For more information refer to the Water Wells That Last video series Part I — Planning and Construction.

Water Well Drilling Agreements

This module outlines a checklist of items that you and your drilling contractor should discuss and agree to before starting any drilling. A clear understanding between both parties is crucial so there are no misunderstandings or false expectations. Disagreements can arise between drilling contractors and well owners after the well is drilled because they simply did not take the time to thoroughly discuss all aspects of the drilling operation ahead of time.

Water wells are far more than a deep wet hole in the ground. They are an important and significant investment for any household or farm. Well owners should take the time to ensure they understand what they are purchasing. Money spent on high quality well design and construction materials is money well invested. A low cost well may not deliver the quality, quantity or reliability you need.

A Water Well Drilling Agreement covers the topics you should discuss with your drilling contractor before any work begins. A blank copy of an example agreement is included at the back of this module and in the pocket on the back cover. Many drilling contractors have their own version of a Water Well Drilling Agreement.

Water Well Drilling Agreement Example

This agreement is designed to prevent misunderstandings between the well owner and drilling contractor. It benefits both parties and can establish costs for materials and services.

Identification

Items 1-4 identify the parties involved in the agreement.

1. Well owner *John Q. Doe*

   Address *Anywhere, Alberta*

2. Drilling contractor *Peters Water Well Services*

   Address *Anywhere, Alberta*

   Drilling contractor approval no. _____

3. Land location of well
   Qtr *NE* Sec *36* Twp *17* Rge *7* W of *4* Meridian
   Lot _____ Block _____ Plan _____

4. Proposed starting date *June 21, 1997*

   Proposed completion date *June 25, 1997*

Water Requirements

5. Proposed well use: Household__X_____ Livestock_____ Irrigation_____

The well use should be specified as being for household, livestock, irrigation or a combination. Municipal and industrial wells are usually covered by a detailed contract.

6. Desired water quality

Finding water with suitable water quality is important for all water uses. A drilling contractor can use a field testing kit to get a rough estimate of some parameters such as iron, hardness, pH and total dissolved solids, but only the tests done in a laboratory are really reliable.

The laboratories use the Guidelines for Canadian Drinking Water Quality to assess water quality. If testing shows some of the parameters are higher than these guidelines, water treatment equipment may be necessary.

7. Desired yield_____0.4 (5)_____L/s (gpm) Min. acceptable yield_____0.1 (1)_____L/s (gpm)

The desired yield is the flow rate of water, in gallons per minute (gpm), from an individual well. To calculate the desired yield, refer to the worksheet "Average Daily and Annual Water Requirements" in Module 2, "Planning Your Water System". Using this worksheet, calculate your daily and peak water use requirements. In some areas the desired yield is simply not available because of slow yielding aquifers. In such cases, the desired yield should be expressed as the normal yield for the area. A certain minimum yield should be established so if the well produces less than this minimum, it is not considered economically feasible to develop as a water well.

8. Groundwater supply options based on existing records Consolidated Bedrock, Paskapoo Formation Sandstone units — 30 to 60 m (100 to 200 ft.)

Groundwater supply options should identify potential groundwater exploration targets that have the potential to meet the owner's water requirements.

The well driller or well owner should review groundwater information on local wells to determine appropriate design considerations. Information is available from the Groundwater Information Centre; see Module 12, "Other Resources."

Well Construction

9. Maximum desired depth_____65 (210)_____ m (ft.)

A maximum desired depth should be established. Factors affecting this include the known depth of productive aquifers, and the water quality at the various depths. Also personal finances will be a factor.

10. Type of drilling Rotary

11. Diameter of hole 158 mm (6 1/4") and 124 mm (4 7/8")

The type of drilling equipment, aquifer composition, yield required and depth determine the type of well produced. Rotary drilled and cable tool drilled wells are typically 100-200 mm (4-8 in.) in diameter; bored wells range in diameter from 45-90 cm (12-36 in.). The water well drilling industry is required by law to construct wells with casings 102 mm (4 in.) or more to accommodate submersible pumps.

12. Flowing well control N / A

In cases where a flowing well is anticipated, provision must be made to equip the well with a control device that allows the flow to be shut off completely and to prevent freezing.

13. Well connection Pitless Adaptor

Where the connection of the pumping equipment to the well casing is made below the ground surface, a pitless adaptor is required under the Water (Ministerial) Regulation. Well pits are no longer permitted. If a jet pump is being used, a pump house that houses only the well and the pumping equipment is allowed.

14. Formation logging procedure _____

Logging the geological formations during drilling provides key information about aquifer location and quality. The information is especially important to accurately place well screens. There can be several types of formation logging.

- ❒ *Descriptive logging records the material encountered as drilling proceeds (lithology).*
- ❒ *Electric logging, or E logging, verifies and supplements descriptive logging. It can only be performed in an uncased hole that is filled with drilling fluid. Basically it reveals the character of the material and relative quality of water in the formation. A limited number of drilling contractors in Alberta possess this equipment.*
- ❒ *Gamma-ray logging can be performed in cased holes without drilling fluid and reveals the character of the material present. Very few drilling contractors in Alberta have this equipment. A combination of descriptive logging and electric or gamma-ray logging provides very accurate information about the formations through which the well is constructed.*

Good well construction and material selection is necessary to reduce the effects of natural corrosion, biofouling and incrustation.

15. Annulus or casing seal Bentonite

All wells must be constructed to prevent contaminated surface water from entering groundwater aquifers through the space (annulus) between the well casing and the bore hole. The annulus must be filled from immediately above the producing zone up to ground surface. The method of sealing is dependent on the type of rig the driller operates and design of the well.

16. Artificial sand pack _____

The grain size distribution of the aquifer affects the efficiency of the screen during development. If the aquifer has a relatively uniform grain size, a well cannot be effectively developed without the installation of an artificial sand pack. This "pack" provides a natural filter which holds back the finer aquifer materials.

Good well design encourages well monitoring and maintenance.

17. Well Development Method

Backwashing_____ Jetting_____ Surging__X_____

Heavy pumping_____ Bailing_____

By regulation, the drilling contractor is responsible for ensuring a well is completed in a manner that ensures no damage will be incurred to the pumping system, plumbing or fixtures due to sediment in the water. If a newly constructed well produces sediment, it is usually because the drilling contractor did not properly develop it. Different types of well completion require different development techniques. In the rare case where a well cannot be adequately developed to produce sediment-free water, a sediment filter could be installed in the water distribution system. However, this alternative should be used only when it is evident that sufficient development of the well has been done, and the landowner is in agreement.

18. Hydrofracing N / A

Hydrofracing is a development technique used to increase well yield in bedrock aquifers. It involves pressurizing the aquifer to increase the size of the fractures and thereby increase well production. This technique is used in poorly fractured bedrock aquifers.

Material

19. Casing material Plastic Schedule 80* PVC * Steel Protector casing at Surface

Inside diameter 127 mm (5") wt. per m (ft.)_____ wall thickness 0.375

See Appendix 1.

20. Well cover *manufactured well cap*. Distance from top of casing to ground surface *300 mm (12")*

Minimum requirement is 20 cm (8") above ground surface or 60 cm (2") above the highest flood record unless a watertight cover is used. A vented well seal (cap) or tight-fitting or vermin-proof well cover should be specified.

The well cap should be removable for monitoring water level in the well. Alternatively, for wells with difficult to remove caps, a cap with a hole leading to a dip tube can be used for easier monitoring of the water level. A removable plug should be used to plug the hole.

21. Liner material *Plastic Schedule 40 PVC*

Inside diameter *102 mm (4")* wt. per m(ft.)_____ wall thickness *0.237*

See Appendix 1. Plastic PVC or ABS casing lasts indefinitely because it does not rust through like metal casing. It should be protected at the ground surface with metal casing.

22. Screen

Manufacturer *ABC Screen Co.*

Length _____

Material _____

Nominal diameter _____

It is important to get a good original pump test on the well. This provides a base condition to which the condition of the well can be compared as it "ages."

Wells completed in unconsolidated aquifers, such as sand or gravel, should be screened. The length of screen required depends on the volume of water to be pumped and the ability of the aquifer to transmit water.

Yield Testing

23. Yield testing duration (hours) *Minimum: 2 hour water removal and 2 hour recovery*

The drilling contractor should conduct a yield test following completion of the well.

The purpose of the yield test is to measure the well's yield so that the most suitable pumping equipment can be selected. This also serves as a benchmark for monitoring future well performance. The test should include the following information:

a) non-pumping (static) water level
b) water removal rate in gpm (L/s)
c) depth to the pumping water level as determined over a period of time at one or more constant pumping rates (drawdown)
d) the length of time the well is pumped at each rate
e) the recovery of the water level over a 2 hour period or until 90 percent recovery of the non-pumping water level is reached.

See Water Well Drilling Report at the back of module as an example of what you will get from the drilling contractor.

While the drilling contractor is on site, you may want to get an estimate to plug any unused wells to protect water quality in the new well.

Disinfection

24. Disinfection Well and pumping equipment to be disinfected

The well and new pumping equipment should be disinfected for a minimum of 12 hours with at least 200 mg/L of chlorine prior to use. Use Table 1, Amount of Chlorine to Obtain a Chlorine Concentration of 1000 PPM, and the example in Step 3 on page 51 to calculate the amount of chlorine for 1000 ppm. Then divide the total litres of chlorine by 5 to get the amount required for 200 mg/L.

25. Well head finishing Driller to remove all surplus materials and equipment on site.

Well head finishing includes the clean up of mud and aquifer debris and removal of material scraps.

Costs

Costs may vary with the location of your well. Contact local drilling contractors for cost estimates in your area.

26. Test holes per metre (foot) _____
27. Reaming per metre (foot) _____
28. Drilling/boring per metre (foot) _____
29. Casing per metre (foot) _____
30. Liner per metre (foot) _____
31. Screen _____
32. Sand pack _____
33. Development _____
34. Hydrofracing _____
35. Labor per hour _____
36. Water testing _____
37. Reclamation of unused well _____
38. Payment schedule _____

_____

Provincial regulations require that a water well be completed to ensure no damage will be incurred to the pumping system, plumbing or fixtures due to sediment in the water.

Guarantee

39. _____

Workmanship and materials should be guaranteed for a specific period of time.