover, as the business climate changes in the coming years, the level of viable return on investment may change considerably.

4.4 PUBLIC FINANCING

Public financing can potentially be obtained from three governmental institutions in Oregon:

1. State Revolving Fund administered by the Oregon Department of Environmental Quality (ODEQ);

2. Water and Wastewater Fund administered by the Oregon Economic and Community Development Department, (OECDD); and

3. Water and Wastewater Loans and Grants administered by the Rural Utilities Service of the U.S. Department of Agriculture (RUS).

Specific information about these institutions follows.

ODEQ

The Clean Water State Revolving Fund (CWSRF) Loan Program provides low-cost loans for the planning, design or construction of various water pollution control activities. The Oregon Department of Environmental Quality administers the program, and any public agency in Oregon is eligible for a CWSRF loan. Eligible agencies include cities, counties, sanitary districts, soil and water conservation districts, irrigation districts and various special districts.

Six different types of loans are available within the program including loans for planning, design, construction, emergencies, urgent repairs and local community projects. Interest rates for the loan program change quarterly and are based on a percentage of the national average municipal bond rate. Those percentages vary from 25% to 65%of the bond rate. For example, with a quarterly bond rate of 4.%, the CWSRF interest rates would range from 1.15% to 2.9%.

The low-interest rates and terms inherent with these loans make this program an attractive option to the municipal bond market. For example, a $4 million, 20-year loan with a CWSRF interest rate one percentage point lower than a bond would reduce the interest cost by about $500,000 over the life of the loan.

Interest rates effective for loans executed from January 1 through March 31, 2009 are indicated in the table below. This information was obtained from http://www.deq.state.or.us/wq/loans/loans.htm.

Loan Type	Repayment Term	Interest Rate	Annual Fee?
Planning	5 years	1.06%	No
Interim	Pd. when long-term financing is completed	1.06%	No
Design/Construction	5 years	1.06%	Yes
Design/Construction	10 years	2.34%	Yes
Design/Construction	15 years	2.55%	Yes
Design/Construction	20 years	2.77%	Yes

ODEQ reviews and scores all projects based on application information. Points are used to rank the project and are assigned based on specific ranking criteria (these criteria are located on the ODEQ Web site). Scored projects are initially listed by rank on the program's Applicants List. All applicants on this list are encouraged to complete the various program documents and provide details supporting the project's application. These documents may include environmental reviews, land-use compatibility statements and financial reports. Once ODEQ receives and approves all required project documentation, the project moves from the Applicants List to the Project Priority List, where it is considered for a loan agreement. Both the Applicants List and Project Priority List are included in an Intended Use Plan describing goals and program plans for each fiscal year.

ODEQ funds the project if sufficient loan monies are available. If monies are insufficient to fully fund all of the completed applications, projects are funded in Project Priority List order, with a maximum of 15 percent of the monies going to any one applicant. The program typically provides about $40 million annually for funding projects.

OECDD

The Oregon Department of Economic and Community Development Department (OECDD) administers a loan and grant program to provide for the design and construction of public infrastructure needed to ensure compliance with the Safe Drinking Water Act and/or the Clean Water Act.

A proposed project must be owned by a public entity that is an Eligible Applicant. Eligible activities include reasonable costs for construction improvement or expansion of drinking water, wastewater or storm water systems.

To be eligible, a system must have received, or is likely to soon receive, a Notice of Non-Compliance by the appropriate regulatory agency associated with the Safe Drinking Water Act or the Clean Water Act. Projects also must meet other state or federal water quality statutes and standards.

Eligible activities

- Water source, treatment, storage and distribution
- Wastewater collection and capacity
- Stormwater system
- Purchase of rights of way and easements necessary for construction
- Design and construction engineering

In addition, eligible projects must demonstrate that they will ensure that municipal water and wastewater systems comply with the Safe Drinking Water Act and/or the Clean Water Act. Further:

- The project must be consistent with the acknowledged local comprehensive plan.

- Recipient shall certify that a registered professional engineer will be responsible for the design and construction of the project.

Ineligible activities

- Privately owned facilities and infrastructure
- Purchase of property not related to infrastructure construction
- Costs incurred prior to award, except costs for engineering and other support activities necessary to construction (department approval required)

The fund provides both loans and grants, but it is primarily a loan program. The loan/grant amounts are determined by a financial analysis of the applicant's ability to afford a loan (debt capacity, repayment sources and other factors).

Loans

The maximum loan term is 25 years or the useful life of the infrastructure financed, whichever is less. The maximum loan amount is $15,000,000 per project through a combination of direct and/or bond funded loans.

Loans are generally repaid with utility revenues or voter approved bond issues. A limited tax general obligation pledge also may be required. "Credit worthy" borrowers may be funded through sale of state revenue bonds.

Grants

Grant awards are limited to a maximum of $10,000 per hookup. The maximum grant is $750,000 per project.

An applicant is not eligible for grant funds if the applicant's annual median household income is equal or greater than 100 percent of the state average median household income for the same year.

Rural Utilities Services

The Rural Utilities Services, U.S. Department of Agriculture, also operates a loan and grant program for wastewater infrastructure. For its programs, applicants must meet the following criteria.

- Be unable to obtain needed funds from commercial sources at reasonable rates and terms.

- Have the legal capacity to borrow and to repay loans, to pledge security for loans, and to operate and maintain the facilities.

- Propose facilities that are consistent with any development plans of the State, multi-jurisdictional area, counties, or municipalities where the project is to be located. All facilities must comply with Federal, State, and local laws, including those involving zoning regulations, health and sanitation standards, and water pollution control.

Grants may be provided when necessary to reduce user costs to a reasonable level. At the time this document was drafted, a reasonable level was $54 per month. They may cover a maximum of 75 percent of eligible facility development costs. Further, a community would only be eligible for grant assistance if the median income of the community does not exceed $41,230.

Loan guarantees may be available for up to 90 percent of any eligible loss incurred by the lender. Lenders pay a 1 percent guarantee fee, which may be passed on to the loan recipient.

Loan and grant funds may be used to:

- Construct, repair, modify, expand, or otherwise improve water supply and distribution systems and waste collection and treatment systems, including storm drainage and solid waste disposal facilities. Certain other costs related to development of the facility may also be covered.

- Acquire needed land, water sources, and water rights.

- Pay costs such as legal and engineering fees when necessary to develop the facilities.

The law authorizing the program allows a maximum repayment period of 40 years. However, the repayment period cannot exceed the useful life of the facilities financed or any statutory limitation on the applicant's borrowing authority.

Three interest rates are used. They are set periodically based on an index of current market yields for municipal obligations. The most current rates are available on the RUS Water and Environmental Programs Home Page on the Internet at http://www.usda.gov/rus/water/.

- **Poverty Rate** - The poverty interest rate is currently 2.38%. The poverty rate applies when:

  (a) The primary purpose of the loan is to upgrade existing facilities or construct new facilities required to meet applicable health or sanitary standards; and

  (b) The median household income (MHI) of the service area is below the poverty line for a family of four or below 80 percent of the Statewide Nonmetropolitan MHI (SNMHI).

- **Market Rate** - The market rate is set quarterly based on the average of the "Bond Buyer" 11-Bond Index over a four week period prior to the beginning of the quarter. It applies to loans for projects where the MHI of the service area exceeds the SNMHI. Currently, it is at 4 percent.

- **Intermediate Rate** - The intermediate interest rate is the poverty rate plus half of the difference between the poverty rate and the market rate, but not to exceed 3.25%. It applies to loans that do not meet the criteria for either the poverty rate or the market rate.

- Borrowers may choose the interest rate in effect on the date of loan approval or on the date of loan closing.

Loans are secured so as to adequately protect the Government's interest. Bonds or notes pledging taxes, assessments, or revenues may be accepted if they meet statutory requirements. A mortgage or other lien may also be taken on the applicant's property when State laws permit.

4.5 SUMMARY OF PUBLIC FINANCING ALTERNATIVES

There may be confusion or questions about how one determines which public financing alternative to seek. In almost all cases, the three sources of public financing (ODEQ, RUS, and OECDD) will meet with a prospective borrower at some stage of the facilities planning process. These agencies use this meeting to determine which one or more of them will finance the project.

4.6 MUNICIPAL, TAX-FREE BONDS

In lieu of obtaining financing through the public agencies listed above, a municipal government such as a city or county service or sanitary district, can issue tax-free municipal bonds.

Interest income generated by municipal bonds is generally exempt from federal income taxes and, if the bonds are held by an investor resident in the state of issuance, may be exempt from state and local income taxes. As a result, their stated interest rate may be less than that of fully taxable bonds and they may provide greater returns after taxes are taken into account.

Municipal, tax-free bonds would be purchased by private investors including, but not limited to banks, pension funds, and other financial institutions. As with other financial instruments, the interest will depend on how the bonds are secured and the number of institutions competing at auction for the purchase of the bonds.

4.7 FINANCING ASSUMPTIONS FOR THIS FEASIBILITY STUDY

For the purpose of determining an estimated cost to individual property owners, this feasibility study will assume that financing for the publicly-owned components of the sewerage facility will be procured from a State Revolving Loan from ODEQ. At the time this report was drafted, the 20 year State Revolving Loan interest rate for construction and design was 2.77% plus 0.5% annual administrative fee for an overall rate of 3.27%. For the corporately-owned components, the report assumes that private funding can be secured at an assumed interest rate of 6.00%. This is based on the assumption that a reputable company like SELLC will be deemed a relatively risk-free borrower and may require a level of publicly backed guarantees. For the individually-owned ATT systems, loans may be deemed to have a higher risk, so an interest rate of 8.00% was used.

Again, it must be noted and stated clearly that the above procurement of financing is in no way assured in either level of funding nor in interest rates. The rates assumed are considered to be reasonable relative to each other for the type of financial instrument being considered. Depending on future financial markets, these specific rates could change significantly. However, it is assumed that all would move up or down generally the same relative to one another.

CHAPTER 5.0 EVALUATION OF POTENTIAL MUNICIPAL GOVERNMENTS TO OVERSEE SEWAGE COLLECTION SYSTEM

5.1 PURPOSE

This chapter will identify and analyze potential municipal governments that could own, operate, and maintain the sewage collection system whose feasibility is being evaluated in this report.

Sunriver Environmental, LLC (SELLC) is a privately-owned utility company that provides wastewater collection, treatment and disposal for Sunriver Resort, and two adjacent resorts. Its wastewater facilities are authorized and regulated by the Oregon Department of Environmental Quality under a Water Pollution Control Facilities (WPCF) permit.

For expansion of a sewer system into the south Deschutes County to be feasible, there must be a public entity created to fund the construction of the sewer collection and transmission components. SELLC does not have the ability or desire to provide private financing for any of the construction of the sewer collection and transmission system in the south county. Thus a public utility entity would operate and maintain the facilities that collect and transport the sewage to SELLC. In addition, the public utility would assess and collect fees from users of the sewage collection system and contract with SELLC for treating and disposing of the treated sewage.

5.2 IDENTIFICATION OF POTENTIAL MUNICIPAL GOVERNMENTS

Under Oregon Revised Statutes, there are three types of public utilities that could be established to own and operate the sewage collection and transport facilities. These are 1) a county service district, 2) a sanitary district, or 3) a sanitary authority. A description of each of these follows. Please note that the statutes governing each of these types of municipalities contain numerous provisions in State law. The descriptions below do not include all of the provisions in the law; the descriptions contain only those provisions viewed by the author to be germane to this report.

County Service District

Oregon Revised Statute (ORS) 451 governs the establishment of a county service district. Under ORS 451, a service district can be formed to own and operate sewerage facilities as well as provide many other services, including but not limited to water supply and solid waste management. The service district is established by and governed by the County Board of Commissioners.

Powers and authorities provided for service districts under ORS 451 are as follows:

1. The order establishing the district is subject to referendum to the voters either by the Board of Commissioners or by petition.

2. ORS 451.490 allows the service district to finance the construction and operation of sewerage facilities by:

    a. Assessments against the property in the district with or without issuance of bonds.

    b. Service or user charges in the district.

    c. Connection charges.

    d. District ad valorem (property) taxes.

    e. Sale of bonds.

3. ORS 451.545 provides for the service district to issue general obligation and/or revenue bonds subject to an election by district electors.

4. Supervise, manage, control, operate and maintain service facilities.

5. Compel all residents and property owners in a district to connect their property, houses and structures requiring sewage disposal or surface drainage with adjacent sewers or other sewage or drainage facilities in the district.

6. Acquire by purchase, gift, devise, condemnation proceedings or by any other means, such real and personal property and rights of way, either within or without the county, as in the judgment of the governing body of the district, are necessary or proper in the exercise of the powers of the district, and to pay for and hold the same.

7. Make and accept contracts, deeds, releases and documents which, in the judgment of the governing body of the district, are necessary or proper in the exercise of the powers of the district.

8. Employ and pay necessary agents, employees and assistants associated with the facilities.

Sanitary District

Oregon Revised Statute (ORS) 450 governs the establishment of a sanitary district. Under ORS 450, a service district can be formed only to own and operate sewerage facilities. The sanitary district is established by order by the County Board of Commissioners, but is governed by a three or five member district board made up of electors or property owners within the district.

Powers and authorities provided for sanitary districts under ORS 450 are as follows:

1. Although not specifically stated in Statute, a sanitary district is established by an order of the County Board of Commissioners. The statue does not state if the order from the district is subject to referendum of the electors within the district. A district may also be formed via a petition to the Board of Commissioners.

2. Acquire, construct, reconstruct, alter, enlarge, renew, replace, operate and maintain such sewage collection and disposal systems as in the judgment of the board, are necessary and proper for the area of the district. In the performance of these functions, either in or out of the district, the sanitary district may join with any other public body as defined in ORS 174.109, a federal agency or another state in the joint establishment, maintenance and operation of such works, and may contract therefore within the limits of authority conferred by ORS 450.005 to 450.245.

3. Acquire by purchase, gift, devise, condemnation proceedings or otherwise, such real and personal property and rights of way, either within or without the limits of the district as in the judgment of the board, are necessary or proper to the exercise of its powers, and to pay for and hold the same.

4. Make and accept contracts, deeds, releases and documents that, in the judgment of the board, are necessary or proper in the exercise of any of the powers of the district.

5. Issue bonds as provided in ORS 450.095 to 450.125. The issuance of bonds, whether general obligation or revenue bonds, are subject to an election of the electors of the district.

6. Determine the rate of levy of taxes in the district, and fix sewer rentals, charges and assessments as provided in ORS 450.130 to 450.175.

7. Employ and pay necessary agents, employees and assistants associated with the facilities.

8. Lay its sewers and drains in any public street or road in the county, and for this purpose enter upon it and make all necessary and proper excavations, restoring it to its proper condition. However, the consent of the proper city, county or state authorities, as the case may be, shall first be obtained and the conditions of such consent complied with.

9. Call all necessary elections.

10. Compel all residents and property owners in the district to connect their houses and structures requiring sewage or drainage disposal with adjacent street sewers, drains or other sewage disposal system of the district.

11. Do any act necessary or proper to the complete exercise and effect of any of its powers or for the purposes for which it was formed.

12. The sanitary board may enact ordinances levying sewer service charges within the district, for the purpose of financing the construction, operation and maintenance of the sewage collection and disposal system.

Sanitary Authority

A sanitary authority is governed by ORS 450.705 through 450.990. An authority is established by order of the County Board of Commissioners and is governed by a board of five persons made up of electors within the boundaries of the authority. The concept of a sanitary authority was developed by the Oregon Legislature in recognition that "sewage disposal, drainage, insect control and related problems in many of the areas of the state where the population is rapidly expanding can best be solved through the cooperative and integrated effort and support of unincorporated and incorporated areas." In other words, a sanitary authority was intended to be employed in situations where sewage management might be more efficiently and cost-effectively provided by combining the sewerage facilities of two or more sanitary districts, county service districts and/or incorporated cities into a single entity.

The powers, authorities, requirements and limitation of a sanitary authority are similar to those provided for county service districts or sanitary district.

Private Utility

It might seem conceivable that a private utility could be formed to own and operate the sewage collection and transport facilities being considered in this feasibility study. A private utility, however, is not eligible for governmental financial subsidies such as grants or low interest loans. For this reason, a new private utility is not being considered in this feasibility study.

5.3 COMPARISON OF MUNICIPAL ALTERNATIVES

The advantages or disadvantages of a specific governmental entity, whether a county service district, sanitary district or sanitary authority, will, in many cases, depend on the perspective of the individual making the comparison.

In this comparison, a sanitary authority will not be further considered. This is because a sanitary authority is generally intended for use when two or more districts or incorporated cities find it useful to merge and combine sewerage facilities. This is not the case in the circumstances of this feasibility study. Further, the properties and authorities of a sanitary authority are essentially the same as that of a sanitary district.

Governing Board

One of the continuing problems with sanitary districts, particularly ones with small populations, is finding people willing to serve on the governing board. The effectiveness and efficiency of a district is dependent on the governing board. The advantage of a county service district is that it automatically has a governing board - the Board of County Commissioners.

While the Board of County Commissioners may agree that it would provide a more stable governing board for the sewerage facility under consideration in this feasibility study, the Board may also believe it is not in the best interest of the entire county for it to take on the responsibilities of managing sewerage facilities in one portion of the county. If the Board did take on the responsibility, it would mean a significant additional burden to the County that it does not already have.

From the perspective of the citizens in the area to be served by sewer, the citizens may feel that their interests would be better served if it is governed by those who are paying the bill for the sewer service.

Other Considerations

Regardless of SELLC's eventual governing method, before it decides it will provide sewage treatment for another district, it must be satisfied that the other municipal government responsible for the sewage collection and transport system in south Deschutes County will be able to fulfill its contractual obligations. If and when this latter district is established, it will need the administrative and legal capacity to negotiate and comply with a contract with SELLC for sewer service. The entity will also need to hire staff and consultants to begin the process of designing, constructing, and operating its component of the sewerage facility. There also needs to be money to finance these start-up costs.

A county service district may have access to the resources to cover start-up costs; a newly formed sanitary district would likely not unless, at the time the district is formed, an assessment charge is established against properties within the district.

Recommendation

The most appropriate type of governing body to manage sewage collection and transport will be determined by the Deschutes County Board of Commissioners. A sanitary district would work the best for the following reasons:

1. The property owners who would pay for the facilities would also be responsible for governing the facilities.

2. The County Board of Commissioners would not be encumbered with the added responsibility of governing a sewerage facility.

CHAPTER 6.0 COST ANALYSIS SUMMARY

6.1 PURPOSE

This chapter will combine and summarize the cost projections established in Chapters 2 and 3. In addition, this chapter will project monthly sewer rates (assuming full build-out) for the various sewage collection and treatment options using two different interest rate scenarios.

6.2 BACKGROUND

In general, there are four components of cost with the construction and operation of a community sewerage facility. These components are:

1. The capital cost of construction of the treatment and disposal facilities.
2. The capital cost of construction of the sewers that collect and transport sewage from buildings to the sewage treatment plant. This could include the major pump stations and force mains.
3. Individual building connections
4. Operation and maintenance costs.

6.3 COST APPORTIONMENT ANALYSES

Treatment and Disposal

Currently, SELLC is obligated by the Oregon Department of Environmental Quality (ODEQ) to upgrade its sewage treatment process so it can produce a Class A recycle water. Class A recycle water can be irrigated on a golf course with few restrictions according to ODEQ regulations for recycled water.

The property owners currently served by SELLC are therefore obligated to contribute to the cost of upgrading the SELLC sewerage facilities. Property owners in South Deschutes County will also benefit if their sewage is collected and managed by the upgraded sewerage facilities if this option is selected.

Because the current users of SELLC and the property owners in south county will both benefit from the construction and use of the expanded, relocated sewerage facility, the capital costs should be shared equally among the two groups in proportion to the number of properties being served.

Sewers and Pump Stations

Capital costs for the interceptor sewers and associated pump stations to transport the sewage to the treatment plant will be the sole responsibility of a unit of government formed to manage the collection of sewage in south Deschutes County. (Hereinafter, this unit of government will be referred to as the District.) The typical means for apportioning the costs to the District patrons is to divide the total cost by the number of potential connections within the District. Assuming that all of the connections are for single family dwellings, this would be simple and fairly equitable. Since there are commercial buildings connected to the system, their charges could be based upon their sewage flow in proportion to an equivalent single family dwelling.

Individual Building Connections

The cost of connecting each existing building to the pressure sewer main in the street will vary depending on the circumstances associated with the building and its location on the lot. The cost will include pumping and abandoning the existing septic tank, installation of a small pump station, installation and connection of a pressure line between the pump station and the pressure sewer main, and connection of the existing building sewer to the pump station. Typically, the lot owner is responsible for pumping out and properly abandoning the septic tank (pursuant to ODEQ regulations) and for installing a gravity sewer to the pump station. For this study, it is assumed that each individual pump station and the service lateral to the pressure sewer main would be part of the project and would be the responsibility of the District. These latter costs would be shared equally among all property owners.

For undeveloped properties, this cost would be based on actual expenditures to make the connection and would be paid at the time the property is developed.

Operation and Maintenance

Operation and maintenance (O&M) costs for the interceptor, associated pump stations, pressure sewer mains, and individual building pump stations (except for electricity to power the building pump stations which will be borne by the property owner) will be the responsibility of the District. This cost should be distributed equally to the users except for those commercial users which might be assessed on actual sewage flow.

O&M costs associated with the pump station at the site of the existing sewage treatment plant would be borne by SELLC.

O&M costs associated with the sewage treatment plant, effluent storage and effluent disposal would be split between SELLC and the District. These costs could be divided based upon actual flows coming into the treatment plant from the District and the resorts or upon anticipated or design flows.

6.4 COMPARISON OF ESTIMATED CAPITAL COSTS

Table 6.1, Appendix A, displays the estimated capital costs of all of the scenarios discussed in Chapters 2 and 3. The capital cost per lot ranges from $18,700 to $19,100 for a centralized treatment plant and collection system.

6.5 COMPARISON OF ESTIMATED MONTHLY COSTS

Table 6.2, Appendix A, displays the estimated monthly costs for each scenario assuming that the capital costs are financed over 20 years. Three different financing scenarios are evaluated. The first interest rate scenario assumes no grants and that the privately owned facilities would not receive public financing. Components owned and operated by SELLC are assumed to be funded using private financing (which in all likelihood will not be entirely possible). In addition to debt service, an assumed return rate is included in the rate. This return rate is for comparison purposes only and actual return rate will be a business decision at the time based on market conditions. Publicly-owned facilities, however, would be financed at the current ODEQ State Revolving Fund interest rate of 3.27%.

The second financing scenario assumes that all of the capital costs can be financed at the current ODEQ State Revolving Fund interest rate of 3.27%. This scenario may not be viable because ODEQ State Revolving is limited to public facilities. This second scenario could be viable if SELLC facilities were purchased by a municipal government like a sanitary district.

The third financing scenario assumes that the Rural Utilities Services (RUS) would provide a grant to reduce monthly costs to a maximum level generally imposed on other similar communities. Currently, this monthly rate is $54.00/month. It is currently limited to areas with a median income not exceeding $41,230. RUS apparently will not fund the house connection (that portion of the collection system from the property line to the house). This financing scenario assumes that the house connection would be financed by the DEQ state revolving fund at a rate of 3.27%. Therefore, the monthly cost for the south county area would be $54.00 plus the cost of financing the house connection. This funding scenario did not include Sunriver under the grant funding option because its monthly rate is already close to or under the $54.00 per month rate.

The comparisons in Table 6.2 clearly show the obvious: lower interest rates for capital costs lower the monthly rates and grants would lower it further. It would be to the advantage of the people served by the project to maximize the amount of capital costs financed by subsidized interest rates and grants from State and/or Federal agencies

It should be noted from Chapter 4 that none of the governmental lending institutions will be able to finance the millions of dollars for these project in a single year. For instance, the ODEQ State Revolving Fund limits its funding to no more than 15% of available funds (likely around $6 million) in any one year. Therefore, implementation of this project may need to be staged over several years, which would be the likely case anyway.

If the projects contemplated by this feasibility study proceed, a pre-design facilities plan will need to be developed. This plan will include a financing plan which lays out how the project will be financed. Development of the financial plan will likely include a pre-meeting with the governmental lending institutions to discuss the best way to finance the project.

Because of the expense of any of the sewage treatment options, low income property owners may find any option unbearably burdensome. For this reason, the financial plan should consider an option where the costs are deferred until the property is sold, at least, for low income people.

CHAPTER 7.0 FEASIBILITY ANALYSIS

7.1 PURPOSE

The purpose of this chapter is to analyze the feasibility of providing community sewerage service facilities to portions of South Deschutes County south of Sunriver. The analysis will consider land use requirements, costs and other aspects of feasibility.

7.2 LAND USE CONSIDERATIONS

Statewide land use regulations in Oregon generally prohibit community sewerage facilities in areas outside urban growth boundaries or other areas where such systems have been allowed by an exception process approved by local government and the Oregon Department of Land Conservation and Development (DLCD). One basis for an exception occurs if the Department of Environmental Quality (ODEQ) determines that a potential public health hazard exists as a result of sewage disposal practices and, in this case, ODEQ determines the public health hazard cannot be adequately abated by the repair or maintenance of existing sewer systems or on-site systems or by the installation of new on-site systems as defined in OAR 340-071-0100. The term practicable means that it is capable of being put into <u>practice</u> or of being done or accomplished.

7.3 ANALYSIS RELATIVE TO COST

Table 6.2 summarizes the monthly costs for each scenario of the various potential scenarios. Depending on the type and cost of financing that could be applied, none of the scenarios can be discarded because of cost. The costs are all relatively expensive, but not unreasonable. Some will likely disagree with the assertion that the costs are reasonable. If the potential alternative to upgraded sewage treatment is a worthless home because of the lack of safe, unpolluted drinking water, then expensive sewage treatment facilities may seem more acceptable, desirable, and the cost, therefore, reasonable.

7.4 CONCLUSIONS RELATIVE TO FEASIBILITY

Construction and operation of a community sewerage facility to serve Areas 1 through 21 excluding Area 7 is concluded to be feasible based upon the following findings:

1. The cost of providing community sewerage facilities is not unreasonable.

2. A community sewerage facility will provide verifiable assurance that the groundwater in the areas of consideration will be protected from groundwater pollution due to nitrate and other pollutants from current development.

7.5 NEXT STEPS

Assuming that the Deschutes County Board of Commissioners (Board) agrees with the conclusions of this report, the following steps are recommended:

1. Subject to approval by vote of the affected property owners, the Board forms a sanitary district. The articles of formation should include a charter and an assessment charge per property to finance operations of the district. The Board may wish to convene an advisory group of affected property owners to oversee the charter and assessment charge.

2. The election to approve the sanitary district should include election of a board of directors.

3. Assuming the district is approved by property owners and a district board is elected, the district should retain a manager to oversee preparation of a facilities plan.

4. The facilities plan would evaluate all potential collection, treatment and disposal options. It would develop a detailed financing plan and would assess potential environmental impacts and determine the most cost effective system to design.

5. Following the facilities plan adoption, financing would be procured and design would proceed.

6. Construction would then follow.

APPENDIX A

TABLES

Table 1.1: Study Area Development, Groundwater, and Septic Failure Data by Sub-Areas

Area	# of Lots	# of Lots in High GW[1]		# of Lots NOT in High GW		% of lots in High GW	County-Owned	# of Septic Failures	% Failures
		House	No House	House	No House				
1	24	0	0	22	2	0.0%	0	3	12.5%
2	177	3	44	105	25	26.6%	6	27	15.3%
3	85	43	12	16	14	64.7%	1	18	21.2%
4	871	104	535	157	75	73.4%	53	69	7.9%
5	210	65	84	40	21	71.0%	6	17	8.1%
6	637	192	341	68	36	83.7%	32	62	9.7%
7	0	0	0	0	0	0.0%	0	0	0.0%
8	83	27	41	7	8	81.9%	4	9	10.8%
Lots 1-8	**2087**	**434**	**1057**	**415**	**181**	**71.4%**	**102**	**205**	**9.8%**
9	7	3	4	0	0	100.0%	0	0	0.0%
10	102	0	0	78	24	0.0%	0	29	28.4%
11	249	111	117	13	8	91.6%	5	43	17.3%
12	40	13	14	8	5	67.5%	0	0	0.0%
13	223	1	10	152	60	4.9%	1	24	10.8%
14	465	184	170	53	58	76.1%	3	42	9.0%
15	151	36	22	64	29	38.4%	3	32	21.2%
16	384	47	241	42	54	75.0%	23	19	4.9%
17	58	10	6	20	22	27.6%	0	6	10.3%
18	12	0	0	6	6	0.0%	0	1	8.3%
19	32	5	5	8	14	31.3%	0	1	3.1%
20	52	15	3	17	17	34.6%	1	10	19.2%
21	113	34	13	50	16	41.6%	1	34	30.1%
Lots 9-21	**1888**	**459**	**605**	**511**	**313**	**56.4%**	**37**	**241**	**12.8%**
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	**139**	**446**	**11.2%**

Notes:

1. Lots were included in this column if any portion of a given lot was in the areas showing high groundwater on the map in Figure 1.

Table 2.1: Sewage Treatment Plant Construction Cost Summary 2010 Dollars

Project	Description of Project	New Plant	New Plant Plus 2087	New Plant Plus 3975	(SF)[1] Scale Factor	Scaling Basis
1	Headworks	$1,432,000	$1,842,000	$2,140,000	0.6	Peak Day Flow
2	Relocate FET	$60,000	$60,000	$60,000	N/A	None
3	New FET	$479,000	$617,000	$716,000	0.6	Peak Mo. Flow
4	Membrane Treatment	$6,735,000	$9,425,000	$11,509,000	0.8	Peak Mo. Flow[2]
5	Ultraviolet Disinfection	$151,000	$194,000	$225,000	0.6	Peak Mo. Flow
6	Plant Water Pump Station	$41,000	$53,000	$62,000	0.6	Peak Mo. Flow
7	Dewatering	$558,000	$717,000	$833,000	0.6	Peak Wk. Solids
8	Cake Storage	$200,000	$257,000	$299,000	0.6	Peak Wk. Solids
9	Plant Air System	$139,000	$179,000	$209,000	0.6	Peak Mo. Flow
10	Infrastructure and Modifications					
A	Additional Lake Storage	$750,000	$1,400,000	$2,000,000	N/A	W.H. Estimate
B	Booster Pump and Force Main	$1,628,000	$1,628,000	$1,628,000	N/A	W.H. Estimate
C	Biosolids Processing	$876,000	$994,000	$1,071,000	0.3	Peak Mo. Flow
D	Effluent Disposal	$409,000	$1,010,600	$1,602,000	N/A	W.H. Estimate
11	Non-Process Buildings and Facilities	$1,140,000	$1,140,000	$1,140,000	0.6	Peak Mo. Flow
12	Odor Control	$25,000	$32,000	$38,000	0.6	Peak Day Flow
13	New Engine Generator	$135,000	$174,000	$202,000	0.6	Peak Mo. Flow
14	Sludge Storage	$359,000	$462,000	$536,000	0.6	Peak Mo. Solids
15	Site Demolition	$449,000	$449,000	$449,000	N/A	None
	Project Hard Cost	**$15,566,000**	**$20,633,600**	**$24,719,000**		
	Contingency	$3,113,000	$3,508,000	$3,708,000		
		20%	*17%*	*15%*		
	Engineering	$3,113,000	$3,508,000	$3,708,000		
		20%	*17%*	*15%*		
	Estimated Construction Cost	**$21,792,000**	**$27,650,000**	**$32,135,000**		
	Project Management (Allowance)	$1,000,000	$1,200,000	$1,400,000		
	Legal & Administrative (Allowance)	$400,000	$400,000	$400,000		
	Total Project Cost	[illegible]	[illegible]	[illegible]		

Notes:

1. Where a scaling factor is used the remote site costs have been adjusted as follows: $ = $Remote X (Q2/Q1)^SF.
2. A higher scaling factor (0.8) has been used for the membrane treatment process because the costs are more directly related to flow rate (flux) through the membranes. In other words, the number of membranes required is directly proportional to the flow rate.

Table 2.2: Effluent Storage and Irrigation Estimated Costs

SCENARIO	Sunriver Buildout New Plant 5400 EDU	Sunriver New Plant Plus 2087 7494 EDU	Sunriver New Plant Plus 3975 9375 EDU
Storage			
Hold the leakage created by Lining Woodlands 17, (100,000 gpd*150 days)	15,000,000	15,000,000	15,000,000
Add 500 EDUs Caldera (500*25000 gallons)	12,500,000	12,500,000	12,500,000
Add S.C. 2000 EDUs (2000*25000 gallons)		50,000,000	100,000,000
Add S.C. 4000 EDUs (4000*25000 gallons)			
Total Additional Storage Needed, gallons	27,500,000	77,500,000	127,500,000
Acres at 20' average depth	5	14	23
New Pond at Lake Penhollow site, $150,000/AC for the small pond, reducing to about $87,000 per acre for the large pond.	$750,000	$1,400,000	$2,000,000
Irrigation			
Additional Irrigation Acres at 36"/AC. Volume to store in gallons/7.48/43560/3	28	79	130
Clearing and Grading cost (avg $4,000/acre)	$112,000	$316,000	$520,000
Mainline cost ($3,000/acre)	$84,000	$237,000	$390,000
Handline cost ($2400/acre) Rob, Cascade Pump	$67,200	$189,600	$312,000
Harvesting equipment ($2,000/acre)	$56,000	$158,000	$260,000
New Irrigation Pump Station Cost	$90,000	$110,000	$120,000
Totals	$409,200	$1,010,600	$1,602,000

Table 2.3: Projected Annual Operation and Maintenance Costs for Treatment, Storage, and Irrigation

Note	Category	Current Total Treatment & Irrigation Costs	Alternative Scenerios: Projected Costs at Sunriver Buildout	Alternative Scenerios: Projected Costs with 2087 Additional Customers from South County	Alternative Scenerios: Projected Costs with 3975 Additional Customers from South County
1	Labor	$266,500	$272,500	$286,250	$300,000
2	Building Maintenance	$6,500	$7,366	$9,100	$10,834
3	Contract Services	$33,000	$33,000	$33,000	$33,000
4	Electrical/Mechanical	$19,200	$21,400	$27,500	$31,900
5	Electricity	$78,300	$92,200	$134,700	$168,600
6	Maintenance	$21,600	$24,000	$30,900	$35,900
7	Equipment Purchase	$24,800	$27,600	$35,500	$41,200
8	Gas	$8,000	$8,400	$9,600	$10,300
9	Landscaping	$4,700	$4,700	$4,700	$4,700
10	Licenses and Permits	$3,200	$3,200	$3,200	$3,200
11	Supplies	$8,000	$8,900	$11,400	$13,300
12	Vehicles	$19,500	$19,500	$19,500	$19,500
13	Waste Removal	$4,000	$4,800	$7,300	$9,300
	Chemicals				
14	Chlorine (6% Bleach)	N/A	$2,250	$3,400	$4,400
15	Polymer	$7,800	$9,400	$14,200	$18,300
16	Miscellaneous	$4,600	N/A	N/A	N/A
17	Membrane Replacement	N/A	$19,200	$29,200	$37,500
18	Revenue (Compost Sales)	($88,000)	($99,730)	($123,200)	($146,670)
19	Administrative Costs				
	Labor	$121,500	$135,260	$173,906	$202,012
	Other Expenses	$170,300	$189,562	$243,609	$283,153
	Total:	$713,500	$783,508	$953,765	$1,080,429
	Cost per Customer per Month		$12.09	$10.62	$9.60

Table 3.1 Project Cost Summary for Collection System 2009/2010 Dollars

Total Customers:	2,087	3,975
Description of Project	Areas 1-9 except Area 7	Areas 1-21 except Area 7
Pressure Sewer Line Construction	$7,031,410	$19,792,260
Pressure Sewer Main Crossing Over the Deschutes River, South Site of Harpers Bridge	$65,000	
Four Pressure Sewer Main Crossings Over the Deschutes and Little Deschutes Rivers		$260,000
Pressure Sewer Main Crossing Under Railroad	$95,000	$95,000
Pressure Sewer Main Crossing Under South Century Drive at Spring River Road	$21,000	$21,000
Central Pump Station	$300,000	$350,000
Pressure Force Main Distance, feet	19,400	19,400
Pressure Force Main Cost @ $90/linear foot	$1,746,000	$1,746,000
Intermediate Pump Station		$300,000
Initial Operation and Maintenance Equipment	$515,000	$670,000
TOTAL HARD COST	$9,773,000	$23,234,000
Contingency	**17.00%**	**15.00%**
	$1,661,410	**$3,485,100**
Engineering	**12.00%**	**12.00%**
	$1,172,760	**$2,788,080**
Estimated Construction Cost	**$12,607,170**	**$29,507,180**
Project Management (Allowance)	**$800,000**	**$1,000,000**
Legal & Administrative (Allowance)	**$600,000**	**$800,000**
Total Collection/Transmission Cost:	$14,007,000	$31,307,000
Residential Grinder Pump and Connection (per Lot Basis)	$5,400	$5,400

Table 3.2 Projected Operation and Maintenance Costs for Sewage Collection

ANNUAL COSTS								
			South County 2087 Lots			South County 3975 Lots		
Item	Description	Unit	Quantity	Unit Cost	Cost	Quantity	Unit Cost	Cost
1	Full Time Employees at Buildout	Ea	2	$55,000	$110,000	3	$55,000	$165,000
2	Backhoe and pickup Maintenance	LS	1	$5,000	$5,000	1	$8,000	$8,000
3	Shop maintenance and Tool replacement	LS	1	$1,000	$1,000	1	$1,000	$1,000
4	Pump and Parts Replacement	Ea	1	$12,000	$12,000	1	$22,000	$22,000
5	Collection Piping Parts	LS	1	$2,000	$2,000	1	$3,000	$3,000
6	Main Pump Station Maintenance	Ea	1	$2,000	$2,000	1	$3,000	$3,000
7	Main Pump Station Electricity at buildout	LS	1	$5,500	$5,500	1	$10,000	$10,000
8	Fuel	LS	1	$3,500	$3,500	1	$6,000	$6,000
9	Administrative, communications	LS	1	$5,500	$5,500	1	$8,000	$8,000
	Totals				$146,500			$226,000
	Monthly charge				$5.85			$4.74
INITIAL CAPITAL COSTS								
1	Land for Shop	LS	1	$80,000	$80,000	1	$80,000	$80,000
2	Shop Building	SF	2000	$100	$200,000	3000	$100	$300,000
3	One Ton dump	Ea	1	$35,000	$35,000	2	$35,000	$70,000
4	Pickup	Ea	1	$20,000	$20,000	2	$20,000	$40,000
5	Mini Excavator	Ea	1	$75,000	$75,000	1	$75,000	$75,000
6	Trailer mounted Vactor Unit	Ea	1	$100,000	$100,000	1	$100,000	$100,000
7	Tools, with locator	LS	1	$5,000	$5,000	1	$5,000	$5,000
	Totals				$515,000			$670,000

Table 6.1 Project Cost Summary 2010 Dollars

Sunriver Customers:	5400		5400	
South County Customers:	2,087		3,975	
Project Component	New Plant Plus 2087 So. Co.		New Plant Plus 3975 So. Co.	
	Sunriver Share	South Deschutes County Share	Sunriver Share	South Deschutes County Share
Community Sewage Treatment, Storage and Irrigation at Sunriver	**$29,250,000**		**$33,935,000**	
	$21,097,000	$8,153,000	$19,547,000	$14,388,000
SDC-Recovery of Value of Sewer Company	**$25,000,000**		**$25,000,000**	
Prorated SDC-Recovery of Value of Sewer Company	$19,425,000	$5,575,000	$16,520,000	$8,480,000
Sewage Collection System w/o on-site connection costs (i.e individual pumps, building sewers, septic tank decommissioning, etc)		$14,007,000		$31,307,000
Individual House Pump Unit Costs @$5400/lot		$11,269,800		$21,465,000
Facilities Plan and Permit Costs [1]	$216,375	$83,625	$172,800	$127,200
Total Capital Costs	$40,738,000	$39,088,000	$36,240,000	$75,767,000
Total Capital Costs/Lot		$18,729		$19,060

Notes:

1. Facilities Plan and Permitting Costs are assumed to be $300,000 and, where applicable, are divided between units based upon the number of lots in the respective units.

Table 6.2 Projected Monthly Costs at Various Interest Rates

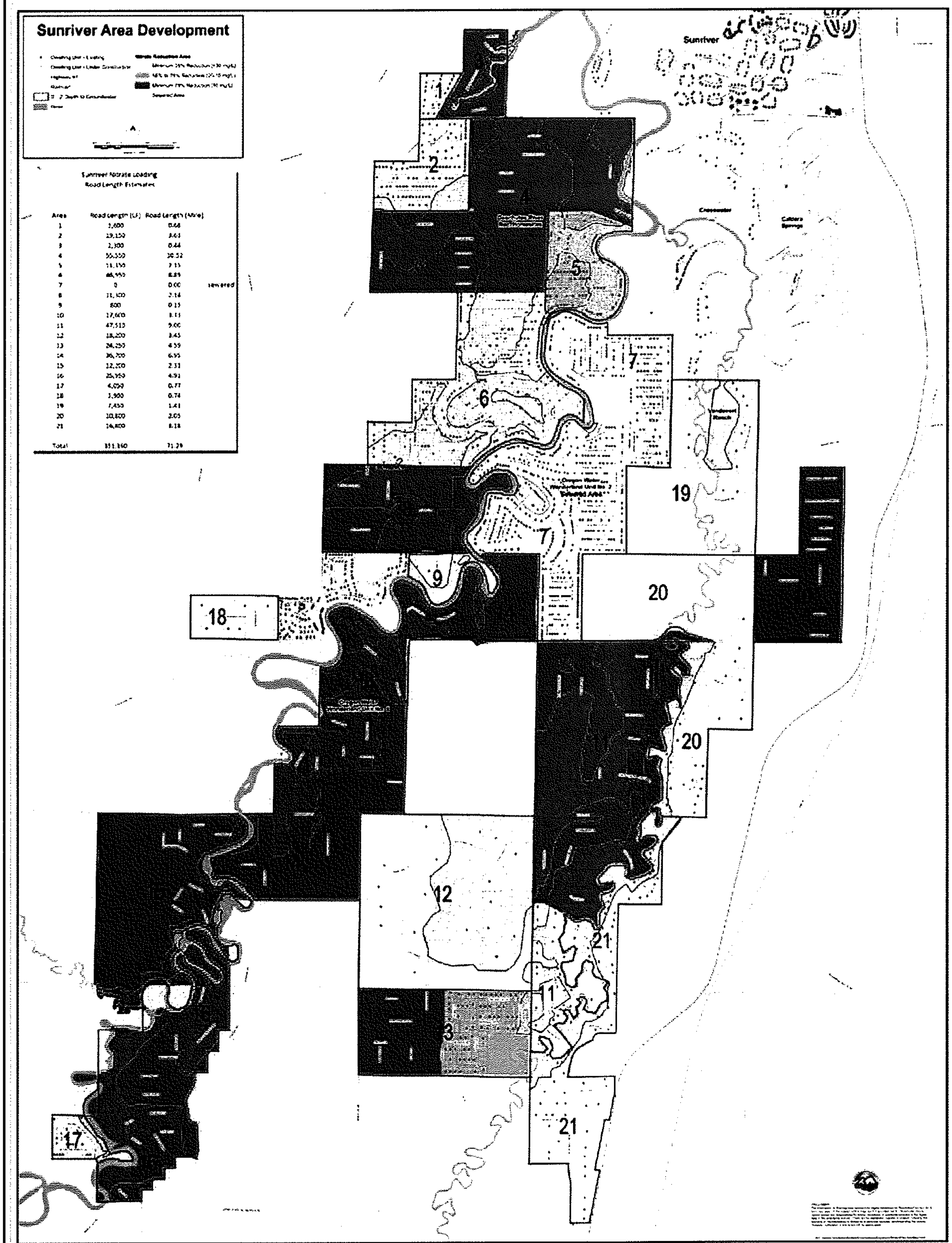
Sunriver Customers:	5,400		5,400	
South County Customers:	2,087		3,975	
Project Component	**New Plant Plus 2087 South County.**		**New Plant Plus 3975 South County**	
	Sunriver Share	**South Deschutes County Share**	**Sunriver Share**	**South Deschutes County Share**
Community Sewage Treatment, Storage and Irrigation at Sunriver	$29,250,000		$33,935,000	
	$21,097,000	$8,153,000	$19,547,000	$14,388,000
SDC-Recovery of Value of Sewer Company	$19,425,000	$5,575,000	$16,520,000	$8,480,000
Sewage Collection System including on-site connection costs (i.e individual pumps, building sewers, septic tank decommissioning, etc)	$0	$25,277,000	$0	$52,772,000
Facility Plan and Permit Costs	$216,000	$84,000	$173,000	$127,000
Total Capital Cost of Option	$40,738,000	$39,089,000	$36,240,000	$75,767,000
Financing Scenario #1- Public/Private Funding				
Monthly Capital Cost	$107.80	$163.04	$95.90	$157.82
O&M Cost	$13.62	$16.47	$12.60	$14.34
Total	[illegible]	$179.50	$108.50	$176.90
Financing Scenario #2 - Public Funding				
Monthly Capital Cost	$42.87	$106.42	$38.13	$108.31
O&M Cost	$13.62	$16.47	$12.60	$14.34
Total	[illegible]	$122.89	$50.74	$122.65
Financing Scenario #3 - Public Funding with Grant				
Monthly Capital Cost	$42.87	$84.68	$38.13	$84.68
O&M Cost	$13.62	See Note 6	$12.60	See Note 6
Total	$56.48	$84.68	$50.74	$84.68

Notes for Table 6.2:

1. Private Funding in Scenario #1 assumes private funding sources for treatment plant construction at reasonable rates will be available at time of construction. Based on current economic conditions there is no assurance that such will be possible.
2. Public Funding Scenario #2 does not consider grant money or debt forgiveness.
3. Public Funding Scenario #2 assumes a circumstance whereby public money can be used for the construction of the capital improvements of the currently private sewer company.
4. For comparison purposes, all rates shown in the table are based on 100% participation and build out of all potential users. This will not be likely for many years into the project. Thus, in the intervening period, rates would vary based on staging of construction, costs and users.
5. The above analysis is provided for comparative purposes. Many variables remain for consideration before an informed decision between SELLC and the various involved entities can be concluded.
6. In Scenario #3, O&M costs would be included in the $54.00 maximum monthly rate established by the U.S. Rural Utilities Service, U.S. Department of Agriculture.

APPENDIX B

FIGURES



Sunriver Nitrate Loading
Road Length Estimates

Area	Road Length (LF)	Road Length (Mile)	
1	3,600	0.68	
2	19,150	3.63	
3	2,300	0.44	
4	55,550	10.52	
5	11,150	2.11	
6	46,950	8.89	
7	0	0.00	sewered
8	11,300	2.14	
9	800	0.15	
10	17,600	3.33	
11	47,515	9.00	
12	18,200	3.45	
13	24,250	4.59	
14	36,700	6.95	
15	12,200	2.31	
16	25,950	4.91	
17	4,050	0.77	
18	3,900	0.74	
19	7,455	1.41	
20	10,800	2.05	
21	16,800	8.18	
Total	351,160	71.29	

NEWTON CONSULTANTS INC.
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South Deschutes County Sewage Collection Feasibility Study Area

DESIGNED BY:	DRAWN BY:	DATE:	PROJECT NO.	
D.Nichols	S.Schenck	Jan 2010	1053-104-1AA	FIGURE 1

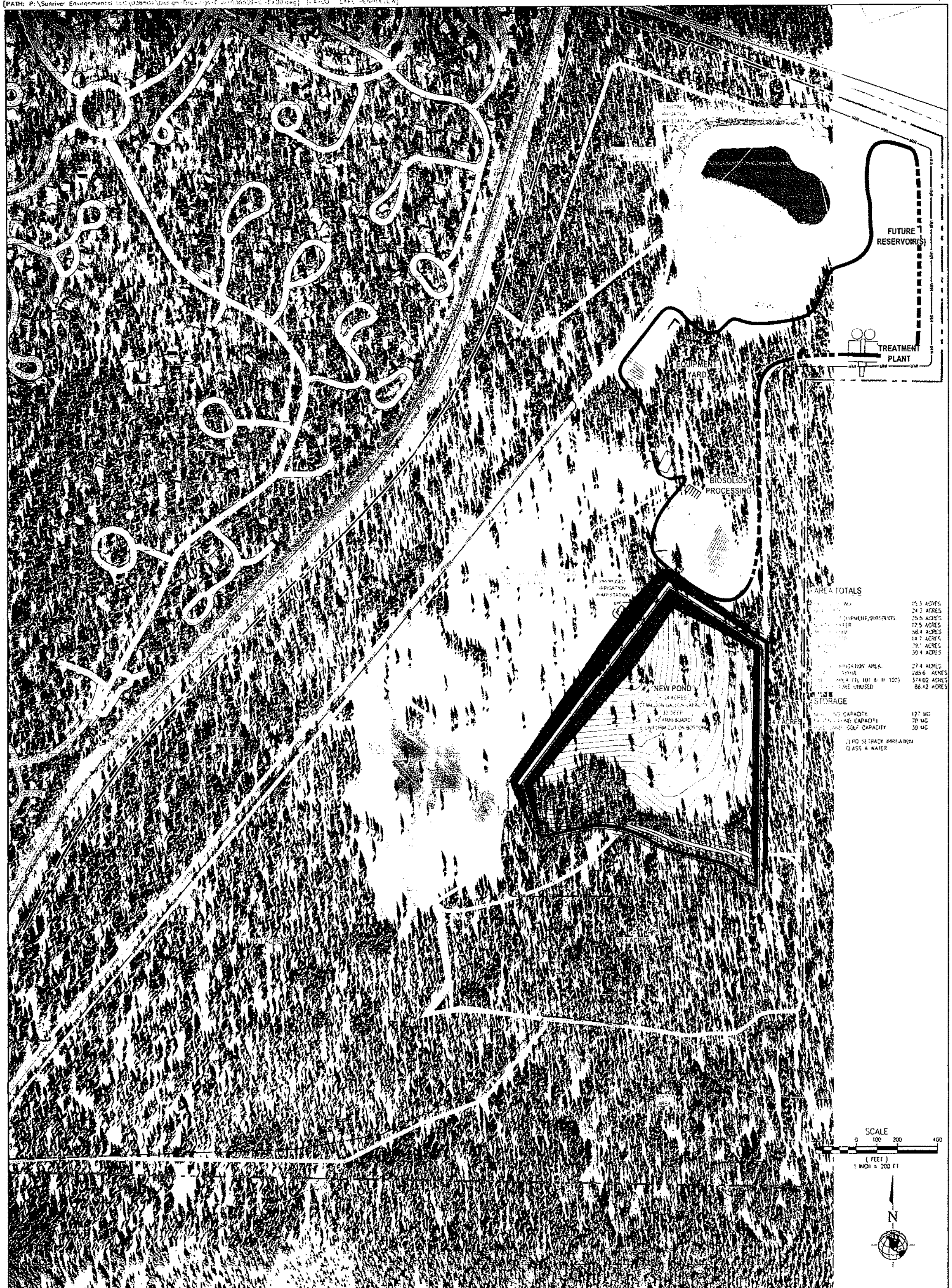

EXHIBIT	FIGURE 2 LAKE PENHOLLOW SITE SUNRIVER ENVIRONMENTAL SOUTH COUNTY SEWERAGE		
SHEET NUMBER	PROJECT NUMBER 036509	DRAWING FILE NAME 036509-C-EX00	SCALE 1"=200'

SHEET INFO	
DESIGNED	NWB
DRAWN	NWB
CHECKED	JEF
APPROVED	JEF
LAST EDIT	1/26/2010
PLOT DATE	2/1/2010
SUBMITTAL	

REVISIONS			
NO	BY	DATE	REMARKS

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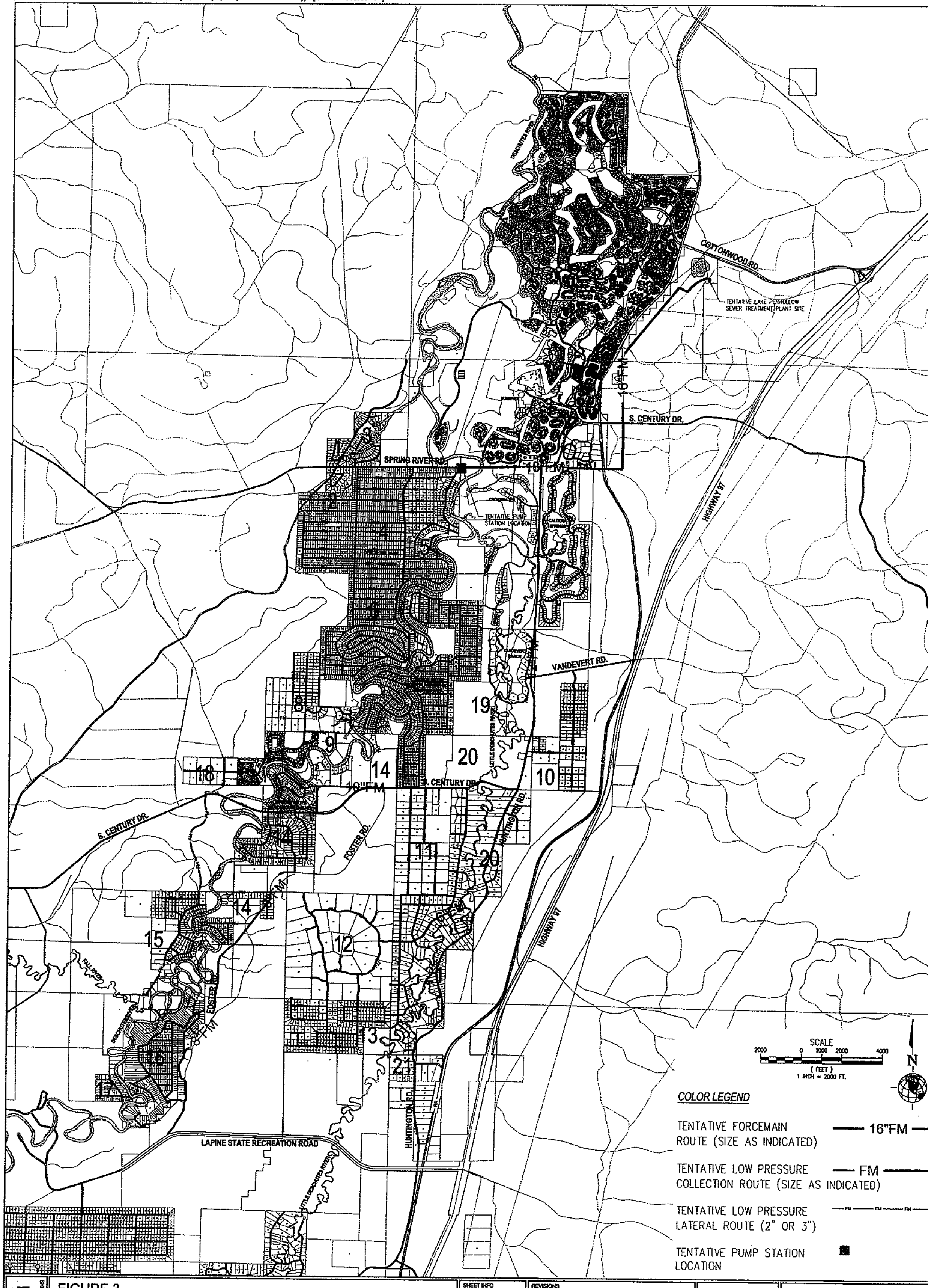
[DATE: 2/1/2010 10:24 AM] [AUTHOR: nboggs] [PLOTTER: \\whp-bend\HP Designjet 4000] [STYLE: WHP-Standard.ctb]
[PATH: P:\Sunriver Environmental LLC\036509\Design\Drawings\Civil\036509-C-EX00.dwg] [LAYOUT: COLLECTION]



EXHIBIT

SHEET NUMBER

FIGURE 3
PROPOSED SEWAGE COLLECTION SYSTEM
SUNRIVER ENVIRONMENTAL
SOUTH COUNTY SEWERAGE

PROJECT NUMBER	DRAWING FILE NAME	SCALE
036509	036509-C-EX00	1"=2000'

SHEET INFO	
DESIGNED	NWB
DRAWN	NWB
CHECKED	JEF
APPROVED	JEF
LAST EDIT	2/1/2010
PLOT DATE	2/1/2010
SUBMITTAL	

REVISIONS

NO.	BY	DATE	REMARKS

PRELIMINARY

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