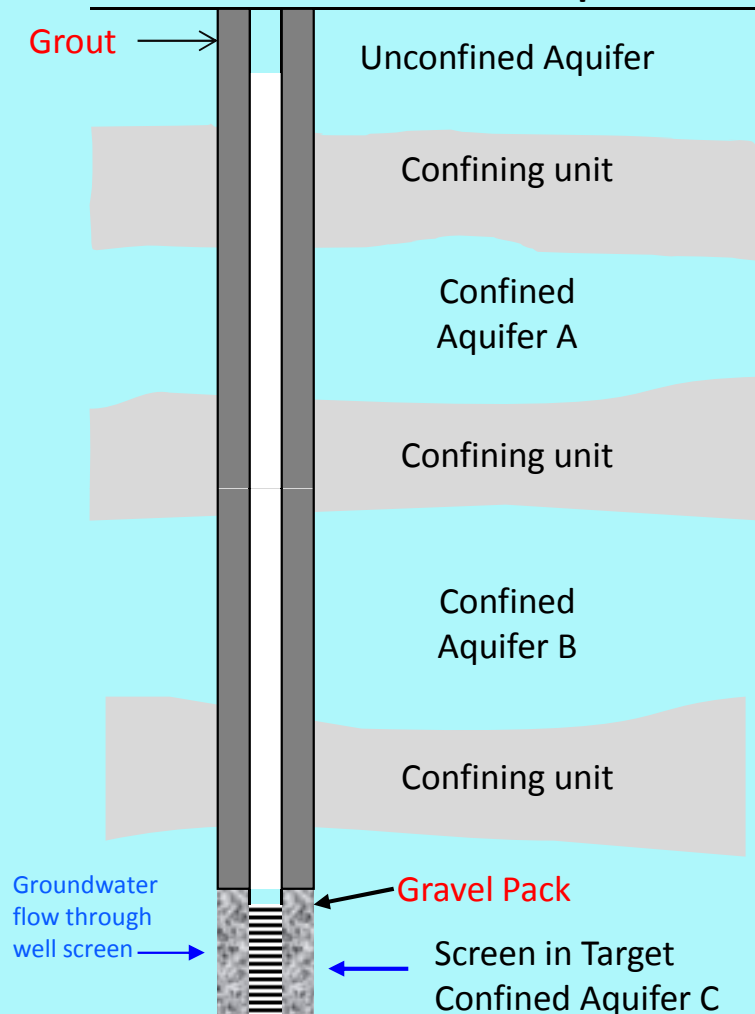


Well Construction Example 1



Note: This construction is recommended even if your facility or public system, etc. does not currently need a withdrawal permit since it can prevent future permitting problems.

Proper Well Construction Requirements

In addition to the Virginia Department of Health requirements.

- > **Conduct Geophysical logging** (Spontaneous Potential, Single Point Resistance, 16/64 Short and Long Normal, Natural Gamma) and complete geologist's logs during well drilling (required for all permitted wells)
- > **Install gravel packs and grout for observation wells and production wells in a manner that prevents leakage between aquifers.** Gravel pack should be terminated close to the top of well screens and should not extend above the top of the target aquifer as shown in Example 1. Bentonite plugs between screened intervals should be used. DEQ staff need to review the geophysical logs and driller's logs to determine the gravel pack intervals prior to well construction (See contacts below.)
- > Ensure that **Well Completion forms (GW2s)** are completed by the driller and retained by owner and driller.
- > **Document Pump intake settings and do not set the pump intake (1) below the top of the uppermost screened confined aquifer or (2) below the bottom of an unconfined aquifer.** Evaluate the effect of the allowable pump intake level on needed production and pumping water levels in the well as part of the well performance evaluation. DEQ should be contacted to help evaluate the geophysical logs and determine the aquifer top and allowable pump intake limit. Two weeks notification of the drilling schedule is needed to schedule DEQ assistance.
- Collect the GPS location for the well and include the Lat/Long and reference datum (i.e. NAD 27, WGS 84) on the Well Completion Form

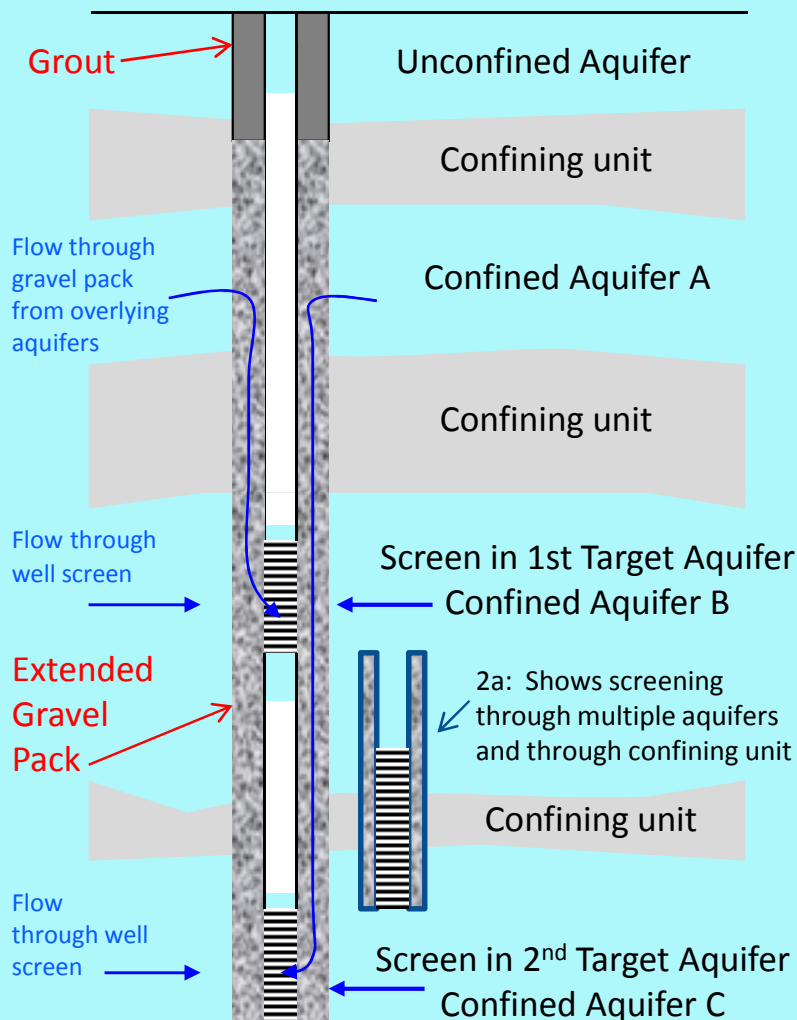
Who to Contact for Additional Information:

Ground Water
Characterization:
Scott Bruce
(804) 698-4041

Groundwater Withdrawal Permitting:
Craig Nicol
(804) 698-4214

DEQ Factsheet: Groundwater Well Installation in Groundwater Management Areas

Well Construction to Avoid - Example 2



Improper Well Construction

- Extending the Gravel pack beyond the top of the screened interval and/or extending the gravel pack into other aquifers as shown in Example 2
- Including multiple aquifers in the well screen or extending the well screen through multiple aquifers or as shown in Example 2 and 2a
- Wells with this type of construction often do not meet regulatory requirements due to the unintended impact on overlying aquifers and the pump intake limit may be impacted limiting capacity. This means the well may have to be abandoned and a new well constructed.** Even if the wells may be usable, this construction can cause the need for expensive and complex aquifer testing in order to obtain a permit, and for the pump intake limit to be shallow (above Aquifer A in Example 2)

Other Common Well Construction Problems

-No geophysical log : Geophysical logging data is necessary for permit issuance in almost every case. *Collection of geophysical and geologist's logs must be performed during well drilling and cannot be collected once the well is completed. Drilling an additional bore hole and conducting geophysical logging may be necessary if geophysical data is not available for the location.*

-No well completion form : *This information is necessary to issue a permit. If the depth of the well, the screened intervals, the grout depth, and the gravel pack extent are not documented, a camera survey may be necessary to determine the basic well construction.*

-No documentation of the Pump Intake depth
It is illegal for a pump intake to be set (1) below the top of the uppermost confined aquifer in use or (2) below the bottom of an unconfined aquifer. If the pump depth is not documented, the pump may have to be pulled to determine the depth or to raise the pump. Raising the pump can reduce the well yield, sometimes significantly.