2.5 Ground Water Level

Revision: October 31, 2013

Ground water is any water in Idaho that occurs beneath the surface of the earth in a saturated geological formation of rock or soil (IDAPA 58.01.03.003.14). Ground water may be present near the ground surface at normal and seasonal high levels. Seasonal high ground water level is the highest elevation of ground water that is maintained or exceeded for a continuous period of 1 week per year (IDAPA 58.01.03.003.15.a). Normal high ground water level is the highest elevation of ground water that is maintained or exceeded for a continuous period of 6 weeks per year (IDAPA 58.01.03.003.15.b).

Subsurface sewage disposal systems and septic tanks must maintain vertical separation distances from the ground water to the bottom of the drainfield (IDAPA 58.01.03.008.02.c) and top of the septic tank (IDAPA 58.01.03.007.17). Ground water may be present year-round or seasonally. Permanent (year-round) ground water levels may fluctuate through the year or remain fairly constant. Seasonal ground water levels can fluctuate greatly and are typically affected by runoff or irrigation practices. To ensure separation distances as required by IDAPA 58.01.03 to permanent or seasonal ground water levels are met, determining the normal and seasonal high ground water levels is important.

High ground water levels may be established by the presence of low chroma mottles, historic records, or actual ground water monitoring (IDAPA 58.01.03.003.15). DEQ recommends and prefers that actual ground water monitoring be performed prior to issuing a subsurface sewage disposal permit if the proposed site of a new system is suspected to be affected by ground water levels. This monitoring ensures that adequate separation distances are maintained from subsurface sewage disposal systems and ground water as required by IDAPA 58.01.03.008.02.c and fulfills the intent of the State of Idaho's ground water policy as outlined in Idaho Code §39-102.3.a and the intent of DEQ's ground water policy as outlined in IDAPA 58.01.11.006.05 to prevent contamination of ground water from any source to the maximum extent practical.

In situations where a repair permit must be issued to replace a failing subsurface sewage disposal system, it would be appropriate to use historic records or the presence of low chroma mottles to establish the normal and seasonal high ground water levels.

The following provides guidance on when and how to use low chroma mottles and historic records, and how to perform and interpret actual ground water monitoring.

2.5.1 Ground Water Monitoring

Ground water monitoring is the preferred method for determining ground water levels. Over a period of time, ground water levels can be established by recording elevation changes in the ground water's surface, observed through a permanent or temporary well.

2.5.2 Monitoring Wells

During preliminary site investigations prior to subsurface sewage disposal permit issuance, temporary monitoring wells are the most common type of monitoring well used. If continual ground water monitoring is required as a condition of the subsurface sewage disposal installation

permit (e.g., large soil absorption systems), permanent monitoring wells are recommended to be installed after permit issuance. The recommended installation and design of both of these well types are provided below.

2.5.2.1 Permanent Monitoring Wells

DEQ recommends that permanent monitoring wells be installed by a professional well driller and the Idaho Department of Water Resources be consulted to determine the need for a well permit and any required construction standards. Permanent wells should be cased, with perforations in the casing throughout the anticipated zone of saturation. An idealized permanent monitoring well for observing ground water of less than 18 feet deep is shown in Figure 2-5. If a permanent well will be used for water quality monitoring, it should be

1. Purged or otherwise developed to eliminate installation contamination and silt buildup.
2. Provided with a ground water seal at the annular space between the casing and natural ground to prevent surface water from entering the ground water along the casing's exterior.

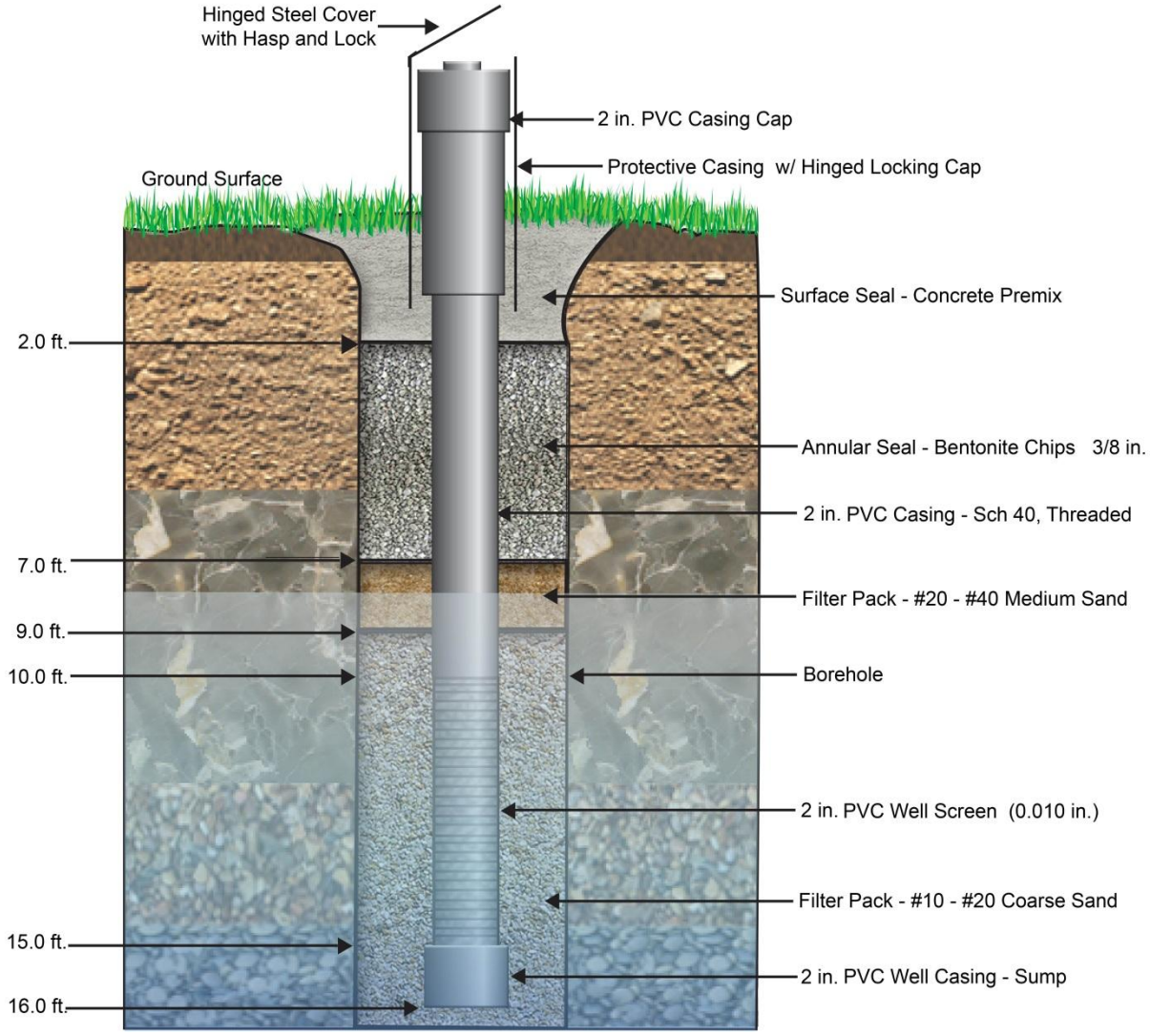

Figure 2-5. Permanent shallow ground water monitoring well design.

2.5.2.2 Temporary Monitoring Wells

Temporary monitoring wells are typically installed at the same time that test pits are excavated and evaluated. Monitoring wells are either placed in the excavated test pit or are placed in a separate hole near the test pit created by an auger. Temporary monitoring wells placed by an auger should be no farther than 10 feet from the evaluated test pit. More than one temporary monitoring well may be necessary at each site and is highly recommended. Each monitoring well should have an evaluated test pit associated with its placement.

Temporary monitoring wells are typically constructed of perforated or solid plastic pipe at least 1 inch in diameter. Solid plastic pipe should be manually perforated with holes or slits that extend up the pipe through the expected zone of saturation. Temporary monitoring wells should extend 10 feet belowground or to a known limiting layer less than 10 feet deep. Temporary monitoring wells placed to evaluate spring runoff influenced seasonal ground water should be extended above grade high enough to be found through snow pack during the early monitoring period. Removable caps are recommended to be placed on the top of each monitoring well. The

bottom end of the monitoring well should not be capped. Geotextile fabric or a filter cloth/sock should be used to wrap the plastic pipe from the bottom of the pipe to a point above the perforations. Mound fill soil around the temporary monitoring well when backfilling the well excavation so a depression does not form in the ground's surface around the mound that will collect surface runoff and artificially raise the ground water level within the monitoring well. An idealized temporary monitoring well for observing ground water of less than 18 feet deep is shown in Figure 2-7. Cutoff trench side view. **(Revision: March 25, 1998)**

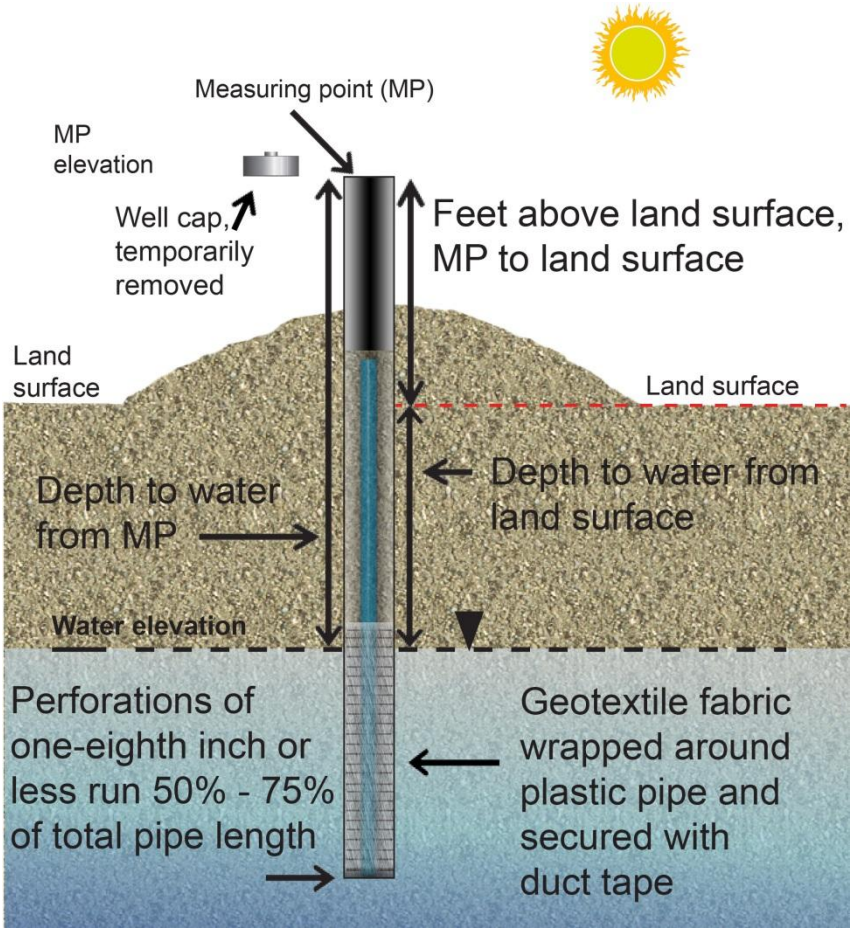

Figure 2-6. Temporary ground water monitoring well design.

2.5.2.3 Measuring the Seasonal Ground Water Level from a Monitoring Well

Seasonal ground water is typically influenced by seasonal runoff of snowmelt, spring rain events, and irrigation practices. The time frame in which these influences affect a property may vary due to location, climate, or agricultural practices. Due to this variability, monitoring time frames required prior to subsurface sewage disposal permit issuance may vary from permit to permit. Monitoring periods may overlap if all of these influences are expected to impact seasonal ground water levels at a proposed subsurface sewage disposal site. Typical time frames for monitoring based upon ground water influences are as follows:

- Seasonal runoff and spring rain events: February 15 through June 30
- Irrigation: April 15 through October 31

Monitoring should be performed by the applicant on a weekly basis over the determined monitoring period. Concurrent monitoring at a proposed subsurface sewage disposal site should also be performed by the health district on a monthly basis to verify ground water levels obtained by the applicant. The monthly verification by the health district also allows for the evaluation of any potential temporary or intermittent surface waters that may exist on the site.

Prior to recording ground water levels from a newly installed permanent or temporary monitoring well, the well should be left undisturbed for 24 hours before observing and recording the ground water's surface elevation. To record the ground water level, mark a standardized location on the top rim of the monitoring well to obtain the ground water measurements from. Use the following equipment to obtain the ground water level below grade:

- Measuring tape that will fit inside the monitoring well
- Carpenter's chalk to coat the initial length of the measuring tape
- Ground water monitoring table that includes the following information:
  - Height of the monitoring well above the native soil surface
  - Total depth of the monitoring well from the top rim to its termination point below ground level
  - Date and time for each measurement
  - Location for recording the ground water level from top rim of monitoring well
  - Location for recording the total depth of wetted chalk (indicates how far below the ground water level that the measuring tape was inserted)
  - Location for recording the water level below ground surface (ground water level measurement minus the wetted chalk depth minus the height of the monitoring well above the native soil surface)
  - Location for date specific notes (e.g., weather, well conditions, and recorder)

The following steps should be taken at each monitoring well to obtain the ground water level:

1. Coat 1 to 2 feet of the measuring tape with carpenter's chalk.
2. Lower the measuring tape down the monitoring well with the tape against the identified measuring point on the top rim of the monitoring well.

   This step should occur at a rapid rate so the measuring tape can be heard when it encounters the top of the ground water level.
3. Once the tape has either encountered the top of the ground water level or the bottom of a dry monitoring well, record the value on the measuring tape that is identified at the measuring point on the top rim of the monitoring well.
4. Slowly remove the measuring tape from the monitoring well and obtain the total wetted chalk measurement.
5. Determine the ground water depth below native ground level by subtracting the wetted chalk measurement and height of the monitoring well above native ground from the measurement obtained in step 3.

level occurs from week 1 through 6. During this time, the lowest ground water level recorded from native grade occurs on week 2, so the normal high ground water level is 24-inches below native grade. This level meets the requirements of IDAPA 58.01.03.003.15.a in that 24 inches is the highest elevation of ground water that is maintained or exceeded for a continuous period of 6 weeks.

2.5.3 Low Chroma Mottles

If the static ground water level cannot be determined through ground water monitoring due to the time of year the soil profile is observed, but its presence at some time in the year is suspected, its level can be predicted by looking for the presence of the following soil conditions:

1. Reddish-brown or brown soil horizons with grey mottles that have a chroma of two or less and red or yellowish-red mottles.
2. Grey soil horizons that have a chroma of two or less, or grey soil horizons with red, yellowish-red, or brown mottles.
3. Dark-colored, highly organic soil horizons.
4. Soil profiles with soluble salt concentrations at or near the ground surface.

Take care in interpreting soil conditions as an indicator of high ground water. Mottling may be the artifact of past ground water from geologic time. Some soils do not readily indicate mottling, especially those with high ferric (Fe^{+++}) iron content and in areas with newly established water tables or where the brown color is from iron bacteria.

2.5.4 Historical Records

Historical records are another method that may be used to determine seasonal and normal high ground water levels for a proposed subsurface sewage disposal system. Use historical records that evaluate unconfined aquifers or perched seasonal water tables. Well drilling records may not be suitable in all circumstances and must be evaluated on a case-by-case basis if available. Historical records composed of ground water monitoring data, as described in section 2.5.2, should be used to determine ground water levels at a proposed site.

All historical records available for properties immediately surrounding the applicant's property should be used to determine ground water levels. Other records from nearby properties should also be evaluated to gain an understanding of ground water levels for the immediate area with emphasis placed on records for properties closest to the applicant's property. Take a conservative approach in this evaluation, and use the most restrictive ground water level record within the historical records when issuing a permit.

2.5.5 Low Water Years

Take care when reviewing ground water monitoring records related to spring runoff during low water years. Snow-water equivalents of less than 75% of normal would be considered an extremely low water year. Ground water monitoring performed during these years may need to be repeated due to below normal ground water levels. Information regarding the snow-water equivalent reading is available through the Natural Resources Conservation Service.