

Open/Closed Loop	Ground Loop Type	Ideal Conditions for this type of Ground Loop	Cost	Notes
OPEN	Open Loop Well with GW discharged into a shallow drain or nearby surface water body	Good Water Quality	\$\$	Water pH and chemistry must be tested to make sure it will not damage or foul up the heat exchanger.
		Good Well Yield		A rule of thumb is that 1.5 gpm is required per ton of heat pump capacity. Therefore, a 3-ton heat pump will need about 4.5 gpm well yield.
		Relatively shallow ground water table		If the depth to water is too deep, pumping costs will be high.
		Regulations allow water to be returned to surface water or to subsurface via a gravity-type drain.		Water is returned to subsurface via a dry well, drain or nearby surface water.
	Open Loop Well + GW Reinjection	Good Water Quality	\$\$\$	Water pH and chemistry must be tested to make sure it will not damage or foul up the heat exchanger.
		Good Well Yield		A rule of thumb is that 1.5 gpm is required per ton of heat pump capacity. Therefore, a 3-ton heat pump will need about 4.5 gpm well yield.
		Relatively shallow ground water table		If the depth to water is deep, pumping costs will be very high.
		Regulations must allow water to be returned to aquifer--this practice is prohibited in some areas.		Aquifer that accepts return water must be able to accommodate full volume of return water.
	Standing Column Well with Existing Water Supply Well	<i>Water Supply Well already exists onsite</i>	\$	Water from existing water well can be used for geothermal system instead of drilling new well.
		Depth and yield of well are adequate to allow well to be used a geothermal well.		Well must yield enough water for geothermal system and domestic water needs. Also, well must be deep enough to accommodate return waters.
Good Water Quality ¹		Water pH and chemistry must be tested to make sure it will not damage or foul up the heat exchanger.		
Regulations allow water to be returned to aquifer				
Standing Column Well	Relatively shallow ground water table	\$\$\$	If the depth to water is deep, pumping costs will be very high.	
	Good Water Quality ¹		Water can be used for domestic use	
	Good Well Yield ²			
	Fractured Bedrock ³			
Open Pond/Lake Loop	Regulations allow water to be injected into local aquifer	\$	One deep well is drilled	
	Nearby pond or lake			
Closed Loop - Pond/Lake	Regulations allow withdrawal and reinjection of water into surface water bodies	\$	Home should have frontage on surface water body.	
	Nearby pond or lake		Depth of water in pond/lake should remain greater than 6 ft to ensure good thermal exchange.	
Closed Loop - Horizontal	Pond/Lake meets minimum volume, depth, and quality criteria.	\$\$	Plenty of land is needed for trenching.	
	Plenty of Land		Moist or wet soils transmit heat much better than dry soils.	
	Best in areas of shallow groundwater		Trenches in clay-rich soils stay open more easily.	
Closed Loop Vertical	Soils conducive to trenching	\$\$\$\$	Boreholes in unconsolidated sediments need to be cased which can increase costs.	
	Best in bedrock		Be sure to check to make sure proposed borehole location(s) comply with applicable local and state regulations, where applicable.	
	Some areas have regulations about minimum setbacks between geothermal boreholes and nearby water wells.		Boreholes are deeper than water wells to achieve adequate thermal geoexchange.	
	The grout installed around the HDPE piping in borehole must be properly installed to assure good thermal connection.		Properly installed and grouted closed loop vertical loops generally require little to no maintenance systems.	
	HDPE piping and connectors must be properly installed to prevent leaks and ensure longevity of system.			