
Fish Mill Lodge
Coos County, Oregon

Water System
Feasibility Study

April 2009 Amended



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Fish Mill Lodge

Lane County, Oregon

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April 2009 Amended
Project No. 2009.13

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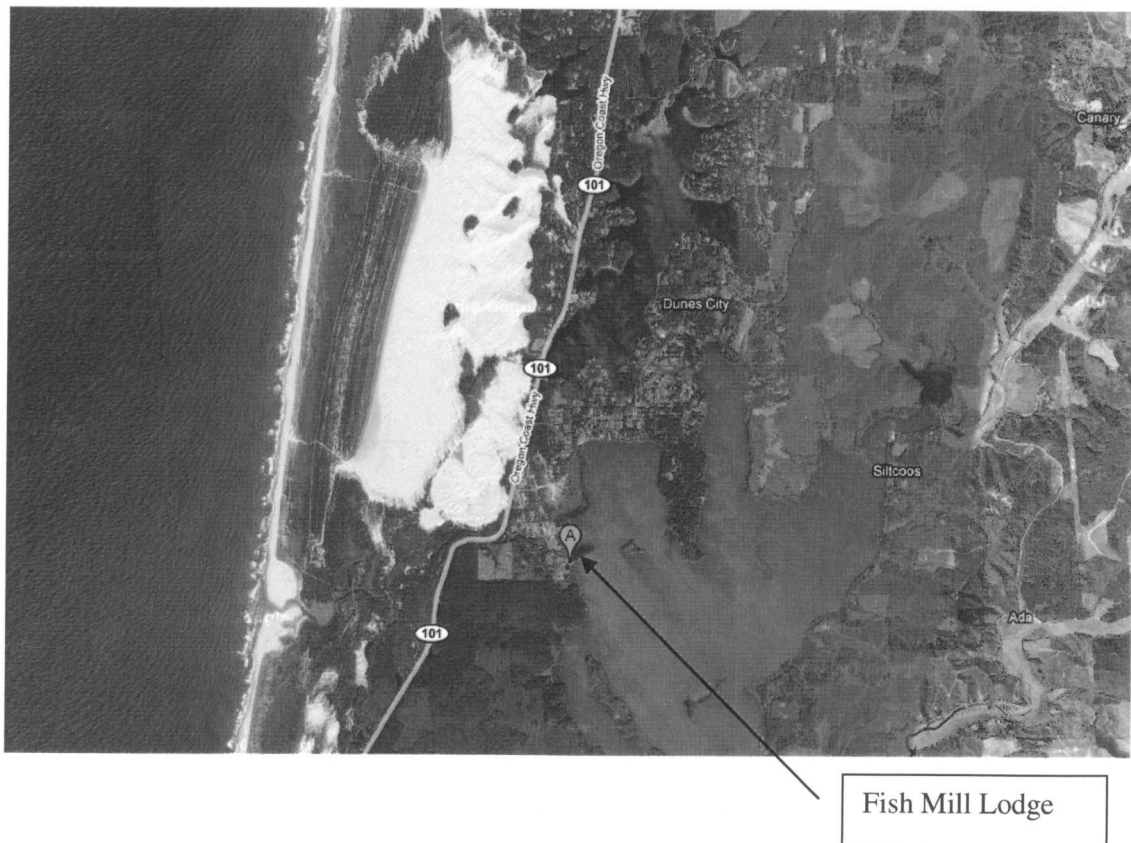
1.1 Background

Fish Mill Lodge is located 42 miles north of Coos Bay on Highway 101 (see Figure 1-1 “*Location Map*”).

This small water system is composed of a spring that gravity feeds a 3000 gallon plastic tank. From the storage tank water is pumped into a hydro-pneumatic tank and distributed throughout the system. The distribution system is composed of 1-1/2” transmission lines that feed 3 residential homes and Fish Mill Lodge. From the lodge, the transmission line breaks into two sections, the first leg feeds the lodge and cabins while the other leg feeds the RV Park.

Fish Mill Lodge and residents do not have any flow meters on the existing distribution system, but water usage is assumed to be approximately 1,500 gallons per day. This average daily demand (ADD) is based on information provided by Fish Mill Lodge, based on the time it takes the system to drain the storage tank when the spring is not gravity feeding the water storage tank.

Figure 1-1 *Location Map*



1.2 Study Objective

The purpose of this Feasibility Study is to furnish the Fish Mill Lodge with a preliminary planning document that provides engineering assessment of system components and guidance for Capital Improvements immediately needed by the system.

This Study identifies infrastructure improvements required to maintain compliance with State and Federal standards as well as provide for anticipated growth. Capital Improvements are presented as projects with estimated costs to allow the Fish Mill Lodge to plan and budget as needed. Supporting technical documentation is included to aid in grant and loan funding applications and meet the requirements of the Oregon Economic and Community Development Department (OECDD).

Work Tasks

This study provides descriptions, analyses, projections, and recommendations for the water system for the immediate improvements. The following elements are included:

- Description of the existing water system including supply, treatment, storage and distribution
- Improvement and recommendations with associated costs
- Recommended improvements



2.1 Existing Facilities

The existing spring is captured via a 42" well casing that sits over the existing spring and is recessed into the ground approximately 7'. This spring gravity-feeds a 3,000 gallon storage tank. A pump was used to supply the water storage tank during the dry season but has since been removed. The storage tank foundation is an old redwood tank that was used prior to its installation. At this point the storage tank feeds into the pump house building where the water is pumped to a pressure tank and out to the distribution system.

2.2 System Deficiencies

2.2.1 Storage Tank

The storage tank is a 3,000 gallon clear plastic tank that is located on top of the old redwood tank floor. This redwood tank floor is acting as the foundation for the plastic storage tank and is deteriorating (see Figure 2-2-1). If the foundation fails under the strain of the storage tank, it may rupture the tank resulting in water loss for the resident and Fish Mill Lodge. A proper foundation should be designed for the storage tank in order to distribute the loading.

Sunlight penetrating the storage tank can enable algae growth. We recommend that the tank be painted or replaced with a NFS approved tank.

Figure 2-2-1 Existing Storage Tank



2.2.2 Chlorination System

Fish Mill Lodge does have a few violations for Coliform levels, adding a chlorinator would eliminate this. The sodium hypo chloride chlorinator would need to be installed prior to the storage tank so that 30 minutes of contact time would be achieved.

2.2.3 Spring Box

The existing 42" spring box extends approximately 7 feet down into the spring head and extends 5 feet above the surface and is starting to show signs of deterioration and may be the source of the Coliform (see Figure 2-2-3). We recommend replacing the existing spring box with a new pre-cast 48" spring box with 3 feet of drain rock at the bottom. This could require a rail system for installation. The new pre-cast spring box would only need to extend 3 to 4 feet above the existing grade, and would have a small extended slab around the base.

Figure 2-2-3 Existing Spring Box



2.2.4 Pump House

The existing pump house building is in poor condition (see Figure 2-2-4) is rapidly deteriorating, and does not have the room to house a sodium hypo chloride chlorination system with the pressure tanks and pump(s) configuration. This new building could be a stick-built structure with a concrete slab on which the pumps and pressure tank can be mounted.

Figure 2-2-4 Existing Pump House



2.2.5 Genset with Transfer Switch

No emergency power is supplied to the pumps that maintain the system pressure. In the event of a power outage, less than 20 psi is maintained in portions of the distribution system. An emergency generator with automatic transfer switch is recommended to maintain system pressure.

2.2.6 Water Meters

Currently the Fish Mill Lodge distribution system does not have any water meters for either services or a master meter to read overall system demand. Installing water meters on both the residential homes and the lodge, with a master meter at the storage tank will help Fish Mill Lodge to track water usage and losses. Each service to the residential homes could use a 5/8" water meter with lodge using a 1" water meter on the leg that feeds the lodge. Based on the configuration of the lodge, it may be beneficial to install a meter for the RV Parks and a separate meter for the Lodge. This would allow the lodge to track usage easier and isolate other problems that may arise.

2.2.7 Pumps

Fish Mill Lodge has three pumps that are configured to supply the lodge with water. The primary pump that supplies water from the spring to the storage tank is no longer in service. There is a secondary pump that was used to pump from the spring directly into the distribution system, but is also out of service. The final pump is used to pump from the storage tank into the pressure tank that

feeds the distribution system (see figure 2-2-4). The pressure throughout the distribution system ranges between 32 psi at the highest elevation service and 38 psi at the lowest service. Pressure setting on the pressure tank should be higher, which could indicate that the tank may have a air leak or some other problems with the bladder.

Recommendations



3.1 Recommendations

Fish Mill Lodge is located relatively close to the ocean putting the system in an area of heavy rain fall and corrosive salt spray. Based on the relatively small size of the system a 4,500 gallon water storage tank is recommended. This tank will need to be NSF approved and would benefit from being housed within the pump house building and out of the elements. A 4,500 gallon reservoir would give the system a 3 day supply of water based on the water usage provided by Fish Mill.

3.2 Spring Box

The existing 42” spring box is in poor condition (see figure 2-2-3) and is recommend that it is replaced. A new 48” spring box will allow for more water storage during the dry periods and should incorporate a poured in place slab around the structure to help support it. The spring box would extend approximately 7’ down into the spring and have a 2-3 foot drain rock base below the structure (See Table 3.2).

Table 3.2

Spring Box			
48" Manhole	Rock	Labor	Total
\$2,500	\$2,000	\$22,000	\$26,500

3.3 Chlorination

Due to several Coliform violations over the past few years, Fish Mill Lodge is recommended to install a sodium hypo-chlorinator to eliminate this. Based on the rural location and difficulty in reaching the pump house building, a tablet chlorination system is recommended. This chlorination tablet system would treat the spring water prior to the storage tank in order to obtain the 30 minutes of contact (See Table 3.3).

Table 3.3

Tablet Chlorination			
Terminator Chlorinator	Piping	Installation	Total
\$3,700	\$350	\$800	\$4,850

3.4 Pump House

The existing pump house building that houses the water storage tank pump along with the pressure tank is in poor condition and is recommended that it be replaced. A new structure could house the new pumps, pressure tank and tablet chlorination system. This structure could also house the storage tank protecting it from the elements and vandalism. The new building could be fenced in with a 6 feet chain link fence with security wire (razor wire) on top to reduce the problems Fish Mill is experiencing with vandalism (see Table 3.4).

Table 3.4

Pump House Building			
Building	Fence	Alarm	Total
\$27,000	\$6,400	\$3,500	\$36,900

3.5 Water Meters

Water loss cannot be accounted for on the existing system as water meters are installed on neither the service connection nor the reservoir. In order for the district to track water usage and help identify possible problems, water meters should be installed on the three residential homes and one water meter for the lodge. Since the lodge is broken into two primary services, the Lodge and the RV Park both should be metered independently of each other. This will also allow the district to more easily track down water loss problems. A master meter is recommended on the discharge side of the storage tank to track water consumption (see Table 3.5).

Table 3.5

Water Meters				
	Number of Meters	Cost	Installation	Total
5/8" Water Meter	3	\$250	\$250	\$1,500
1" Water Meter	3	\$350	\$300	\$1,950
				\$3,450

3.6 Genset with Transfer Switch

Fish Mill Lodge does not have emergency backup power supplied to the pump house. A diesel standby generator with an automatic transfer switch would be able to supply power in the event the primary power source fails. A genset would need to be housed in an all weather enclosure or housed within the pump house building. The generator will need to be capable of running two pumps during a start up cycle and miscellaneous lighting and demands for up to 12 hrs. (See Table 3.6).

Table 3.6

Generator & ATS			
Genset	ATS	Installation & Start-up	Total
\$10,000	\$1,200	\$2,600	\$13,800

3.7 Pumps

The pump feeding the storage tank from the spring is not in service and the water supplied to the storage tank is gravity fed. During the dry season the flow from this spring is often very small and cannot keep up with the system demands. A new pump should be installed that can supply the system with a reliable water source at a constant flow rate. This constant flow rate will be used with the tablet chlorinator to properly disinfect the water. Secondary pumps will be needed to charge the pressure tank from the water storage tank to adequately pressurize the distribution system. In order to prolong pump life, a dual-plex pump configuration can be used with properly sized pressure tanks. This new configuration would allow for minimal wear on the pumps providing a longer life cycle (see Table 3.7).

Table 3.7

Pumps & Pressure Tank					
	Dual-Plex Pumps	Spring Pump	Pressure Tank(s)	Installation & Misc. Piping	Total
5/8" Water Meter	\$17,000	\$3,500	\$850	\$1,500	\$22,850

3.8 Soda Ash System (Amended)

Due to the corrosive nature of the water at engineered soda ash system is recommended. This will help prolong the life of the existing distribution system and help prevent future problems.

Table 3.8

Soda Ash System		
Soda Ash System	Engineering	Total
\$10,000	\$1,500	\$11,500

3.9 System Up-Grades

Fish Mill Lodge water system is breaking down and in need of repair and replacement of some of the system components. The location of the pump house and storage tank does pose an access issue. Both are located approximately 700 feet up a foot path with no vehicle access (see Figure 3.8). Also, there has been a security issue with the existing pump house. A possible solution would be to relocate the pump house near the lodge itself. This would allow for more security and ease of maintenance. The new pump system is more than capable of maintaining adequate pressure throughout the distribution network. This option would require some additional water line installation, but would not require a new road to access the existing pump house location.

Figure 3.9 Access Road



A new pump house building would need to house the tablet chlorination system with the dual-plex pumps and pressure tank. If room allows, possibly the water storage tank due to its relatively small size, this would protect the system from the elements and corrosive natures of it close proximity to the ocean.

Since Fish Mill Lodge has no water meter throughout the distribution so that they can monitor water usage and losses, installing water meters on all services and a master meter will allow the district to monitor its water usage and help identify problem areas.

Of the three original pumps that make up the Fish Mill Lodge only one is still in operation. Replacing the aging and failing pumps with a new spring pump and a dual-plex pump configuration can help prolong the pump life.

Table 3.8

System Up-Grade Costs	
Storage Tank	\$10,800
Chlorination	\$4,850
Water Meters	\$3,450
Pump(s) & Pressure Tank	\$22,850
Generator & ATS	\$13,800
Spring Box	\$26,500
Soda Ash	\$11,500
Pump House Building	\$36,900
Sub Total	\$130,650
Admin & Legal	\$6,533
Engineering	\$26,130
Total Costs	\$137,183