

Plate 1

Thickness of interval (ft)	Geology	Hydrostratigraphy	Lithologic description	Water-yielding characteristics
<30	Mountain Village alluvial fan	Mountain Village aquifer	Quaternary Alluvial fan deposits—stratified alluvial deposits and poorly sorted debris flow deposits.	Limited water supply source. Small areal coverage, varied matrix size in alluvial fan setting. Shallow depth, vulnerable to surface contamination. One aquifer test reported a 7,060 ft ² /d transmissivity.
<40	Mountain Village glacial till		Quaternary Glacial Drift/outwash—Cobble-pebble, gravel with sand, silt, clay matrix.	Glacial Drift aquifer—Transmissivities reported from 2,410 to 2,950 ft ² /d. Probably connected to overlying alluvial fan deposit and surrounding bedrock water sources, including fractured dacite sills.
<70	Meadow Village sand and gravel	Meadow Village aquifer	Quaternary Modern alluvium—Unconsolidated, stratified fan alluvial deposits of silt, sand, and gravel. Some glacial drift deposits of cobble-pebble gravel with sand, silt, and clay matrix near the bottom of the deposit.	Meadow Village aquifer—Excellent aquifer, high productivity and very good water quality. Rapidly recharged from surface water. Transmissivities range from 3,057 to 27,400 ft ² /d. Vulnerable to surface activities.
575	Frontier Fm	Frontier aquifer	Dominantly black shale with light gray to yellow tan thin-bedded sandstone up to 10 feet thick, with intervals of clay, coal, and chert. Lower section contains bentonite beds up to 15 feet thick.	Water-bearing aquifers in thin sandstone layers (1 foot to 10 feet thick). Water may also be present in fractured shale layers. Transmissivities range from 36 to 831 ft ² /d. Primary aquifer source for Moonlight Basin and for areas around Meadow Village and Spanish Peaks.
20	dacite sill		Cretaceous dacite intrusion with sills: Gray to greenish-gray, weather to light gray or tan. Contains plagioclase phenocrysts in very fine-grained matrix. Intrusive into bedrock and often highly fractured. Forms sills between Cretaceous sediment layers.	The highly fractured nature of much of the intrusive dacite provides secondary porosity for water infiltration and groundwater storage that are often connected to bedrock aquifers. The presence of fractured dacite can provide larger water storage capacity and rapid recharge from surface-water sources. Dacite drilled in wells within the study area. Part of aquifer/water-supply system at Moonlight Basin, Mountain Village, and in bedrock wells around Meadow Village area.
440	Mowry Fm	Mowry aquitard	Cretaceous—Brown to greenish-gray mudstone and shale with thin sandstone beds in upper unit. Light gray, green, yellow, brown, light red, and cream-colored bentonitic mudstone. Easily weathers, poorly exposed.	Very poor water-bearing formation. Composed mostly of low-permeability mudstones, siltstones, and shales, contains bentonite clays. Wells may be able to draw water from secondary fractures. Frequently acts as an aquitard with dry layers impenetrable to water. Transmissivities range from 890 to 1,645 ft ² /d, likely from fractures and dacite intrusions and may not be typical of all areas. Water productivity is dependent upon density and arrangement of fractures and presence of dacite.
10	dacite sill			
100	Muddy Fm	Muddy aquifer	Brown to brownish-gray thin- to medium-bedded clay-rich medium-coarse salt-and-pepper sandstone that locally contains mud chips. With interspersed shale layers.	Poor water-bearing unit in fractured silty-sandstone, transmissivities range from 40 to 1,589 ft ² /d and are dependent on the extent of local fracturing.
10	dacite sill			
240	Thermopolis Fm	Thermopolis aquifer	Black, fissile shales with silty-brown sandstone beds over thin-bedded, fine-grained, white to tan quartz arenite with black fissile shale interbeds. With iron staining and rust colored clots.	Good water-bearing potential in fractured sandstones interlayered with shales. Transmissivities range from 380 to 2,730 ft ² /d depending on the extent of local fracturing.
10	dacite sill			
40	Kootenai Fm	Kootenai aquifer	Upper-Upper—20–50 feet is medium-bedded, light gray fossil-bearing limestone.	Upper-Upper—poor water-bearing unit.
175			Lower-Upper—red, purple, yellow, and gray layers of shale, mudstone, siltstone, sandstone, and limestone; frequently weathered to a reddish soil.	Lower-Upper—Good water-bearing unit.
80			Lower—Gray medium- to coarse-grained, salt-and-pepper sandstone with chert and limestone conglomerate layering at the base.	Lower—Good water-bearing unit in fractured zones, transmissivities vary from 162 to 1,440 ft ² /d depending on the extent of fractures and local weathering. Primary water-supply source for Spanish Peaks and Yellowstone Club.
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80	Morrison Fm	Morrison aquifer	Upper—65–100 feet is black and purple shale with rusty-brown to gray quartz lenses, thinly bedded gray, yellow, orange, red, and green shales with siltstone and quartz interbedded.	Moderate to poor water-bearing unit, often highly mineralized, contains H ₂ S. Secondary water-supply source for Yellowstone Club when Kootenai not available. Transmissivity values range from 88 to 121 ft ² /d.
200			Lower—thin bedded, gray, orange, yellow, red, and green shale and siltstone with some lesser gray quartz arenite and thinly bedded limestone.	
40	Ellis Group	Not applicable to this study	Swift Fm	Glauconite sandstone.
25-150			Rierdon Fm	Oolitic limestone with siltstone.
80-180			Sawtooth Fm	Interbedded limestone and shale.
100			Upper Dinwoody Fm	Mudstone over silty-sandstone and sandstone.
165			Lower Dinwoody Fm	Thin-bedded limestone, limey-siltstone, and quartz sandstone.
245			Shedhorn Fm	Massive quartz-rich sandstone, some shale.
295			Quadrant Fm	Dolomite-cemented quartz-arenite, sandstone.
295	Snowcrest Range Group	Amsden Fm	Sandstone, limestone, and shale.	
180		Lombard Fm	Thin-bedded limestone, more dolomitic and shaley towards bottom.	
245		Kibbey Fm	Dolomitic sandstone, sandy-dolostone, and siltstone.	
790	Mission Canyon Fm	Madison Group aquifer	Massive, light gray and brownish-gray with chert stringers. Solution breccias in uppermost part. Resistant unit.	An excellent water-supply source in many areas of Montana where groundwater is withdrawn from solution cavities. The top of the Madison Group is buried deep (2,500–4,000 feet) below the land surface at Big Sky. One well within the study area has been completed in the Madison Group limestone where it is at shallow depth. No aquifer tests have been conducted in this aquifer at or near Big Sky.
590	Lodgepole Fm		Thin- to medium-bedded limestone and silty-limestone, locally cherty, fossiliferous upper half.	