RLK HYDRO INC.

Hydrology, Engineering and Environmental Consulting

Juniper Bay, LLC
Public Water Supply

PWS ID# To be Assigned

SOURCE WATER DELINEATION AND ASSESSMENT REPORT

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EXECUTIVE SUMMARY

This Source Water Delineation and Assessment Report (SWDAR) was prepared by Rich Nehl, P.E., RLK Hydro, Inc. of Kalispell, Montana. This report was completed as required by the Federal Safe Drinking Water Act and in accordance with Montana's Source Water Assessment Plan administered by the Montana Department of Environmental Quality (DEQ). Source water assessment is the first step towards source water protection. This report is intended to provide information and help the public water system staff/operator, consumers, and community citizens to develop strategies to protect this drinking water source. The information provided includes the delineation of the area most critical to maintaining safe drinking water, an inventory of significant **potential** sources of contamination within this area, and an assessment of the relative threat that these sources pose to the water system. This PWS will use Flathead Lake surface water as its source of drinking water. According to the Source Water Protection Program (DEQ, 1999) all surface waters used for public water supply are considered to have **high sensitivity** to **potential** contamination.

As part of this assessment, two types of source water protection areas are mapped or delineated. They are: the Control Zone and the Inventory Region. The Control Zone is a 100-foot radius circle around the pump intake. The goal of management in the Control Zone is to avoid introducing contaminants directly into the pump intake. The Inventory Region is a half-mile radius around the pump intake.

The most significant potential sources of contamination identified within the Control Zone of the pump intake are spills that might be associated with public watercraft and commercial barges.

The inventory process found several sources of potential contamination located within the Inventory Region. These sources include septic systems, inactive leaking underground storage tanks, potential for an accidental spillage from a chemical or fuel tanker truck on US Highway 93, and stormwater runoff pollution entering the Lake. Since these pollution sources would have to enter the groundwater or travel overland before reaching Flathead Lake, the potential that these spills would reach the PWS intake is low.

Susceptibility is the degree of likelihood for a public water supply to be impacted by inventoried contaminant sources. Susceptibility is determined in accordance with the DEQ Source Water Protection Program (DEQ, 1999). Susceptibility is based on the hazard of potential contaminant sources and the presence of barriers that stand between the intake and potential contaminant sources. In this situation, the PWS surface water intake is considered to have moderate susceptibility to fuel related spills along the shore and in the vicinity of the control zone. The intake is considered to have a low susceptibility to contamination associated with spills along the highway. In addition, the DEQ Source Water Protection Program states that surface water to be used as the source of a PWS has "high source water sensitivity" to contaminant exposure.

Mitigating and managing some of the potential sources of contamination identified within the Inventory Region can be beyond the scope of what PWS operator(s) and/or owner(s) can accomplish or have the authority to change unless the Inventory Region is completely within the boundaries of the property or there are only a limited number of landowners involved. The DEQ

Source Water Protection Program acknowledges this and recommends that whenever possible, public water supplies work together and work with local, county, and state officials to find ways to protect their source water. To this end, the Source Water Protection Program offers assistance to individual public water supplies and communities in developing source water protection planning. Protection planning uses delineation and assessment reports like this one as a starting point to develop and implement strategies to protect source water, identify alternate sources of water, and develop emergency procedures. Protection plans can be developed as stand-alone documents or they can be developed as components of larger community level planning efforts. A plan as described above can build a case for monitoring waivers.

The costs associated with contaminated drinking water are high, and prevention is vastly preferable to treatment. Public awareness is a powerful tool for protecting drinking water. The information in this report is intended to help increase public awareness about the relationship between land use activities and drinking water quality.

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1.0 INTRODUCTION

The primary purpose of this source water delineation and assessment report (SWDAR) is to provide information that will help this public water supplies (PWS) protect its drinking water source. Source water assessment is the first step towards source water protection. This Source Water Delineation and Assessment Report (SWDAR) is intended to meet the technical requirements for delineation and assessment of this Public Water System as required by the Montana Source Water Protection Program (DEQ, 1999) and the federal Safe Drinking Water Act (SDWA) Amendments of 1996 [U. S. Code Title 42, Chapter 6A, Subchapter XII, Part E, § 300j-13-(a) Source Water Assessment].

2.0 BACKGROUND

The proposed Villas at Juniper Bay public water supply is located in Tracts 7BA, 7C, 7E, 7EA & 7J of Government Lot 1; Section 35; Township 27 North, Range 21 West, Flathead County, Montana, and is approximately 10 miles south of Kalispell, near Somers, on the west shore of Flathead Lake. The public water supply will service 15 existing dwellings and 12 proposed dwellings. The maximum supply flow rate is 10 gallons per minute (gpm) not to exceed 6,750 gallons per day or 16.0 acre-feet per year. The source water for the system is Flathead Lake. This PWS is classified as a Community Non-Transient PWS, as it serves more than 15 year-round residents. Refer to Figure 1 for a Vicinity Map and Figure 2 for a Site Map.

2.1 PHYSICAL SETTING

2.1.1 Geography and Hydrology

The Villas at Juniper Bay PWS is located approximately 2.5 miles southwest of Somers, Montana, on the west shore of Flathead Lake and at the base of the Salish Mountains. The lake has a surface area of approximately 192 square miles and a maximum depth of 371 feet. The Flathead and Swan Rivers are the major sources of surface water entering the north end of the lake and flows discharge out of the south end of the lake through Kerr Dam on the Flathead River. The shore elevation fluctuates between 2,883 and 2,993 feet above MSL (mean sea level). The elevation in the area of the PWS is generally between 3,000 and 3,100 feet above MSL (mean sea level).

2.1.2 Climate Summary

The climate is classified as modified north Pacific maritime. Annual total precipitation averages 16.22 inches per year and is most abundant in May and June. The area receives an annual average of 64.7 inches of snow, usually between December and February. The climate summary is based upon records from the National Weather Service weather station located at Glacier Park International Airport in Kalispell, MT.

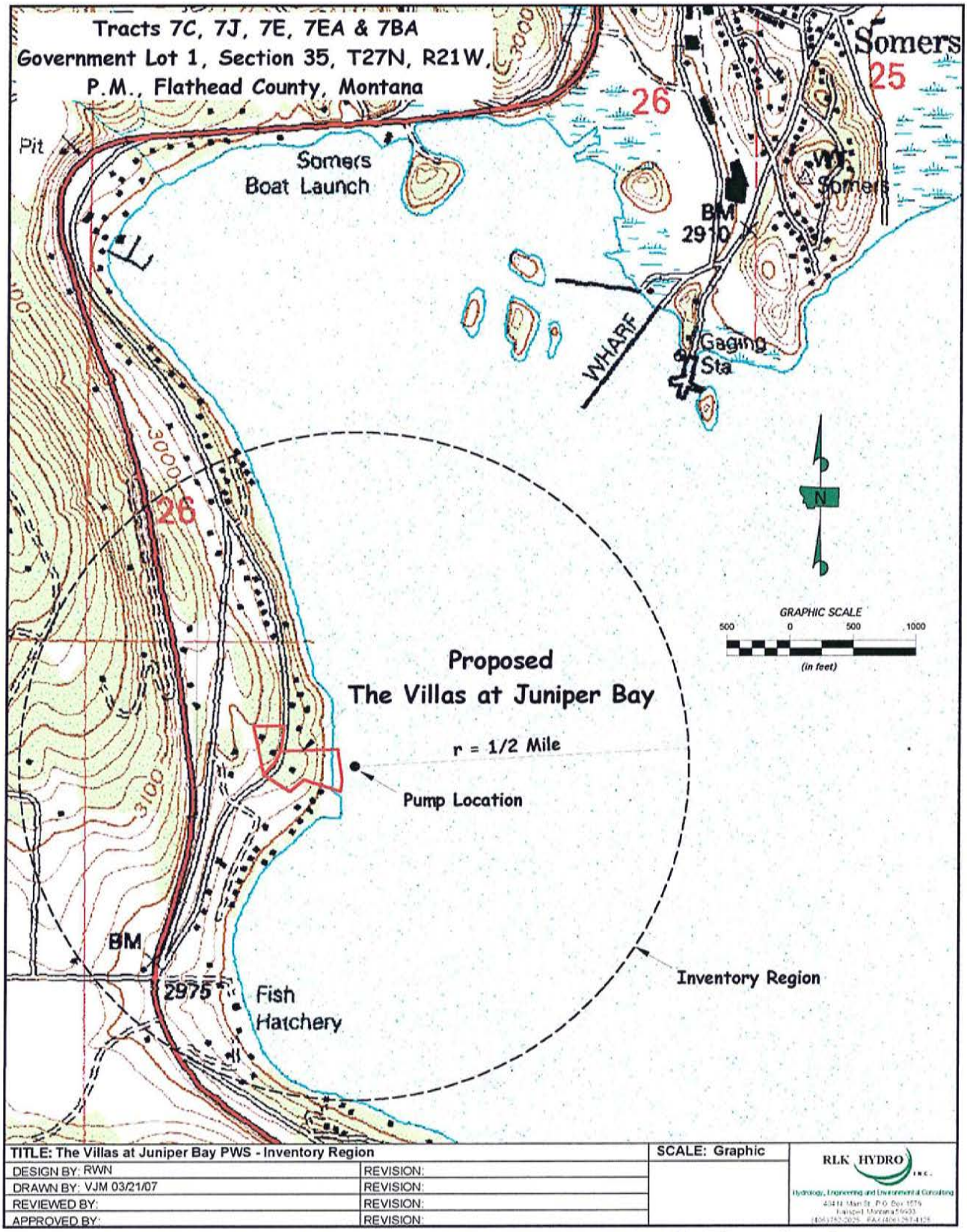
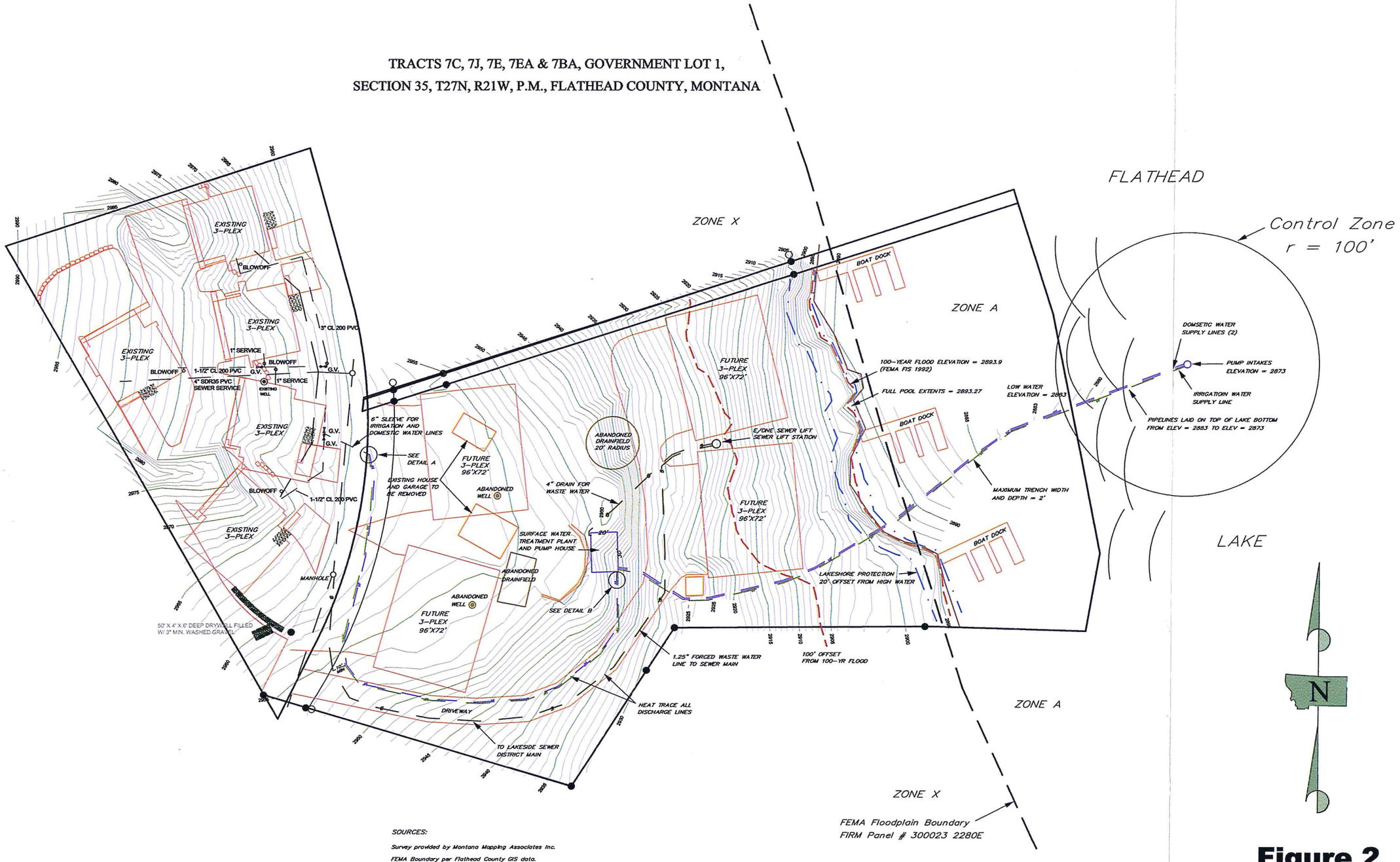


Figure 1. Vicinity Map – The Villas at Juniper Bay Public Water Supply

TRACTS 7C, 7J, 7E, 7EA & 7BA, GOVERNMENT LOT 1,
SECTION 35, T27N, R21W, P.M., FLATHEAD COUNTY, MONTANA



SOURCES:

Survey provided by Montana Mapping Associates Inc.

FEMA Boundary per Flathead County GIS data.

Figure 2

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SCALE: 1" = 75'

Figure 2

TITLE: The Villas at Juniper Bay	
DESIGN BY: RWN	REVISION:
DRAWN BY: VJM 03/21/07	REVISION:
REVIEWED BY: RWN	REVISION:
APPROVED BY:	REVISION:

2.1.3 Source Water

Kerr Dam is located at the southern end of Flathead Lake near Polson, MT. Regulation of outflow by the dam maintains the lake's level between 2,883 and 2,893 feet above sea level. If runoff conditions in the mountains don't warrant flood threats, the lake level is brought to 2,890 feet by the end of May and to full pool by June 15. The approximate lake volume is 5.6 cubic miles equaling 18.92 million acre-feet or 6.2 trillion gallons. The United States Geological Survey (USGS) gauging station, ID 12372000 on the Flathead River near Polson MT, reports average flow rate from 1939 through 2005 as 11,400 cfs equaling 8,238,462 acre-feet per year or 5,117,057 gpm.

Flathead Lake is one of the 300 largest natural lakes in the world and is the largest natural freshwater lake in the western United States. Of those large lakes, Flathead Lake is one of the cleanest and water quality sampling performed by the USGS and Flathead Lake Biological Station indicates that Flathead Lake source water is well below United States Environmental Protection Agency (EPA) Drinking Water Standards for inorganic chemicals, organic chemicals, radionuclides, disinfectants, and disinfection byproducts. However, being surface water, Flathead Lake does not meet EPA Drinking Water Standards for microorganisms. As such, this water will need to be treated to remove these contaminants for this PWS. EPA lists potential microorganism contaminants in surface water as Cryptosporidium, Giardia lambia, Heterotrophic plate count bacteria, Legionella, total coliforms, turbidity, and enteric Viruses. Heterotrophic plate count bacteria have no health effects; it is an analytic method used to measure the variety of bacteria that are common in water. The lower the concentration of bacteria in drinking water, the better maintained the water treatment system is.

2.2 The Public Water Supply

2.2.1 Water Supply Facilities

This PWS uses surface water from Flathead Lake. The intake structure consists of two-1 hp submersible pumps placed 10 feet below the Flathead Lake low water level of 2,883 ft-MSL and two 2-inch diameter pipelines. One pump and pipeline will be online continuously, and the other pump and pipeline will be used as a backup in case the first system fails. The pumps rest in separate protective structures, which keep the pumps approximately 2 feet above the lake bottom. This ensures lake bottom sediments will not be drawn into the pump by suction. The pipelines feed the drinking water treatment system and are equipped with totalizing flow meters immediately before the treatment system. The treatment system is designed to treat 10 gpm continuous and is a Culligan packaged system, which includes filtration and disinfection. The disinfection is provided by the application of UV light and chlorine. The system consists of the following equipment and unit processes:

1. **Pre-filtration Polymer Injection.** If needed, polymer can be injected prior to filtration to aid in sediment & suspended solids flocculation and eventual removal by the sediment removal filters. A static mixer is placed immediately after the injection point to provide complete mixing of polymer in source water.

2. **Automatic Backflush Sediment Removal Media Filtration.** Turbidity reduction, suspended solids removal, organics and disinfection-by-product precursor reduction, & microbiological contaminant removal down to 10 micron. There are pressure gauges, with sample taps, before and after the sediment filter to monitor differential pressure and initiate a backflush to clean the filter media of sediment and suspended solids load. If differential pressure set point is not met, an automatic backflush will occur once per day at a scheduled time, usually at night during off peak demand hours. Backflush water is discharged to sanitary sewer.

3. **Nominal 10-micron & 1-micron Cartridge Filtration, with "Alternate" Absolute 1-micron Cartridge Filtration.** *Giardia lambia* & *Cryptosporidium* cyst removal. Further turbidity reduction. There are pressure gauges, with sample taps, before and after the sediment filter to monitor differential pressure. The "alternate" 1-micron absolute 1-micron filter can be used for further polishing if deemed necessary.

4. **Ultraviolet Light (UV) Disinfection.** Parallel high output 254-wavelength UV disinfection units used for virus and coliform bacteria destruction.

5. **Residual Chlorine Disinfection.** Inject a pre-mixed 1.38% Sodium hypochlorite solution in treated water to obtain a 0.2 mg/l to 1.0 mg/l free chlorine residual disinfection concentration in the drinking water. This will be activated by level control system in the clear well tanks.

6. **Absolute 1-micron Filter.** Provides polishing of any particles passing through the nominal 1-micron filters. There are pressure gauges, with sample taps, before and after the sediment filter to monitor differential pressure.

7. **Recirculation Pump.** This pump is used to provide recirculation flow through the cartridge filters and UV in order to keep the cartridge filters free of microbiological slime build-up and prevent the UV from overheating when system is not online. This pump also operates when the system is online to provide cartridge filter disinfection.

8. **Flow Restrictor.** Ensures that the system cannot operate at a flow rate greater than the 10-gpm-design flow rate. Also, this will prevent the 10-gpm domestic water right diversion rate from being exceeded.

9. **Turbidity & pH Monitors.** Continuous pH and turbidity monitors to analyze finished water quality.

10. **Clear Well.** There are two 3,000-gallons tanks for the clear well. The 6,000-gallon capacity clear well is used to obtain the needed chlorine contact time and for storage needed to meet a peak demand water usage of 47 gpm. There are 4-position level controls on each tank, which control water level by opening and closing an electric solenoid valve on the finished water line. The tanks are also equipped with inlet and outlet spargers to prevent water flow path short-circuiting within the tank and over flow piping discharge to a floor drain.

11. **Temperature Monitor.** There is also a temperature monitor in the tank to record finished water temperature.

12. **Duplex Supply Pumps.** The clear well tanks are fitted with redundant duplex discharge pumps that will supply water to the end users. The pumps are sized to meet the peak water demand design flow rate of 50 gpm and an end users pressure of 35-psi. There is a flow restrictor immediately down stream of the pumps to ensure that this flow rate is not exceeded.

13. **Pressure Switch & Pressure Tanks.** There is a pressure switch immediately after the pumps that will sense pressure induced by three pressure control tanks and cycle the pumps off and on to meet end user demand at a required minimum of 35-psi. Initially, the pressure switches will be set at 70-psi pump on & 80-psi pump off to overcome elevation and friction head losses in the distribution system.

14. **Pressure Relief Valve.** After the pressure tanks, there is a pressure relief valve that acts as a safety feature to relieve excess system pressure.

15. **Chlorine Monitor.** Automatic chlorine monitor to continuously monitor residual free chlorine in finished water.

16. **Pump to Waste Valve.** A drain valve used to completely empty system to sewer.

17. **Backflow Prevention Device on Backflush Line to Media Filters.** The sediment removal filters automatically backflush to periodically clean the loading collected on the media, discharging to sanitary sewer. The backflow prevention device eliminates the potential cross connection between untreated source water and treated backflush water. The backflush water, since it is treated water containing residual chlorine, will disinfect the sediment filter media promoting longer runtime and more efficient treatment.

18. **Totalizing Flow Meters.** A totalizing flow meter will record total flow distributed to the public water supply users. Also, a totalizing flow meter will record total flow used to backflush the sediment removal media filters. Data from these two meters will represent the yearly total flow volume used by the system. This data will be reported to the MDEQ and the Montana Department of Natural Resources (DNRC).

19. **Piping Connecting Unit Processes.** All piping internal to the surface water treatment plant connecting the individual unit processes will be copper, as specified by Culligan.

20. ***Optional SCADA System.*** A Supervisory Control and Data Acquisition (SCADA) system may be installed to record data from the chlorine residual, turbidity, pH, temperature, and flow monitors. The certified operator would be able to remotely link to this SCADA system via a cell phone and personal computer. If MDEQ will agree to reduce daily monitoring visits that are required for this system, SCADA will be installed to reduce monitoring costs.

A state certified water treatment operator will maintain the system on a daily basis. After treatment, the water is distributed to 27 dwellings, which will serve an estimated total population of 67.5 residents. This public water supply is classified as a Community Non-Transient PWS since it serves more than 15 year-round residents.

2.3 WATER QUALITY

Public water systems must conduct routine monitoring for contaminants in accordance with Federal Safe Drinking Water Act requirements. A community public water supply must sample in accordance with schedules specified in the Administrative Rules of Montana (ARM). Monitoring includes coliform bacteria, lead, copper, nitrate, nitrite, volatile organic chemicals (including hydrocarbons and chlorinated solvents), inorganic chemicals (including metals), synthetic organic chemicals (including pesticides), and radiological contaminants. Analytical results are maintained in DEQ's database and reported in units of milligrams per liter (mg/L, equivalent to one part per million) or micrograms per liter (µg/L, equivalent to one part per billion). The results are compared to water quality standards established by the EPA. Maximum Contaminant Levels (MCLs) are enforceable standards limiting the amount of a contaminant in drinking water.

3.0 MANAGEMENT AREA DELINEATION

3.1 GENERAL DISCUSSION

This report delineates two source water management areas. The goal of source water management is protection of the source water in the management areas by 1) controlling activities in the Control Zone, and, 2) managing significant potential contaminant sources in the Inventory Region. Methods and criteria for delineating source water protection areas for public water supplies are specified in the Montana Source Water Protection Program (DEQ, 1999).

3.2 DELINEATION RESULTS

Control Zone – A 100-foot radius Control Zone is delineated around the pump(s) intake.

Inventory Region – The Inventory Region is generally the area that is expected to contribute to the water supply over a period of several years. The inventory region is a ½ mile radius around the pump(s) intake. This is roughly in accordance with the Source Water Protection Program (DEQ, 1999) guidelines and as discussed with Jeffrey F. Herrick with the DEQ Source Water Protection Program (personal communication 12/2006). The area could be delineated to enclose a considerably larger area, but to do so would capture areas that are reasonably beyond the water system operator or owner to manage. It is also recognized that Flathead Lake is so large that the volume of the lake allows for considerable dilution and lake currents that are beyond ½-mile from the intake both reduce the likelihood of the PWS experiencing impacts from potential contaminant sources originating beyond that distance. Refer to Figure 1 for the Inventory Region area and Figure 2 for Control Zone area.

4.0 INVENTORY

Prior to assessing the public water supply's susceptibility to contamination, an inventory of potential contaminant sources is conducted using information that is publicly available. To this end, potential contaminant sources within the Control Zone and Inventory Region were inventoried. The inventory focuses on businesses, facilities, and other operations that generate, use, store, or transport potential contaminants, as well as certain land uses. The methods and data sources used in the inventory process are explained below. It is important for the reader to understand that the sources identified in this section are considered **potential** sources of contamination to the drinking water. It should not be

assumed that they have released contaminants into the surface water or environment, but that they have the potential to do so. If contaminant releases are documented for any of the inventoried sites, it will be mentioned in this report along with what is known about the status of cleanup and remediation activities. Contamination of drinking water sources is less likely when potential contaminants are properly managed.

4.1 Inventory Method

Information on facilities and land uses that are potential sources of regulated contaminants was obtained from a number of databases. The process for completing the inventory includes the following:

- Step 1: The Montana State Library Natural Resources Information System (NRIS) GIS database was queried to identify septic land application sites, wastewater treatment plants, animal feeding operations, septic system density, sewer systems, and agricultural land uses. It should be noted that septic density is based upon population density in non-sewered areas and comes from US Census data for the Year 2000 census.
- Step 2: The DEQ PWS files were reviewed to identify agricultural activities or wastewater treatment in the vicinity of the PWS.
- Step 3: As appropriate, the EPA's Envirofacts System http://www.epa.gov/enviro/ was queried to identify EPA-regulated facilities located in the management areas. This system accesses facilities listed in the following databases: Resource Conservation and Recovery Information System (RCRIS), Biennial Reporting System (BRS), Toxic Release Inventory System (TRIS), and Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) and the Permit Compliance System (PCS - for Concentrated Animal Feeding Operations with MPDES permits). The available reports were browsed for facility information including the Handler/Facility Classification to be used in assessing whether a facility should be classified as a significant potential contaminant source.
- Step 4: Montana DEQ databases were queried to identify any of the following in the management areas:
  - Underground fuel storage tanks (USTs) and leaking underground fuel storage tanks (LUSTs) http://www.deq.state.mt.us/UST/USTDownloads.asp
  - Hazardous waste contaminated sites, above ground fuel storage tanks (ASTs), landfills, abandoned and active mines, gravel pits, or other sites that could concentrate hazardous materials. These are searched for at the following site http://nris.state.mt.us/gis/bundler/
  - Any information on past releases and present compliance status was noted.

Potential contaminant sources are considered significant if they fall into one or more of the categories in Table 1:

Table 1. Potential Contaminant Source Categories

1. Large quantity hazardous waste generators. 2. Landfills. 3. Underground storage tanks. 4. Known groundwater contamination (including open or closed hazardous waste sites, state or federal Superfund sites, and leaking UST sites). 5. Underground injection wells. 6. Major roads or rail transportation routes.	7. Cultivated cropland exceeding 20% of the Inventory Region. 8. Animal feeding operations. 9. Wastewater treatment facilities, sludge handling sites, or land application areas. 10. Septic systems. 11. Sewer mains. 12. Storm sewer outflows. 13. Abandoned or active mines.

4.2 INVENTORY

The following are the results of the inventory process.

4.2.1 Control Zone Results

The databases that were searched identified no potential contaminant sources within the Control Zone. However, fuel spills from public watercraft and commercial barges are recognized as potential contaminant sources within the control zone.

4.2.2 Inventory Region Results

The Juniper Bay, LLC, constructed and financed the sewer main that connects their property and potentially others to the ***Lakeside County Water and Sewer District.*** The presence of this forced main poses no contaminant threat within the Inventory Region. This sewer main slopes parallel to Flathead Lake.

However, as indicated by the NRIS database, there are areas adjacent to Juniper Bay LLC that have high septic density. Refer to Appendix A for Septic Density updated in the year 2000. This means that there are concentrations that are greater than 300 septic systems/mile^2. These concentrations of septic systems are based on population density as determined by the 2000 US Census. If any of these septic systems either fail or are poorly maintained, they have a potential to discharge untreated or poorly treated septic effluent to the surface water.

U.S. Highway 93 is upgradient of the Juniper Bay LLC property. If a tanker truck carrying chemicals (inclusive of fuel) were to rollover and spill its contents into the immediate environment, there is a remote potential for an impact to the surface water source.

The inventory identified one leaking underground storage tank facility at the Montana Fish, Wildlife & Parks; Flathead Salmon Fish Hatchery approximately one-half mile southwest of the subject property. This is an inactive site that was closed in 1992. There

is one other inactive underground storage tank facility located at the Eidsvold Lutheran Church approximately one-half mile northwest of the subject property. Refer to Appendix B for a map and a brief summary of these sites.

The land use in the immediate area of Juniper Bay LLC is urban/residential. The general area to the west of U.S. Hiway 93, adjacent to the property, is forest with some agriculture. See Land Use Map & Report in Appendix C. The database search indicated that there were no landfills, recreational vehicle dump sites, septic land application sites, wastewater discharges, animal feeding operations, railroads or abandon mine sites located in the inventory region.

There are no public storm sewer outfalls in the inventory region. However, stormwater does flow overland and through ditches along roads and eventually into Flathead Lake. There are no known or planned storm water discharges into the lake, which are located within or adjacent to the Control Zone. Storm water does have some potential to carry undetermined contaminants to the lake, which in turn may affect water quality within the inventory region. Stormwater runoff is not considered to be a significant potential contaminant source for this PWS.

Also, as identified within the control zone, fuel spills from public watercraft and commercial barges are recognized as potential contaminant sources within the inventory region. There are boat docks on the shore of Flathead Lake that are for the use of the citizens residing at the proposed Villas at Juniper Bay. Fuel spills from boats using these docks provide a source of potential contamination.

5.0 SUSCEPTIBILITY ASSESSMENT

Susceptibility is the degree of likelihood for a public water supply to be impacted by inventoried contaminant sources. Susceptibility is determined in accordance with the DEQ Source Water Protection Program (DEQ, 1999). Since this PWS source water intake is in Flathead Lake it is considered highly susceptible. As stated before, public watercraft and commercial barges are the greatest potential contaminant source. The susceptibility analysis is intended to provide the operator with information on where the greatest risk occurs. To this end, the assessment is focused on potential contaminant sources nearest the PWS that have been determined to be significant.

Susceptibility of the Juniper Bay LLC PWS's surface water source is determined by two factors: the potential of a contaminant reaching the intake and the resulting health hazard. Susceptibility is assessed in order to prioritize potential pollutant sources and to guide management actions undertaken by local entities, in this case the managers of Juniper Bay LLC, Flathead County, and by local residents and other stakeholders.

The goal of source water management is to protect the source water, manage significant potential contaminant sources and ensure that land use activities in the Spill Response Region pose minimal threats to the source water. Management priorities are determined by ranking the significant potential contaminant sources identified in the previous chapter according to susceptibility. Alternative management approaches that could be pursued by the Juniper Bay LLC PWS owners, operators, or other entities to reduce susceptibility are also included in this section of the report.

Susceptibility is determined by considering the hazard rating for each potential contaminant source and the existence of barriers that decrease the likelihood that contaminated water will reach the PWS intake. The hazard presented by point sources of contaminants depends on whether contaminants can discharge directly to local streams or the lake. Hazard is also dependent on the health affects associated with potential contaminants. Hazard ratings for point and nonpoint sources are assigned based on criteria listed in Table 2. Barriers can be anything that decreases the likelihood that contaminated water will reach the surface water intake. Examples of barriers include: a vegetated riparian area, protective forest management practices, and dilution.

Table 2. Hazard of Potential Contaminant Sources

For Surface Water Sources

Potential Contaminant Sources	**High Hazard Rating**	**Moderate Hazard Rating**	**Low Hazard Rating**
Point Sources of VOCs, SOCs, or Metals (including fuel)	Potential for direct discharge of large quantities from roads, rails, or pipelines	Potential for direct discharge of small quantities to source water (public watercraft & commercial barges)	Potential for discharge to groundwater hydraulically connected to source water
Point Sources of Nitrates or Pathogens	Potential for direct discharge to surface water	Potential for discharge to groundwater hydraulically connected to surface water	Potential contaminant sources in the Spill Response region
Septic Systems (density)	More than 300 per sq. mi.	50 – 300 per sq. mi.	Less than 50 per sq. mi.
Municipal Sanitary Sewer (percent land use)	More than 50 percent of region	20 to 50 percent of region	Less than 20 percent of region
Cropped Agricultural Land (percent land use)	More than 50 percent of region	20 to 50 percent of region	Less than 20 percent of region

Barriers to contamination can be anything that decreases the likelihood that contaminants will reach surface water intake. Barriers can be engineered structures, management actions, or natural conditions. Examples of engineered barriers are spill-catchment structures for industrial facilities and leak detection for underground storage tanks. Emergency planning and best management practices are considered management barriers. Table 3 presents the susceptibility of source water based on hazard rating and the presence of barriers.

Table 3. Susceptibility of Source Water based on Hazard rating and the presence of Barriers

	High Hazard Rating	**Moderate Hazard Rating**	**Low Hazard Rating**
No Barriers	Very High Susceptibility	High Susceptibility	Moderate Susceptibility
One Barrier	High Susceptibility	Moderate Susceptibility	Low Susceptibility
Multiple Barriers	Moderate Susceptibility	Low Susceptibility	Very Low Susceptibility

Table 4 displays the susceptibility assessment results for the Juniper Bay LLC PWS surface water intake. The intake (in Flathead Lake) is susceptible to a number of different sources and types of contaminants, including fuel, pathogens, nitrates, and fertilizers.

Table 4. Susceptibility Assessment Results

Significant Potential Contaminant Sources in the Spill Response Region

Juniper Bay PWS surface water intake

Potential Contaminant Source	Contaminant (regulated)	Hazard	Hazard Rating	Barriers	Susceptibility	Management Recommendations
Sewer Main	Nitrate, pathogens	Leaks in collection lines, system failure, infiltration of untreated effluent into shallow ground water	**Low**	Dilution Part of sewer district. Slopes parallel to lake.	**Very Low**	Make public aware that this sewer main is part of Lakeside County Water and Sewer District and report any leaks in system to the District immediately.
Septic Density	Nitrate, pathogens	Leaks in septic tanks, leaks in collection lines, system failure, infiltration of untreated effluent into shallow ground water	**Moderate**	Dilution These areas are located down-shore	**Low**	Educate public on proper maintenance and replacement of on-site systems; promote advanced treatment systems
Stormwater transport to the lake	Fertilizers, nitrate, pathogens, TDS, other	Improper disposal of assorted materials that get picked up by stormwater runoff and transported to the lake	**Moderate**	Dilution No stormwater outfalls are actually present within the region	**Low**	Public education to reduce improper disposal of chemicals, spill catchment, stormwater filtration/diversion, stormwater wetland development, public chemical collection and recycling day
Roads that are present throughout the area	Fertilizers, other	Spills, storm water runoff, infiltration into ground water, erosion and transport of sediments	**Moderate**	Dilution Stormwater from the roadways appears to be diverted out of the region both to the south and north	**Low**	Maintain preparedness of local emergency personnel through active training; develop stormwater runoff diversion.
Inactive underground storage tank and leaking underground storage tank sites.	Petroleum	Migration of petroleum spills or releases to groundwater, which may in turn reach surface water.	**Moderate**	Dilution Sites are inactive and tanks are removed.	**Low**	Public education to make residents aware of these sites.
Fuel spill or release from public watercraft or commercial barges	Petroleum	Direct discharge of contaminant in surface water in Control Zone and around boat docks in the Inventory Region.	**High**	Dilution	**Moderate**	Public education to make area residents and commercial barge operators aware that there is a PWS intake at this location, to promote proper boat and barge fueling techniques. Maintain preparedness of local emergency personnel through active training.

6.0 LIMITATIONS OF THIS SWDAR

This Source Water Delineation and Assessment Report is intended to meet the technical requirements for delineation and assessment of this PWS as required by the Montana Source Water Protection Program (DEQ, 1999) and the federal Safe Drinking Water Act (SDWA) Amendments of 1996 [U. S. Code Title 42, Chapter 6A, Subchapter XII, Part E, § 300j-13-(a) Source Water Assessment]. The following limitations should be noted:

- Not every potential or existing source contamination in the vicinity of the PWS has been identified. Consideration was limited to potential sources of contamination that are within the Inventory Region and of a type determined by the DEQ to be significant.
- Potential sources of contamination were identified using online databases and available aerial (overhead) and map imagery. Field surveys and inspections of the Inventory Region were not conducted. It is highly recommended that the operator or other persons knowledgeable about the community review the inventory, and revise it as necessary. The potential contaminant sources described in the inventory are identified from readily available information. Consequently, unregulated activities or unreported contaminant releases may have been overlooked. Multiple data sources are used to increase the likelihood that major threats to the source water are identified. The inventory is not exhaustive and some potential contaminant sources may not have been included for the reasons just stated. Absence of a potential contaminant in the inventory or susceptibility assessment of this report does not mean that the potential for contamination does not exist, or that there is no threat.

- This report is not, and should not be construed as, a guarantee, warranty or certification that the PWS will not be impacted by potential contaminant sources for which it appeared to have a low susceptibility. It should be understood that even small releases of some chemicals in close proximity to a surface water intake can have significant negative impact on water quality, and is therefore a significant threat to the public water supply.

7.0 REFERENCES

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National Weather Service Online, Missoula, MT; Normals for Butte, Kalispell, and Missoula Based on National Climatic Data Center 30 Year Normals for Kalispell, MT Weather Station Located at Glacier Park International Airport

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United States Census Bureau, 2000. http://factfinder. census. gov/home/saff/main. html?_lang=en

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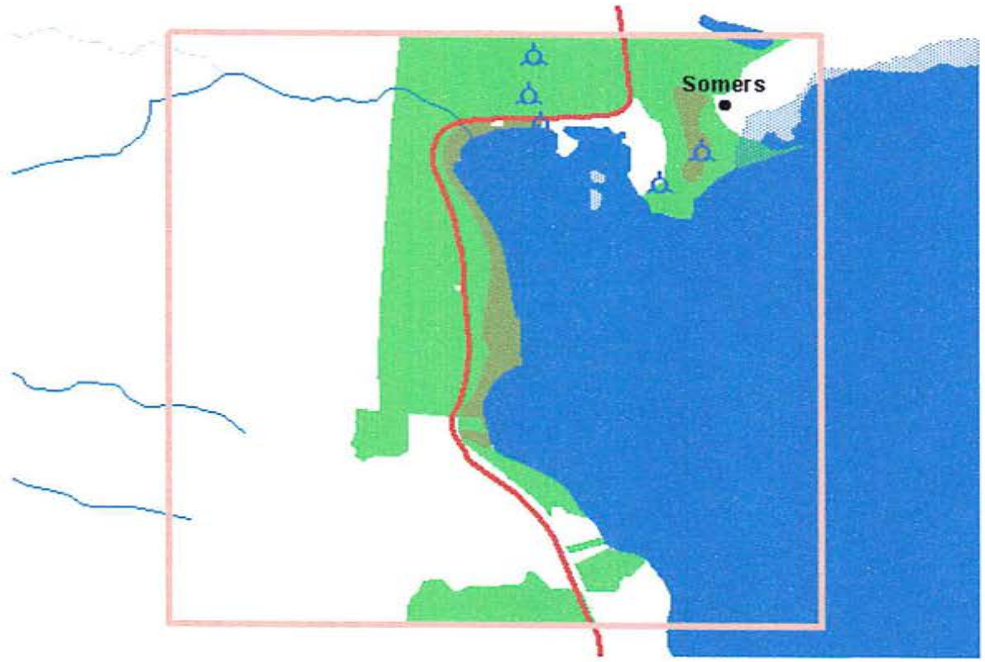
APPENDIX A

SEPTIC DENSITY YEAR 2000

Septic Density 2000

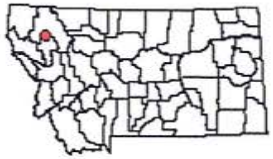
Selection Info: State Plane Coordinates: 244848,432554,249331,436612

Back To Data List | Zoom IN OUT Zoom Factor 2 | Pan | Full Extent



This map is 4.12 miles wide.

Location Map



Data Reports

Septic Summary Click Here

Public Water Supply Summary Report Click Here

Download Septic Density 2000 Shape File

Download Public Water Supplies Shape File

Identify | Legend | Metadata

	Septic Density: High, Medium, Low, City Sewer	No
	Public Water Supply	Yes
	Hydrologic Unit	Yes
	Highways: Interstate Route, U.S. Route, Montana Route, Secondary Route	Yes
	Town Population: 0-100, 101-1,000, 1,001-5,000, Over 5,000	Yes
	Water Body: Lake/Pond, Swamp/Marsh, Glacier	Yes
	Streams: Major river or stream, Other stream, Un-named stream	No

Select a Background Image:

None

Click here for a printable version

HELP

Report Description

2000 Septic Density

Click here to close window and return to map.

Estimated Septic Tank Density. This coverage was developed using 2000 Census block data and known city boundaries. Using these 2 coverages, we clipped the census blocks for all areas OUTSIDE of known city boundaries (making the assumption that all areas within city boundaries were sewered). Using the blocks outside of city boundaries, we then applied a conversion rate supplied by DEQ.

The assumption made was that there is a statewide average of 2.5 persons per installed septic tank. 3 hazard levels were then applied (using the census block population density value):

High Hazard - >300 septic systems (750 persons) per square mile
Medium Hazard - >50 septic systems (125 persons) but < 300 septic systems per square mile
Low Hazard - <50 septic systems (125 persons) per square mile

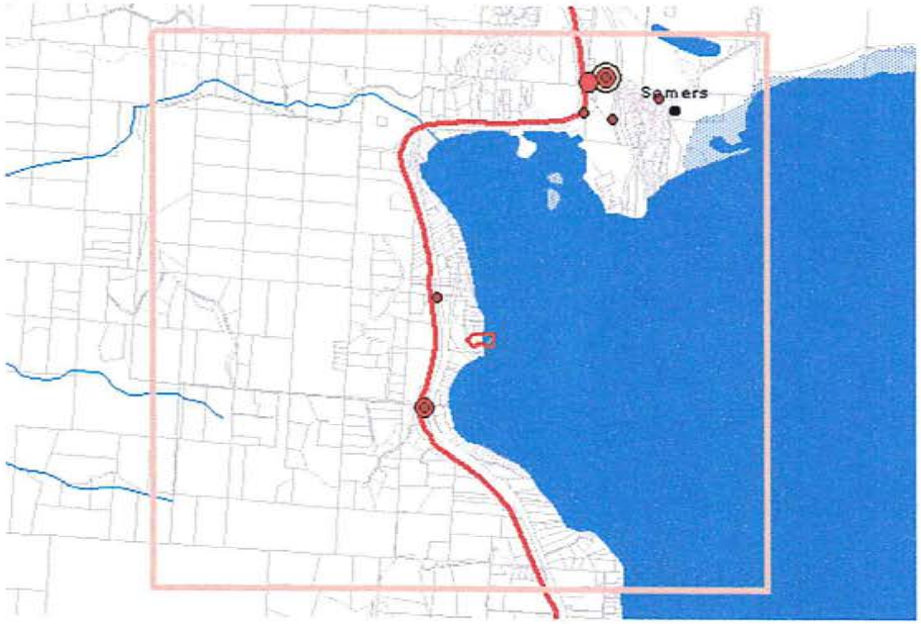
APPENDIX B

UNDERGROUND STORAGE TANKS

Underground Tanks, Petroleum Releases, and Release Compensation Sites

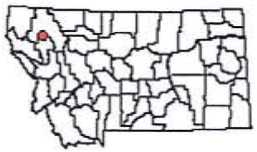
Selection Info: State Plane Coordinates: 244856,432632,249339,436690

Back To Data List | Zoom IN OUT Zoom Factor 2 | Pan | Full Extent



This map is 4.12 miles wide.

Location Map



Data Reports	Description
Underground Storage Tank Facilities	Click Here
Underground Tank Leaks	Click Here
Other Leaks (Non-UST)	Click Here
Petroleum Compensation Sites	Click Here

Download Underground Storage Tank Facilities Shape File
Download Leaking Underground Tanks Shape File
Download Other Leaks (Non-UST) Shape File
Download Petroleum Compensation Sites Shape File

Identify	Legend	Metadata
	Underground Storage Tank: Active Facility; Inactive Facility	Yes
	Leaking Underground Tank	Yes
	Other Leak	Yes
	Petroleum Release Compensation Site	Yes
●	Owner Parcels	Yes
	County	Yes
	Highways: Interstate Route; U.S. Route; Montana Route; Secondary Route	Yes
	Town Population: 0-100; 101-1,000; 1,001-5,000; Over 5,000	Yes
	Streams: Major river or stream; Other stream; Un-named stream	No
	Water Body: Lake/Pond; Swamp/Marsh; Glacier	Yes

Select a Background Image: None

Click here for a printable version

HELP

Data last retrieved from DEQ on 11/13/2006 3:56:12 AM

EventID: 1320 **AltEventID:** **Priority:** 12 **Confirmed Release:** 4/27/1992 **Resolved Date:**

Site Name: Flathead Salmon Fish Hatchery 100 Spring Creek Road Somers

Active: Yes **Lat/Long:** 48.0591 -114.2429

Latitude/Longitude Determination Method: Address Match Exact ESRI

UST Release

Tank	Tank Release	Pipe	Spill	Overfill	Quantity	Discovered	HowFound	Comments
1	Yes	No	No	No		4/27/1992	Other	S/W SAMPLE RESULTS; 1775 PPM, TP Cause: UNKNOWN

Underground Storage Tank Facility Summary Report

Data last retrieved from DEQ on 11/13/2006 3:51:56 AM

Facility ID: 15-03496
Eidsvold Lutheran Church

I. Ownership of Tank(s)

System ID: 2227

State Owner ID: 2227

Name: Eidsvold Lutheran Church

Address: PO Box 100 Somers, MT 59932-0100

Phone: (406) 857-3529

Fax:

Contact: Wayne Pris

Comments:

Type of Notification: Closure

SystemID: 1503496

State Facility ID: 15-03496

Date Received: 5/2/1986

Re-Notification:

Facility Operator: Wayne Pris

II. Facility (Location of Tanks)

Name: Eidsvold Lutheran Church

Location: 5935 US Highway 93 S Somers, MT 59932, Flathead County

Latitude: 48.0664

Longitude: -114.2423

Latitude/Longitude Determination Method: Address Match Exact Maptech

Phone: (406) 857-3529

Comments:

Facility Compliance

Operating Permit Renewal Date:

Last Operating Permit Issued:

III. Type of Owner

Commercial

IV. Indian Lands

Tanks are not located on land with an Indian Reservation or on other trust lands

Tanks are not owned by a native American nation or tribe

V. Type of Facility

Type of Facility: Membership organizations

Comments:

VI. Contact Persons in Charge of Tanks

Name: Wayne Pris
Phone: (406) 957-3529
Contact Type: **Other:** Pastor

Address: PO Box 100 Somers, MT 59932-0100
Fax:

VII. Financial Responsibility

Facility does not meet financial responsibility requirements.

Financial Responsibility methods:

Comments:

VIII. Certification

Name: Wayne H Pris **Title:** Pastor **Date:** 4/30/1986

IX, X, and XI. Underground Storage Tanks

Tank ID	Status	Installed	Substance	Capacity	Date Closed	Closure Status
Tank 1 -- Detailed Report	Permanently Out of Use	4/30/1968	Heating Oil	500	4/10/1997	Tank removed from ground

Underground Storage Tank Summary Report

Facility ID: 1503496
Eidsvold Lutheran Church, Somers
Tank Number 1

Data last retrieved from DEQ on 11/13/2006 3:51:56 AM

IX. Description of Underground Storage Tank

1. Status of Tank

Status Notes: State Regulated Amended Information

Tank Status: Permanently Out of Use

Tag Number:

Received: 5/2/1986

Alt Tank ID: S1

Certificate Date:

Comments:

Tank Compliance
Operating Permit Type:
Operating Permit Issue Date:

2. Date of Installation

4/30/1968

3. Estimated Total Capacity (Gallons)

500

4. Material of Construction

Tank Material: Asphalt Coated or Bare Steel

Tank Material Option: None

Comments:

5. Piping Material

Piping Material: Copper

Pipe Material Option: None

Comments:

6. Piping Type

Type of Pipe: Not Listed

Comments:

7. Substance Currently or Last Stored in Greatest Quantity by Volume

Substance: Heating Oil

CERCLA No:

Description:

Comments:

X. Tanks Out of Use, or Change in Service

1. Closing of Tank

Date Last Used: 2/1/1997

Date Closure Received: 5/22/1997

Date Closed: 4/10/1997

Closure Status: Tank removed from ground

Inert Fill:

2. Site Assessment

Site Assessment has been completed

Evidence of a leak has not been detected

XI. Certification of Compliance

1. Installation

Certification or Inspection of Installation:

Comments:

2. Release Detection

Detection methods for tank:

- Not listed

Detection methods for pipes:

- Not listed

Comments:

3. Spill, Overfill, and Corrosion Protection

Installer Oath

Name:

Company:

Position:

Date Signed:

Underground Storage Tank Facility Summary Report

Data last retrieved from DEQ on 11/13/2006 3:56:12 AM

Facility ID: 15-04909
Flathead Salmon Fish Hatchery

I. Ownership of Tank(s)

System ID: 5627

State Owner ID: 5627

Name: Department of Fish Wildlife Park

Address: 1420 E 6th Ave Helena, MT 59601-3871

Phone: (406) 444-3755

Fax:

Contact:

Comments:

Type of Notification: Closure

SystemID: 1504909

State Facility ID: 15-04909

Date Received: 9/3/1991

Re-Notification:

Facility Operator:

II. Facility (Location of Tanks)

Name: Flathead Salmon Fish Hatchery

Location: 100 Spring Creek Road Somers, MT 59932-9706, Flathead County

Latitude: 48.0591

Longitude: -114.2429

Latitude/Longitude Determination Method: Address Match Exact ESRI

Phone:

Comments: Leak site

Facility Compliance

Operating Permit Renewal Date:

Last Operating Permit Issued:

III. Type of Owner

State Government

IV. Indian Lands

Tanks are not located on land with an Indian Reservation or on other trust lands

Tanks are not owned by a native American nation or tribe

V. Type of Facility

Type of Facility: Executive, legislative, and general government

Comments:

VI. Contact Persons in Charge of Tanks

Name: Stewart Kienow **Address:** 100 Spring Creek Road Somers, MT 59932-9706
Phone: (406) 857-3744 **Fax:**
Contact Type: **Other:** Hatchery Manager

VII. Financial Responsibility

Facility meets financial responsibility requirements.

Financial Responsibility methods: State Fund

Comments:

VIII. Certification

Name: Thomas L Hansen **Title:** Civil Engineer **Date:** 8/27/1991

IX, X, and XI. Underground Storage Tanks

Tank ID	Status	Installed	Substance	Capacity	Date Closed	Closure Status
Tank 1 -- Detailed Report	Permanently Out of Use	4/22/1983	Gasoline	80	4/2/1992	Tank removed from ground
Tank 2 -- Detailed Report	Permanently Out of Use		Gasoline	500	4/2/1992	Tank removed from ground
Tank 3 -- Detailed Report	Permanently Out of Use		Heating Oil	500	4/2/1992	Tank removed from ground
Tank 4 -- Detailed Report	Permanently Out of Use		Heating Oil	500	4/2/1992	Tank removed from ground

Data last retrieved from DEQ on 11/13/2006 3:51:56 AM

EventID: 1320 **AltEventID:** **Priority:** 12 **Confirmed Release:** 4/27/1992 **Resolved Date:**

Site Name: Flathead Salmon Fish Hatchery 100 Spring Creek Road Somers

Active: Yes **Lat/Long:** 48.0591 -114.2429

Latitude/Longitude Determination Method: Address Match Exact ESRI

UST Release

Tank	Tank Release	Pipe	Spill	Overfill	Quantity	Discovered	HowFound	Comments
1	Yes	No	No	No		4/27/1992	Other	S/W SAMPLE RESULTS; 1775 PPM, TP Cause: UNKNOWN

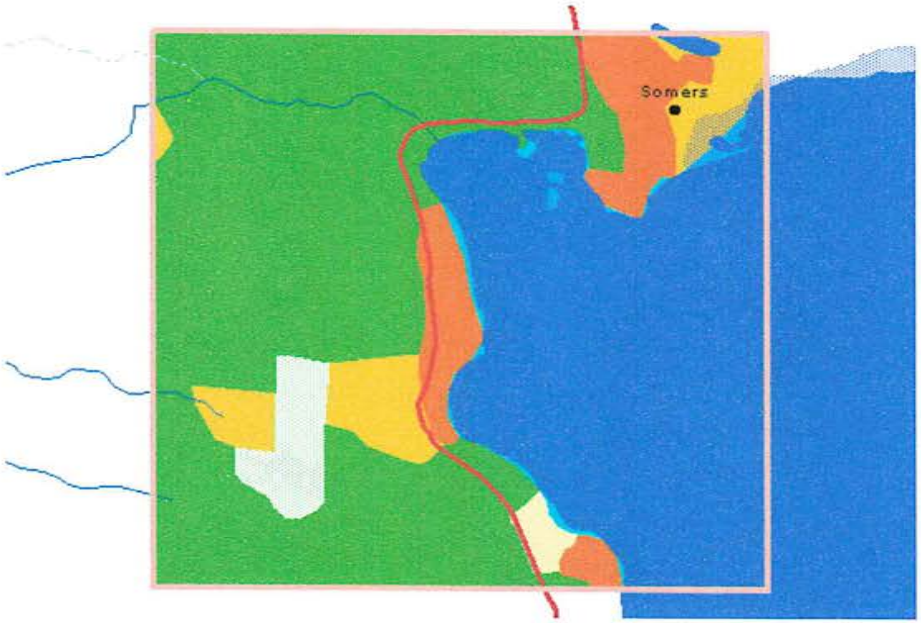
APPENDIX C

LANDUSE

Montana Landuse

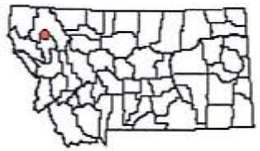
Selection Info: State Plane Coordinates: 244856,432632,249339,436690

Back To Data List | Zoom IN OUT Zoom Factor 2 | Pan | Full Extent



This map is 4.12 miles wide.

Location Map



Data Reports

Detailed Summary

Download Land Use Shape File

Description

Click Here

Identify | Legend | Metadata

Land Use — Yes
- Urban
- Agriculture
- Rangeland
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Wetland
- Bare Ground
- Tundra
- Ice/Snow
- Water

Hydrologic Unit — Yes

Highways — Yes
- Interstate Route
- U.S. Route
- Montana Route
- Secondary Route

Town Population — Yes
- 0-100
- 101-1,000
- 1,001-5,000
- Over 5,000

Water Body — Yes
- Lake/Pond
- Swamp/Marsh
- Glacier

Streams — No
- Major river or stream
- Other stream
- Un-named stream

Select a Background Image:

None

Click here for a printable version

HELP

Land Use Report

Click here to close window and return to map.

Search Area:
State Plane Coordinates: 244856,432632,249339,436690

Total size of search area = 4,495 Acres.

Land Use	Acres	Percent of Total
Evergreen Forest	2,120	47.2%
Reservoir	1,590	35.4%
Crop/Pasture	297	6.6%
Residential	237	5.3%
Mixed Forest	125	2.8%
Industrial	72	1.6%
Grass Rangeland	39	0.87%
Commercial	16	0.36%

Data Description

Landuse Detailed Summary. This report provides a detailed breakdown of land use categories. Data is from Montana 1:250,000 scale Land Use/Land Cover. Derived from USGS GIRAS files, some provided by the U.S. Bureau of Mines, others downloaded from the USGS World Wide Web server. GIRAS is the U.S. Geological Survey's Geographic Information Retrieval and Analysis System. The U.S.G.S. digitized the data from 1:250,000 scale maps, which it created through field surveys and aerial photo interpretation. The minimum size of regions to be classified was 10 acres in urban areas, 40 acres in rural areas, linear manmade features at least 660 feet wide, and linear natural features at least 1320 feet wide.