

**From:** [David J. Baumgarten](#)  
**To:** [ECY RE WW SW Manual Comments](#)  
**Subject:** Draft Stormwater Manual Seasonal High Ground Water Determination  
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Having completed numerous infiltration feasibility studies, I would recommend Ecology add language regarding a specific "definition" of Seasonal High Ground Water as consider including a "methodology" for determining seasonal high ground water levels/depths.

Items to consider:

1. **Driven Well Points:** The new language does include the installation of monitoring wells (at least one) for use in determining the seasonal high ground water level. You may want to consider allowing driven well points as well for sites with expected shallow depths to seasonal high ground water. The driven well points can be installed under the supervision of a PE and would not require a drill rig and licensed driller.
2. **Frequency of ground water level measurement:** I have seen sites where ground water levels were measured once a month during the wet season, sites where water levels were measured weekly, and sites where data loggers and pressure transducers were installed in the wells with hourly measurements of water levels. Each of these measurement intervals will yield markedly different hydrographs which would be used to determine the seasonal high water level.
3. **Seasonal High Ground Water Level:** What is the seasonal high ground water level? Our firm has done quite a bit of literature research on this topic. Some municipalities have language stating the seasonal high ground water level is the highest elevation/shallowest depth to water recorded during the wet season monitoring period. Under this language the frequency of measurements (Item No.2 above) becomes very critical. We have worked on many sites where the summer/early fall ground water levels are say 12 feet below grade. In the wet winter months the ground water level may rise to 8 feet below grade. We have a number of sites where we have installed datalogger/pressure transducer units to record hourly ground water level data. What we have seen with the datalogger data are short term ground water level spikes during large storm events, so we may see the ground water level rise to 5 or 6 feet below grade from 8 feet below grade for several hours and then return to the 8 foot below grade level after the storm event.

We would likely NOT have seen this short duration rise if we were only taking weekly or monthly hand readings in the wells. In the above example one could argue that seasonal high ground water level is 8 feet below grade. Some folks have looked at that hydrographs and would say the seasonal high ground water level is the highest ground water level recoded (5 feet below grade) even though the rise to 5 feet below grade was very sharp in response to a storm and of only several hours in duration. So the frequency of measurements can greatly affect the wet season hydrographs and determination of the seasonal high ground water level.

I believe Pierce County has language in their stormwater manual stating the seasonal high ground water table is the highest single ground water level reading collected, but with no direction of method of collection. In Olympia there is an area where they have had flooding due to high ground water and they have water level data measured during a peak flooding event that you are instructed to use with regression analysis from on-site ground water level data and rainfall comparisons. On the east coast many areas also have these long term index wells that you do a similar regression. In both of these cases they are trying to estimate a seasonal high ground water level from site data tied to some historic high ground water level event.

Some methodologies call for the 85<sup>th</sup> or 90<sup>th</sup> percentile of the water level data collected as the seasonal high ground water table. Those methods eliminate the rare short term spikes due to heavy rain events

I think you may want to consider putting in a “definition” of seasonal high ground water.

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