



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

## Water Well Drilling Agreements

This module outlines a checklist of items that you and your licensed water well 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 licensed water well 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 holes 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 licensed water well 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 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 licensed water well 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 G. Doe  
Address Anywhere, Alberta
2. Licensed water well contractor Peters Water Well Services  
Address Anywhere, Alberta  
Licensed water well 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, 2012  
Proposed completion date June 25, 2012

*You should discuss the purpose of any new well being drilled with your licensed water well contractor. If the well is going to be used for a non-household purpose it must be constructed in a manner that will allow it to be licensed.*

### 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 groundwater with suitable water quality is important for all water uses. A licensed water well 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.*

*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.)

*The licensed water well contractor or well owner should review groundwater information on local wells to determine potential target aquifers and appropriate well 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 45-90cm (12-36 in.). The water well drilling industry is required by law to construct wells with casings 102mm (4in.) 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 flow 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. This 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 licensed water well 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 licensed water well 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 design, construction and material selection is necessary to reduce the effects of natural corrosion, biofouling and incrustation.**

15. Annular or casing seal Bentonite

All wells must be constructed to prevent contaminated surface water from entering groundwater aquifers through the annulus (or space) between the outside of the well casing and the borehole. 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 the 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 fine 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.

17. Well Development Method

Backwashing \_\_\_\_\_ Jetting \_\_\_\_\_ Surging X

Heavy pumping \_\_\_\_\_ Bailing \_\_\_\_\_

By regulation, the licensed water well 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 licensed water well 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.

### Material

18. 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 Water Well Casing Specifications, page 33.

19. Well cover 6" well cap.  
Distance from top of casing to ground surface 300 mm (12")

*Minimum requirement is 20cm (8") above ground surface or 60cm (2") above the highest flood record unless a water tight cover is used. A water-tight, vented vermin-proof cap is ideal. For large diameter wells, a tight-fitting, vented cover should be specified.*

*The well cap should be removable or be designed to allow access to a dip tube for ease of monitoring the water level.*

20. Liner material Plastic Schedule 40 PVC  
Inside diameter 102 mm (4") wt. per m(ft.) \_\_\_\_\_ wall thickness 0.237

*See Water Well Casing and Specifications, page 33. Plastic PVC or ABS casing lasts indefinitely because it does not rust like metal casing, however it must be protected at the ground surface with metal casing.*

21. Screen Manufacturer ABC Screen Co.  
Length \_\_\_\_\_  
Material \_\_\_\_\_  
Nominal diameter \_\_\_\_\_

*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

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

*The licensed water well contractor should conduct a yield test following completion of the well. It 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 a constant pumping rate(drawdown)
- d) the length of time the well is pumped
- 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.

23. Pump Type Sub Size 0.5 HP

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

***The purpose of measuring the well's yield is to gather enough information to determine what pumping equipment will best ensure adequate water pressure and prevent damage to the well by over-pumping. Not all licensed water well contractors include pump installation as part of their business. Be sure to select your pump contractor carefully and provide them with the yield test data collected by your driller.***

*While the licensed water well contractor is on site, you may want to get an estimate to plug any unused wells on your property to protect water quality in your new well. For more information, see Module 9 "Plugging Abandoned Wells".*

*Contact local licensed water well contractors for cost estimates in your area.*

*Provincial regulation requires 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.*

### Disinfection

24. Disinfection Well and pumping equipment to be disinfected

*After the well is completed and pumping equipment is installed you should disinfect the water in the well with at least 200mg/L of chlorine and left in the well for a minimum of 12 hours. Use Table 1, Amount of Chlorine for a Chlorine Concentration of 200PPM, and the example in Step 3 on page 51 to calculate the amount of chlorine for 200 ppm.*

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

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. Sandpack \_\_\_\_\_

33. Development \_\_\_\_\_

34. Labor per hour \_\_\_\_\_

35. Water testing \_\_\_\_\_

36. Reclamation of unused well \_\_\_\_\_

37. Total Costs \_\_\_\_\_

38. Payment schedule \_\_\_\_\_

### Guarantee

39. \_\_\_\_\_

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

## Water Well Casing Specifications

**Materials** All well casing material must meet or exceed the specifications set for that material and purpose by the Canadian Standards Association or the American Society for Testing and Materials.

### Non-Plastic Well Casing—Required Thickness

Type of Well Casing	Minimum Casing Thickness
Metal well casing	0.188 in.(4.78mm)
Metal liner casing	0.156 in. (3.96mm)
Cement-like casing * for 24in.(60.96 cm) casing or less	* 2.5in.(6.35cm)
* for casings larger than 24in.	* 2.5in.plus 1in.forevery additional foot of well diameter
Corrugated and galvanized steel casing	16gauge

### Plastic Well Casing—Required Thickness for ABS or PVC

Outside Pipe Diameter in. (mm)	Casing Schedule (SCH) Number	Minimum Wall Thickness in. (mm)
4.5 (114.3)	SDR21	0.214 (5.43)
4.95 (125.7)	SCH 40	0.260 (6.60)
5Nominal(127.0)	SCH 80	0.397 (10.1)
5.56 (141.2)		
6 (152.4)	WellCasing	0.390 (9.9)
6.625 (168.3)	SCH 40	0.432 (11.0)
6.625 (168.3)	SCH 80	0.280 (7.1)
8.625 (219.7)	SCH 40	0.322 (8.2)
8.625 (219.7)	SCH 80	0.5 (12.7)
10.75 (273.1)	SCH 40	0.365 (9.2)
10.75 (273.1)	SCH 80	0.593 (15.1)



# Water Well Drilling Report

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GIC Well I.D.  
GSA Well Tag No.  
Date Report Received

**Well Identification and Location**

Owner Name: \_\_\_\_\_ Address: \_\_\_\_\_ Town: \_\_\_\_\_ Postal Code: \_\_\_\_\_

Location: 1/4 of L.S.D.: SEC: \_\_\_\_\_ TWP: \_\_\_\_\_ RGE: \_\_\_\_\_ W of MER: \_\_\_\_\_ LOT: \_\_\_\_\_ Block: \_\_\_\_\_ Plan: \_\_\_\_\_ Additional Description: \_\_\_\_\_

Measured from Boundary of:  Quarter  Lot

GPS Coordinates in Decimal Degrees (NAD 83)  
Latitude: \_\_\_\_\_ Longitude: \_\_\_\_\_ Elevation: \_\_\_\_\_

m/ft from  N  S  E  W  Hand Held Auto 20-30m  Diff. Corr. Hand Held 5-10m  Surveyed GPS < 1m

**Drilling Information**

Method of Drilling:  
 Auger  
 Backhoe/Dug  
 Boring  
 Cable Tool  
 Rotary (air)  
 Rotary (mud)

Type of Work:  
 New Well (Producing)  
 Test Hole or  New Well (Dry)  
 Plugged with:  
 Bentonite Slurry  
 Bentonite Chips  
 Cement  
 Other (Specify): \_\_\_\_\_

Amount Used: \_\_\_\_\_

Deepened Well  
 Reconstructed Well - Well ID (if applicable): \_\_\_\_\_

Proposed Well Use:  
 Household (up to 1250 m3/yr with residence on property)  
 Other (Specify): \_\_\_\_\_

(Note: All wells, except household wells, must be licensed by Alberta Environment, to drill and use groundwater)

**Formation Log**

Measurements in:  Metric  Imperial

Depth from ground level	Indicate if Water Bearing	Lithology Description	Total Depth Drilled	Finished Well Depth	Start Date	End Date
1		Top Soil	97	97	13 01 08	13 01 09
23		Brown clay & Rocks				
77		Gray Clay				
83		Gray Sandstone				
97	✓	Sandstone				

**Well Completion**

Borehole: Diameter: 6" From: 0 To: 80  
 Diameter: 5" From: 80 To: 97

Surface Casings: (if applicable)  
 Steel  
 Galvanized Steel  
 PVC  
 Fiberglass  
 Cement  
 Other

Size OD: 6 5/8  
 Wall Thickness: 0.188  
 Bottom at: 80

Well Casing/Liner:  
 Steel  
 Galvanized Steel  
 PVC  
 Fiberglass  
 Other

Size OD: 4 1/2 Wall Thickness: 0.237  
 Top at: 77 Bottom at: 97

Perforations:  
 From: 78 To: 96  
 Size: 4" X 3/8"

Perforated by:  Machine  Saw  Drill

Annular Seal:  Bentonite Slurry  Bentonite Chips  Cement  
 Placed From: 0 To: 79  
 Amount: 4 BAGS  
 Drive Shoe, at: 80'  
 Welded Ring, at: \_\_\_\_\_  
 Shale Trap, at: \_\_\_\_\_

Screen Type:  Stainless Steel  PVC  
 Size OD: \_\_\_\_\_ To: \_\_\_\_\_ Slot Size: \_\_\_\_\_  
 Interval From: \_\_\_\_\_ To: \_\_\_\_\_ Slot Size: \_\_\_\_\_  
 Telescoped  Attached to Casing

Top Fittings:  Packler  Coupler  Wash-down  Ball  Plug

Pack: \_\_\_\_\_

**Yield Test**

Test Date: 13 01 09 Start Time: 2:30 am/pm

Distance From Top of Casing to Ground Level: 30' m/ft

Static Water Level: 7.18' m/ft

Artesian Flow:  Yes, flow control installed Describe: \_\_\_\_\_

**Method of Water Removal:**

Pump  
 Pumping Rate: 8.6 L/min (gpm) Water Removal Rate: \_\_\_\_\_ L/min / gpm  
 Depth Pumped From: 75 m/ft Depth Bailed From: \_\_\_\_\_ m/ft

Baller  
 Water Removal Rate: \_\_\_\_\_ L/min / gpm  
 Depth Bailed From: \_\_\_\_\_ m/ft

If water removal period was < 2 hours, explain why: \_\_\_\_\_

Recommended Pump Rate: 6 L/min or (gpm) Pump installed  Yes  No  
 Recommended Pump Intake Depth (From TOC): 75 m/ft Type: Sub Mode: Grundfos P: 0.5

Did you Encounter:  Saline Water (>4000 ppm TDS) Depth: \_\_\_\_\_ m/ft  
 Gas Depth: \_\_\_\_\_ m/ft

Reinforced Action Taken: \_\_\_\_\_

Additional Comments on Well:  
 TDS @ 1500 ppm

Sample Collected for Potability:  
 Yes  Result Attached  No

**Water Diverted for Drilling**

Water Taken: \_\_\_\_\_ Amount Taken: 13 01 08 7:15 am/pm

**Contractor Certification**

Copy of Drilling Report Given to Owner: \_\_\_\_\_

Name of Journeyman responsible for drilling/construction of well: \_\_\_\_\_ Certification No: \_\_\_\_\_

Company Name: \_\_\_\_\_

**Approval Holder Signature:** \_\_\_\_\_ Date: 13 01 10

White copy: Alberta Environment Yellow copy: Well Owner Pink copy: Contractor

Pumping Minutes	Recovery
7.18	0
8.52	1
8.86	2
9.02	3
9.21	4
9.39	5
9.54	6
9.69	7
9.82	8
9.95	9
10.09	10
10.33	12
10.53	14
10.73	16
11.09	18
11.50	20
11.85	25
12.16	30
12.50	35
13.01	40
13.50	50
14.17	60
14.79	75
15.39	90
15.65	105
15.81	120

# Water Well Drilling Agreement Form

## Identification

1. Well owner \_\_\_\_\_  
Address \_\_\_\_\_
2. Licensed water well contractor \_\_\_\_\_  
Address \_\_\_\_\_  
Licensed water well contractor approval no. \_\_\_\_\_
3. Land location of well: Qtr \_\_\_\_\_ Sec \_\_\_\_\_ Twp \_\_\_\_\_ Rge \_\_\_\_\_ W of \_\_\_\_\_ Meridian Lot \_\_\_\_\_ Block \_\_\_\_\_ Plan \_\_\_\_\_
4. Proposed starting date \_\_\_\_\_  
Proposed completion date \_\_\_\_\_

## Water Requirements

5. Proposed well use: Household \_\_\_\_\_ Livestock \_\_\_\_\_ Irrigation \_\_\_\_\_
6. Desired water quality On-site tests:  
total dissolved solids \_\_\_\_\_ parts/million                      iron \_\_\_\_\_ parts/million  
hardness \_\_\_\_\_ parts/million                                      pH \_\_\_\_\_ parts/million
7. Desired yield \_\_\_\_\_ L/s (gpm) Min. acceptable yield \_\_\_\_\_ L/s (gpm)
8. Groundwater supply options based on existing records \_\_\_\_\_

## Well Construction

9. Maximum desired depth \_\_\_\_\_ m (ft.)
10. Type of drilling \_\_\_\_\_
11. Diameter of hole \_\_\_\_\_
12. Flowing well control \_\_\_\_\_
13. Well connection \_\_\_\_\_
14. Formation logging procedure \_\_\_\_\_

- 15. Annular or casing seal \_\_\_\_\_
- 16. Artificial sand pack \_\_\_\_\_
- 17. Well development method: Backwashing \_\_\_\_\_ Jetting \_\_\_\_\_ Surging \_\_\_\_\_ Heavy pumping \_\_\_\_\_ Bailing \_\_\_\_\_

**Material**

- 18. Casing material \_\_\_\_\_  
Inside diameter \_\_\_\_\_ wt. per m(ft.) \_\_\_\_\_ wall thickness \_\_\_\_\_
- 19. Well cover \_\_\_\_\_ Distance from top of casing to ground \_\_\_\_\_
- 20. Liner material \_\_\_\_\_  
Inside diameter \_\_\_\_\_ wt.per m(ft.) \_\_\_\_\_ wall thickness \_\_\_\_\_
- 21. Screen  
Manufacturer \_\_\_\_\_ Material \_\_\_\_\_  
Length \_\_\_\_\_ Nominal diameter \_\_\_\_\_

**Yield Testing**

- 22. Yield testing duration (hours) \_\_\_\_\_
- 23. Pump type \_\_\_\_\_ Size \_\_\_\_\_

**Disinfection**

- 24. Disinfection \_\_\_\_\_
- 25. Well head finishing \_\_\_\_\_

**Costs**

- 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. Labor per hour \_\_\_\_\_
- 35. Water testing \_\_\_\_\_
- 36. Reclamation of unused well \_\_\_\_\_

**Total**

- 37. Total Costs \_\_\_\_\_
- 38. Payment schedule \_\_\_\_\_

**Guarantee**

- 39. Guarantee \_\_\_\_\_

\* Working copies are included in the pocket on the back cover.