SEELEY LAKE WATER & SEWER DISTRICT

Preliminary Engineering Report

Wastewater System Improvements

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Prepared for:
Seeley Lake Water & Sewer District

Prepared by:
Amy Deitchler, EI
Craig Pozega, PE

MONTANA
CRAIG RICHARD POZEGA
15382 PE
4-12-12
LICENSED
PROFESSIONAL ENGINEER

GreatWest engineering

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1.0 EXECUTIVE SUMMARY

1.1 Introduction and Background

The Seeley Lake Sewer District was created in 1992. The Seeley Lake Sewer District existing wastewater system consists of individual onsite septic systems. There is no existing centralized wastewater system for this community. The community is currently served by a central water system and obtains their drinking water from Seeley Lake. However, the community has two distinct district boundaries for the water and sewer districts. The current water district boundary is much larger than the current sewer district boundary and encompasses development areas outside of the core community. The boards are separate entities.

Since the creation of the Seeley Lake Sewer District, the District has been working to address the problem of approximately 400 individual on-site wastewater treatment systems consisting of standard septic tanks and drainfields in the Seeley Lake area. Approximately 73% of the lots within the District are less than or equal to ½ acre in size. A review of the Missoula County Septic Tank Permits for the Seeley Lake area indicates that on-site systems within the community typically consist of a 1,000 gallon concrete tank and drainfield. However, there are approximately 64 seepage pits within the community that have been allowed as replacement systems because of the small lot size and inability to locate a replacement drainfield area. Thirty-three percent (33%) of the systems have had replacement drainfields with approximately 20% being 10 years or older. This review also indicated that approximately 70% of the on-site systems within the community are 10-years or older and that 45% are 20-years or older. Several 750 gallon metal tanks have also been installed.

In 2004 the Seeley Lake Sewer District completed a Wastewater Preliminary Engineering Report (PER) to determine the best option for developing a centralized wastewater system. In 2008 the District updated the PER. Also in 2008, the District completed a preliminary design which includes plans that further delineate the project details of both the collection system and the treatment system.

During this pre-design phase, meetings with the United States Forest Service (USFS) were held about the treatment and disposal site identified in the PER. After meetings with the USFS, it was determined that an Environmental Impact Statement (EIS) would be required for the proposed site. The requirement to complete an EIS rendered this site not feasible for the District. A new site location search was started and an additional USFS property was identified on the northern end of the District.

A detailed field investigation of this proposed treatment and disposal site was completed. The site investigation included drilling of three test wells, flooded basin testing and aquifer characterization. The investigations indicated that the site was feasible for the District's proposed treatment and disposal alternative. An Application for Purchase of Forest Service Lands under the Forest Service Townsite Act was then submitted to the USFS. This application has been accepted by the Forest Service and is awaiting an environmental assessment. One of the requirements of the Townsite Act is to provide evidence that there is no equally suitable private, local government, State, or other Federal lands available. To ensure that this obligation is met, the District decided to make one more concerted effort to locate any other viable treatment and disposal sites.

The District was only able to identify a few parcels that met the specific requirements needed for a wastewater treatment and disposal site. The owners of these parcels were identified and contacted to determine their availability. Only one privately owned site was identified that met the need criteria. The owner of this property was initially interested but then later stated that he would not make the land available to the District as a treatment site. Besides the USFS property, the DNRC owned the only other land that was determined viable as a treatment site. In 2004 the DNRC parcels were also identified as viable sites. At that time the preferred alternative was lagoon treatment with storage and irrigation of forest. The District requested an opinion from DNRC on the availability of their land for lagoon treatment with storage and irrigation of forest. The DNRC rejected the District's request to use DNRC land for this type of treatment (See Appendix X). Again, to ensure that all potentially viable treatment sites have been thoroughly examined, the District again requested the use of DNRC land with the District's new preferred alternative of a Sequencing Batch Reactor treatment plant with discharge to groundwater. The DNRC has been responsive to the District utilizing this same property for the District's new treatment alternative. The DNRC has further committed to the District and has permitted use of this property for further geotechnical investigations, which are planned in the second quarter of 2012. Contracting for this task has been completed between the District and Great West Engineering.

1.2 Problem Definition

Seeley Lake is an unincorporated community that for the most part was built prior to the establishment of Health Department regulations in 1966, thus many individual septic disposal systems do not comply with current regulations. This situation creates a public health hazard for the community and warrants the need for a centralized wastewater collection and treatment system.

Several conclusions were made during the development of this PER. The major conclusions affecting the wastewater facilities are as follows:

- Groundwater in the area is relatively shallow. The Montana Bureau of Mines and Geology (MBMG) prepared a groundwater study for the Seeley Lake area and made the following conclusions. A copy of the report is included in Appendix A.
    - Nitrate and chloride data suggests groundwater is being degraded by septic tank effluent.
    - Nitrate and chloride probability plots shown in Figures 10 and 12 of the MBMG Report also suggest septic tank contamination.
    - Figure 11 of the MBMG Report shows a positive correlation between elevated nitrate and chloride, suggesting contamination by septic tank effluent.

- Additional development along the shoreline of the lake would likely result in septic tank effluent reaching the lake.
- Indications of degradation might be a gradual increase in plants along the shore and decreased water visibility.
- Development south of town is not likely to threaten the lake, as groundwater is more likely to flow toward the Clearwater River or Morrell Creek, but may cause degradation of the groundwater in this area.

- Groundwater monitoring in the Montana Bureau of Mines and Geology (MBMG) report demonstrates that upgradient of the central core of the community, nitrate and chloride levels area at very low to non-detectable levels In the 2004 PER, the wells downgradient of the core of the community showed the chloride concentrations ranged from a low of 7 mg/l to a high of 13.5 mg/l while nitrate concentrations ranged from a low of 1.6 mg/l to a high of 3.6 mg/l. Since 2004, additional data from the wells downgradient of the core area of the community has shown increased chloride concentrations ranging from 23 mg/l to 268 mg/l. Nitrate concentrations have correspondingly also elevated ranging from 0.57 mg/l to 12.4 mg/l. This strongly supports the conclusion that groundwater is being degraded by septic systems. Loading calculations presented in Table 5, page 32 of the MBMG report also demonstrate elevated nitrates.

- The presence of nitrate and chlorides is an indicator of the possible presence of disease causing organisms (See pages 44 and 45, of the Phase II Cumulative Effects Study in Appendix P)

- Groundwater monitoring wells completed by the Sewer District confirm the presence of elevated nitrates, total coliforms and fecal coliforms in the groundwater downgradient of the community (Appendix N). The monitoring wells are located downgradient of the center of Town just before groundwater enters the lake as shown in Figure 3-1.

- Several studies on the quality of water in Seeley Lake have been completed. These studies have demonstrated elevated levels of nutrients (phosphorous and nitrates) in the lake. The lake is classified as meso-eutrophic to eutrophic with degrading water quality. The lake experiences algae blooms, occasionally with toxic blue-green algae (See Appendix B). Increased nutrient loads to the lake from any source will facilitate eutrophication of the lake and increases water quality degradation. Lake water quality degradation may impair the recreational value of the lake and the economy of the area.

- Wastewater flows from lake shore cabins and other development east of the lake most likely enters the lake causing the potential for increases in plant growth. The portion of the lake south of the Clearwater discharge is more susceptible to plant growth impacts because the River does not “flush” this portion of the lake as efficiently.

- Through the use of groundwater flow path maps (See Plate 1, Appendix A), seepage tests (page 16, Appendix A), and geologic descriptions (See

Figures 4 and 5 on page 10, Appendix A) the MBMG study demonstrated that groundwater flowing under the Town site flows into Seeley Lake.

- Discussions with the Missoula County Sanitarian and Jim Carlson, Director of the Missoula County Department of Health, indicated development within the community utilizing on-site septic systems for unapproved existing vacant lots less than ½ acre will not be allowed. Additionally, new or expanded commercial facilities will likely be required to install very large or advanced on-site treatment systems to satisfy state and county nondegradation regulations. This could severely limit economic growth within the District boundary.

- The cumulative effect model developed for Missoula County in cooperation with the University of Montana and Water Consulting indicates that septic tank densities are high in the Seeley Lake area for the hydrogeologic conditions that exist (See Phase III Report, Section 6 in Appendix P).

- Current wastewater management within the District consists of standard septic tanks and drainfields on very small lots. Approximately 73% of the lots within the District are equal to or less than ½ acre in size. More specifically, 48% are less than 1/3 acre in size with 40% less than ½ acre in size for new on-site wastewater treatment when the home is served by a central water system. A full acre is required for new homes with a private well plus an on-site septic. Most residential homes in Seeley Lake do not satisfy these standards.

- A detailed review of the County septic permits was conducted. These records document that a significant percentage of the permitted systems were installed without solid header pipes for uniform distribution to the drainfields wastewater laterals and many lots were developed with seepage pits rather than drainfields. Appendix O contains several County septic tank permits demonstrating how several of the systems were installed. Seepage pits do not provide for an aerobic phase of effluent treatment which is important in killing pathogens and breaking down waste. Both of these non-compliant systems are more likely to result in sewage surfacing in residential yards. The public health risks due to human exposure to raw sewage are clear. Additionally, as shown by the permits in Appendix O, many systems were constructed with atypical drainfield configurations leading to poor distribution of wastewater throughout the drainfield. As documented on page 12 of the Executive Summary of the Phase II Cumulative Effects Study, Volume 1 (Appendix P) atypical drainfield configurations lead to non-uniform distribution within the pipelines and poor treatment.

- County septic regulations limit septic discharge to 600 gallons per acre per day. Many of the commercial lots in town cannot add new flows to the septic system because they don't have adequate acreage to meet this requirement. Businesses that have high flows such as carwashes, food and beverage establishments, motels, and laundry facilities are likely to find that growth is impossible due to an inadequate land base for septic disposal. The ability to construct assisted living facilities for the elderly is very difficult because of this requirement. Additionally, it is the goal of the Community Council to develop affordable housing within the community such as duplexes and four-plexes. Construction of these types of facilities will be difficult to impossible without a central sewer system.

- Because of the small lot size it has been difficult to locate replacement areas within the lots and substandard replacement systems in the form of seepage pits are still being allowed. Seepage pits provide poor treatment and inject sewage deeply where it can reach groundwater quickly without adequate treatment.

- County septic tank permits (Appendix O) document that several metal septic tanks were installed in the 1970's.

- Land uses within the current district boundary consist of 312 residential homes, 42 commercial facilities, 9 institutional facilities, and 117 vacant lots. Commercial facilities consist of 20 retail stores, 8 restaurant/bars, 5 gas station/auto shops, 1 industrial facility, 7 business/offices, and 1 laundry mat. Institutional facilities consist of 5 churches, 1 senior citizens center, 1 grade school, 1 hospital and 1 fire hall.

- Because no central wastewater collection and treatment systems exist in Seeley Lake, wastewater flows cannot be measured. For the purposes of this PER, wastewater EDU's were estimated based on the Water District's metered wintertime water usage for the facilities within the Sewer District boundary that are served by the water system. For the purposes of the calculation 1 EDU was assigned a flow of 250 gpd. It should be noted that the current water district boundary is much larger than the sewer district boundary and that not all lots within the sewer district boundary have community water service. Wastewater flows have been estimated based on the best available information. It is estimated that 154,000 gpd of wastewater will be generated at full build out within Seeley Lake.

- An environmental review of the proposed improvements found no significant environmental impact. Environmental conditions are expected to improve with the implementation of the wastewater improvements proposed by this PER.

- In 2009, non-resident visitors to the state contributed $2.27 billion in direct expenditures resulting in $2.33 billion in induced economic impacts to the state's economy. Seeley Lake experienced numerous recreation user days per year. Additionally, the area is a popular snowmobile area. The recreational and tourism value of the lake to the Town and to Montana's tourism business is significant and should be maintained and protected.

1.3 Alternatives Considered

1.3.1 Collection System

Alternative C-1: Standard Gravity Collection System

The standard gravity collection system is the most commonly used municipal wastewater collection system. Several of the laterals are interconnected to eventually form a complex network of pipes that transport the raw sewage to a central location. From this central location, the raw sewage is then either pumped (lift station) or fed by gravity to the treatment site.

There is no septic tank between the home and the central collection system and therefore, no interception of the solids prior to reaching the central sewer. However, some homes may require grinder pumps to pump the raw sewage to the central sewer. For the grinder pump homes, flows from the homes would be transported to a small chamber; specially constructed pumps transport all of the waste through a pressure line that dumps the sewage into the gravity main. No solids separation takes place with the grinder pump concept. Because this type of collection system handles both the solid and the liquid portions of raw sewage, larger pipe sizes must be used and manholes must be located at every change in alignment and slope. These design features are necessary to prevent plugging and to facilitate cleaning. The minimum pipe diameter allowed by state standards is 8-inches and manholes must be located every 400 feet. State design standards also specify minimum slopes for each pipe diameter.

This type of collection system depends entirely on gravity for the transport of the raw sewage and therefore must be laid out in accordance with the topography of the area. Obviously, the less undulating and hilly the topography, the less complex and expensive the gravity collection system. At slopes greater than 20%, it is much more difficult to install a standard gravity collection system. Where the topography is very hilly and steep, it may be more functional and cost effective to install a collection system that utilizes force mains and pumps.

The primary advantage of the standard gravity collection system is its simple and inexpensive operation and maintenance. This is because it does not rely on numerous small pumping and control facilities that not only require ongoing maintenance but can also fail. The standard gravity collections system is a tried and true technology that has generally proven to be reliable if properly operated and maintained. The systems should be set up on a periodic flushing and cleaning schedule that results in the cleaning of each pipe segment in the system every 5 years. The system may experience periodic plugging that must be corrected by the system operator. These systems generally have a very long service life and can be expected to last 50 years or more.

Alternative C-2: Small Diameter Gravity Collection with Individual Septic Tanks

The small diameter gravity collection system has typically been utilized in smaller communities and subdivision. In this collection system, the building sewer service transports raw sewage from the building to a concrete septic tank serving that particular building. Within the septic tank, solids are separated from the liquid fraction of the raw sewage. The liquid fraction is then fed by gravity from the septic tank to a network of small diameter gravity sewer mains serving the entire community. The layout of the small diameter collection system for Seeley Lake would be identical to the system laid out in Figure 7-1 for the standard gravity system; however, the small diameter system, as the name implies, uses smaller diameter sewer mains than the standard gravity system and can use cleanouts in lieu of manholes. This is possible because the small diameter system does not have to transport solids.

Approximately 3,000 feet of 8", 9,400 feet of 6", and 36,500 feet of 4" sewer mains would be utilized for the small diameter collection system serving the community. Approximately 20 standard manholes and 120 cleanouts would also be necessary. DEQ standards require a hydraulic design of ½ to ¾ full pipes at 20 year peak flow. Larger pipe diameters will be necessary for some of the trunk mains.

Like the standard gravity collection system, the network of small diameter sewer mains relies on gravity to transport the liquid fraction of sewage to a central location where it is pumped or fed by gravity to a central treatment system. Just like the standard gravity collection system, this system must be laid out in accordance with the topography of the area and is subject to the same limitations previously discussed for the standard gravity collection system.

Alternative C-3: Pressurized Collection System

The pressurized collection system, typically consisting of Septic Tank Effluent Pumps (STEP), grinder pumps, or a combination of the two, has more typically been used in smaller communities and subdivisions where the terrain is hilly and does not lend itself well to gravity drainage. It has also been used in combination with the standard gravity collection system to service low lying areas or areas of low population density that may not otherwise be serviceable.

In the STEP collection system, the building sewer service transports raw sewage from the building to a concrete septic tank serving that particular building just as described for a small diameter gravity collection system. In the septic tank, solids are separated from the liquid fraction of the raw sewage and transported to a second compartment that houses the effluent pump. The liquid fraction of the sewage is then pumped from the septic tank to a network of 1.5 to 4 inch diameter pressure sewer mains serving the entire community. This would be based on maintaining velocities greater than 2ft/sec. For a grinder system, building flows would be transported to a smaller chamber where specially constructed pumps transport all of the waste to the pressure mains. No solids separation takes place with the grinder pump concept. Approximately 50,000 linear feet of pressure sewer mains would be utilized for a system serving Seeley Lake. The pressure sewer mains would be laid out in a manner similar to that presented in Figure 7-1 from Alternative C-1 except that manholes are not utilized.

The size of each septic tank or the grinder vault is dependent on the flows generated by the particular user. Most residential homes would require a 1,000 to 1,500 gallon septic tank and residential size packaged grinder systems. The school and some commercial facilities would require larger septic tanks and grinders. The remaining commercial users generate flows equal to or smaller than most residents and would therefore also require a 1,000 to 1,500 gallon septic tank and residential sized grinders. Septic tanks serving existing users would be reused if these existing tanks are in good condition and of proper size and type. Each of the existing tanks would be leak tested to ensure structural integrity. As discussed in previous chapters, 70% of the on-site systems within the community are 10-years or older and 45% are 20-years or older. Assuming that 80% of the septic tanks will require replacement does not appear to be an overly conservative assumption. In the case of grinder pumps, most septic tanks would be emptied and abandoned in place.

1.3.2 Treatment System

Alternative T-1: Treatment Lagoons with Storage and Irrigation

This alternative consists of two single partial-mix aerated lagoons for primary treatment followed by three storage cells. The storage cells are sized for the necessary storage volume so that water can be stored during the non-irrigation season. During the irrigation season, stored effluent would be spray irrigated on forestland in accordance with DEQ and EPA requirements.

The lagoon technology uses a mechanical means for diffusing air into the wastewater. The upper zone of the pond is aerated resulting in an aerobic environment throughout much of the water column. The lower portion of the lagoon, near and within the sludge layer, is an anaerobic environment. This process is known as a partial mix mechanically aerated lagoon. Mechanical aeration will be accomplished by blowers and subsurface diffusers.

Mechanically aerated ponds provide mixing of organic and oxygen. Also, the mechanical equipment provides oxygen at a greater rate and to a greater depth. These mechanical processes increase the rate of decomposition of organics and allow for shorter detention times and smaller ponds. The state design standards require 15 days of detention time for irrigation systems and the systems are often designed with 20-25 days of detention time. A new blower building will be constructed to house the blowers that will operate the aeration system.

Disinfection of the treated effluent prior to irrigation is proposed and will allow the buffer zone around the irrigation area to be reduced to 50 feet, resulting in a substantial reduction in land requirements. An ultraviolet (UV) system will be utilized for disinfection. This system will be housed in a CMU building.

The storage lagoons and the irrigation sites will be phased. Each phase will be designed to handle 52,000 gallons per day (gpd). The irrigation site for each phase is 26 acres of irrigated area. A 50 foot buffer is also needed surrounding the irrigation site. Site access will be restricted with installation of an electrical fence. An irrigation main will be buried along the center of the access road to the irrigation site and irrigation laterals will be added to each side of the access road. Each phase of irrigation area contains three zones. Each zone will have an irrigation cycle consisting of 12 hours of irrigation followed by a drying time of 2.5 days (60 hours). This will allow for an adequate wetting/drying period. The treated effluent will be pumped to the irrigation system by a floating pump installed in the storage lagoon.

Trees of all stage growths will be the best scenario with the majority of them being younger trees that will be in an active growth stage. An approximate age of existing trees and remaining active growth period will still need to be obtained to assess harvesting and planting needs. Several saplings may need to be planted as some mature trees may need to be harvested. Root removal will probably not be necessary. Period harvesting of trees will be necessary for proper treatment operation. In the design process, Dr. Running with the University of Montana, Department of Forestry was consulted to determine forestry water use and nitrogen uptake. See Appendix M for the data provided by Dr. Running.

Alternative T-2: Sequencing Batch Reactor with Groundwater Infiltration Galleries

A sequencing batch reactor (SBR) is a biological nutrient removal facility that will remove nitrogen and phosphorous to meet State and Federal nondegradation limits for discharge to groundwater. The advantage of this treatment alternative is its compact design. However, the treatment process is complex and therefore requires significant equipment.

Prior to the treatment in the SBR, the raw sewage will be pretreated. Pretreatment will take place in the headworks building and consist of screening and grit removal. The wastewater will flow through the headworks system using gravity flow and continue to the SBR basins. If it is determined that gravity cannot be utilized then a small lift station will be installed to transfer wastewater from the headworks to the SBR basins. The headworks building will be constructed of concrete masonry blocks (CMU) and contain a magmeter for flow measurement.

An SBR is a batch process that has been used extensively in wastewater treatment. A single reactor is used for all treatment processes including aeration, biologic treatment, and clarification. Since the SBR treats wastewater in batches, a minimum of two tanks are required. The tanks operate 180 degrees out of phase, so while one tank is filling, the second tank is going through the treatment, clarification, and decanting cycles. The operation cycles of each tank are switched after each batch. Four batches per day per SBR tank is recommended (6 hours per cycle). After each batch the treated effluent is removed from the tank via a floating decanter to an equalization basin for follow-up treatment. An equalization basin allows any downstream process units, like disinfection, to be sized for system design flows rather than the higher flow rate of the decanter. Also after each batch, some of the sludge must be wasted from the SBR tank and sludge is sent to the sludge digester. Digested sludge is dewatered and stored until it can be disposed of through land application or in a landfill. In the final step, the treated wastewater will be disinfected with UV disinfection and discharged to the groundwater.

The infiltration galleries will be used to dispose of the wastewater. The water has already been treated so these galleries will only be a disposal method for the water. The galleries will be dug down to the highest permeable zone and backfilled with gravel so they have the highest permeable area possible.

Alternative T-3: Membrane Biological Reactors with Groundwater Infiltration Galleries

The membrane biological reactor (MBR) is a suspended growth activated sludge process designed for biological nutrient removal that will remove nitrogen and phosphorous to meet State and Federal nondegradation limits for discharge to groundwater. The advantage of this treatment alternative is also its compact design. However, this treatment process is the most complex and requires the most significant amount of equipment.

Prior to treatment in the MBR, raw sewage will be pretreated. Pretreatment will take place in the headworks building and consist of screening and grit removal. The wastewater will flow through the headworks system using gravity flow and continue to the MBR basins. If it is determined that gravity cannot be utilized, then a small lift station will be installed to transfer wastewater from the headworks to the MBR basins. The headworks building will be constructed of concrete masonry blocks (CMU) and contain a magmeter for flow measurement.

The MBR is a series of membrane filters that follow either a flow thorough treatment process or a batch reactor treatment process (SBR). The system will include biological basins for BOD_5 and total nitrogen removal (nitrification and denitrification) in a minimum of two treatment trains. The basins for the treatment trains will be constructed of concrete. The biological basins will be located inside the new treatment building. Each biological treatment train shall include an anoxic basin and an aerobic basin. The system shall include all equipment necessary for mixing of the biological basins, including mechanical mixers or air lift pumps (as required), piping within the basins, valves and controls. The aerobic digester will consist of a cast-in-place concrete basin and will be designed for a minimum of 45 day solids retention time.

MBR systems include microfiltration (MF) or ultrafiltration (UF) membranes installed in concrete basins attached to and following the biological basins. The membrane basins will be located inside the new membrane treatment building. Membrane elements shall be mounted on the system standard units (or cassettes) with all necessary piping and valves (permeate, air, chemical and other as required) to the point of connection with fixed headers outside the membrane basin.

A coagulant dosing system may be needed for phosphorus removal. Redundant chemical feed pumps, along with all necessary piping, valves, and controls for system operation to meet the total phosphorus effluent limits shall be provided. All chemical feed pumps, along with all necessary piping, valves, and controls for system operation will be included.

The infiltration galleries will be used to dispose of the wastewater. The water has already been treated so these galleries will only be a disposal method for the water. The galleries will be dug down to the highest permeable zone and backfilled with gravel so they have the highest permeable area possible.

1.3.3 Project Site Alternatives

Alternative S-1: Site #1 – DNRC Airport Site

Site #1 is located on State School Trust Lands east of Seeley Lake as shown in Figure 7-7. This site has suitably flat and uniform topography for construction of the wastewater treatment facilities and disposal area. Groundwater in this area is generally 15 to 30 feet below the ground surface and should not be encountered during construction. Sufficient acreage exists within the area for the treatment facilities.

During the initial site investigation, three test pits were excavated. All three excavations revealed a deposit of massive (essentially unsorted) silt to boulder sized material. One of the test pits revealed some reasonably well-sorted material below about nine feet. Below that depth lies strata of silty, fine-grained sand intercalated with thin (<0.25 feet) strata of sand and gravel.

The site investigation also demonstrated a considerably high percolation rate. While it is glacial in origin, there are a significantly low percentage of fines in the matrix. The three test pits were spread out across 800 feet and were generally consistent in soil matrix. The report from the site investigation can be found in Appendix W.

Missoula County officials are currently working with the High School to obtain an easement for the District through the high school property for an access road and an easement for the forcemain. The school district is willing to work with the Sewer District and it is expected to have an easement for this site within the second quarter of 2012.

Alternative S-2: Site #8 – DNRC Southwest Site

Site #8 is located on State School Trust Lands southwest of Seeley Lake as shown in Figure 7-7. This site also has suitably flat and uniform topography for construction of the mechanical treatment plant and the drainfields. This site is relatively close to the Clearwater River elevation and it is likely that groundwater would be encountered during construction. This area has several roads running through it and would allow good access to the treatment facility.

Great West Engineering identified two areas within this site location to be favorable to the construction of the wastewater treatment facilities and disposal. The first was directly west of Riverside Drive. One test pit was excavated in this location and a deposit consisting of gravel to boulder sized clasts in a clayey silt matrix was found. The deposit is unsorted, with no discernible structure. The soil was quite wet through the upper three to four feet. A percolation test hole was attempted but the extremely rocky nature of the soil proved virtually impossible to excavate with anything other than powered equipment. The crews were able to manage to excavate a shallow percolation test hole in the base of a shallow pit that was excavated to a depth of three feet. The test was invalid, however due to the fact that, after approximately 30 minutes the water in the five-inch deep, eight-inch diameter hole had not seeped into the ground at all.

The second area of interest lies about three-quarters of a mile south of the first site. Representatives from DNRC, Missoula County and Great West Engineering attempted to access the area but could not due to snow depths. The site was visually inspected and concluded this site would not be feasible due to groundwater and/or soil conditions. The area was noted to be heavily forested with predominately spruce and fir, which tend to grow best where there is ample soil moisture.

Alternative S-3: Site #2 – Forest Service Site

Site #2 is located on United States Forest Service land as shown in Figure 7-7. This site also has suitably flat and uniform topography for construction of the mechanical treatment plant and the drainfields.

The soil for this site is glacial in origin, and derived mostly from Precambrian-aged Belt Supergroup argillite, siltite and quartzite. It is generally coarse-grained, consisting mostly of coarse sand, gravel and cobbles. There is some variation in the distribution of the grain size, but generally speaking the material has few fines and is probably quite permeable.

An Application for Purchase of Forest Service Lands under the Forest Service Townsite Act application has been submitted and accepted by the USFS for this property. Currently, an Environmental Assessment must be completed on the site. This assessment must be completed in compliance with the requirements outlined in Chapter 3 of the NEPA scope of work requirements. See Appendix GG for the NEPA scope of work.

One of the requirements of the Townsite Act is to provide evidence that there is no equally suitable private, local government, State, or other Federal lands available. To ensure that this obligation is met, the District decided to make one more concerted effort to locate any other viable treatment and disposal sites. The treatment site evaluation completed in this PER will meet these requirements.

This site is relatively close to residential dwelling; however it is one of the only sites available for construction. The plant will be placed as far as possible from the public as possible.

1.4 Preferred Alternative

Each of the alternatives presented above in Section 1.3 were analyzed in detail. A decision matrix was developed to compare alternatives and help select a preferred alternative. The decision matrix included environmental impacts, technical feasibility, 20-year life cycle costs, public health and safety, operation and maintenance, and public opinion. A public meeting was held by the District board, and Great West Engineering presented the preliminary engineering report to the public in order to get their opinion and support of the project.

Based upon the results of the decision matrix, the preferred alternative was determined to include:

- Alternative C-1: Standard Gravity Collection
- Alternative T-2: Sequencing Batch Reactor (SBR) with Groundwater Infiltration
- Alternative S-1: DNRC Airport Site

C-1: This alternative ranked the highest and will be the design basis for this project. As stated in the C-1 description report, individual grinder pumps may be considered on a case by case basis in conjunction with this layout.

T-2: This alternative ranked the highest and will be the design basis for this project. The analysis of this alternative focused on the Sequencing Batch Reactor treatment; however, other types of mechanical treatment may be considered during the design phases of this project.

S-1: The DNRC Airport Site ranked the highest and will be considered the preferred alternative. However, if further geotechnical investigations indicate this site is not feasible due to the soil matrix and aquifer conditions, S-3 will be the alternate site.

The following are some features and benefits of the preferred alternatives:

- It is recommended that a new central wastewater collection and treatment facility be constructed to service the current and future users of the District. This will reduce the groundwater and public health problems associated with the condition of the existing on-site wastewater systems. It will also eliminate the groundwater degradation associated with poorly treated wastewater being discharged from on-site systems within the community. In turn, this will reduce the nutrient loading to Seeley Lake. A central sewer system will also allow for community growth and economic development.

- Existing septic tanks in the community should be abandoned and replaced with a standard gravity collection system (C-1); although STEP and grinder pump systems may be utilized in areas where the standard gravity system will not work.

- The treated effluent will be disinfected utilizing UV. This method of disinfection works well with the high quality effluent produced by the SBR plant.

- Sludge will be disposed to the County landfill.

- The proposed SBR treatment plant will have an overall improvement of water quality in Seeley Lake. The impact from the project on the existing watershed will be very positive. The new wastewater treatment system will provide a much higher effluent quality than is currently being discharged by individual septic systems.

1.5 Project Costs and Budget

The proposed total project is estimated to cost $15,000,000 with a projected total system annual O&M cost of $262,375 per year.

Due to the cost of the total project, the District has decided that it is in their best interest to construct the project in phases. The project will be divided into four different phases for the collection system and two different phases for the sequencing batch reactor. The first phase of the treatment will be designed to handle the first two phases of collection system and the second phase of the treatment will handle the full build out of the collection system. Section 9 details the phasing of the project.

Phase 1 of both the treatment and the collection system is estimated to cost $6,907,000 with a projected total system annual O&M cost of $158,700. At this time, phase 1 of both the collection system and the treatment system will be the main focus of funding.

TSEP's published target rate for the Seeley Lake CDP is $67.28 per month for combined water and wastewater services. The current average monthly residential user rate for water is $61.09. The average monthly residential wastewater user rate with the preferred funding alternative for the project is $102.22. The combined total is $163.31 per month, which is well above the combined target rate of $67.28 per month (242.7%).

Various funding scenarios were considered with a variety of grant and low interest loan sources available to the District. The recommended funding strategy includes grant funds from the Treasure State Endowment Program (TSEP), the Department of Natural Resources and Conservation (DNRC), Community Development Block Grant Program (CDBG), State and Tribal Assistance Grants (STAG), Water Resourced Development Act (WRDA), and a Rural Development Grant (RD). A percentage of the project funding will be through the Rural Development (RD) loan program. Table 10.1 in Section 10 presents a detailed breakdown of the proposed funding strategy with estimated user rates.