

PART II. REQUIRED INFORMATION FOR APPROVAL OF SUBDIVISIONS UNDER THE SANITATION IN SUBDIVISION ACT

A. INTRODUCTION

Historic Kootenai Lodge Condominiums is a 65-unit residential retreat to be constructed on approximately 41 acres at the north end of Swan Lake in Lake County, Montana. Construction will include adaptive reuse of existing historic structures of the Kootenai Lodge Complex and new construction of single-family homes along with recreational amenities and operational support facilities. Water supply and sewer services will be constructed on-site. Sewage treatment and disposal will be off-site.

This report presents preliminary design rationale for the water and sewer utility systems to support the Historic Kootenai Lodge Condominiums (HKLC). Please see the preliminary plat and accompanying figures for all of the additional information required under this part.

B. WATER SYSTEM

Water supply for the HKLC can originate from two sources, surface water from Swan River/Lake or Johnson Creek or groundwater from wells constructed on-site. A number of seasoned water rights filings exist for both surface and groundwater that are to be transferred in the site purchase transaction.

Since the Montana Department of Environmental Quality (DEQ) will require filtration/disinfection of any surface or surface influenced water sources, the groundwater source is the obvious choice for the public water supply for the HKLC. Groundwater development has a considerable reduced capital investment and is much easier to implement and operate when compared to a surface water treatment plant. Therefore this assessment of water supply for HKLC will focus on multiple on-site wells supported by pumping facilities located in an on-site pump house.

The water system will be owned and operated by the Condominium Owners Association. A qualified operator will be retained for supervision of operation and maintenance.

Water Demand

The proposed preliminary plan for Historic Kootenai Lodge Condominiums contemplates 65 up-scale single-family dwellings. The domestic water demand by the residents and support services combined with the site landscape irrigation requirements yields a peak daily total water demand of approximately 1,400 gallons per day (GPD) per dwelling unit. This equates to a peak daily water demand of 91,000 GPD. Applying a peaking factor of 6.0 the peak instantaneous water demand (maximum hourly) is then estimated to be 380 gallons per minute (GPM).

No fire flow is required or will be provided. The local rural fire department will establish access points within or near the Condominiums for suction draft of surface water by department pumper trucks on the property line at Sunburst Drive and Johnson Creek and at the proposed turnout by bridge crossing Johnson Creek. In addition, a 2 ½ tanker recharge tap will be provided at the pump house.

Water Supply

Groundwater in the Swan River/Lake valley floor alluvium is plentiful. A number of wells are documented within 0.5 miles of the project boundaries. For the 10 closest wells the average yield was 55 GPM with an average depth of 128 feet below ground surface (BGS). The static water level in these wells varied from 30 to 50 feet BGS. Generally these are wells developed to support single family or non-public multi-user water systems. Drilling was suspended when an adequate water source was encountered. In the Swan Basin this occurred at a relatively shallow depth when drilling in alluvium. The measured discharge primarily reflects the limitations of the pumping systems which are designed to produce only the quantity of water for the intended use and not necessarily the capacity of the aquifer. Therefore, little data exists for deeper, high yield wells in the vicinity of the HKLC project.

The valley fill aquifers typical of northwestern Montana are comprised of moderately sorted to well sorted silt, sand and gravel derived from pre-cambrian rocks as well as reworked glacial deposits. Because alluvium is stream deposited, it typically consists of interlayered lenses of silt, sand and gravel resulting from the migration of the stream channel. Multiple water bearing zones that are interconnected are the result of a series of intercalated sand and gravel layers within fine-grained interbeds that most likely represent paleo-channels of the Swan River. The interconnection then yields a single stratified aquifer. Thus it is expected that additional well depth will generally correlate to higher yield wells. A 300 foot deep eight-inch diameter well is estimated to yield 200 gallons per minute. Two wells of this capacity will be adequate for the public water supply serving the HKLC.

Water Rights

The Swan River/Lake valley aquifer has abundant yield. The Kootenai Lodge property has a number of historic, seasoned water rights. Usages of these water rights vary from commercial and residential to irrigation and power generation. Points of diversion range from on-site extraction by well to off-site surface water from surrounding Johnson and Schmidt creeks. Below is a tabulation of water rights in the Roling's name (current owner of site as of 2/8/05) and will be transferred to Milhous' name soon. Below is a list that tabulates the water rights that will be available to the Kootenai Lodge development site.

Legal authority to supply the required flow and annual volume will be secured by modifying and combining existing water rights with an additional new filing for any short fall.

WATER RIGHT NO. SOURCE PRIORITY DATE FLOW (GPM)

DOMESTIC

76K 84254	WELL	12-Jan-1993	10
76K 40313	JOHNSON CREEK	20-Aug-1896	15
76K 40314	JOHNSON CREEK	1-Aug-1914	15
76K 49048	WELL	3-Sep-1982	30
76K 92299	WELL	21-Oct-1994	20
76LJ 102486	WELL	19-Aug-1997	20
SUBTOTAL			110

GPM

STOCK

76K 40315	JOHNSON CREEK	20-Aug-1896	30
76K 40316	JOHNSON CREEK	11-Oct-1906	30
SUBTOTAL			60

GPM

IRRIGATION

76K 40317	JOHNSON CREEK	20-Aug-1896	196
76K 40318	JOHNSON CREEK	11-Oct-1906	95
76K 40319	JOHNSON CREEK	1-Aug-1914	170
76K 40320	SCHMIDT CREEK	22-Nov-1923	69.7
SUBTOTAL			530.7

GPM

POWER GENERATION

76K 40321	JOHNSON CREEK	1-Aug-1914	2693
76K 40325	SCHMIDT CREEK	22-Nov-1923	1543
SUBTOTAL			4236

GPM

COMMERICAL

76K 40322	JOHNSON CREEK	1-Aug-1914	250
76K 40326	SCHMIDT CREEK	22-Nov-1923	70
76K 40327	SCHMIDT CREEK	22-Nov-1923	100
76K 40328	WELL	8-Oct-1959	30
SUBTOTAL			450

GPM

LAWN & GARDEN

76LJ 102486	WELL	19-Aug-1997	20
SUBTOTAL			20

GPM

FISH & WILDLIFE

76K 40324	SCHMIDT CREEK	22-Nov-1923	
76K 30004165	GROUNDWATER FROM PIT	23-Oct-2002	
SUBTOTAL			

RECREATION

76K 40323	SWAN RIVER	1-Aug-1914	
SUBTOTAL			

Pumping Facilities

Two eight-inch (8") diameter wells will be constructed within the site. Submersible pumps will be installed to lift the water and pressurize the distribution system. Pump cycling will be controlled by hydro-pneumatic tanks within an on-site pump house. All hydro-pneumatic components including storage capability will be sized in accordance with Circular DEQ 3. The pump house will contain electrical switching and controls, a water quality sampling point for each well, recording water meters and pressure-activated alarms. A 2½ tanker recharge tap will be included in the piping for the local volunteer fire department.

Distribution System

A combination of four inch (4") and six inch (6") water mains will be looped to distribute water to the various units within the condominium complex. Any dead end lines will have flushing hydrants. One-inch (1") water service lines with meters will connect each individual dwelling unit to the system.

C. WASTEWATER TREATMENT

The HKLC will be served by an on-site conventional sewer system with manholes at all deflection points and collect sewage from the various structures within the condominium complex and convey it to a common lift station site. The lift station and associated forcemain will convey sewage approximately 5,000 feet to an off-site wastewater treatment facility

The design and implementation will be in accordance with the standards and requirements of the DEQ and the Lake County Environmental Health Department.

The sewer facilities will be owned, operated and maintained by the Lake County / Kootenai Lodge Sewer District, as detailed in 7-13-2201 through 7-13-2351, Montana Code Annotated. The creation of this entity will be coordinated to be in place to assume the operational control of the wastewater treatment facility as it is placed in service.

Wastewater flows

The wastewater collection and treatment system must be sized to reasonably serve the immediate design population within the Sewer District service area with some moderate allowance for growth (10%).

The Historic Kootenai Lodge Condominiums include existing structures to be upgraded and new units as well as common support facilities. The following is a tabulation of the various structures and wastewater generation estimates based on DEQ Circulation 4:

9	Existing:	@ 2BR EA (225 GPD)	=	2025 GPD
1	Existing:	@ 4BR EA (350 GPD)	=	350 GPD
55	New Homes:	@ 4BR EA (350 GPD)	=	19250 GPD
2	New Facilities	@ LUMP SUM	=	3500 GPD
	Future:	@ 10% INCREASE	=	2513 GPD
Total Design Flow:=				27,638 GPD

With a peaking factor of 4.0 the average daily design flow rate is converted to the peak hourly flow rate of 77GPM.

Wastewater Treatment Facility

The wastewater treatment facility is to be constructed off-site, approximately 5,000 feet south of the HKLC, on lot 4 of The Ridge Subdivision, a 60-acre parcel. Below is a photo showing the proposed location. This site was selected for the treatment and disposal site due to the remote lateral separation from Swan Lake, an anticipated distance of greater than 500 feet. Desirable soil characteristics and considerable vertical separation from the disposal site ground elevation to the ground water table below are also contributing factors. This remote parcel is also large enough to provide a buffer from existing home sites.

The proposed treatment processes under consideration are on-site systems that are based on nutrient-reducing wastewater treatment concepts. The design and implementation goals are a system that will fully comply with non-degradation rules established by DEQ and any applicable Lake County regulations for on-site disposal of domestic wastewater.



The proposal is to create a wastewater treatment and disposal facility that fully meets the non-degradation requirements and is classified “non-significant.”

Wastewater will be treated to DEQ Treatment Level 2, effluent Nitrate (as N) concentration of 24 mg/l or lower. The system will be ruled non-significant by demonstrating the Nitrate concentration at the end of a subsurface mixing zone is below the non-degradation trigger level of 5 milligrams per liter (mg/l) while the system is operating. Subsurface wastewater treatment systems (SWTS) that MDEQ has determined to meet the requirements of Level 2 treatment are:

- A. Re-circulating Sand Filers (DEQ 4 Ch 16)
- B. Re-circulating Trickling Filters (DEQ 4 Ch 17)

Both systems include primary and secondary treatment of wastewater prior to land application in subsurface soil absorption trenches. Five parallel systems each with a treatment capacity of 6,000 gallons per day will be sequenced to meet the wastewater loads anticipate.

Land Application

Treated effluent will be applied to the soil via subsurface absorption beds. These beds receive a pressurized dose of effluent through a grid of lateral distribution lines laid in subsurface absorption trenches. Adequate area for the primary land application sites as well as 100 percent replacement area.

Initial sizing estimates of 27,700 square feet of total absorption trench area are based on an application rate for the sandy soil of 0.5 gallons per day per square foot of trench bottom,

combined with an area reduction bonus of 50% for the advanced level 2 treatment. Considering earth internal separation and absorption trench width, the gross application area is 64,633 square feet (1.48 acres) for the primary system.

Non Degradation

The system layout and topographic siting of the absorption field were analyzed using standard mathematical models for nitrate dilution and phosphorus absorption. Results for the preliminary design are as follows:

Nitrate Sensitivity:

Site Parameters

Hydraulic Conductivity (K-value)	500	ft/day
Hydraulic Gradient (Assumed as 1/3 slope)	0.013	ft/ft
Mixing Zone Length (Per ARM 17.30.517)	500	ft
Width of Drainfield Perpendicular to Groundwater Flow	940	ft
Background Aquifer Nitrate Concentration	0.10	mg/L
Equivalent Dwelling Units (EDU)	67	
Precipitation	35	in/yr

Resultant Nitrate Concentration at End of Mixing Zone	0.49	mg/L
Trigger Level (Maximum Allowable)	5.0	mg/L

Phosphorous Breakthrough

Site Parameters

Width of Drainfield Perpendicular to Groundwater Flow	940	ft
Length of Drainfield's Long Axis	940	ft
Width of Drainfield's Short Axis	465	ft
Depth of Limiting Layer from Bottom of Laterals	16	ft
Distance from Drainfield to Surface Water	370	ft
Phosphorous Mixing Depth in Ground Water (0.5 for coarse soils, 1.0 for fine soils)	0.5	ft
Equivalent Dwelling Units (EDU)	67	

Resultant Phosphorous Breakthrough Time to Surface Water	332.5	years
Trigger Level (Minimum Allowable)	50.0	years

Based on this preliminary analysis the proposed treatment process and absorption field siting render a sewage treatment system that will be ruled "non-significant" by the MDEQ.

The wastewater collection, treatment and disposal facilities will be owned, maintained and operated by a newly formed County Sewer District. Revenue to perpetuate the sewer utility will be generated by sewer usage fees. Water meter readings will be utilized to determine monthly sewage generation by individual users.

All applications must include the information required in ARM 17.36.101-805 and the appropriate circulars. In order to facilitate review, the application should be organized in the same manner as this application form and follow closely the submittal requirements in the rules and circulars.

D. SOLID WASTE

Solid waste will be collected by private hauling and disposal contractors either to the Ferndale container site or the BFI landfill in Missoula.

E. DRAINAGE

Drainage from streets will be conducted along the roadway swale and culverts and discharge to a drainage system which will include stormwater detention and storage onsite. The typical roadway will be 26-foot wide asphalt. Runoff will be collected for disposal onsite with extreme flood flow discharging into natural drainage swales. Stormwater runoff will be channeled to common disposal areas.

During construction straw bales and filter socks shall be placed periodically in the roadside drainage swales to help prevent the transport of sedimentation offsite. Temporary silt fences will be constructed along the streambank and shoreline to prevent sedimentation from entering state waters. After construction, revegetation shall be used to enhance disturbed areas. The formal stormwater drainage plan will be submitted to DEQ as part of the subdivision review process for removal of sanitary restrictions after preliminary plat approval is obtained.

Stormwater Runoff

Stormwater runoff will be discharged to state waters following treatment. Treatment will consist of number of subsurface vaults with skimmer siphons to remove both particles of higher and lower specific gravities than water. Heavy solids will settle out in the sump basins of the chambers and the lighter liquids, such as petroleum products, will be trapped on the water surface and absorbed by petroabsorbing pads. This system will be maintained on a yearly basis to ensure proper filtration treatment.

Streambanks and Shorelines

No shoreline or streambank modifications are proposed. However, the project plan contemplates construction of 24 boat slips. Three, eight-vessel dock units will be constructed along the lake shoreline. Dock units will extend into the Swan Lake a minimum of 60 feet. Dock construction will conform to Lake County Lakeshore Protection regulations and permitting requirements.